United States Environmental Protection Agency
Air

Office of Air Quality Planning and Standards
Research Triangle Park, NC 27711

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Implementation Plan

$PM_{2.5}$ Federal Reference Method Performance Evaluation Program

Forward

The intent of this document is to describe the implementation of the $PM_{2.5}$ Federal Reference Method Performance Evaluation Program (PEP). The Implementation Plan will identify how and when various activities will be accomplished and who is responsible to accomplish them. It is intended to establish a framework for communication among the organizations participating in this program, as well as allowing interested parties to understand the implementation aspects of the PEP.

The document was developed with the assistance of various Workgroups who will be responsible for implementing or overseeing the implementation aspects of the PEP, as well as State and local organizations who have a vested interest in the quality of the routine ambient air monitoring data. The personnel involved in these Workgroups can be found in the acknowledgments.

It must be understood that this document represents the current thinking (based on the date of the document) of the organizations that helped develop the information. As the PEP progresses, and strategies or implementation activities change, the Implementation Plan will change to reflect this. After the completion of each calendar year of implementation, the Implementation Plan will be reviewed and revised as necessary.

This document is available on hardcopy as well as accessible as a PDF file on the Internet on the Ambient Monitoring Technology Information Center (AMTIC) Bulletin Board under the $PM_{2.5}$ QA area (http://www.epa.gov/ttn/amtic/pmqa.html). The document can be read and printed using Adobe Acrobat Reader software, which is freeware that is available from many Internet sites, including the EPA web site. The Internet version is write-protected. Hardcopy versions are available by writing or calling:

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Contents

Acknowledgments

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Acronyms and Abbreviations

AIRS	Aerometric Information Retrieval System
AMTIC	Ambient Monitoring Technical Information Center
APTI	Air Pollution Training Institute
ATF	Air Training Facility
CFR	Code of Federal Regulations
CMD	Contracts Management Division
CO	Contracting Officer
COC	chain of custody
CS	Contracting Specialist
DAS	data acquisition system
DBMA	data base management system
DQA	data quality assessment
DQOs	data quality objectives
EDO	environmental data operation
EMAD	Emissions, Monitoring, and Analysis Division
EPA	Environmental Protection Agency
ESAT	Environmental Services Assistance Team
FEM	Federal equivalent method
FRM	Federal reference method
FTE	full time equivalent
GLP	good laboratory practice
LAN	local area network
MQAG	Monitoring and Quality Assurance Group
MQOs	measurement quality objectives
MSR	management system review
NAAQS	National Ambient Air Quality Standards
NAMS	national air monitoring station
NERL	National Exposure Research Laboratory
NIST	National Institute of Standards and Technology
NPAP	National Performance Audit Program
OAQPS	Office of Air Quality Planning and Standards
OAM	Office of Acquisition Management
OAR	Office of Air and Radiation
OARM	Office of Administration and Resources Management
ORD	Office of Research and Development
PC	personal computer
PE	performance evaluation
PEP	Performance Evaluation Program
$PM_{2.5}$	particulate matter $\leq$ 2.5 microns
PO	Project Officer (Headquarters)
PTFE	polytetrafluoroethylene
QA/QC	quality assurance/quality control
QA	quality assurance
QAPP	quality assurance project plan
QMP	quality management plan
RPO	Regional Project Officer
SLAMS	state and local monitoring stations
SOP	standard operating procedure
SOW	statement or scope of work
STAG	State and Tribal Air Grants
TSA	technical system audit
WAM	Work Assignment Manager

Tables

Figures

1.0 INTRODUCTION

1.1 $PM_{2.5}$ Program

In general, the measurement goal of the $PM_{2.5}$ Ambient Air Quality Monitoring Program is to estimate the concentration, in units of micrograms per cubic meter ($\mu g/m^3$), of particulates less than or equal to 2.5 micrometers (μm) that have been collected on a 46.2mm polytetrafluoroethylene (PTFE) filter. For the SLAMS/NAMS network, which is the focus of this Implementation Plan, the primary goal is to compare the $PM_{2.5}$ concentrations to the annual and 24-hour National Ambient Air Quality Standard (NAAQS). The national primary and secondary ambient air quality standards for $PM_{2.5}$ are 15.0 $\mu g/m^3$ annual arithmetic mean concentration and 65 $\mu g/m^3$ 24-hour average concentration measured in ambient air. A description of the NAAQS and its calculation can be found in the July 18, 1997 Federal Register Notice. In addition, Appendix L of 40 CFR part 50 also provides the following summary of the measurement principle:

> " An electrically powered air sampler draws ambient air at a constant volumetric flow rate into a specially shaped inlet and through an inertial particle size separator (impactor) where the suspended particulate matter in the $PM_{2.5}$ size range is separated for collection on a polytetrafluoroethylene (PTFE) filter over the specified sampling period. The air sampler and other aspects of this reference method are specified either explicitly in this appendix or generally with reference to other applicable regulations or quality assurance guidance.
>
> Each filter is weighed (after moisture and temperature equilibration) before and after sample collection to determine the net weight (mass) gain due to collected $PM_{2.5}$. The total volume of air sampled is determined by the sampler from the measured flow rate at actual ambient temperature and pressure and the sampling time. The mass concentration of $PM_{2.5}$ in the ambient air is computed as the total mass of collected particles in the $PM_{2.5}$ size range divided by the actual volume of air sampled, and is expressed in micrograms per actual cubic meter of air ($\mu g/m^3$)."

1.2 The Federal Reference Method (FRM)Performance Evaluation Program (PEP)

Since the data for the NAMS/SLAMS network is used for NAAQS comparisons, the quality of this data is very important. A quality system has been developed to control and evaluate the quality of data in order to make NAAQS determinations within an acceptable level of confidence. During the development of the $PM_{2.5}$ NAAQS, the EPA used the data quality objective process to determine the allowable measurement system imprecision and bias that would not significantly effect a decision makers ability to compare pollutant concentrations to the NAAQS. The precision requirement (10%CV) and bias requirement ($\pm$10%) are based on total measurement uncertainty, which incorporates errors coming from all phases (field sampling, handling, analysis etc.) of the measurement process. The collocated samples provide adequate estimates of

precision. The FRM Performance Evaluation, if properly implemented, can provide the bias estimate.

The FRM Performance Evaluation Program (PEP) is a quality assurance activity which will be used to evaluate measurement system bias of the $PM_{2.5}$ monitoring network. The pertinent regulations for this performance evaluation are found in 40 CFR Part 58, Appendix A, section 3.5.3. The strategy is to collocate a portable FRM $PM_{2.5}$ air sampling instrument within 1 to 4 meters of a routine NAMS/SLAMS air monitoring instrument, operate both monitors as required in the Federal Reference Method and standard operating procedures (SOPs), and compare the results.

The implementation of the FRM Performance Evaluation is a State/local responsibility. However, due to a number of comments made during the review period for the December 13, 1997 $PM_{2.5}$ NAAQS Proposal, the Agency assessed the FRM PEP and consequently made the following revisions:

- modified the system to include an independent FRM Performance Evaluation;
- reduced the burden of this program by changing the audit frequency from all sites to 25% of the $PM_{2.5}$ sites; and reduced the audit frequency from six times a year to four times a year;
- and made allowances to shift the implementation burden from the State and local agencies to the federal government.

A performance evaluation is defined as a type of audit in which the quantitative data generated in a measurement system are obtained independently and compared with routinely obtained data to evaluate the proficiency of the an analyst or laboratory. In the case of the PEP, the goal is to evaluate total measurement system bias, which includes measurement uncertainties from the field and the laboratory activities. Independent assessment (Figure 1.1) was defined by the $PM_{2.5}$ QA Workgroup (see Section 2) in order to ensure that an appropriate level of independence is maintained during State and local implementation of the PEP.

The goal of the $PM_{2.5}$ program is to establish a $PM_{2.5}$ monitoring network by December 31, 1999. Sites within this network will include SLAMS/NAMS sites using FRM and federal equivalent method (FEM) samplers, chemical speciation sites, visibility measurement sites, and special purpose monitoring sites. Each year 25% of the SLAMS/NAMS monitors, which will be a subset of the network, will be identified for performance evaluations at a frequency of 4 times per year.

During the months of August through October, 1997, the EPA discussed the possibility of federal implementation with the EPA Regions, SAMWG and various State and local organizations (NESCAUM, MARAMA, WESTAR, individual organizations). The majority of the responses from these organization were towards federal implementation of the PEP.

Independent assessment - an assessment performed by a qualified individual, group, or organization that is not part of the organization directly performing and accountable for the work being assessed. This auditing organization must not be involved with the generation of the routine ambient air monitoring data. An organization can conduct the FRM Performance Evaluation if it can meet the above definition and has a management structure that, at a minimum, will allow for the separation of its routine sampling personnel from its auditing personnel by two levels of management, as illustrated in Figure 1. In addition, the pre and post sample weighing of audit filters must be performed by separate laboratory facility using separate laboratory equipment. Field and laboratory personnel would be required to meet the FRM Performance Audit field and laboratory training and certification requirements. The State and local organizations are also asked to consider participating in the centralized field and laboratory standards certification process.

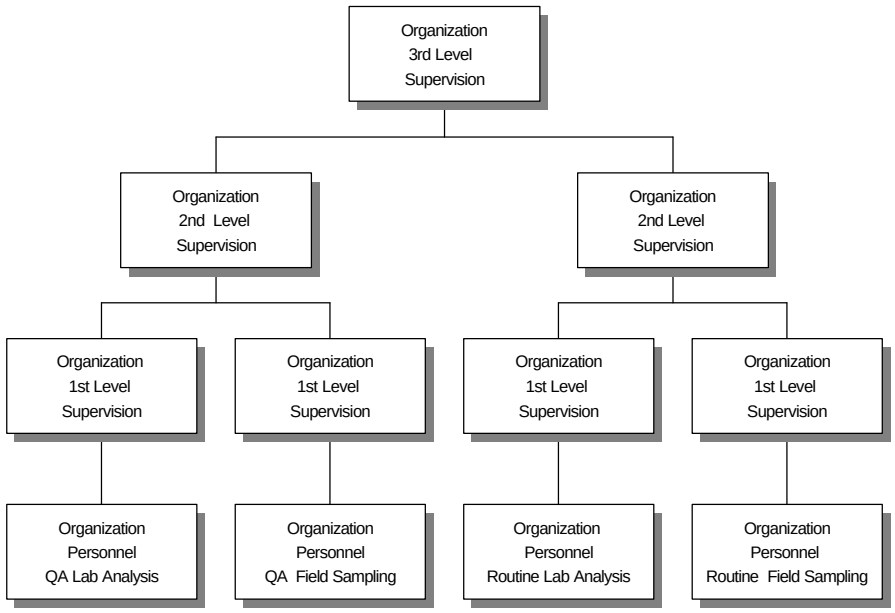

Figure 1

Figure 1.1 Definition of independent assessment

EPA looked into potential contracting mechanisms to assist in the implementation of this activity and will use the Environmental Services Assistance Team (ESAT) Contract, currently in place in each Region, to provide the necessary field and laboratory activities. Each EPA Region will implement the field component of this activity while Regions 4 and 10 will also operate the

laboratory component. In addition, Region 10 will also function as a calibration standards certification facility.

The FRM Performance Evaluation can be segregated into a field and a laboratory component. The following information provides a brief description of these activities. Detailed standard operating procedures (SOPs) would be developed for all field and laboratory activities. Figure 1.2 provides a basic description of the PEP in five steps:

1. EPA will send filters to the Regions 4 and 10 laboratories where they will be checked, equilibrated, labeled, weighed and prepared for the field
2. Regions 4 and 10 will ship the filters and accompanying chain-of-custody to the Regions
3. The field operators will take the filters, field forms, and chain-of-custody to the field and operate the portable monitor
4. The field operator will send the filter, data (diskette), field forms and chain-of-custody back to the appropriate laboratory (as well as keeping a set of data and records)
5. Regions 4 and 10 laboratories will equilibrate /weigh filters, validate data and upload information to AIRS

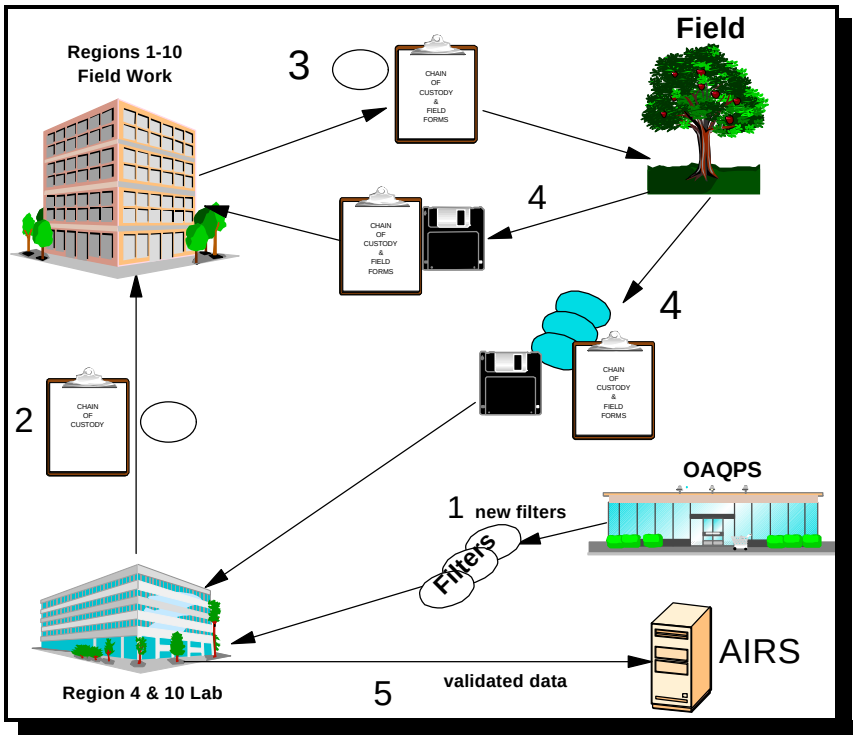

Figure 1.2 Performance Evaluation Program implementation summary

Field Activities:

The FRM portable audit samplers will be used in a collocated manner to perform the evaluations. These samplers have been approved by EPA as a Federal Reference Method and are designed to be durable, rugged, and capable of frequent transport. These samplers are constructed in sections with each section weighing no more than 40 pounds. The total weight of the sampler itself must not weigh more than 120 pounds. While these samplers have been specifically designed to perform these evaluations, precautions must still be taken to ensure the quality of the data received from these samplers' evaluations. Specific detailed instructions will be found in the PEP Quality Assurance Project

Plan (PEP QAPP) and the Standard Operating Procedures (SOPs), which will be devloped specifically for this program.

The following steps must be observed to ensure the quality of the data:

- adherence to the vendor's operations manual for the proper operation of the sampler; this includes the proper assembly, transport, calibration, and operation
- adherence to the guidance outlined in the QA Handbook *QA Hand Book Document 2.12 Monitoring $PM_{2.5}$ in Ambient Air Using Designated Reference or Class I Equivalent Methods.*
- adherence to the SOPs for the program
- adherence to the standards, principles, and practices outlined in the PEP QAPP, and specific site plan for the identified sites
- completion of the required certification training program
- special attention must also be given to any activity involving filter handling (loading, transport, removal, etc.) since this data collection phase contains the greatest potential for measurement uncertainty

Field activities:

1. One fully trained operator will transport a portable $PM_{2.5}$ FRM Performance Evaluation sampling device to an established $PM_{2.5}$ site located at any of the SLAMS/NAMS sites within each EPA Region.
2. The operator will assemble the instrument, collocate the sampler, perform a flow, temperature and barometric pressure verification following the SOPs, install a filter and operate the instrument at the same 24-hour sampling mode as the routine instrument (midnight to midnight).
3. If scheduling allows, the operator will leave this location to set up an additional 24-hour performance evaluations at another routine sampling locations. If the schedule does not allow for another set up, the operator may perform additional activities at the site. The operator may also perform any required maintenance or repair of the portable $PM_{2.5}$ sampling device followed by a calibration verification.
4. The operator shall return to each site after the 24-hour sampling time, download the stored electronic monitoring data, remove and properly store the filter for transport, and disassemble the instrument.
5. The operator shall properly package the filter following the QA guidelines for transport to the pre-determined laboratory.

Laboratory Activities:

The FRM Performance Evaluation also requires extensive laboratory activities, including filter handling, equilibration, weighing, data entry/management and archival. Regions 4 and 10 will develop the laboratories for this program and Region 10 is also responsible for developing a calibration standards certification laboratory. Specific detailed instructions will be found in the PEP QAPP and the SOPs. In addition, good laboratory practices must be followed. The following activities must also be observed concerning the laboratory activity:

- adherence to the vendor's operations manual for the proper operation of the weighing devices; this includes the proper assembly, calibration, and operation of the microbalances
- adherence to the guidance outlined in the *QA Hand Book Document 2.12*; especially section 7
- adherence to the SOPs for the program
- adherence to the standards, principles, and practices outlined in the PEP QAPP
- completion of the required certification training program.
- special attention must also be given to any activity involving filter handling (pre-sampling equilibration, weighing, post-sampling equilibration, transport, etc.) since this data collection phase contains the greatest potential for measurement uncertainty

Pre-Sampling weighing--

1. Filters will be received from EPA and examined for integrity based upon EPA approved SOPs.
2. Filters will be enumerated for data entry.
3. Filters will be equilibrated and weighed according to SOPs.
4. Filters will be prepared for field activities or stored according to SOPs.
5. The laboratory will develop and maintain shipping/receiving requirements which would include containers, cold packs, max/min thermometers, and chain-of-custody requirements/documentation.

Post-Sampling weighing–

1. Filters will be received in the laboratory, checked for integrity (damage, temperature, etc.) and logged in.
2. Filters will be archived (cold storage) until ready for weighing.
3. Filters will be brought into the weighing facility and equilibrated for 24-hours (per SOPs).
4. Filters will be weighed according to SOPs and the data entered.
5. Field data will be entered into the data entry system in order to calculate a concentration.
6. Filters will be archived for 3 years.
7. Required data will be transferred to the AIRS database.

1.3 Purpose of this document

The purpose of this FRM Performance Evaluation Implementation Plan is to provide the necessary technical, logistical, and administrative information to successfully implement the program. The specific purposes include identifying:

- each important phase of the program and explaining how it will be implemented
- the roles and responsibilities of all affected agencies and organizations
- the specific lines of communication between the EPA organizations, the State and local agencies, and the ESAT contractors
- the pertinent milestones involved with this program
- the resources required for successful implemention
- the logistical elements, field and laboratory, required for this program
- the data management activities to ensure the resultant data is properly recorded, transferred, and archived
- the necessary quality assurance and quality control procedures required to ensure the quality of the data meets the objectives of the program
- the training and certifications that are required to fulfill the technical aspects of the program
- the assessment and reporting components that are required to implement and document the FRM PEP

2.0 ROLES AND RESPONSIBILITIES

The degree of complexity and the number of agencies involved with the FRM PEP requires that the flow of information and associated communications be structured to optimize the collective resources. The only realistic perspective on implementing this program is one that recognizes that deployment and operation of this network is a shared responsibility among all the involved organizations. The purpose of the following descriptions of roles across programs is to facilitate communications, and to outline very basic responsibilities. Figure 2.1 provides a basic diagram of the organization and lines of communication. Table 2-2, at the end of this section, provides a listing of primary personnel involved in the PEP.

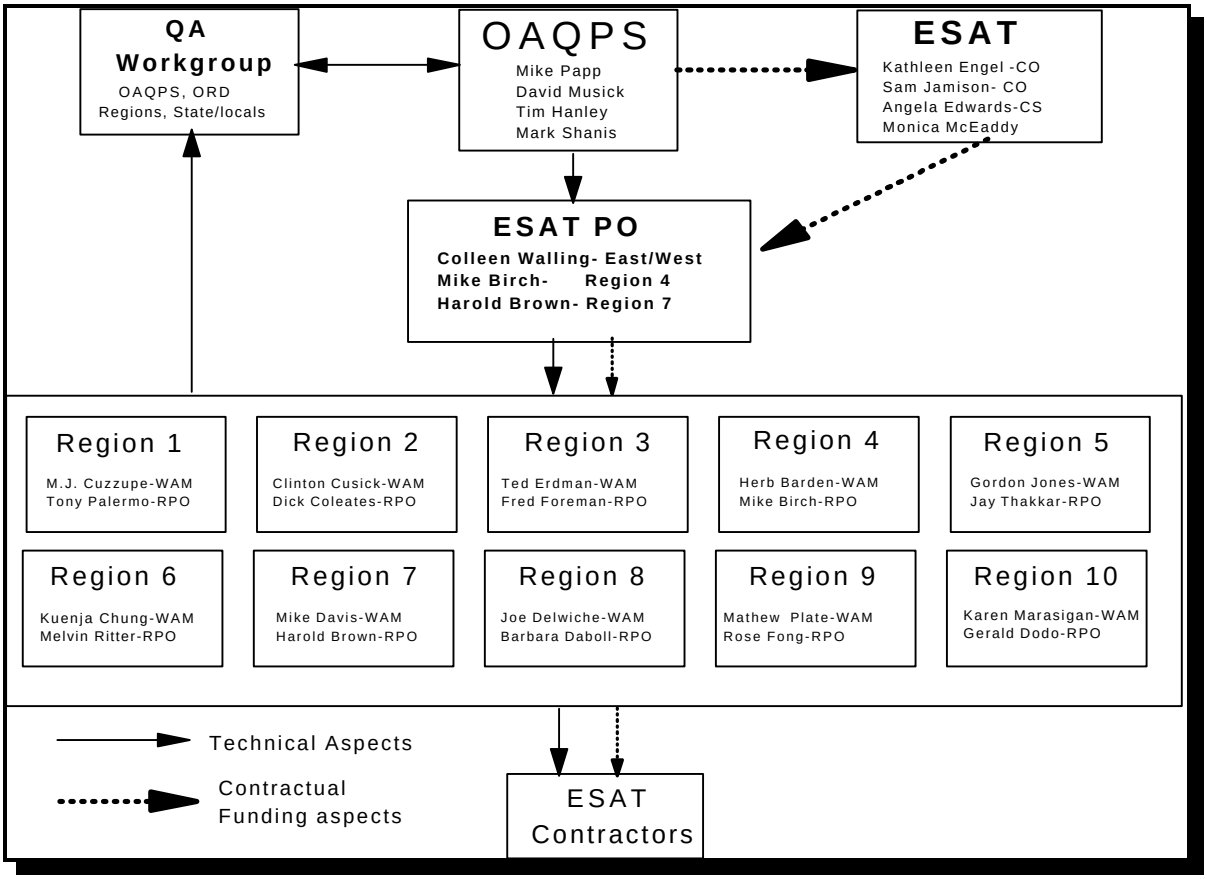

Figure 2.1 Organizational chart of the technical and contractual aspects of the Performance Evaluation Program

2.1 $PM_{2.5}$ QA Workgroup

The $PM_{2.5}$ Quality Assurance (QA) Workgroup was formed to address the QA aspects of the $PM_{2.5}$ Program. Members on the group include personnel from Office of Air Quality Planning and Standards (OAQPS), EPA Regions, The Office of Research and Development (ORD) National Exposure Research Laboratory (NERL) and State and local air monitoring organizations. The

QA Workgroup meets approximately every month to discuss various QA issues. Many of the Regional participants on this Workgroup will also function as work assignment managers (WAMs) for the ESAT Contract. The Workgroup will assist in the development of the Implementation Plan, the field and laboratory SOPs, the PEP QAPP and other guidance related to the PEP.

2.2 EPA Office of Air Quality Planning and Standards (OAQPS)

OAQPS has the overall responsibility for ensuring the quality of the nation's ambient air data. OAQPS has developed specific regulations for the development of a quality system as found in 40 CFR Part 58, Appendix A. One specific element of this quality system is the development of the FRM PEP. OAQPS has the following responsibilities to ensure the development of this Program:

- providing a contractual vehicle for the manufacturing and distribution of the FRM portable evaluation sampler
- developing a Memorandum of Understanding with the ESAT Office
- working with the EPA Regions to determine which State/local organizations will utilize the federally implemented FRM PEP
- transferring the necessary funds to the EPA ESAT contracts management division to support the FRM PEP and to the Regional offices for laboratory equipment and consumables
- procuring the majority of the field capital equipment and consumables
- distributing filters to the national laboratories
- developing the *Performance Evaluation Implementation Plan*, the ESAT Work Assignment (WA), SOPs, PEP QAPP and guidance documentation for the FRM Performance Evaluation
- developing the field and laboratory personnel requirements
- developing the field and laboratory training activities, participating in training, and securing national experts to answer specific technical questions
- developing an information management system
- assessing the concentration information uploaded to the AIRS data base and assisting in reconciling significant differences
- initiating and instituting a communications network and acting as a liaison to groups working on the PEP
- interacting with the Regional, State, and local agency personnel concerning the set-up, operation, and data results of the performance evaluations
- ensuring the success of the program by performing various oversight activities such as management systems reviews and technical systems audits

Most budgetary and technical planning activities are coordinated through 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/locals), and the resource

estimates underlying program implementation. Resource guidance necessary for the State and Tribal Assistance Grants (STAG) 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.

2.3 ESAT Organization

The ESAT contract is in reality four contracts; 2 zone contracts and contracts in Region 4 and 7. The ESAT is organized of contracting officers (COs), contracting specialists (CSs), project officers (POs), and regional project officers (RPOs). Table 2-1 provides information on the four zones and the important contacts within them.

Table 2-1 ESAT Organization

Kathleen Engel- Contracting Officer- Eastern, Western, Region 7 zones Sam Jamison- Contracting Officer- Region 4 zone Angela Edwards - Contracting Specialist			
Zone	**Regions**	**Headquarters PO**	**RPOs**
Western	6 8 9 10	Colleen Walling	Melvin Ritter Barbara Daboll Rose Fong Gerald Dodo
Eastern	1 2 3 5	Colleen Walling	Tony Palermo Dick Coleates Fred Foreman Jay Thakkar
Region 4	4	Mike Birch	Mike Birch
Region 7	7	Harold Brown	Harold Brown

Some important aspects of the ESAT contract include:

- only the WAM, RPO/PO, CO/CS are authorized to give instructions or clarification (technical direction) to the ESAT contractor on the work to be performed. This technical direction is given in writing

- the work assignments will be prepared by the WAMs and RPOs and are effective only upon approval by the CO

The EPA Contracts Manual describes the roles and responsibilities of contracting officers, specialists and project officers which need not be explained here. The important roles and responsibilities for the PEP are described below

Contracting Officers

- working with OAQPS on the securing, obligating, committing. and distributing funds for work performed under the ESAT Contract
- ensuring work assignment activities fall within the ESAT Scope of Work
- approving work assignments

Headquarters Project Officers

- acting as a regional liaison between the RPO and the CO
- providing contract-wide administration
- developing a Memorandum of Understanding with OAQPS

Regional Project Officers

- providing overall management and overseeing performance of respective regional teams
- reviewing region specific invoices with input from WAMs
- preparing (with WAM) FRM PEP work assignments
- assisting in the development of the *FRM Performance Evaluation Program Implementation Plan* and the ESAT Work Assignment
- ensuring there is qualified contractual personnel available to implement the PEP
- providing administrative and logistical support for the ESAT contract
- overseeing the performance of the required activities of the contractor
- communicating on a regular basis with program participants (OAQPS, Region, etc.)

Work Assignment Managers

The Work Assignment Manager (WAM) will, in most cases, be a technical person from the Regional air monitoring branch/division who will be responsible for assisting in the technical aspects of the program. Some of the WAMs' activities may also include the activities listed in Section 2.4, but the responsibilities, as they relate to the ESAT contract, include the following:

- preparing (with RPO) FRM PEP work assignments
- setting up a file system containing all relevant documentation including notes of conversations with the contractor and other items that will provide an audit trail of their actions under the work assignment as well as all technical information related to the PEP
- reviewing the contractors workplan and preparing findings on proposed tasks, labor hours skill mix, and materials and quantities
- monitoring compliance with the work assignments
- tracking dollars and hours, providing technical direction (in accordance with the terms of the contract) and reviewing monthly technical and financial reports
- verifying contractor representations of deliverables received and accepted, and/or progress
- communicating contractor performance and administrative/logistical issues to RPO

2.4 EPA Regional Offices

The EPA Regional Offices are the major communication link with State/local agencies in terms of both communicating the needs and concerns of States to EPA Headquarters Offices and in communicating the objectives and guidance that often are developed by OAQPS to the State/local agencies. This role is absolutely necessary for the development of effective policies and programs. For the FRM PEP, the Regional offices have the following specific responsibilities:

All Regions–

- assisting, through QA workgroup activities, in the development of all pertinent FRM PEP guidance documents
- reviewing and approving the workplans submitted by the ESAT contractors
- identifying WAMs to oversee the technical aspects of field activities that are performed by the ESAT contractors
- training and certifying ESAT field personnel after initial training
- providing technical oversight of the field activities by performing technical systems audits of these activities
- providing a yearly schedule of site evaluations for the ESAT contractors
- working with State and local agencies in developing a yearly schedule of site evaluations
- informing State and local organizations of an upcoming performance evaluation
- evaluating the performance evaluation data and informing State/locals of significant differences
- participating in training activities, including multi-State conferences, EPA satellite broadcasts, and other training vehicles
- attending conference calls and meetings on performance evaluation activities

Regions 4 and 10 (including items listed above)--

- identifying work assignment managers to oversee the technical aspects of laboratory activities that are performed by the ESAT contractors
- developing the primary laboratories for this program with respect to logistical, technical, and analytical support, including necessary facilities to store, condition, weigh, distribute and archive filters and the distribution of filters (including coolers, ice packs, etc.) to the Regions
- training and certifying ESAT laboratory personnel after initial training
- providing technical oversight of the laboratory activities by performing technical systems audits of these activities

Region 10 (including items listed above)--

- identifying work assignment managers to oversee the technical aspects of laboratory activities that are performed by the ESAT contractors

- developing the sole calibration certification laboratory for support to the program
- training and certifying ESAT laboratory personnel after initial training
- providing technical oversight of the certification activities by performing technical systems audits of these activities
- evaluating the certification data

2.5 ESAT Contractors

The ESAT contractors will perform the specific tasks associated with the FRM PEP. The ESAT contractors responsibilities include:

- developing a work plan and cost estimates for each work assignment
- staffing appropriately to meet the requirements of the work assignment
- successfully implementing the activities described in the work plan and work assignment
- learning and implementing SOPs
- understanding government regulations as they relate to contracts and inherent government functions

2.6 State and Local Agencies

EPA could not effectively plan and execute this program without State/local agency participation. State and local agencies bear a tremendous level of responsibility for developing, implementing, and tracking the entire national $PM_{2.5}$ monitoring program. It is imperative that State and local agencies work with the EPA Regional Offices throughout this process to identify problems as early as possible, and to help find solutions. The State and local agencies have the following specific responsibilities:

If not utilizing the federal FRM PEP:

- implementing the FRM PEP at the same frequency
- adhering to the definition of independent assessment (see Figure 1.1)
- undergoing similar training and certification activities
- procuring necessary equipment and consumables
- developing the necessary SOPs and QA procedures into their respective QAPPs
- transmitting data to AIRS
- selecting the sites for evaluation

If utilizing the federal FRM PEP:

- operating their $PM_{2.5}$ monitoring network according to the established regulations and guidelines; this includes proper siting, operations, and quality assurance procedures
- creating an accurate list of SLAMS sites with addresses, AIRS ID's, and makes/models of routine sampling equipment

- assisting, through QA workgroup activities, in the development of pertinent FRM PEP guidance documents
- on a yearly basis, determining whether to continue utilizing the federal implementation of the FRM PEP
- identifying the sites within their monitoring network where performance evaluations will be performed each year
- ensuring an agency representative is on-site when the PEP field operator arrives and performs the evaluation; this includes communicating with the operator, operating the routine monitor in the normal operating mode, and generally supporting the PEP
- ensuring the success of the program by performing various oversight activities such as technical systems audits of field and laboratory activities
- participating in training activities, including multi-State conferences, EPA satellite broadcasts, and other training vehicles
- reviewing routine and performance evaluation data and working with the EPA Region on corrective actions

2.7 Other Affected Entities

EPA Office of Research and Development (ORD)

The ORD's primary role in the implementation of the FRM PEP will be as a technical consultant and advisor. This action will be primarily through the NERL which provides many of the applied research elements for the program. ORD also has the overall responsibility for designating all air monitors as FRM/FEM. The FRM portable audit sampler must be designated by ORD through their Federal Reference and Equivalency Program. This overall responsibility includes:

- designating $PM_{2.5}$ samplers as FRM/FEM and providing technical support
- providing technical support for the national monitor procurement contracts
- providing guidance for field and analytical activities (*QA Hand Book Guidance Document 2.12)*

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 OAQPS EMAD contract liaisons, OAQPS MQAG and ORD technical staff. The CMD is responsible for all communications with vendors and extramural contract organizations. The CMD's responsibilities include:

- developing national contracts for the sampler purchases and filter purchases and working with ORD and Office of Air and Radiation (OAR) contracts and technical staff to provide these products

- providing contracting officers and other contracting support for national procurements

National Performance Audit Program

The National Performance Audit Program (NPAP) is a federally implemented national audit program required for all SLAMS (40 CFR Part 58, Appendix A). Since the FRM PEP affects the $PM_{2.5}$ SLAMS monitors, the NPAP may assume responsibility of the evaluations, depending on future logistical and financial constraints of the ESAT program. Since this is uncertain, the NPAP will continue to have the capability to assume this responsibility without incurring any financial or logistical costs.

Table 2-2 FRM Performance Evaluation Personnel

Name	Address	Phone Number	Electronic Mail
ESAT			
Angela Edwards Kathleen Engel Monica McEaddy Colleen Walling	U.S. EPA 401 M Street, SW. Washington, DC 20460. Monica and Colleen Walling 5203G Kathleen and Angie 3805R	(703) 603-8709 (202) 564-4504 (202) 564-4503	edwards.angela@epa.gov engel.kathleen@epa.gov mckeaddy.monica@epa.gov walling.colleen@epa.gov
OAQPS			
Michael Papp David Musick Tim Hanley Mark Shanis	USEPA Office of Air Quality, Planning & Standards MQAG (MD-14) RTP, NC 27711	(919) 541-2408 (919) 541-2396 (919) 541-4417 (919) 541-1323	papp.michael@epa.gov musick.david@epa.gov hanley.tim@epa.gov shanis.mark@epa.gov
REGIONS			
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Region 2 **WAM** Clinton Cusick **PO** Dick Coleates	USEPA-Region 2 Raritan Depot / MS103 2890 Woodbridge Ave Edison, NJ 08837-3679	 (908) 321-6881 (732) 321-6662	 cusick.clinton@epa.gov coleates.dick@epa.gov
Region 3 **WAM** Theodore Erdman **PO** Fred Foreman	USEPA-Region 3 841 Chestnut Building / 3ES11 Philedelphia, PA 19107 USEPA-Region 3 office of Analytical Services/3ES-20 839 Bestgate Road Annapolis, MD 21401-3013	 (215) 597-1193 (215) 566-2766	 erdman.ted@epa.gov foreman.fred@epa.gov
Region 4 **WAM** Herb Barden Steve Hall **PO** Mike Birch	US-EPA Reg 4 Science and Ecosystem Support Division 980 College Station Road Athens, Georgia 30605-2720 USEPA-Region 4 APTMD Atlanta Federal Center 61 Forsyth St. SW Atlanta, GA 30303-3104	 (706) 355-8737 (706) 355-8615 (706) 355-8552	 barden.herbert@epa.gov hall.johns@epa.gov birch.mike@epa.gov

Name	Address	Phone Number	Electronic Mail
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Region 6 **WAM** Kuenja Chung	USEPA-Region 6 First Interstate Bank Tower at Fountain Place 1445 Ross Avenue Dallas, TX 75202-2733	(214) 665-2729	chung.kuenja@epa.gov
PO Melvin Ritter	USEPA Region 6 Laboratory Houston Branch/ 6MD-HC 10625 Fallstone Road Houston TX 77099	(281) 983-2146	ritter.melvin@epa.gov
Region 7 **WAM** Mike Davis	USEPA-Region 7 ENSV / EMWC 25 Funston Road Kansas City, KS 66115	(913) 551-5081	davis.michale@epa.gov
PO Harold Brown	USEPA Region 7 726 Minnesota Ave/ENSV/RLAB Kansas City, KS 66101	(913)-551-5127	brown.harold@epa.gov
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PO Barbara Daboll	/8TMS-L	(303) 312-7757	daboll.barbara@epa.gov
Region 9 **WAM** Mathew Plate	USEPA-Region 9 75 Hawthorne St. /PMD-3 San Francisco, CA 94105	(415) 744-1493	plate.mathew@epa.gov
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Region 10 **WAM** Karen Marasigan	USEPA-Region 10 1200 Sixth Ave / ES-095 Seattle, WA 98101	(206) 553-1792	marasigan.karen@epa.gov
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3.0 COMMUNICATIONS

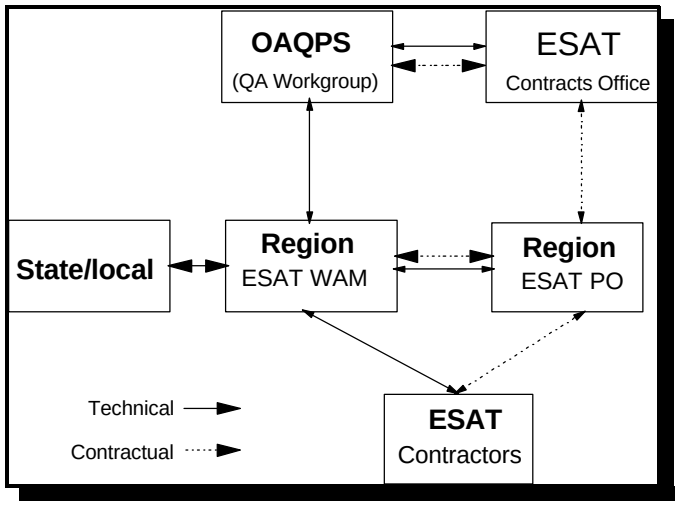


Figure 3.1 Lines of communication

An organized communications framework is necessary to facilitate the flow of information among the parties discussed in Section 2.0 as well as other users of the information produced by the $PM_{2.5}$ network. Figure 3.1 represents the principal communications pathways. In general, ESAT contractors will be responsible for informing Regional WAMs and PO's on technical progress, issues, and contractual obligations. On the technical side, the EPA Regional WAM's will be responsible for communicating with State and local agencies and informing OAQPS on issues that require technical attention. Contractual issues will be conveyed from the ESAT contractor through PO's to the ESAT Contracts Office, and if necessary, to OAQPS. The communication network will be described as it relates to planning, implementation, assessment and reporting stages.

3.1 Planning (10/97 through 1/99)

During the planning stages, discussions on the implementation aspects will take place during the process of development, review and concurrence of the products developed by OAQPS and the QA Workgroup. OAQPS will take the lead in the development of drafts of the *Implementation Plan*, the ESAT Work Assignment, the SOPs and the QAPP. OAQPS will distribute this information to the personnel in the ESAT and QA Workgroups (see below). The personnel will have an opportunity to comment on the drafts until there is general agreement on the various aspects of the program. In order to facilitate this process OAQPS will coordinate three workgroups:

$PM_{2.5}$ QA Workgroup - This Workgroup was established in 10/97 to address $PM_{2.5}$ QA issues The group is made up of personnel from OAQPS, NERL, EPA Regions and State and local representatives. Calls occur approximately every month.

Laboratory Workgroup - This Workgroup was established in 2/98 to develop the laboratory capabilities of the two National Laboratories that will implement the pre-sampling and post-sampling weighing activities. Personnel on the Workgroup include OAQPS, EPA Regions 4 and 10, and State and local organizations interested in the laboratory aspects of the program. Calls occur approximately every month.

ESAT Workgroup - This Workgroup (Table2-2) was established in 6/98 to discuss the technical, contractual and implementation activities of the ESAT contract, and will include OAQPS, the EPA Regional WAMs, POs, RPOs, and the ESAT COs/CSs. At the planning stages, it will not include ESAT contractor personnel. Calls occur approximately every month and will include topics such as:

- personnel requirements
- funding and equipment acquisition
- work assignment development
- implementation schedules
- logistics

Notes from each Workgroup call will be taken and distributed electronically within five working days of the call. Workgroup participants will have an opportunity to comment on the notes which will be appropriately revised.

3.1.1 Regional Communication with State and Local Organizations

Prior to implementation, the EPA Regions and State/local organizations will select the sites that will be visited in the calendar year. The site selection will be based on the regulations in 40 CFR Part 58 Appendix A and on discussions with the State and local reporting organizations. A tentative evaluation schedule for the year will then be developed that will take into account the logistics, and monitoring frequencies of each monitor. This information will then be distributed to each affected reporting organization for review and comment. Communication at this level will be the responsibility of the EPA Regional WAMs

3.2 Implementation

3.2.1 National Communication

During implementation, the ESAT Workgroup will remain the primary mode of communication for the participants in the program. ESAT contractors may be involved in the call in order to supply technical information and progress reports. Since most of the planning aspects should be completed, these calls will be scheduled at frequencies of once a month and will be used primarily for updates, progress reports and issue resolution. Any issues discussed that result in a change in how the PEP will be implemented will also be communicated to the $PM_{2.5}$ QA Workgroup and included on Ambient Monitoring Technical Information Center (AMTIC) Bulletin Board.

3.2.2 Regional Communication

The following types of communication will take place at the Regional level**:**

ESAT Contractors

The ESAT contractors will have frequent communication with Regional WAMs on the progress of their activities and any problems/issues associated with them. Resolution of these issues should take place in the Regions unless it is something that could affect the implementation of the program at a national level, where it can be discussed and resolved through the ESAT Workgroup conference call.

ESAT Lab/ Field Communication

Since the Region 4 and 10 laboratories will support the field activities for the 10 Regions, frequent communication will be required in the following areas:

Field communication to lab:

- upon shipment of filters to the laboratory, including date of shipment, number of boxes, air bill numbers and a listing of each filter
- electronic mailing of field data from data loggers for each sample
- requests for filters and other consumable supplies housed at the laboratory

Lab Communication to field:

- upon shipping filters and/or consumables out to the lab
- upon receiving filters and data from the field

Each Region will designate a field and laboratory communications coordinator from the ESAT contract staff to ensure adequate communications.

State and local Organizations

During the implementation phase of the PEP, the Regions will be in communication with their respective State and local organizations. This will occur through normal communication processes. Prior to implementation of the PEP, the EPA Regions will have worked with the State and locals to develop an implementation schedule for their respective Region. One week prior to an actual visit, the Regional WAM will call the State and local to inform them of the upcoming evaluation and to coordinate any meetings required for the ESAT field personnel and the State and local organization. During the week of the evaluation, the WAM will make any further contact with the State and local if implementation schedules change.

3.3 Assessment Communication

During the assessment of the data and the PEP, the following communication avenues will be developed.

3.3.1 National

Data from the PEP, once validated, will be uploaded to AIRS by the ESAT contractors at the Region 4 and 10 laboratories. Once both the PEP and routine data are uploaded, a comparison of the two values through Oracle Discoverer@ software will occur. OAQPS, the EPA Regional WAM and State/locals will assess this information. During ESAT Workgroup conference calls, the data will be discussed as it relates to any observed trends (i.e., overall bias, bias of particular instruments), corrective action or further assessment. General discussions of the PEP data will also occur on the $PM_{2.5}$ QA Workgroup call.

In addition, there is a need to assess the implementation of the PEP. This will take place during OAQPS technical systems audits (TSAs) of the ESAT contractors (see section 8). Information on these TSAs will be placed on AIRS. It is anticipated that OAQPS will institute a monitoring meeting once a year. During this meeting, a session will be devoted to assessing the implementation of the PEP. By 6/2000, an assessment report will be written by OAQPS discussing the positive/negative aspects of the first year of the program including any information coming from the monitoring meeting or any Regional, or State and local assessments of the PEP.

3.3.2 Regional and State and Local Assessments

Detailed reviews and discussions of the PE data will occur at the Regional, State and local levels. If data is outside acceptance criteria, the Regions and State and locals may decide to perform additional PEs at the site where the out-of-criteria values were generated. Information on these corrective actions will be forwarded back to OAQPS in order to make improvements to the PEP.

Regions will forward TSAs performed on the ESAT contractors to OAQPS for review and use during program assessments. State and locals will also be asked to provide any assessments of the PEP to the Regions and OAQPS.

3.4 Reports

It is critical to the success of the program that any pertinent information that is collected is reported in a timely fashion for improvements in the quality of routine $PM_{2.5}$ data as well as to improve the implementation of the PEP.

3.4.1 National Reporting

Every year OAQPS will develop a QA summary report that will provide a data summary of the QA activities performed during the calendar year and will include information that can be retrieved and assessed through AIRS. The PE data will be included in this report. The ESAT Workgroup and the $PM_{2.5}$ QA Workgroup will have input to the content and structure of the report and will have the opportunity for internal peer review prior to distribution on AMTIC.

Every three years OAQPS will develop a QA report assessing three years worth of data. This report differs from the yearly report in that it will be more interpretive and will integrate all facets of the QA program. The ESAT Workgroup and the $PM_{2.5}$ QA Workgroup will have input to the content and structure of the report and will have the opportunity for internal peer review prior to distribution on AMTIC.

3.4.2 Regional and State and Local Reporting

Reporting at the Regional, State and local level will reflect the current reporting policy or regulation established for the Ambient Air Quality Monitoring Network.

3.5 The Ambient Monitoring Technology Information Center (AMTIC)

Another important avenue of communication is AMTIC. AMTIC is a publically available Internet web site devoted to ambient air monitoring. AMTIC presently has an area devoted to $PM_{2.5}$ monitoring. Important information and guidance documents are being posted in this area. In addition, a communication forum has been developed that will allow State/local organizations to post technical questions that will then be available for other organizations to read. EPA will utilize AMTIC extensively throughout the planning, implementation, assessment, and reporting processes. The $PM_{2.5}$ AMTIC address is: ***http://www.epa.gov/ttn/amtic/amticpm.html***

3.6 Summary

Early establishment of a good line of communication is important and it must be followed consistently to ensure that all parties receive the information in a timely manner. Figure 3.1 presented the general lines of communication. By following this figure and using the Workgroups currently established, it is anticipated that the PEP should be implemented in an efficient manner. Table 3-1 provides a summary of the technical aspects that each organization will be responsible for communicating

Table 3-1 Overview of Principal Communication Lines.

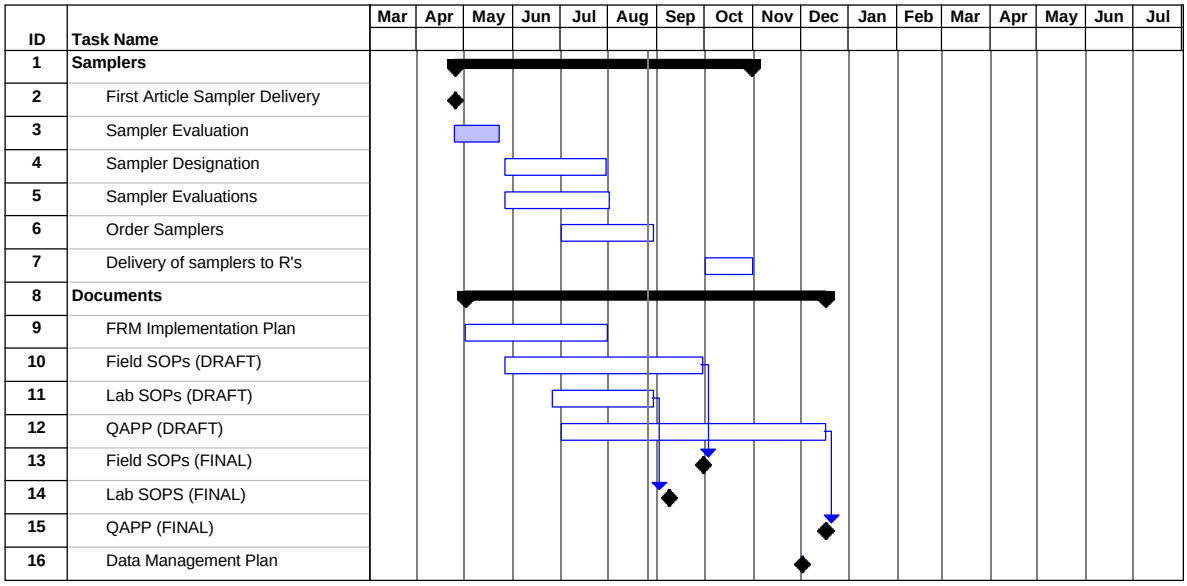
OAQPS	Program requirements, training procedures, guidance documentation, contractual information, program funding, TSAs, data analysis, coordination, QA reporting.
ORD	Federal Reference and Equivalency information, technical advice.
Regions	Field and laboratory support, State/local implementation schedules, data assessments, corrective action, TSAs, work plan review information, ESAT progress reports.
ESAT Contractors	Information concerning the specific tasks of the performance evaluation, any feedback to the operation and training procedures, information concerning the annual work plans, implementation progress, information on the operation of the FRM portable audit sampler itself.
ESAT CO/CS PO/RPO	Information concerning the training, personnel and specific tasks of the performance evaluations, information concerning the financial, contractual, administration or logistical support of the program.
States/local Agencies	Information concerning the network, the specific sites to be evaluated, any required training and guidance needed, information on the operation of the routine monitor itself, any feedback on the PEP, TSAs

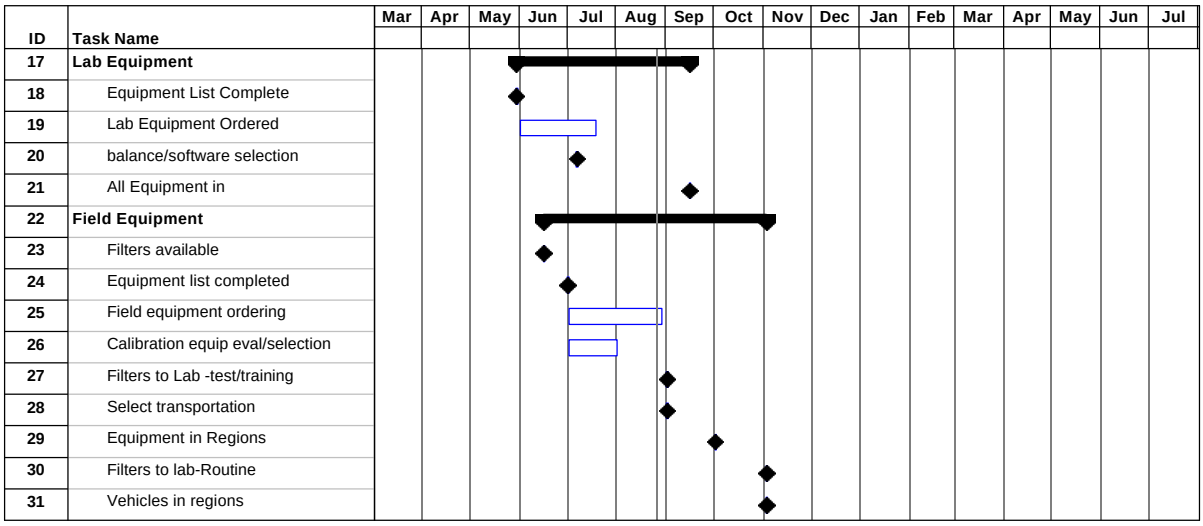
4.0 TIME LINES/MILESTONES

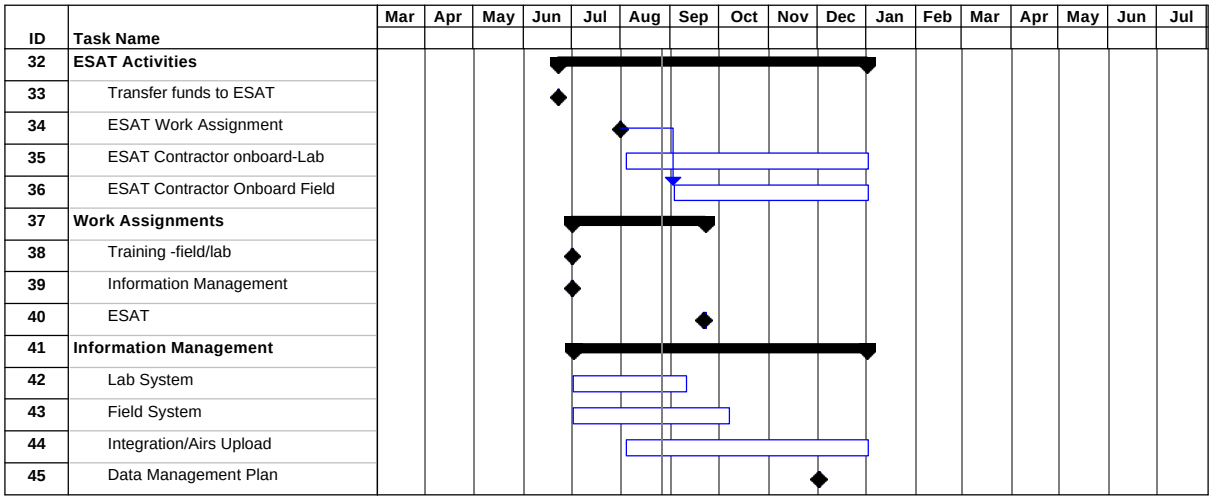
In order to ensure that the PEP is implemented in calendar year 1999, many aspects of the program must be completed in a timely, efficient fashion.

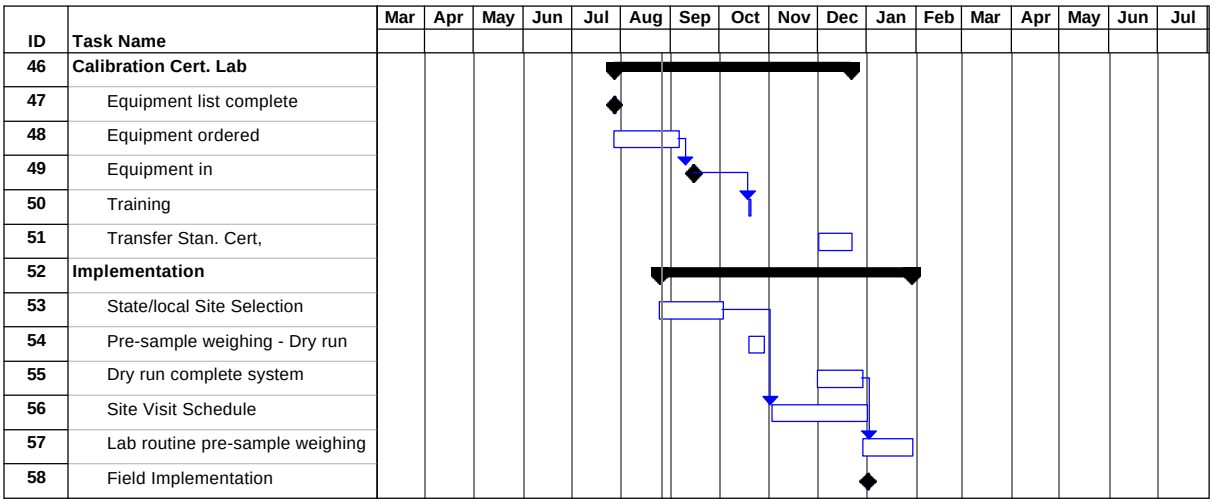
4.1 Planning Time Lines

Figure 4.1 provides the key planning aspects of the program that must be completed within the specified time frames in order to meet a 1/1/99 implementation date. The dates in Figure 4.1 run from April 1998 through July 1999









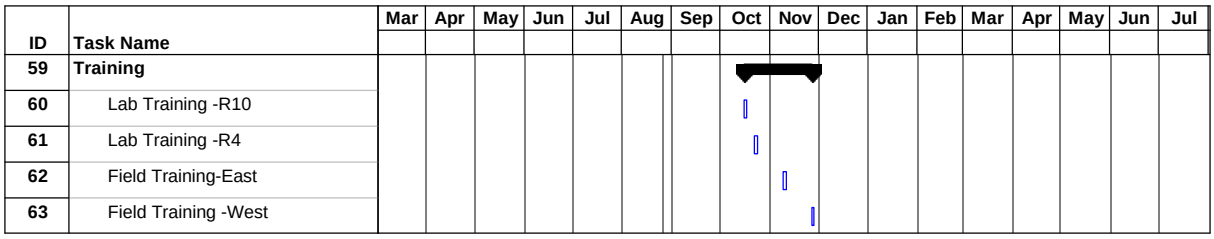


Figure 4.1Planning Time Line 4/98 - 7/99

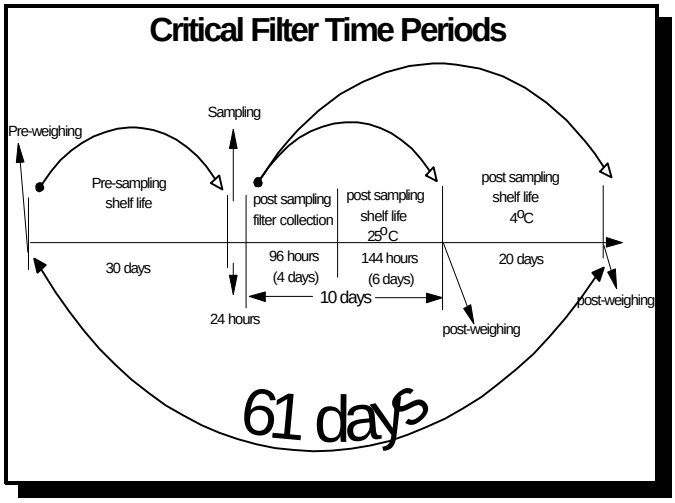


Figure 4.2 Critical filter holding times

4.2 Implementation Time Lines

There are some other important dates that must be met during implementation activities. They involve both laboratory and field activities.

4.2.1 Laboratory Time Lines

One aspect of the implementation process that is time critical is the filter holding time dates. As is illustrated in Figure 4.2 and stipulated in the Code of Federal Regulations, filters must be used within 30 days of pre-sampling weighing or they must be reconditioned and pre-weighed. Therefore, it is critical that Region 4 and 10 laboratories develop a schedule to provide the field operators with filters that will be utilized in the appropriate time frame.

Table 4-1 provides an estimate of the number of filters to be prepared for the field each month (filters/month); it includes field blanks and collocated filters but does not include laboratory QC filters. This spread sheet was developed for the Region 4 and 10 laboratories to help provide a more accurate estimate of filter preparation. This estimate is based upon the numbers of SLAMS/NAMS samplers that are expected to be sited in FY 98. However, the actual values may be somewhat higher when additional information on the exact method designations for each routine monitor that each reporting organization within a Region will receive.

Table 4-1 Filter Estimates

Region	NAM/SLAMS	sites/year	sites/quarter	site/month	filters/month	filters/year
1	67	17	17	4	7	75
2	58	15	15	4	7	66
3	95	24	24	6	9	101
4	181	45	45	11	16	182
5	162	41	41	10	15	164
6	114	29	29	7	11	119
7	66	17	17	4	7	74
8	51	13	13	3	6	60
9	105	26	26	7	10	110
10	48	12	12	3	6	57
Total	**947**	**237**	**237**	**59**	**94**	**1008**

Based upon the estimates in Table 4-1, Table 4-2 provides a summary of the monthly filter preparation requirements for each laboratory.

Table 4-2 Monthly Filter Preparation Estimates.

Region 4 Laboratory		**Region 10 Laboratory**	
Region	Monthly Filter Requirement	Region	Monthly Filter Requirement
1	7	5	15
2	7	7	7
3	9	8	6
4	16	9	10
6	11	10	6
Total	**50**	**Total**	**44**

Figure 4.2 also indicates that filters must be weighed within 10 days (if maintained at 25ºC) or 30 days (if maintained at 4ºC) of the sampling end date. The Region 4 and 10 laboratories will be able to post-sampling weigh within the 10 day window, even though they will maintain filters at 4ºC prior to filter conditioning.

Data Input/Assessment/Upload

It is anticipated that an automated data entry system will be in place so that minimal data entry will be required. Once a batch of samples has completed post-sampling weighing, the data will be reviewed, verified, and validated by the ESAT contractor. This process will be completed in 10 working days. Upon data validation and acceptance by the EPA WAM, the data will be uploaded to AIRS by the ESAT contractor. This should be completed within 5 working days from data validation.

4.2.2 Field Time Lines

Figure 4.2 indicates that filters must be collected within 96 hours of the end of the sample period. In most instances the field personnel will collect the filters within 8 to 48 hours of the end of the sample period. Samples will be sent the day of removal to the appropriate laboratory via next day delivery. Data will be immediately downloaded from the portable sampler and stored in two mediums (hard drive and two diskettes). One diskette of the data will be shipped with the sample. Data may also be transmitted, via modem, to the appropriate laboratory.

4.2.3 Implementation Summary

Table 4-3 provides a summary of the key activities discussed above.

Table 4-3 Implementation Summary

Implementation Phase	Activity	Acceptable Time frame
Laboratory	Pre-sampling weighing	30 days
	Post-sample weighing	10 days
	Data input/review/validation	10 working days
	AIRS Upload	5 working days
Field	Filter use	30 days of pre-sample weighing
	Filter collection	8-24 hours from sample end date/time
	Filter/data shipment	within 8 hours of sample removal

4.3 Assessment Time Lines

In order to assess the PE data, the data from the routine sampler must also be available in AIRS. State/local requirements for data upload to AIRS is 90 days after the quarter in which the data is collected. However, the time frame for pre- and post-sampling weighing, as illustrated in Figure 4.2, is also a requirement for the routine samplers. Therefore, data for the routine sampler that was evaluated could be available within 30 days of the sample end date. If possible, submittal of routine sampler data as soon as possible is encouraged if data assessment is to occur in a timely manner.

4.3.1 OAQPS Assessments

Once both routine data and PE data for a site are in AIRS, OAQPS, Regions and State and locals can use the AIRS data evaluation programs, based on data quality assessment techniques, to assess this information. OAQPS will review this information every month and will summarize their comments on the ESAT Workgroup and $PM_{2.5}$ QA Workgroup calls.

4.4 Reporting Time Lines

4.4.1 OAQPS Reporting

QA Reports

As mentioned in Section 3, OAQPS plans on the development of a yearly QA Summary Report and the interpretive QA Report every three years. The yearly report will be based on a calendar year and will be completed six months from the last valid entry of routine data by the State and local agencies. The three year QA Report will be generated 9 months after the last valid entry of routine data by the State and local agencies for the final year.

Audit Reports

OAQPS will also perform technical systems audits of the ESAT contractors (anticipated 1/region/year). Audit reports will be completed with 15 working days of the audits.

5.0 RESOURCES

This section will explain the source of funding, the development of resource estimates, and the schedule for resource allocations for the PEP.

5.1 Source of Funds

Since the PEP is a State and local responsibility, the source of funds for the PEP are State and Tribal Assistance Grants (STAG) currently authorized under CAA 103 authority for the set-up and operation of the $PM_{2.5}$ Ambient Air Quality Monitoring Program. Due to negotiations between OAR, the Regions, and the State and local agencies, there has been agreement to shift the burden of this program to federal implementation for the first two years and possibly longer if the State and locals wish for the PEP to remain a federally operated program.

Beginning in FY-2000 each State or local reporting organization will decide whether they intend to participate in the nationally administered PEP or if they intend to provide for the PEP independently. Decisions on whether a reporting organization will choose to continue federal implementation must take place within a time frame that will allow the ESAT contract enough time to appropriately staff for the calendar year. Funds will be appropriately "tapped" from the STAG funds to implement the audit for that reporting organization. In January of the preceding fiscal year, EPA will submit an estimate of the resources needed to continue implementing the PEP. Between January and April of the preceding fiscal year, State and locals will decide to accept the EPA tap. By July of the preceding fiscal year the final tap figure will be secured. If the decision of the reporting organization is to implement the audit themselves, they must meet the definition of an independent assessment (see Figure 1.1) and the funds to perform the audit will be distributed to the reporting organization.

5.2 Resource Estimates

Tables 5-1, 5-2, and 5-3 provide estimates for the FY98 (planning), 99 (year 1), and 2000 (year 2) activities respectively. The FY2000 estimate will present the cost for the years that follow, assuming full implementation continues (i.e., all reporting organization continue to allow federal implementation). The resource estimates are presently the "best estimate" based upon current knowledge of the PEP. As implementation occurs, these estimates will be revised and improved as needed.

5.2.1 FY 98-Year 0, Planning

Since the first year of routine operation of the PEP starts 1/1/99, FY98 and the months of October through December of FY99 are being used to plan the PEP, acquire the necessary personnel, capital equipment and consumables, and develop and implement training activities. Figure 4.1 provides a schedule for these activities. Table 5-1 was developed in order to estimate

Table 5-1 FY98 Resource Allocation

	98	CY99	FY98	Field	Monitor	Monitor	Field		Lab	Lab	Lab
Region	sites	Field FTEs	Field FTEs	FTE Costs	Number	Costs	misc	Vehicles	FTEs	FTE Costs	Cap Costs
1	67	1.0	0.08	10000	5	45000	9000	20000			
2	58	1.0	0.08	10000	5	45000	9000	20000			
3	95	1.0	0.08	10000	5	45000	9000	20000			
4	181	2.0	0.16	20000	10	90000	18000	40000	0.16	18000	
5	162	2.0	0.16	20000	10	90000	18000	40000			
6	114	2.0	0.16	20000	10	90000	18000	40000			
7	66	1.0	0.08	10000	5	45000	9000	20000			
8	51	1.0	0.08	10000	5	45000	9000	20000			
9	105	1.0	0.08	10000	5	45000	9000	20000			
10	48	1.0	0.08	10000	5	45000	9000	20000	0.32	36000	60000
Totals	**947**	**13.0**	**1.0**	**130000**	**65**	**585000**	**117000**	**260000**	**0.48**	**54000**	**60000**
First Article											52300
Reallocation to Routine Monitoring											36525
Grand Total											**1294825**
98 sites-75% reduction from "total sites" for year 2000											
CY99 Field FTEs- based on assumption that 1 FTE can perform 80 audits/year the calculation = (98 sites/80) and rounded to a full integer											
FY98 Field FTEs - 2 man months of CY99 Field FTEs required per FTE in FY 98											
FY98 FTE Costs - based on 2 months in FY98 using a cost of 100K/ year for a contractor +2000 travel/ perdiem for training each FTE											
Field Capital Costs - based upon each FTE requiring 5 portable audit instruments (9K each) a vehicle (20K) and misc equipment (9K)											
Lab FTEs - based upon Regional laboratories that require 2 months for training and preparation											
Lab FTE Costs -based upon 2 month in FY98 for training and preparation = $2000 for travel/perdiem											
Lab capital costs - based upon estimate to develop and outfit regional laboratories											

the resources required for FY98, but was based on the personnel and the sites that will be running in FY99. Important points about the FY98 estimate follow:

Table 5-1- The table in this document reflects the present allocation of resources and funds as of the printing date. A number of earlier versions of this table exist which reflected different estimates based upon assumptions that required revision**.**

Sites - It is estimated that 947 sites will be available in FY 98 for the PEP. Since 25% will be audited (CFR Part 40) 4 times a year, the PEP would generate 947 audits.

Field personnel - It is anticipated that 1 full time equivalent (FTE) can audit about 20 sites a year. This is based on a national estimate that 1 audit can be accomplished every three days. Since a site must be audited 4 times per year, the equation becomes:

$$\frac{240\ working\ days\ /\ 3\ days\ per\ audit}{4\ audits\ per\ site} = 20\ sites$$

This is a conservative estimate since there will be situations where more than 1 audit can be accomplished in the same 3 day period. Using the “98 sites” information in Table 5-1, one can determine the number of FTE’s needed in FY99 and therefore the number that would be needed

for training in FY98. However, due to the fact that no implementation is occurring in FY98, 2 man months are estimated as the time required for training and preparation.

Field capital equipment - Capital equipment costs for the field include the portable audit sampling device, calibration transfer standards, miscellaneous equipment and consumables, information management devices, and transportation. Based on the estimates in Table 5-1, it is anticipated that an FTE may utilize three portable samplers in one day (sites in close proximity). In order to provide efficiencies and reduce down time, each FTE is allocated 5 portable audit samplers which includes two as spares. Additional details on the capital equipment are discussed in Section 5.3

Lab personnel - An estimate was needed to determine the throughput for the filter weighing laboratories. Figure 5.1 is a time estimate based upon an 473 filters, which is the total number of routine filters (947) expected for FY98, divided by two laboratories. Including QA/QC filters, it is estimated that 26 weeks would be required for each lab in FY 99. However, due to the fact that the PEP routine operation begins in FY99, 2 man months are estimated for FY98 for training and preparation.

Laboratory capital equipment - In June 1998, EPA decided to fund 120K to outfit the Region 4 and 10 laboratories with internal EPA funds. The initial 180K STAG allocation was redistributed to cover the additional costs of the portable monitors and the additional taps discussed below. Therefore, only 60K is presently allocated to laboratory equipment. Additional details on the capital equipment is included in Section 5.3

Additional Taps- Due to a shortfall in funds for the purchase of routine monitors, EPA shifted $36,525 from the PEP. Also, three first article portable monitors were purchased with PEP funds at a cost of $52, 300. The portables were needed for initial review prior to FRM designation. These values show up just above the grand total in Table 5-1.

5.2.2 FY99- Year 1, Implementation

Table 5-2 represents the resource estimate for the first year of implementation. FY99 will represent implementation of the PEP starting 1/1/99 for the active sites within the fiscal year. Important points about the FY99 estimate follow.

Field and lab capital costs- The majority of the capital costs have been have been allocated in FY98. Therefore the costs in FY99 reflect field and laboratory consumable costs.

Laboratory Time Estimate (Per filter Basis) ~473 routine samples per lab			
	Time		
Activity	Minutes		Comments
Filter pre-examination	2		examination of each filter for pinholes etc.
Pre-examination data entry	2		recording info above on data sheet/computer
Filter numbering /data entry	2		Unique ID of filter and data entry
Filter equilibration	3		Setting filter into equilibration area and recording pertinent information
Pre-weighing Filter	3		recording data, placing filter in balance waiting for stability.
2nd weighing	3		2nd weighing to determine stability
3rd weighing	3		3rd reweighing if 2nd weighing out of spec.
Filter cassette	3		placing filter in cassette and any data recording
Filter holder	3		placing filter in shipping container and getting ready for the field
Post sampling			
Filter login	4		Logging in filter upon arrival
Filter examination/data recording	2		Post sampling examination and data recording
Filter Equilibrium	3		Setting filter in the equilibration area and recording pertinent data
Post-weighing	3		recording data, placing filter into balance, waiting for stability
Filter Storage	2		recording pertinent info and storing filter
Total	38		
Routine Sample Total	17974	299.57	hours for 473 routine samples
Quality Control (per30 routine samples)			
Microbalance Calibration	120		Calibration at the start of every pre-weighing (60 min) and post weighing (60 min)
Field Blanks	114		3 field blanks per batch of 30 routine samples based upon timeper routine sample above
Lab Blanks	60		3 lab blanks per batch of 30 routine samples based upon a somewhat reduced time frame
Standard weights	36		standard lab weights measured at the beginning, every 10 samples, and end of run
Data Review	30		Review of routine and QC data for anomalies
Routine maintenance	10		Cleaning etc.
Data entry to AIRS	15		Data upload to AIRS data base
Reweighs	9		3 reweighs of routine samples per run (3 min/run)
Misc	15		Miscellaneous time
Total	409		Total time for 30 samples
Total /sample	13.63		Total time per one routine sample
Total time routine and QA	51.63		total /sample for routine and QA activities
Routine sample total	24423	407.04	Hours for 564 routine samples and associated QA
Yearly Fixed Activities			
Lab cleanup	2400		1 week
Routine Maintenance	2400		1 week
Training	2400		1 week
Reporting Activities	4800		2 weeks
equipment/consumable procurements	4800		2 weeks
Meetings/Conference Calls	4800		2 weeks
Data/hardcopy archive	4800		2 weeks
Miscellaneous	12000		5 weeks
Sub-total	38400		16 weeks
Grand Total	62823	26.18	weeks

Figure 5.1 Laboratory time estimate for filter weighing activity.

Table 5-2 FY99 Resource Allocation

R	Total sites	98 sites	98 audits	Field FTEs	FTE Costs	Field Cap Costs	Lab FTE's	Lab FTE Costs	Lab Cap Costs	shipping
1	**97**	**67**	67	1.0	**120100**	5000				**2010**
2	**93**	**58**	58	1.0	**117400**	5000				**1740**
3	**134**	**95**	95	1.0	**128500**	5000				**2850**
4	**266**	**181**	181	2.0	**254300**	10000	**0.75**	75000	**10000**	**5430**
5	**230**	**162**	162	2.0	**248600**	10000				**4860**
6	**190**	**114**	114	2.0	**234200**	10000				**3420**
7	**88**	**66**	66	1.0	**119800**	5000				**1980**
8	**116**	**51**	51	1.0	**115300**	5000				**1530**
9	**157**	**105**	105	1.0	**131500**	5000				**3150**
10	**129**	**48**	48	1.0	**114400**	5000	**1.5**	150000	**20000**	**1440**
	1500	947	947	13.0	**1584100**	**65000**	**2.25**	**225000**	**30000**	**28410**
										1932510

Field and Laboratory FTE Costs - These costs make up the majority of the FY99 budget and should be constant from year to year as long as the program is implemented at the federal level. During FY99, communication will be important to determine the adequacy of this FTE allocation.

Shipping - Next day shipping to the laboratories and ground shipping from the laboratories will be an expense not incurred in FY98. This should remain constant in the out years.

5.2.3 FY2000- Year 3, Implementation

Table 5-3 reflects the resource allocations for FY2000, which is very similar to Table 5-2.

Table 5-3 FY2000 Resource Allocation

R	Total sites	99 sites	99 audits	Field FTEs	FTE Costs	Field Cap Costs	Lab FTE's	Lab FTE Costs	Lab Cap Costs	shipping
1	**97**	**76**	76	1.0	**122800**	5000				**2280**
2	**93**	**70**	70	1.0	**121000**	5000				**2100**
3	**134**	**104**	104	1.0	**131200**	5000				**3120**
4	**266**	**206**	206	2.0	**261800**	10000	**0.75**	75000	**10000**	**6180**
5	**230**	**186**	186	2.0	**255800**	10000				**5580**
6	**190**	**132**	132	2.0	**239600**	10000				**3960**
7	**88**	**72**	72	1.0	**121600**	5000				**2160**
8	**116**	**59**	59	1.0	**117700**	5000				**1770**
9	**157**	**109**	109	1.0	**132700**	5000				**3270**
10	**129**	**55**	55	1.0	**116500**	5000	**1.5**	150000	**20000**	**1650**
	1500	1069	1069	13.0	**1620700**	**65000**	**2.25**	**225000**	**30000**	**32070**
TOTAL										**1972770**

5.3 Personnel

Personnel will be required for three types of activities: field implementation, filter preparation and weighing, and standards certification.

In general, the PEP requires personnel with a degree in the environmental sciences. Due to the nature of the PEP and the extreme care in which the sample filters must be prepared and handled, personnel must be able to understand and follow SOPs, document and communicate important information, and be able to make decisions in situations that are not covered in SOPs. Clear verbal and written communication skills are required. The following are brief descriptions of the duties for the three activities mentioned above:

Field Personnel - are responsible for transporting a portable $PM_{2.5}$ FRM performance evaluation sampling device to an established $PM_{2.5}$ site which shall be located at any of the State and Local Air Monitoring Stations (SLAMS) sites within each EPA Region. The operator shall be prepared to transport the FRM device to various sampling platforms which may include the tops of buildings or distant rural settings. For ease of operations and the safety of the operators, the portable FRM sampler was designed in sections with each individual section not weighing more than 40 lbs. Field personnel must be able to lift/carry these sections up stairs and/or ladders. Due to the nature of the sampler, ground transportation of the sampler is encouraged. Extensive, year round travel will be required of field personnel and flexible hours (10 hour days, etc.) may be necessary. The field operator will perform the following activities.

a. The operator will assemble the instrument, collocate the sampler, perform calibrations following SOPs, install a filter and operate the instrument to the same 24 hour sampling mode as the routine instrument (midnight to midnight).

b. If scheduling allows, the operator may leave this location to set up an additional 24-hour performance evaluation at another routine sampling location or perform additional activities at the site if so tasked. The operator may also perform any required maintenance or repair of the portable $PM_{2.5}$ sampling device.

c. The operator shall return to each site after 24-hour sampling period, remove and properly store the filter for transport, download the stored electronic monitoring data, enter additional information as required, and disassemble the instrument.

d. The operator shall properly package the filter (i.e., use of ice substitutes) following the chain-of-custody procedures for transport to the pre-determined laboratory.

Filter Preparation and Weighing - The personnel at the filter preparation laboratory have the following duties:

a. Receipt of filters from EPA- A yearly allotment of filters will be received from EPA. Receipt of the shipment should be checked for gross damage, logged in, and stored in an appropriate manner.

b. Filter integrity check - Prior to filter preparation, each filter will be inspected for pinholes, separation of ring, chaffing or flashing, loose material, discoloration, filter nonuniformity or any other imperfection not described above, such as irregular surfaces or other results of poor workmanship. Any defective filters will not be used but should be saved in a secure area (in case a large number of filters are defective and require replacement).

c. Filter equilibration and weighing-Filters will be equilibrated and weighed according to SOPs. Filters will be removed from their packaging placed in filter handling containers and equilibrated in a temperature and moisture controlled environment for a minimum of 24 hours for stabilization. An adequate number of filters will be tested for stabilization and if acceptable, all will be weighed along with a certain amount of QA/QC samples.

d. Filter data entry and preparation for field activities or storage-Filter pre-field weights will be entered on data entry sheets or in the laboratory information management system (LIMS) along with appropriate QA/QC and temperature/humidity information. Each filter will then be placed into a filter holder cassette which will also be identified by a unique ID number and placed into a protective container for shipping. It will then be stored along with the appropriate documentation, for shipping to field personnel.

e. Laboratory supplies and consumables- The laboratory will maintain shipping/receiving supplies which will include containers, cold packs, max/min thermometers, and chain-of-custody documentation.

f. Filter receipt -Laboratories will receive filters either by mail or carried in by the field operator. The filters will be logged in, checked for integrity and appropriately stored (cold storage) until ready for weighing. Field data for each sample will also be checked to ensure completeness and this information will either be entered or downloaded into the LIMS.

g. Filter equilibration and weighing-Filters will be equilibrated and weighed according to SOPs. Filters will be removed from storage, removed from the sampling cassettes and placed in filter handling containers and equilibrated in a temperature and moisture controlled environment for a minimum of 24 hours for stabilization. The filters will then be weighed according to SOPs.

h. Filter data entry and preparation for field activities or storage -Filter post-field weights will be entered on data entry sheets or in the LIMS along with appropriate QA/QC and temperature/humidity information. Checks of QA/QC information will determine corrective action.

i. Concentration calculation-The LIMS will be used to calculate final concentrations in $\mu g/m^3$.

j. Quality Assurance -Quality assurance and quality control samples will be included in each run of routine samples. This information will be reviewed to verify and validate routine data.

k. Data transfer to AIRS-Once data validity is assured, the data will be uploaded to the AIRS system via AIRS data upload protocols.

Standards Certification Personnel- A laboratory will be dedicated to certifying flow rate, temperature and barometric pressure transfer standards. Standards certification personnel will have the following duties.

a. Primary standard certification - will ensure that the primary standards used in the certification laboratory will be compared to a NIST primary standard once a year.

b. Instrument receipt - transfer standards will be received by each EPA Region. Certification lab personnel will log in the instruments and inspect them for damage.

c. Standards certification - will compare the standards against the primary standards per SOPs.

d. Documentation/communication- will document all certification via hardcopy or electronic records and appropriately file this information.

e. Instrument distribution- will distribute standards back to appropriate Regional Offices.

5.4 Equipment

5.4.1 Field Equipment

Table 5-4 represents the equipment required for each field FTE. OAQPS will purchase this equipment and distribute it (based upon Table 5-1) to the Regions.

Table 5-4 Field Equipment List

ACTIVITY	REQUIRED EQUIPMENT	UNIT COST	NUMBER	TOTAL COST
Initial Setup	8 pc screwdriver set	$9.91	1	$9.91
	4 pc plier set	$9.97	1	$9.97
	63 pc 1/4 and 3/8 drive tool set	$39.97	1	$39.97
	retractable knife	$3.26	1	$3.26
	20 in tote box	$21.97	1	$21.97
Operation	clipboard	$0.99	1	$0.99
	nonrefillable mechanical pencils (12 pk)	$3.19	1	$3.19
	permanent x-fine black markers (12 pk)	$6.59	1	$6.59
	cassettes w/ pre-weighed filters			$0.00
	field blank filters in cassettes			$0.00
	37 mm glass fiber filters (50 ct)	$15.00	1	$15.00
	impactor oil (100 ml)	$50.00	1	$50.00
	disposable Antistatic powder free gloves (100 ct)	$20.79	1	$20.79
	poly rope (1/4 x 100)	$12.59	1	$12.59
	folding ladder	$139.00	1	$139.00
	field data sheets	$0.00		$0.00
Maintenance	high vacuum grease	$16.19	1	$16.19
	inlet O-rings (2 sets)	$8.00	1	$8.00
	downtube O-rings (2 sets)		1	$0.00
	WINS O-rings (2 sets)		1	$0.00
	filter holder O-rings (2 sets)		1	$0.00
	soft bristle cleaning brush	$3.79	1	$3.79
	cleaning solution concentrate (12 qts)	$75.40	0.08	$6.03
	32 oz plastic spray mist bottle (4 ct)	$19.95	0.25	$4.99
	lint-free 4-ply paper towels (500 ct)	$39.77	1	$39.77
	cotton swabs (300 ct)	$1.43	1	$1.43
	distilled water (1 gal)	$0.79	1	$0.79
	reagent grade anhydrous alcohol (500 ml x 12)	$201.60	0.08	$16.13
Data Transfer	digital min/max thermometer	$34.19	6	$205.14
	12 cf upright freezer	$279.00	1	$279.00
	30 deg F refrigerant packs (36 ct)	$24.34	1	$24.34
	3x5 zip-top bags (1000 ct)	$29.16	1	$29.16
	data link	$495.00	1	$495.00
	transport containers for filters	$13.99	6	$83.94
	laptop computer w/ modem (Toshiba320CDS)	$1,689.99	1	$1,689.99
	pre-addressed FEDEX labels			$0.00
Calibrations	primary standard			$0.00
	transfer standard (2 per FTE)			$0.00
	temperature calibration device			$0.00
	flow calibration device			$0.00
	pressure calibration device	$3,000.00	1	$3,000.00
Checks	flow check device			$0.00
	temperature check device			$0.00
	pressure check device			$0.00
	leak check device			$0.00
	watch/clock check device	$1,000.00	1	$1,000.00
Extra Parts	WINS impactor		1	$0.00
	impactor wells (3 sets w/ anti-spill rings)	$336.00	3	$1,008.00
	water collection jars (glass)		2	$0.00
	PM2.5 inlet		1	$0.00
Revised Total				$8,244.92

5.4.2 Lab Equipment

Table 5-5 represents a listing of the equipment and consumables required by the Region 4 and 10 laboratory. Costs associated with some of the equipment are estimates. **The use of trade names or vendors does not constitute an endorsement by the Agency.**

Table 5-5 Laboratory Equipment List

Item Number	Quantity	units	Description	Suggested Vendor	Model Number	Unit Cost	Total Cost
Capital Costs							
1	2	each	Microbalance	Sartorious	MC-5	$11,500.00	$23,000.00
2	2	set	ASTM Class 1 weight set			$675.00	$1,350.00
3	2	each	Balance Table			$1,200.00	$2,400.00
4	1	each	Computer			$2,000.00	$2,000.00
5	1	each	GLIMS Software			$2,500.00	$2,500.00
6	1	each	Bar Code Reader			$450.00	$450.00
7	1	each	Bar Code Printing Software	Cole-Parmer	E-21190-10	$295.00	$295.00
8	1	each	Humidity/Temp Monitor			$600.00	$600.00
9	1	each	NIST Traceable Thermometer	Fisher-Scientific	15-041A	$195.15	$195.15
10	1	each	Sling Psychrometer	Bacharach	12-7011	$69.24	$69.24
11	1	each	Tacky Mat plastic frame	Fisher-Scientific	06-528A	$150.00	$150.00
12	1	each	Uninteruptable Power Supply	Cole-Parmer	E-05158-60	$295.00	$295.00
13	1	each	Refrigerator			$1,000.00	$1,000.00
14	1	each	Freezer			$1,000.00	$1,000.00
15	1	each	Dish Washer			$1,000.00	$1,000.00
16	2	each	Antifatigue Floor Mat, static dissipative 3x5'	Richmond	19-61-763	$71.50	$143.00
17	2	each	Acrylic Desiccator with sliding tray's	Cole-Parmer	E-08933-10	$252.20	$504.40
18	1	each	Laser Jet Printer			$500.00	$500.00
19	1	each	De-humidifier			$400.00	$400.00
20	1	each	Light Table			$200.00	$200.00
21	1	each	Microsoft Access 97 Win 32		077-00370	$339.00	$339.00
Total							$38,390.79
Expendable Costs							
24	24	each	HVAC Filters			$15.00	$360.00
25	1	Case of 1000	Powder-Free Antistatic Gloves	Fisher-Scientific	11-393-85A	$112.11	$112.11
26	12	each	Polonium Strips	Sartorious		$40.00	$480.00
27	7	Pack of 100	Petri-dishes	Gelman	7231	$39.00	$273.00
28	1	Case of 12 bottles	Staticide	Cole-Parmer	E-33672-00	$215.00	$215.00
29	1	case of 15 packs	Low-lint wipes	Kimwipes	34155	$188.00	$188.00
30	1	each	HVAC Service Contract	Local		$1,000.00	$1,000.00
31	1	each	Microbalance Service Contract (2 scheduled visits per year)	Sartorious		$400.00	$400.00
32	6	sets	Chart Paper & Pens			$8.00	$48.00
33	1		Cleaning Supplies	Local		$40.00	$40.00
34	2	each	Worklon Antistatic Lab Coats	Fisher-Scientific	01-352-69B	$37.95	$75.90
35	2	each	Forceps (SS w/plastic tips)	VWR	25672-100	$6.85	$13.70
36	1	case	Anti-Static Reclosable Bags 3"x5" (for cassettes)	Consolidated Plastics	90202KH	$69.50	$69.50
37	1	box	Bar-code stickers			$30.00	$30.00
38	1	Case of 1000	Alcohol swipes	Fisher-Scientific	14-819-2	$20.20	$20.20
39	20	each	6-Pack Coolers			$10.00	$200.00
40	4	Case of 24	Re-usable U-Tek Refrigerant Packs (-1C)	Fisher-Scientific	03-528B	$20.05	$80.20
41	1	case	Anti-Static Reclosable Bags 9X12" (for data sheet)	Consolidated Plastics	90210KH	$198.80	$198.80
42	4	each	Log Books			$5.00	$20.00
43	20	each	min/max thermometers (various digital ones available)	VWR	need to try	$30.00	$600.00
44	3	120 sheets	Hard surface Tacky Mat (moderate tack)	Fisher-Scientific	06-527-2	$98.00	$294.00
Costs							$4,718.41
Total Costs							$43,109.20

5.5 SOPs, QAPPs and Other Documentation

OAQPS is utilizing internal funds to develop the appropriate guidance documents for the PEP. OAQPS staff and level of effort contractors will be utilized to develop the following documents:

SOPs- field, laboratory, standard certification

QAPP - QA Project Plan for the PEP

QA Reports - various QA reports will be generated on AIRS as well as overall reports for the PEP

5.6 Training

Two training sessions are anticipated for field activities and two for the laboratory activities. Internal EPA funds have been allocated to contractors to assist in the facilitation of these training sessions. In addition, STAG funds have been allocated for each field and lab FTE (see Table 5-1) to attend one field training session. Training is discussed in more detail in Section 9.

6.0 LOGISTICS

Logistics is defined as the science dealing with procurement, maintenance and transport of materials, facilities and personnel or the handling of the details of an operation. This section will focus on the activities to ensure proper implementation of the PEP. The logistics of the PEP will be an integrated effort by all affected participants as indicated in Table 6-1.

Table 6-1 Logistical Support

STAKEHOLDER	LOGISTICAL SUPPORT
OAQPS	Managing STAG funds, regulations, guidance, SOPs, training, contractual vehicle support, data analysis,
ORD	Provide technical consultation and advise that may alter the performance of the portable audit sampler
Regions	Provide support for the development of the 2 main laboratories, support for the development of the calibration laboratory, provide project officers and task monitors, provide oversight, ensure communications with State/locals and OAQPS
ESAT Contractors	Provide trained personnel with administrative support
ESAT Division	Provide liaison support between OAQPS and the ESAT contractors
State/local agency	Provide operational support of the monitoring network, develop site criteria, ensure operator is present during performance evaluation

The logistical support issues will be detailed in the PEP QAPP, SOPs, and other guidance documentation developed and designed specifically for the PEP. Logistics will be discussed for the following areas:

- Program Initialization: One-time set-up activity such as equipment purchasing and distribution, development of guidance documentation, and training, preliminary lab and field system performance test optimization and SOP finalization.
- Field activity: Pre-trip planning including site selection, visit scheduling, State/local notification, travel arrangements, and implementation.
- Laboratory activity: Regional support for the 2 main laboratories including communications, preparation and implementation activities

6.1 Program Initialization

The following logistics issues will be covered during the planning stages of the PEP:

6.1.1 Contract/task negotiation and funding

OAQPS will work with the ESAT Contracts Management Office to negotiate the appropriate work assignment. Time lines for these activities are found in Figure 4.1 tasks 40-44. OAQPS will be responsible for providing a description of the personnel requirements, and developing a draft and final work assignment that will be reviewed and approved by the ESAT WAM/POs. OAQPS will direct the funding for the PEP through STAG Funds.

6.1.2 Equipment

Equipment Selection, Purchase and Inventory

Lab equipment- The Laboratory Workgroup, the Region 4 and 10 laboratories and OAQPS have selected the appropriate laboratory equipment (see Table 5.5). Figure 4.1, tasks 16-21 identifies the time line for equipment procurement. The Regional WAMs will develop an initial inventory of the equipment, spare parts, and consumables purchased. During implementation, the ESAT lab contractors will keep a running inventory of spare parts, consumables and any additional capital equipment purchases which will be available for WAM review. Inventories of consumable equipment should not get below a 2 months supply.

Field equipment- OAQPS, with review from the $PM_{2.5}$ QA Workgroup, will select the appropriate field capital equipment and consumables (see Table 5-4). Figure 4.1, tasks 22-31 indicates the time line for equipment procurement. OAQPS will purchase the necessary capital/consumable equipment for each FTE identified in Table 5-1. This equipment will be distributed to the Regions by October 1998. OAQPS will develop an inventory list that will be sent to each Regional WAM (hardcopy and electronic). During field implementation, the ESAT field operators will keep a running inventory of consumables and any additional capital equipment purchases which will be available for WAM review. Inventories of consumable equipment should not get below a 2 months supply.

Field transportation- Ground transportation for field personnel have been funded with STAG resources that will transferred to ESAT Office for acquisition. Due to the nature of the portable instruments and the other equipment that may be necessary for weekly site excursions, it is felt that the use of ground transportation is necessary. Once vehicles are selected, the ESAT contractors will be responsible for maintenance.

Sample filters- OAQPS has a national contract for filters. Filters will be purchased by OAQPS and sent to the Region 4 and 10 laboratories. The laboratories will receive a years supply of filters by November 1998 for the first full year of implementation.

6.1.3 Standard Operating Procedures

SOPs for both the field and laboratory activities will be developed by OAQPS and reviewed and approved by the $PM_{2.5}$ QA Workgroup and the ESAT Workgroup. Drafts that will be adequate to initiate the ESAT work assignment will be completed in July with final SOPs completed prior to the lab and field training sessions. Field and lab SOPs will be developed using the EPA guidance document *EPA/G6 Guidance for the Preparation of Standard Operating Procedures for Quality-Related Operations*

Field SOPs- The field SOPs would include procedures on:

- Equipment inventory/maintenance
- Preparation
- Communications (Regions/ State and locals)
- Equipment set-up/take-down
- Calibrations
- Sample handling, chain-of-custody
- Sampling
- Data entry/transfer
- Sample shipping
- Documentation/filing
- QA/QC activities

Lab SOPs- The field SOPs would include procedures on:

- equipment inventory/maintenance
- general lab preparation
- communications (Regions/ State and locals)
- filter handling
- filter conditioning
- calibration
- filter weighing
- filter shipping (to field)
- filter chain-of-custody
- data entry/transfer
- QA/QC activities
- storage/archive

6.1.4 Training

OAQPS will fund, develop and implement five training sessions, three lab training sessions (Regions 4 and two in 10) and two field training sessions (in RTP, NC and a site to be determined in the West). A work assignment with an OAQPS level of effort contractor has been developed to assist in this activity.

Lab Training - The lab training sessions will be held at the two National laboratories. The ESAT lab contractors will be trained on the SOPs in the areas mentioned in the previous section above. Trainers will include OAQPS personnel and contractors who have developed the SOPs and *QA Hand Book Document 2.12.* Lab training is expected to last two or three days; the first to include an overview and hands on training, and the second to observe the contractor performance of the laboratory activities and for certification. Contractors will be expected to be familiar with the SOPs prior to the actual training activity. A formal training schedule/agenda will be developed one month prior to training. The Region 4 and 10 WAMs will also participate in the training activity as well as any State and local organization wishing to observe.

Field Training - The field training sessions will be held in RTP (Regions 1, 2, 3, 4,and 6) and a site in the West (Regions 5, 7, 8, 9, and 10) that will be determined by September, 1998. A formal training schedule/agenda will be developed by the end of August, 1998. The ESAT field contractors will be trained on the SOPs in the areas mentioned in the previous section above. Trainers will include OAQPS personnel and contractors who have developed the SOPs and *QA Hand Book Document 2.12.* It is anticipated that field training will be a three or four day event with two days devoted to hands on training and the third to testing/certification. WAMs will also participate in the training activity as well as any State and local organization wishing to observe.

Dry Run- In order to test the complete implementation process, including the logistics of the PEP, a dry run is anticipated in November or December 1998. The laboratories and field personnel will follow all SOPs to determine whether the process is efficient. Information gathered from the dry run will be used to revise/modify the implementation process.

6.2 Field Logistics

To summarize, the field activity requires that 25% of the NAMS/SLAMS sites be visited four times a year so that within a 4-year period, a performance evaluation would occur at every NAMS/SLAMS site in a Region.

6.2.1 Site Selection-

The NAMS/SLAMs sites that are scheduled to be up and running by 1/1/99 will be the pool of sites from which the initial 25% will be selected. Although an evaluation will eventually be performed on all sites, the performance evaluations should be initially implemented at sites that have or are expected to have concentrations around the NAAQS. The following is an excerpt from 40 CFR Part 58 Appendix A

"...Twenty-five percent of the SLAMS monitors within each reporting organization will be assessed with an FRM performance evaluation each year. Additionally, every designated Federal Reference Method (FRM) or Federal equivalent method (FEM) within a reporting organization must:

a have at least 25 percent of each method designation evaluated, including collocated sites (even those collocated with FRM instruments), (values of .5 and greater round up).
b have at least 1 monitor evaluated.
c be evaluated at a frequency of 4 audits per year.
d have all FRM or FEM samplers subject to an FRM performance evaluation at least once every 4 years.

3.5.3.2 For $PM_{2.5}$ sites during the initial deployment of the SLAMS network, special emphasis should be placed on those sites in areas likely to be in violation of the NAAQS. Once areas are initially determined to be in violation, the FRM performance evaluation program should be implemented according to the following protocol:

1. *Eighty percent of the FRM performance evaluations should be deployed at sites with concentrations $\geq$ ninety percent of the mean annual $PM_{2.5}$ NAAQS (or 24-hour NAAQS if that is affecting the area); one hundred percent if all sites have concentrations above either NAAQS, and each area determined to be in violation should implement an FRM performance evaluation at a minimum of one monitor within that area.*
2. *The remaining 20 percent of the FRM performance evaluations should be implemented at sites with concentrations < ninety percent of the mean annual $PM_{2.5}$ NAAQS (or 24-hour NAAQS if that is affecting the area).*
3. *If an organization has no sites at concentration ranges $\geq$ ninety percent of the mean annual $PM_{2.5}$ NAAQS (or 24-hour NAAQS if that is affecting the area), 60 percent of the FRM performance evaluations should be implemented at those sites with the annual mean $PM_{2.5}$ concentrations (or 24-hour NAAQS if that is affecting the area) among the highest 25 percent for all $PM_{2.5}$ sites in the network."*

State and local organizations will be asked to select the sites they feel meet the criteria above and provide a list of sites for the evaluations conducted in each calendar year on or before October 1, of the previous year. The Regional WAMS, with the assistance of the ESAT contractors, will attempt to determine the most efficient site visit schedule. This schedule should be based upon:

1. the criteria in CFR
2. meeting the same monitoring schedule as the routine sampler being evaluated
3. the sites that are closest in proximity to each other (can be visited within the same day or week)

For each site, the ESAT contractor will develop a Site Data Sheet that contains information such as:

AIRS Monitor Site ID	Monitor ID
Method Designation	Monitor Make and Model
Site Coordinates	Site Type
Reporting Organization	Reporting Organization Contact
Street address	Directions to the site (from Regional Office)
Directions to the site from major thoroughfare	Safety concerns
Additional equipment needed (ropes, ladders etc.)	Closest Hospital (address)
Closest Express Mail Facility	Closest Hardware Store
Recommended Hotel (address)	Important free form notes
Closest site	2nd closest site

This information listed above can be placed on one sheet and included in a site file (filed by AIRS Site ID) and included in a site notebook for each field operator. Software such as MapQuest@ (Internet accessible) can help provide information on directions to sites. In addition, maps for each state and city where a monitor is located will be acquired. Sites can be placed on these maps along with the site IDs,

6.2.2 Field Visit Scheduling

Based upon the site selection criteria, a field implementation schedule will be developed for each calendar year by December of the preceding year and will be disseminated to each State and local organization. The schedule will be based upon the number of evaluations that can be practicably completed in a week. For example there may be areas where a number of sites can be evaluated on the same day whereas other areas that are so remote that only one site will be visited. Since there may be more than one task that can be implemented at a site, during the development of the site visit schedule, the tasks that will be implemented at each site during that visit will be identified by the Regional WAM and identified on the schedule. The schedule should build in "downtime" for weather, sickness or other unplanned delays.

During PEP implementation, the ESAT personnel and WAMs will meet regularly to discuss progress as it relates to the site schedule. The schedule will be updated as required and State and locals will be contacted as the schedule changes. There is a possibility that these schedules will be posted on a public bulletin board (i.e., AMTIC) so that State and local agencies and EPA can access this information at any time.

One week prior to an evaluation visit, the WAM will contact the State and local organizations to make them aware of the visit and ensure the routine monitor is operating on schedule. Details such as where and when to meet the routine operator will be discussed. In addition, the WAM should find out if there are any particular site access problems where special equipment will be needed (ropes, ladders etc.)

During routine communications, Regional WAMs and State and locals will discuss the site visit schedule and will inform each other of changes to the schedule.

6.2.3 Field Sampling

Preparation–

The field operator and or the contractor administrative staff will be responsible for making travel arrangements, which should be made early enough to provide a convenient location for the field sampler to access the site(s) he/she will visit.

Prior to an evaluation excursion for the week, and based upon the number of sites to be visited, the sampling equipment and consumables will be inspected to ensure proper operation and adequate supplies. At least one spare portable monitor and calibration equipment should be on hand. Filters will be selected and stored appropriately (per SOPs) for transport to the sites. Filter chain-of custody sheets should be started and the filters should be checked to ensure they have not gone past their 30 day pre-sampling time period. The field SOPs will contain a check sheet for these preparation operations. Site data sheets should be available for each site. For initial visits some of the information on the Site Data Sheets may be blank and must be completed during the first visit. The field personnel will review the site schedule to be sure that they understand which tasks will be implemented at the sites they are visiting that week. Upon completion of preparation activities, the Regional WAM should be contacted or a meeting scheduled to review the preparation activities.

Transport of the filters back to the National laboratories will require the use of ice substitutes (gel packs). These must be kept frozen until use. During initial transport to the sites all gel-packs should be placed in one cooler (fill cooler full with more ice packs than are required) to maintain their frozen state. In addition, the field sampler may need to find additional mechanisms to keep the gel packs frozen while in the field.

Field Implementation--

Field personnel will travel to the sites and contact the person (typically the site operator) that will allow them access to the monitoring site. The portable FRM monitors will be transported to within 1-4 meters of the routine monitor, set-up and calibrated per the SOPs. Filters will be installed and the monitor set to run on the same schedule as the routine monitor being evaluated. The field personnel will then either perform additional tasks as required at this site or proceed to another site for sampling. If there are any delays in the sampling schedule, the ESAT field sampler will contact the affected State and local organizations and also notify the Regional WAM.

Upon completion of sampling, the field sampler will return to the site(s), remove the sampling filter, visually inspect the filter and store it appropriately for transport to the laboratory and download the data per SOPs. During data download it is suggested that the field sampler and the routine operator exchange or compare monitor download information. This would help

determine that the monitors were operating properly and were indicating the same sampling conditions. Each field sampler will have a portable laptop as well as data loggers provided by the portable sampler manufacturers. Either hardware device may be used to download monitor information but it will eventually need to be stored on the laptop. A diskette of this information is required to be sent to the National laboratory along with the filters.

Safety- Safety in the field is of primary importance. Sites should not be visited or set-up in conditions that are deemed unsafe. Unsafe conditions include weather as well as monitoring platforms where the field samplers feels that they cannot transport or set up the monitor without jeopardizing their personnel safety. If these situations arise, the field operator should document this so mechanisms can be instituted to make the platform safely accessible for a performance evaluation. The field sampler should also know where the closest emergency facilities are located. This information should be included on the Site Data Sheet.

Filter Transportation

It is important that the filters be properly stored and transported to the National laboratories as soon as possible. It is suggested that filters be shipped via next day express mail the same day that they are removed from the monitors. Filters, ice packs, max/min thermometers, copies of the chain-of-custody form and a diskette of the monitor information will be included in the shipment.

OAQPS will develop a blanket contract with a next day delivery vendor. The locations of the closest shipping centers will be identified for each site. Preprinted shipping labels will be developed for the field operator. The field sampler will keep a photocopy of the chain of custody form which would include the number of containers shipped and the air bill number. The day of shipping, the field sampler will contact the national laboratory to make them aware of the shipment and provide the laboratory with the number of containers shipped and the air bill number.

Return to Station

Upon completion of a sampling excursion, the field sampler will return to the Regional Office. The field sampler will ensure all equipment and consumables are properly stored and determine if resupply or equipment maintenance is required. A second diskette of the weeks field information will be downloaded to diskette and given to the WAM. Vehicles will be serviced as required. The field sampler will debrief the WAM on the field excursion including whether the site visits remain on schedule.

Field Maintenance--

A maintenance list will be developed for all sensitive capital equipment. The list will contain the item, its maintenance schedule and date columns that will be filled in when scheduled or unscheduled maintenance is performed. Configuration control documentation will be developed and maintained to record initial and any changed configuration.

6.3 Laboratory Logistics

6.3.1 Preparation

From the months of June through December 1998 , the two national laboratories will be preparing for routine implementation of the PEP. The time line presented in Figure 4.1 provides a summary of the important activities. OAQPS coordinates a conference call with the Region 4 and 10 laboratories every 3-4 weeks to review this time line and to ensure activities are on track for implementation in 1999.

All equipment for laboratory implementation will be at the laboratories by September 1998. The laboratory personnel will be responsible for developing and maintaining equipment, spare parts, and consumable supply lists. During implementation, inventories of consumables should not go below a 2 months supply.

In order to prepare for implementation, laboratory training is anticipated in October and a dry run of the logistics operation involving both field and laboratory aspects is anticipated in November or December 1998. All equipment and procedures will be thoroughly tested through training and the dry run.

Based upon an equal allocation of filters, the Region 4 laboratory will service field personnel in Regions 1, 2, 3, 4, and 6 while the Region 10 laboratory will service Regions 5, 7, 8, 9, and 10. In addition Region 10 will outfit a standards certification laboratory.

The sample laboratories will be responsible for preparing filters and shipping these filters, the protective containers, the shipping containers, ice-packs and thermometers back to the Regions. The Regions will be provided with one months supply of these materials at the start of the PEP. The protective containers, the shipping containers, ice-packs and thermometers will be shipped back the Regions every two weeks via ground carrier (UPS).

Table 4-2 provides an initial estimate of the numbers of filters that must be prepared each month for field activities. These filters must be used within 30 days of pre-sampling weighing. These filters will be labeled and packaged individually so that the can be immediately used by the field personnel. The laboratory will initiate a chain of custody form for each filter that will be utilized by the field personnel. The filters will be sent every two weeks via next day carrier.

6.3.2 Laboratory Implementation

Laboratory logistics activities during implementation include:

- communications
- sample tracking
- filter receipt and shipping

The laboratory implementation activities as they relate to filter weighing are covered in SOPs.

Communications–

During PEP implementation, the WAMS will be in regular communication with the laboratory and field personnel. OAQPS will continue monthly conference calls with the Region 4 and 10 laboratories to assess progress. In addition to these regular communications, laboratory personnel will inform WAMS if problems arise in the laboratory aspects of the program.

The laboratory personnel will also communicate with the Regions they are supporting. Laboratory personnel shall inform field operators when a shipment of filters or equipment is sent to the Region. It is suggested that monthly conference calls between the laboratory and the 5 Regions they support be instituted to ensure proper implementation of the program.

Sample Tracking–

Filters must be used and weighed within prescribed time periods (see Figure 4.2). These time periods should be checked. The laboratory shall track filters from pre-sample weighing to AIRS upload using Table 6-2. All filters that are pre-weighed should be placed on this tracking sheet. If filters are voided for some reason along the data collection process, a flag should be included on the form. The Filter Tracking Form should help to ensure that the filter time periods are met as well as indicate the stage of operation a filter is undergoing. Based upon the concepts for the data management system (see Section 7) the information on this form will be included on other data entry screens and therefore the Filter Tracking Form will simply be a reporting feature.

Table 6-2 Filter Tracking Form

Filter Tracking Form								
Filter ID	Region	Pre-sample Weigh Date	Sample Start Date	Sample End Date	Laboratory Receipt Date	Post Sample Weigh Date	AIRS Upload Date	Flag

Filter Receipt and Shipping--

The laboratories will receive a years supply of filters from OAQPS. The laboratory should throughly inspect the filters for defects (see SOPs). If a large percentage of filters are failing the inspection, OAQPS should be immediately notified and the defective filters shipped back.

The sample laboratories will be responsible for preparing filters and shipping these filters to the Regions. Filters will be shipped next day express mail. The laboratories will notify the field

personnel and Regional WAM of the shipment and will report the number of shipping containers, number of filters and the air bill number for tracking purposes.

The laboratories will also be receiving sampled filters from the Regions. These filters should be received, the chain-of-custody form completed and inspected as soon as they are received. Any filters that are damaged and not indicated (flagged) by the field samplers will be reported to the Laboratory WAM and the Regional Field WAM as soon as possible. There is a possibility that the field sampler may still be in the field and the site can be resampled.

Laboratory Maintenance--

A maintenance list will be developed for all sensitive capital equipment. The list will contain the item, its maintenance schedule and date columns that will be filled in when scheduled or unscheduled maintenance is performed. Configuration control documentation will be developed and maintained to record initial and any changed configuration.

7.0 DATA MANAGEMENT

Success of the PEP relies on data and their interpretation. It is critical that data be available to users and that these data are:

- reliable
- of known quality
- easily accessible to a variety of users
- aggregated in a manner consistent with it prime use.

In order to accomplish this activity, information must be collected and managed in a manner that protects and ensures its integrity. This encompasses multiple activities including: where data is produced, how it is transferred and archived, the various levels of validation, and ultimately, how decision makers will evaluate the data. In order to perform these multiple activities, a management information system (MIS) will be developed. The PE MIS will be run independently in both Region 4 and the Region 10 laboratories on local area networks with appropriate security and back-up safeguards.

Most of the data collected from the PEP will be collected through automated systems at various facilities. These systems must be effectively managed by using a set of guidelines and principles by which adherence will ensure data integrity. The EPA has a document entitled *Good Automated Laboratory Practices (GALP)*. The *GALP* defines six data management principles:

1. DATA: The system must provide a method of assuring the integrity of all entered data. Communication, transfer, manipulation, and the storage/recall process all offer potential for data corruption. The demonstration of control necessitates the collection of evidence to prove that the system provides reasonable protection against data corruption.

2. FORMULAE: The formulas and decision algorithms employed by the system must be accurate and appropriate. Users cannot assume that the test or decision criteria are correct; those formulas must be inspected and verified.

3. AUDIT: An audit trail that tracks data entry and modification to the responsible individual is a critical element in the control process. The trail generally utilizes a password system or equivalent to identify the person or persons entering a data point, and generates a protected file logging all unusual events.

4. CHANGE: A consistent and appropriate change control procedure capable of tracking the system operation and application software is a critical element in the control process. All software changes should follow carefully planned procedures, including a pre-install test protocol and appropriate documentation update.

5. STANDARD OPERATING PROCEDURES (SOPS): Control of even the most carefully designed and implemented systems will be thwarted if appropriate procedures are not followed. The principles implies the development of clear directions and Standard Operating Procedures (SOPs); the training of all users; and the availability of appropriate user support documentation.

6. DISASTER: Consistent control of a system requires the development of alternative plans for system failure, disaster recovery, and unauthorized access. The control principle must extend to planning for reasonable unusual events and system stresses.

The principles listed above apply to both the local (Regions 4 and 10) and central information management systems (AIRS). In order to address these principles, OAQPS will develop a *PEP Data Management Plan* which will include the following elements:

Personnel	Quality Assurance
Facilities	Equipment
Security	Standard Operating Procedures
Software	Data Entry
Raw Data	Data transfer
Records/Archive	Reporting

Guidance for developing these elements can be found in the *GALP*. The *PEP Data Management Plan* will be completed by December 1998.

7.1 Performance Evaluation Data Collection

The PEP is dependent upon the collection of quality data which will come from several different sources, such as the PEP field and laboratory activities and the field and laboratory data collection activities for the routine sampling activities where a PE was performed.

Each of the individual stakeholders are responsible for collecting quality data from their area of influence and distributing the data to the appropriate participants. Table 7-1 represents the data management structure for the FRM PEP.

Table 7-1 PEP Data Management Structure

STAKEHOLDER	TYPE OF DATA	DISTRIBUTION
State/local agency field monitoring staff	Filter ID from the operation of their Primary $PM_{2.5}$ monitor, AIRS site ID, POC, and Method Code. Note: Method Code can be determined if sampler make and model are known.	To the Field Performance Evaluation Operator.
Field Performance Evaluation Operator	Data from the operation of the FRM Portable Audit Sampler	To appropriate Region 4 or 10 laboratory. To state/local agency monitoring staff. To AIRS
State/local agency laboratory staff	Routine Gravimetric Laboratory Data	Use same distribution and validation procedures as all other $PM_{2.5}$ data produced by the state/local, then uploaded to AIRS.
Performance Evaluation Gravimetric Laboratory Analyst	PEP Gravimetric Laboratory Data	To local laboratory information management system.. To AIRS
Performance Evaluation Laboratory Manager	Comprehensive Performance Evaluation Reports	To State/local QA Manager and OAQPS
Performance Evaluation Laboratory Manager	AIRS Reports	AIRS
Regions	Sites to participate in the performance evaluation for the year	To ESAT contractor and OAQPS for development of audit plan for the year
OAQPS	Resultant data from the analysis of the operational field and laboratory data received	To State/local agencies and Regions for assessment and corrective actions.
Others	Any pertinent data received from outside entities	To all interested participants.

7.1.1 $PM_{2.5}$ FRM Performance Evaluation Portable Sampler Data

The $PM_{2.5}$ FRM portable sampler, once appropriately programmed, provides all the required monitor data that needs to be collected by the performance evaluation field operator. This will be accomplished by utilizing either a lap top computer or data download link just after recovery of the performance evaluation sample. Additional information may be documented to supplement the information collected automatically. In addition to standard fields that will be automatically generated by the $PM_{2.5}$ FRM portable sampler, Table 7-2 presents the four fields that need to be programmed into the sampler.

Table 7-2 Required Portable Sampler Entry Fields

Field	Dynamic or Static Field	Example Format
Filter ID Number	dynamic	T8xxxxxx T for Teflon 8 for year unique 6 digit code for filter
Cassette ID	dynamic	xxx
Site identification	dynamic	xx-xxx-xxxx xx for state code xxx for county code xxxx for site code
Method Code	Static	xxx unique 3 digit code that identifies the type of FRM sampler used.

The first three fields listed will be programmed into the sample each time a sample run is set up. The fourth field "Monitor ID" only needs to be set up once.

7.1.2 $PM_{2.5}$ FRM Primary Sampler Data

The primary sampler will be operated in accordance with its normal operational schedule. This should include all regular frequencies for sample schedule, maintenance, and calibrations. The data acquired by the routine field operator will follow its normal path as detailed in the monitoring organizations QAPP and SOPs.

7.1.3 Performance Evaluation Gravimetric Laboratory Data

The performance evaluation gravimetric laboratory will be operated by ESAT personnel according to the appropriate laboratory SOPs. The data acquired by the gravimetric laboratory will be collected and validated as detailed in the PEP QAPP. The data will be handled by a management information system that acquires data both manually and automatically. Data will be stored in a relational database so that it can be efficiently stored and accessed.

7.1.4 Routine Gravimetric Laboratory Data

The routine gravimetric laboratory will be operated in accordance with its normal operational procedures. The data acquired by the gravimetric laboratory should follow its normal path as detailed in the monitoring organizations QAPP and SOPs.

7.2 Performance Evaluation Data Transfer and Archiving

Data transfer and archiving in the PEP will take place at multiple levels. Table 7-3 presents information such as where various data are produced, and how/ when it will be archived/transferred.

Table 7-3 Data Transfer and Archiving

Data Produced	How to Archive	When to Transfer
Performance Evaluation Field Sampler Data	1.) Write each field data set over oldest field data set in sampler data storage 2.) Download each field data set to lap-top computer or data link.	Transfer data via diskette with each sample. Back-up maintained on field lap-top
Performance Evaluation Gravimetric Laboratory	Laboratory Database	1.) Back-up of database occurs each week as per laboratory computer network storage procedures?

Some differences for how data will be managed are pointed out below:

- All data as per Table L-1 in 40 CFR Part 50 Appendix L will be uploaded to the AIRS database.

- Concentration data will be uploaded to the AIRS database in a Precision & Accuracy Transaction. This transaction will be one newly created in the re-engineered AIRS that will allow for reporting of P&A data without having both concentration values available at the same time.

7.3 Hardware and Software Requirements

7.3.1 Production Hardware Requirements

The field and laboratory data collection systems will need sufficient memory, disk space, and processing speed to provide adequate performance in a client/server environment. Requirements for these activities are listed below:

Field PC (laptop)
- Pentium processor 122MHz
- 16 MB RAM
- 2.1 GB Hard Drive
- 800x600 VGA video card
- Mouse
- CD ROM
- Internal Modem

Laboratory PC
- Pentium processor 200 MHZ
- 32 MB RAM
- 4.3 GB EIDE Hard Drive
- 800x600+ VGA or SVGA video card
- Mouse
- TCP/IP Connectivity
- CD Rom

In addition, the field personnel will be provided with data loggers provided by the portable sampler manufacturers that will be capable of downloading the required field information.

7.3.2 Field and Lab Software Requirements (States, Local Agencies and EPA)

The software requirements in this section are based on a high-level proposed conceptual design. These requirements are preliminary and will not be finalized until the functional requirements are determined.

Field
- Windows95,
- Microsoft Office Pro97 (Access)
- Word Perfect

Laboratory
- Windows95,
- Oracle SQL*Net v2.0
- Oracle Discoverer/2000
- Microsoft Office Pro 97 (Access)
- WordPerfect
- AIRS-AQS Application Software
- Oracle7 ODBC Driver
- X Windows Emulation (example: Hummingbird eXceed)
- Web Browser (example: Netscape v3.0)

7.4 Data Management Flow

Figure 7.1 provides a flow of the information management system for the PEP. In general, hardcopy/electronic information will be collected at various stages of the field and laboratory procedures. This information will be stored in the Region's 4 and 10 local database. The required AIRS fields, once verified and validated will be uploaded to AIRS where it will be compared with the routine data that has been uploaded from the State and local agencies. The *Data Management Plan* and the *PEP QAPP* will provide the details of this procedure.

7.5 Central Data Management Scheme

Eventually, all required data will reside in the Aerometric Information Retrieval System (AIRS) data base. The AIRS database is divided into 4 subsystems, two of which are important to the ambient air monitoring: 1) the air quality subsystem (AQS) including air quality data and monitoring site descriptions, and 2) the geographic/common subsystem, which contains geographic and other codes common to the other 3 subsystems and database control information.

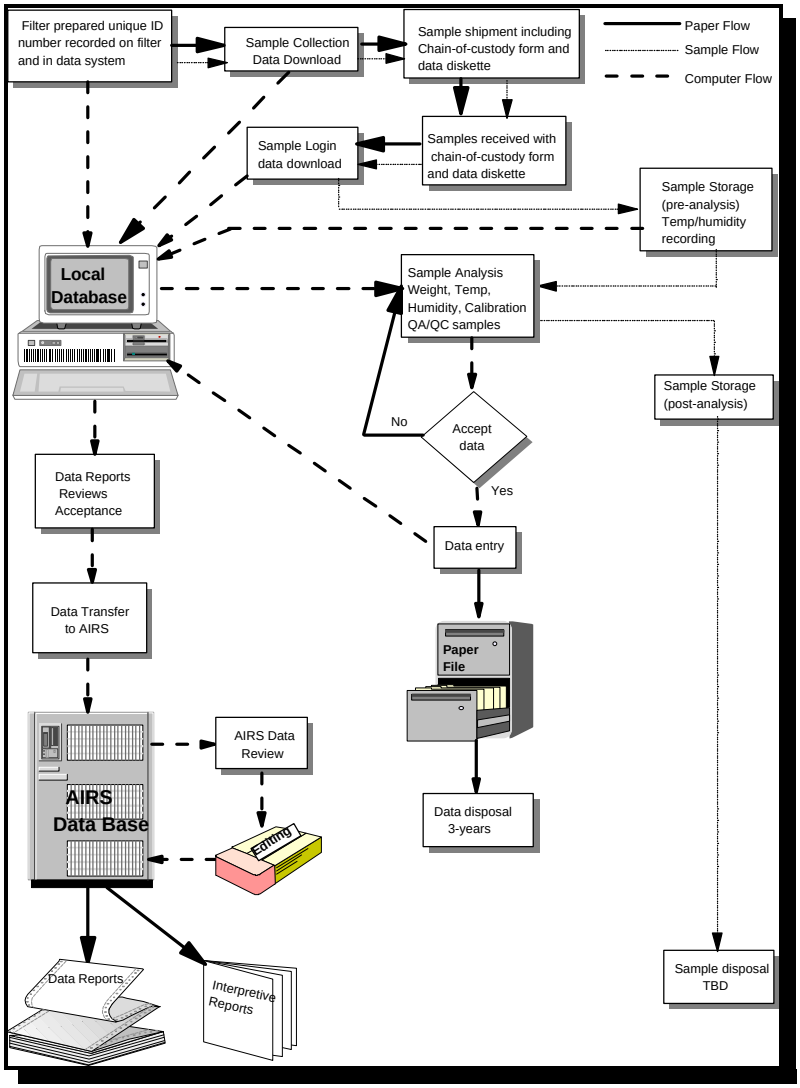


Figure 7.1 PEP information management flow

The conceptual design for the re-engineered AQS subsystem uses a relational database management system (DBMS) in a client-server architecture. The increased flexibility of the relational database and client-server architecture allows for growth and change.

To implement the new architecture, a UNIX server (or servers) running Oracle (v.7) relational database management software and Oracle SQL*Net will be used, with PC clients running Microsoft Windows 3.1 or above. Additional server software may be needed for job scheduling and output management. PCs will require Oracle SQL*Net, Oracle Discoverer/2000, the AIRS/AQS application, a Web browser, and X-Windows emulation. X-Windows is needed to access SAS Graphics.

The re-engineered AQS will incorporate a graphical user interface. A graphical user interface is more intuitive and easier to learn and navigate than a text based interface. The system will provide all Windows-style functionality, including point & click, pull-down menus, tool bars, on-screen prompts, a status bar, dialog boxes, check boxes, on-line help and documentation, multiple on-screen windows, edit/undo, and cut & paste. The interface will facilitate data entry as well as reporting and data retrieval. The system will provide on-line data entry screens with immediate error detection and correction, as well as a streamlined batch data submission process. Additional edit checks and validations will be in place, improving the quality of the data. Redesigned Edit/Update reports will be available, again to ensure that the data loaded into the database is of the highest quality. The system will provide a more efficient data certification procedure.

Communications Requirements for the Re-engineered AQS

The information management system will use TCP/IP (Internet) as the network communications protocol. The system should be developed to minimize the transfer of large amounts of information over the Network/ Internet.

- queries should run on the servers and return only a subset of information to the user's PC
- report previews should provide users with information on record counts before reports are run
- the information system should allow users to execute large print jobs remotely at off peak hours
- The information system should provide for remote storage of large files to minimize file transfers over the network

For performance reasons, the Region 4 and 10 laboratories will have dedicated Internet connectivity. Although dial up connectivity will be possible, the performance of dial-up access through an Internet provider will depend on the speed of the modem, the reliability of the provider, and the amount of traffic on the network.

8.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

8.1 Overview

An important concern in any organization that is collecting and evaluating environmental data must be the quality of the results. A quality system must be developed and documented to ensure that the PEP evaluation results:

- meet OAR's regulatory and scientific data needs;
- satisfy customers expectations;
- comply with applicable standards and specifications;
- comply with statutory (and other) requirements, and
- reflect consideration of cost and economics.

A quality system is a structured management system describing the policies, objectives, principles, organizational authority, responsibility, accountability, and implementation plan of an organization for ensuring quality in its work processes, products, and services. The PEP is a QA/QC procedure that is part of the quality system of the Ambient Air Quality Monitoring Program. However, the PEP must be able to evaluate and control the data quality within its own environmental data operations. Therefore, QA/QC procedures must be developed for the PEP. The following are key assumptions or ideas that should be kept in mind:

- **The DQO Process drives the quality system**- The DQO Process for the $PM_{2.5}$ program established the acceptable risk (decision error) for total bias at $\pm$ 10%. The PEP data will be used to assess total bias. Therefore, the PEP must control the quality of the PEP data so that this bias estimate can be made within a specified level of confidence.

- **QA/QC activities are required to evaluate and control PEP measurement system bias and precision-** The measurement system represents all data collection activities, from initial preparation of the filters, through field and laboratory activities, to data reduction and reporting. At each phase of this process, errors can enter the system. Development of QA/QC activities are necessary in order to understand where these errors are occurring, determine their magnitude, and to improve data quality.

- **Independent assessments and internal quality control are important**- Development of QA/QC activities requires both components. An independent assessment provides an objective review of the PEP measurement system. Technical system audits would be considered independent assessments. Internal quality control includes types of samples that allow personnel implementing the measurement system real-time information to evaluate and control measurement error in order to meet the DQOs. Collocated PE samples and the use of various blanks and duplicates will be used to evaluate and control various phases of the measurement system.

- **QA data represents routine data precision and bias**- The intent of a good quality system is to collect enough precision and bias information to adequately represent the measurement uncertainty of the routine PEP data with a specified degree of confidence.

To assure the quality of data from air monitoring measurements, two distinct and important interrelated functions must be performed. One function is the control of the measurement process
through broad quality assurance activities, such as establishing policies and procedures, developing data quality objectives, assigning roles and responsibilities, conducting oversight and
reviews, and implementing corrective actions. The other function is the control of the measurement process through the implementation of specific quality control procedures, such as audits, calibrations, checks, replicates, routine self-assessments, etc. In general, the greater the control of a given monitoring system, the better will be the resulting quality of the monitoring data.

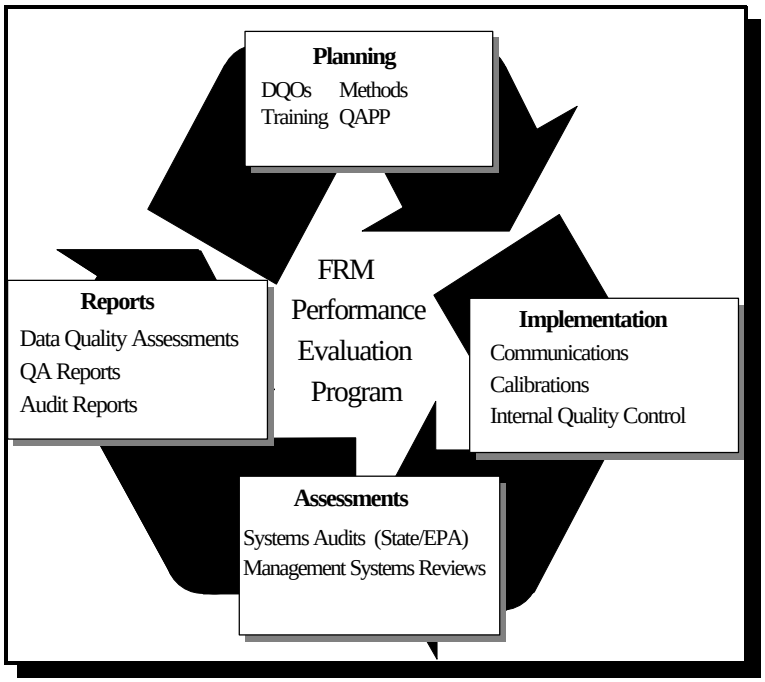


Figure 8.1 QA/QC activities for the FRM Performance Evaluation Program

The development of the QA/QC activities for the PEP requires a coordinated effort between EPA Headquarters and Regions, and the State and local monitoring community. Elements of the QA/QC activities include planning, implementation, assessment, and reporting, as illustrated in Figure 8.1. The topics within each element will be discussed in their perspective sections

This intent of this Section is to describe how the major phases of the PEP quality system will be implemented, not to describe the detailed technical aspects or rationale for the quality system. The quality system will be thoroughly described in the PEP QAPP. The implementation strategy will discuss the following sections:

- Communication
- Planning
- QA Roles and Responsibilities
- Implementation

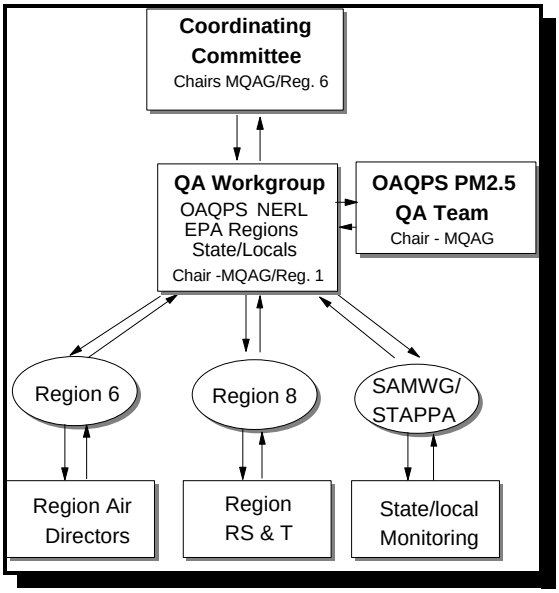


Figure 8.2 QA communication network

- Assessments
- Reporting

8.2 Communication

8.2.1 $PM_{2.5}$ QA Communication

The development of a quality system for $PM_{2.5}$ requires a coordinated effort between EPA Headquarters and Regions, and the State and local monitoring community. Figure 8.2 represents the communication network for QA activities of the $PM_{2.5}$ Monitoring Program, not the PEP. This communication network will be 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 (M. Kemp) and OAQPS/MQAG (L. Byrd) has been established to address issues related to the implementation of the $PM_{2.5}$ 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, described in earlier sections, 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.

OAQPS QA Team- The QA Team is made up of QA 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 Headquarters, Regions, ORD, and the State and local monitoring community. This group is ultimately responsible for the development of the quality system and its related guidance and training.

Region 6- In FY98, Region 6 is responsible for the coordination of monitoring activities. The Region is responsible for the assisting in the dissemination of information from OAQPS to the Regional Air Directors and coordinating the responses and issues from the Regions.

Region 8 - Similar to Region 6's responsibilities, Region 8 is responsible for acting as a liaison between OAQPS and the Regional Science and Technology (RS&T) Divisions. These Divisions will play an important role in the FRM PEP by assisting in the establishment of the two national weighing laboratories and a standards certification laboratory.

SAMWG/STAPPA/ALAPCO - These organizations represent the State and local perspective of the monitoring program and will participate on many of the QA conference calls. STAPPA/ALAPCO also has initiated a conference call with OAQPS and the Regions. The QA Workgroup chairs attend this conference call.

The coordination scheme presented in Figure 8.2 helps to ensure that all organizations with technical responsibility for program implementation are communicating and efficiently disseminating QA information.

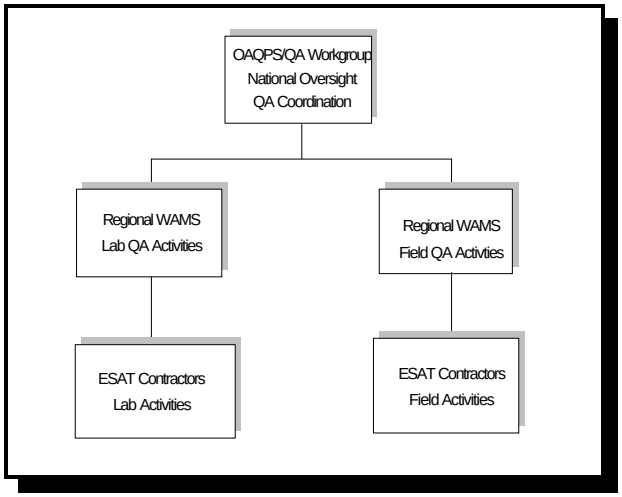


Figure 8.3 PEP QA Communication

8.2.2 QA Communication for the PEP

Figure 8.3 represents the QA Communication within the PEP. Regional WAMS will be responsible for handling routine QA communications with field and laboratory personnel. Once the PEP QAPP is completed and approved, issues related to QA will most likely be handled at the Regional level. Any important issues that are identified during implementation of the PEP that not covered in the QAPP will be directed to OAQPS. These issues will be addressed during QA Workgroup conference calls and resolved.

8.2.3 Ambient Monitoring Technology Information Center (AMTIC)

Another important avenue of communication on QA activities is the Ambient Monitoring Technical Information Center (AMTIC) on the Internet *(http:www.epa.gov/ttn/amtic)*. AMTIC presently has an area devoted to $PM_{2.5}$ monitoring. Included in this area is a topic on QA. Important information and guidance documents will posted in this area. In addition, a communication forum was developed that allows State/local organizations to post technical questions that are available for other organizations to read. EPA will utilize AMTIC extensively throughout the implementation process.

8.3 QA Roles and Responsibilities

The three major entities involved in the $PM_{2.5}$ implementation include the federal organizations (OAQPS, NERL and EPA Regions), State and local organizations, and ESAT Contractors. Following the theme of planning, implementation, assessment and reporting, Table 8-1 provides a list of the QA roles and responsibilities of these organizations. Table 8-1 illustrates that a number of activities (e.g., DQOs, field/laboratory training) are shared responsibilities that will be discussed and coordinated through the $PM_{2.5}$ QA Workgroup.

Table 8-1 QA Roles and Responsibilities

$PM_{2.5}$ QA Activities	
Activity/Organization	**Responsibilities (** * indicates a contributing role of review/comment/or assistance)
Planning	
OAQPS	QA Regs, DQOs, Implementation Plan, PEP QAPP, acceptance criteria, guidance documentation, training program, field/lab SOPs, AMTIC
NERL	QA Hand Book Document 2.12
EPA Regions	DQOs*, Implementation Plan*, PEP QAPP*, guidance documentation*, training*, field/lab SOPs*, technical systems audit
State/ Locals	PEP QAPP development*, program planning review*
ESAT Contractors	Review of Work Plan, SOPs, PEP QAPP, QA related guidance
Implementation	
OAQPS	field/laboratory training, QA Workgroup, AMTIC
NERL	Answering technical questions.
EPA Regions	ESAT WAM, QAPP approval, data reviews, quality control, corrective action , local training
State/ Locals	Routine monitoring including data verification/validation
ESAT Contractors	Training certification, internal QC implementation, data verification/validation
Assessments	
OAQPS	Management systems reviews, technical systems audits, data quality assessments, critical review reports
NERL	
EPA Regions	technical systems audits, data quality assessments
State/ Locals	technical systems audits, data quality assessments
ESAT Contractors	Performance audits, data quality assessments
Reporting	
OAQPS	P&A reports, QA reports, Data quality assessments, MSR reports
NERL	Special studies
EPA Regions	Technical system audit reports,
State/locals	Technical system audit reports, data reports
ESAT Contractors	QA reports,

8.4 Planning

The majority of the QA planning efforts will initially occur with the OAQPS QA Team and the QA Workgroup. These groups have contributed to the development of this Implementation Plan.

8.4.1 $PM_{2.5}$ Data Quality Objectives

During the spring and summer of 1997, OAQPS implemented the DQO process in order to identify the bias and precision required to make attainment/nonattainment decisions within a known level of confidence. In summary, precision should be controlled to 10% coefficient of variation and bias to $\pm$ 10% in order to make attainment decisions with a 95% probability of making the correct decision. The DQO process was used by the OAQPS QA team to develop the implementation requirements for the PEP and the acceptance criteria for various quality control samples implemented at the various measurement phases of the PEP data collection effort (Tables 8-2 and 8-3)

8.4.2 Methods

In order to ensure consistent implementation of $PM_{2.5}$ environmental data operations, the following methods have or will be developed:

QA Hand Book Document 2.12 **(completed 5/98)** - The National Exposure Research Laboratory developed this guidance document. *QA Hand Book Document 2.12* includes field and laboratory guidance for the routine operation of designated reference or class 1 equivalent methods. It is available on AMTIC. The final method will be incorporated into the *Quality Assurance Hand Book (QA Hand Book) for Air Pollution Measurement Systems- Volume II Ambient Air Specific Methods*.

FRM PEP SOPs - Detailed field and laboratory SOPs will be developed using *QA Hand Book Document 2.12*. The SOPs will include QA/QC procedures as indicated in Section 6.1.3.

8.4.3 PEP QA Project Plan

Planning for the development of the quality system will be implemented through the $PM_{2.5}$ QA Workgroup. The major planning document for this activity is the PEP QAPP. EPA policy requires that all projects involving the generation, acquisition, and use of environmental data be planned and documented and have an Agency-approved quality assurance project plan or QAPP prior to the start of data collection. The primary purpose of the QAPP is to provide an overview of the project, describe the need for the measurements, and define QA/QC activities to be applied to the project, all within a single document. The EPA QA Division has developed guidance for the development of QAPPs. These documents can be found on the Internet *(http://es.epa.gov/ncerqa/qa/)*. In order to help facilitate the generation of QAPPs at the State and local level, in April 1998, OAQPS and the $PM_{2.5}$ QA Workgroup developed the document entitled *Quality Assurance Guidance Document Model Quality Assurance Project Plan for the PM2.5 Ambient Air Monitoring Program at State and Local Air Monitoring Stations (SLAMS)*. This document is based upon EPA QA policy, guidance and regulation and will be used to generate the PEP QAPP which will be completed in December 1998.

8.4.4 QA Training

Training will be discussed in Section 9.0. The field and laboratory QA training will include:

- Calibrations
- Quality control activities
- Corrective actions requirements
- Data verification/validation
- QA reporting
-

OAQPS will be responsible for implementing the QA training activities.

8.5 QA/QC Implementation

Table 8-1 presents a listing of the implementation responsibilities of the organizations participating in the PEP. Implementation in the PEP quality system is defined as those quality assurance activities that attempt to evaluate and/or control either the entire measurement system or a phase of the system.

8.5.1 Calibrations

Calibration refers to the comparison of a measurement standard, instrument, or items with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustments. The PEP QAPP will identify any equipment or instrumentation that requires calibration to maintain acceptable performance and will indicate the acceptance criteria and the frequency of these calibrations along with corrective actions. Calibration activities follow a two step process:

1. Certifying the calibration standard and/or transfer standard against an authoritative standard. This activity will be accomplished once a year by the Region 10 standards certification laboratory implemented by ESAT contractors.
2 Comparing the calibration standard and or transfer standard against the routine sampling/analytical instruments. The frequency will be discussed in the PEP QAPP and will be implemented by the ESAT contractors.

As mentioned in bullet 1, a standards certification laboratory will be developed in Region 10. This lab will house a set of primary standards that will also be certified once a year against NIST standards. The primary standards will then be used to verify the calibration and verification standards that are used in the field. The transfer standard laboratory will set up a schedule to receive all the field standards in the November/December time frame for certification. SOPs for this operation will be developed by OAQPS and the Region 10 laboratory staff.

8.5.2 Quality Control

Quality Control (QC) is the overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer to fulfill requirements for quality. Figure 8.4 illustrates a number of QC tools, many of which will be used in the PEP and discussed in the PEP QAPP.

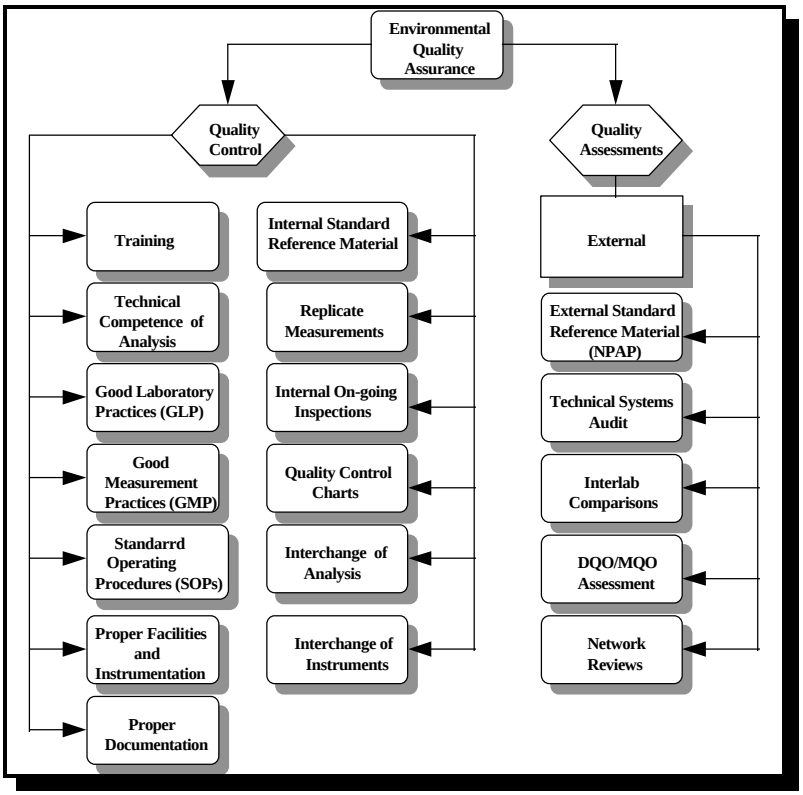


Figure 8.4 Types of Quality Control and Quality Assessment Activities

Figure 8.5 represents the flow of some of the more important QC samples that will be used to evaluate and control data quality at various phases of the PEP. Field and laboratory personnel will implement these checks. All of the required QA/QC activities are included in *QA Hand Book Document 2.12* and the *QA Hand Book.*

Tables 8-2 and 8-3 also summarizes the criteria and frequency of the QC checks that will be used in the laboratory and the field respectively. The PEP QAPP will describe the procedures for each check, the corrective actions to be taken if there is a failure, as well as the statistical formulas for assessing the data.

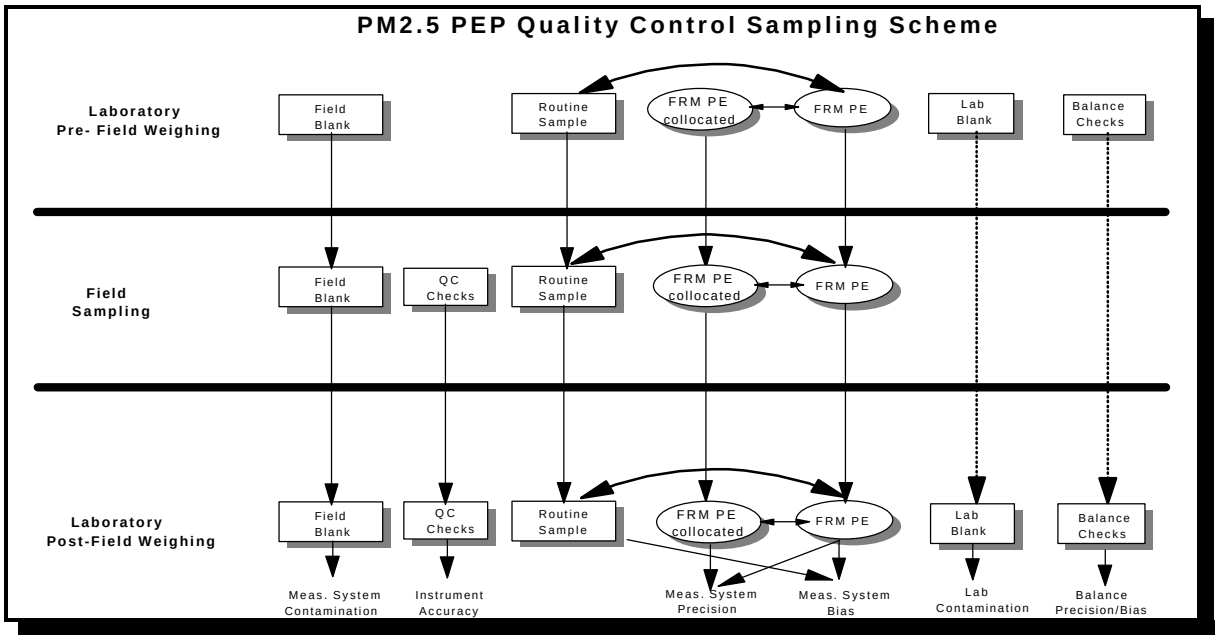


Figure 8.5 PEP QC sampling scheme

Table 8-2 Laboratory QC Checks

Requirement	Frequency	Acceptance Criteria	QA Hand Book Document 2.12	Information Provided
Blanks				
Lot Blanks	3-lot	±15 μg difference	2.12 Sec. 7	Filter stabilization/equilibrium
Lab Blanks	3 per batch	±15 μg difference	Part 50, App.L Sec 8.2 2.12 Sec. 7.10	Laboratory contamination
Calibration/Verification				
Balance Calibration	1/yr	Manufacturers spec.	2.12 sec 7.2	equipment operation
Temp. Calibration	3 mo	± 2 C	QAPP Sec. 13/16	equipment operation
Humidity Calibration	3 mo	±2%	QAPP Sec. 13/16	equipment operation
Accuracy				
Balance Audit	1/year	±15 μg for unexposed filters	2.12 Sec 10.2	Laboratory technician operation
Balance Check	beginning, every 10th samples, end	≤ 3 μg	2.12 Sec. 7.8	Balance accuracy/stability
Calibration standards				
Working Mass Stds.	3-6 mo.	25 μg	2.12 Sec 4.3 and 7.3	Standards verification
Primary Mass Stds.	1/yr	25 μg	"	Primary standards verification
Precision				
Duplicate filter	1 per weighing session	±15 μg difference	2.12 Tab 7-1 QAPP Sec. 13/16	Weighing repeatability/filter stability

Control Charts

Control charts will be used extensively in the PEP. They provide a graphical means of determining whether various phases of the measurement process are in statistical control. The PEP will utilize property charts which graph single measurements of a standard (e.g., balance check or transfer standard) or a mean of several measurements and will also develop precision charts which utilize the standard deviation of the measurement process. Table 8-4 indicates which QC samples will be control charted. The control charts will be utilized as an "early warning system" to evaluate trends in precision and bias and their use will be discussed in the PEP QAPP. Control charts will be incorporated into the information management system as discussed in Section 7.

Table 8-4 Control Charts

QC Check	**Plotting Technique**
Lot blanks	mean value of 3 blanks for each measurement
Lab humidity and temperature values	hourly and 24 hour means
Flow rate calibration verification check	single values plotted
Lab/Field Blanks	mean value of each batch
Flow rate audit	single values plotted
Balance check	mean value of each batch
Collocated monitoring pairs	Percent difference each pair charted by site coefficient of variation each pair coefficient of variation of all sites per quarter.
Duplicate filter weighing	Percent difference each pair

Table 8-3 Field QC Checks

Requirement	Frequency	Acceptance Criteria	CFR Reference	2.12 Reference	Information Provided
Calibration Standards					
Flow Rate Transfer Std.	1/yr	±2% of NIST-traceable Std.	Part 50, App.L Sec 9.1, 9.2	Sec. 6.3	Certification of Traceability
Field Thermometer	1/yr	± 0.1° C resolution	not described	Sec 4.2 and 8.3	Certification of Traceability
		± 0.5° C accuracy	not described	"	
Field Barometer	1/yr	± 1 mm Hg resolution	not described	"	Certification of Traceability
		± 5 mm Hg accuracy	not described	"	
Calibration/Verification					
Flow Rate (FR) Calibration	If multi-point failure	± 2% of transfer standard	Part 50, App.L, Sec 9.2	Sec 6.3 and 6.6	Calibration drift and memory effects
FR multi-point verification	1/yr	± 2% of transfer standard	Part 50, App.L, Sec 9.2.5	Sec 8.3	Calibration drift and memory effects
One point FR verification	every set-up	± 4% of transfer standard		Sec 8.3	Calibration drift and memory effects
External Leak Check	every 5 sampling events	80 mL/min	Part 50, App.L, Sec 7.4	Sec. 8.3	Sampler function
Internal Leak Check	every 5 sampling events	80 mL/min	"	Sec. 8.3	Sampler function
Temperature Calibration	If multi-point failure	± 2% of standard	Part 50, App.L, Sec 9.3	Sec. 6.4	Calibration drift and memory effects
Temp multi-point verification	on installation, then 1/yr	± 2 C of standard	Part 50, App.L, Sec 9.3	Sec. 6.4 and 8.2	Calibration drift and memory effects
One- point temp Verification	1/ week	± 4 C of standard	"	Sec. 6.4 and 8.2	Calibration drift and memory effects
Pressure Calibration	on installation, then 1/yr 1/	±10 mm Hg	"	Sec. 6.5	Calibration drift and memory effects
Pressure Verification	week	±10 mm Hg	"	Sec. 8.2	Calibration drift and memory effects
Clock/timer Verification	1/ week	1 min/mo	Part 50, App.L, Sec 7.4	not described	Verification of proper function
Blanks					
Field Blanks	1/week/instrument	±30 μg	Part 50, App.L Sec 8.2	Sec. 7.10	Measurement system contamination
Precision Checks					
Collocated samples	every 6 days	CV ≤ 10%	Part 58, App.A, Sec 3.5,	Sec. 10.3	Measurement system precision
Accuracy					
Flow rate audit	1/3mo (manual)	± 4% of transfer standard	Part 58, App A, Sec 3.5.1	Sec. 8.1	Instrument bias/accuracy
External Leak Check	4/yr	< 80 mL/min			Sampler function
Internal Leak Check	4/yr	< 80 mL/min	not described	"	Sampler function
Temperature Check	4/yr	± 2 C	not described	"	Calibration drift and memory effects
Pressure Check	4/yr (?)	±10 mm Hg	not described	"	Calibration drift and memory effects
Audits (*external assessments*)					
FRM Performance audit	25% of sites 4/yr	± 10%	Part 58, App A, Sec 3.5.3	Sec 10.3	Measurement system bias
Flow rate audit	1/yr	± 4% of audit standard	not described	Sec 10.2	External verification bias/accuracy
External Leak Check	1/yr	< 80 mL/min	not described		Sampler function
Internal Leak Check	1/yr	< 80 mL/min	not described		Sampler function
Temperature Audit	1/yr	± 2 C	not described		Calibration drift and memory effects
Pressure Audit	1/yr	±10 mm Hg	not described		Calibration drift and memory effects

8.6 Assessments

An assessment is an evaluation process used to measure the performance or effectiveness of the system and its elements. For the PEP, assessments will include: technical systems audits, management systems reviews, and peer review. Table 8-1 indicates the organizations responsible for the various assessments.

The quality system for $PM_{2.5}$ has been developed at three levels of oversight. Since EPA policy states that data collected using the public resources must have a quality system in place and it also states that quality assurance is an inherently governmental function, OAQPS and the EPA Regions have developed a quality system that will allow for independent assessments of the quality assurance program to ensure that the DQOs are met.

Technical Systems Audit (TSA) - A systems audit is an on-site review and inspection of a State or local agency's ambient air monitoring program to assess its compliance with established regulations governing the collection, analysis, validation, and reporting of ambient air quality data. Both OAQPS and the EPA Regions will perform technical systems audits of the field and laboratory activities. The frequency of the audits will be determined through the $PM_{2.5}$ QA Workgroup. Key personnel to be interviewed during the audit are those individuals with responsibilities for: planning, field operations, laboratory operations, QA/QC, data management, and reporting.

To increase uniformity of the TSA, an audit checklist will be developed and used. It will review activities similar to the training certification forms but be more detailed. OAQPS will work with the Regions in developing this checklist

The auditor will prepare a brief written summary of findings, organized into the following areas: planning, field operations, laboratory operations, quality assurance/quality control, data management, and reporting. Problems with specific areas should be discussed and an attempt made to rank them in order of their potential impact on data quality. For the more serious of these problems, audit findings will be drafted from which corrective actions will be implemented.

Management Systems Reviews (MSR) - This is a qualitative assessment of a data collection operation or organization to establish whether the prevailing quality management structure, policies, practices, and procedures are adequate for ensuring that the type and quality of data needed are obtained. This would allow OAQPS to assess consistency of operation among the Regions and improve the quality system. The MQAG QA Team proposes implementing ~3 management systems reviews each year of the EPA Regions on their implementation of the Ambient Air Monitoring Program and will include a review of PEP activities. There is a potential that OAQPS will team up with the EPA QA Division during their management systems reviews of the Regions. Implementation of MSRs are anticipated in FY99.

Peer Review - is a documented critical review of work products conducted by qualified individuals who are independent of those performing the work but are collectively equivalent in technical expertise. The OAQPS plans on using the peer review process to assess it products and guidance. The use of the $PM_{2.5}$ QA Workgroup and the distribution of the PEP documents on AMTIC will serve as peer review.

8.7 Reporting

Many of the QC checks discussed above result in measurement data that can be used to compute and report statistical indicators of data quality to interested parties. The following types of reports are anticipated:

Data quality assessment (DQA) -is the scientific and statistical evaluation to determine if data are of the right type, quality, and quantity to support their intended use. The PEP QA/QC data can be statistically assessed at various levels of aggregation to determine its quality. The statistics to be used to evaluate precision and bias will be included in the PEP QAPP. DQAs will primarily be the responsibility of the EPA Regions (Regional assessments) and OAQPS (National assessments). ESAT contractors will also perform various assessments on the PE data.

P & A Reports - These reports will be generated quarterly and annually and evaluate the precision and bias data against the acceptance criteria using the statistics documented in *40 CFR Part 58*. These reports will be generated through the AIRS system and will be responsibility of OAQPS.

Assessment Reports - Technical systems audits and network reviews will be on file at the EPA Regional office, and OAQPS. The audit check sheets will be sent to OAQPS for central filing. AIRS will include an audit tracking area that will allow for the placement of dates when an audit was implemented. Management systems reviews will be on file in MQAG with tracking information on AIRS.

QA Reports - A QA report provides an evaluation of QA/QC data for a given time period to determine whether the data quality objectives were met. This report will be more evaluative in nature than the P&A reports in that it will combine the various assessments and the QA data to report on the overall quality system. OAQPS will generate a national QA report which will devote a section to the PEP and its resultant data quality. It is anticipated that the Regions, with assistance from the ESAT contractors, will develop QA reports and information from each Region that will be “stand alone” for the Region but also be incorporated into the national report. The criteria and elements to be included in the QA reports will be determined through $PM_{2.5}$ QA workgroup discussions.

9.0 TRAINING/CERTIFICATION OF PERSONNEL

The OAQPS will develop a two-fold training program. The first aspect of the training program is to ensure all monitoring personnel have a baseline level of knowledge concerning the $PM_{2.5}$ monitoring network, the principles of $PM_{2.5}$ monitoring, the operation of a $PM_{2.5}$ monitor, and the quality assurance procedures. This phase of training is ongoing and includes:

- national broadcasts of the specific subject matter
- air pollution training institute courses
- national level conferences and workshops
- training videos
- development of an Air Training Facility for hands-on experience
- national and regional level conference calls
- individual one-on-one sessions upon request

Training information for $PM_{2.5}$ is available on the AMTIC Bulletin Board *(http://www.epa.gov/ttn/amtic/pmtrn.html)*

The second phase of training specifically concerns the FRM PEP. This phase includes:

- five specific extensive hands-on training sessions (2 field, 2 laboratory, 1 certification laboratory), sponsored and developed by OAQPS, involving the ESAT contractors, Regional personnel, and State/local agency personnel
- a certification program to 'certify' the ESAT field and laboratory personnel. This certification will involve a written test as well as a performance test. Failure of either of these tests will result in retraining until successful certification.
- a series of national broadcasts, seminars, workshops, etc. to inform the State/local personnel of the procedures, SOPs, and principles of the performance evaluation

9.1 QAQPS Training Facilities

OAQPS has developed an Air Training Facility (ATF), with the objectives to:

- develop internal expertise in fine particulate monitoring and gravimetric analysis
- have monitoring equipment readily accessible to EPA staff for questions and concerns
- perform training of personnel: EPA staff, Regions, State and local agencies
- perform special studies: study monitor performance, evaluate measurement uncertainty
- perform research studies for future monitoring activities

The ATF is presently being set up to cover the needs of the $PM_{2.5}$ program and includes a field platform for training on monitor operations and a $PM_{2.5}$ weighing room facility. Both facilities are operable and will be used extensively in the program for both training and research needs.

9.2 Training Program

The field and laboratory training program will involve four phases:

1. **Classroom lecture**- will include an overall review of the $PM_{2.5}$ program and it's relation to the PEP. Classroom lectures will also be implemented for each training module (see below)
2. **Hands-on activities**- After a class room lecture, personnel will be taken to the training area where the field/lab activities will be demonstrated and then the trainees will perform under instruction
3. **Certification-Written exam-** a written test to cover the activities of importance in each of the training modules
4. **Certification-Performance evaluation**- this is a review of the actual field implementation activities under evaluation by the trainer/evaluator. Appendix A contains draft forms for this review.

Trainers will include OAQPS personnel from the MQAG QA Team and contractors who have developed the PEP field/lab SOPs and *QA Hand Book Document 2.12.*

9.3 FY 98 Field Training

Prior to implementation on 1/1/99, all personnel involved in the field aspects of the PEP will be trained. Personnel include EPA Regional WAMs and ESAT contractors. In addition, any State and local agencies are welcome to attend this training.

In FY98 the actual dates of training will be dependent on the designation of the portable instruments as federal reference methods and then the subsequent ordering and delivery of these instruments. Training is initially scheduled for the November 1998 time frame.

Two field training activities will occur; one in Research Triangle Park (RTP), NC at the Air Training Facility (ATF); the other is tentatively scheduled for the EPA Facility in Las Vegas, NV. Field personnel supported by the Region 4 (Table 4.2) laboratory will attend the RTP session while those supported by the Region 10 laboratory will attend the Las Vegas session.

Field training is expected to last three full days; two days of lecture and hands-on, and one day of training certification. Trainers and trainees may be required to be available a fourth day for any individuals requiring additional training.

Field Training Modules

Field training will be segregated into the following discreet modules:

- site visit scheduling
- communication
- equipment inventory and maintenance
- filter receipt (from lab)/ storage/tracking
- calibration/verification
- monitor set-up/filter installation
- filter removal/storage/shipping
- data download/storage/transfer
- QA/QC
- monitor disassembly/packing
- documentation /filing/records

9.4 Laboratory Training

Two types of laboratory training will occur, one for the routine PEP filter preparation/weighing activities in Regions 4 and 10 and training for the standards certification laboratory in Region 10.

9.4.1 PEP Weighing Laboratory Training

The lab training sessions will be held at the two National laboratories in Regions 4 and 10. Tentative scheduling for this activity is September 1998. Lab training is expected to last two days; the first to include an overview and hands on training, and the second for testing/certification. The Region 4 and 10 WAMs and the ESAT lab contractors will be trained in the modules listed below:

- equipment inventory/maintenance
- communications (Regions/ State and locals)
- calibrations
- filter conditioning
- filter shipping (to field)/receipt/chain-of-custody/archiving
- filter handling
- pre-sampling and post-sampling weighing
- data entry/transfer
- QA/QC activities
- documentation/filing

9.4.2 Standards Certification Laboratory

Training for personnel at the standards certification laboratory will occur the days following the Region 10 weighing lab training. The modules for this activity will include:

- equipment inventory/maintenance
- communications
- primary standard certification/traceability
- field equipment receipt/log-in/ examination
- transfer standards certification procedure
- data entry
- QA/QC activities
- Documentation/filing

9.5 Certification

Certification will help to ensure that field and laboratory personnel are sufficiently trained to perform the necessary PEP activities at a level that does not compromise data quality and also inspires confidence in the PEP by the State and local agencies.

Both the written exam and the performance review are considered part of the certification requirements. The written exam is gauged to a review of the more critical aspects of the PEP and to identify where the individual requires additional training. The written test will be generated by OAQPS and reviewed/approved by a select group of State and local agencies. The performance evaluation is focused on ensuring that the individual understands and follows the SOPs. The trainer(s) will evaluate the trainees implementation of the modules identified in the field and lab sections above. Appendix A provides a draft of the type of forms that will be used during the performance evaluation.

The intent of the certification activities is not to fail individuals but to determine where additional training is required in order to ensure that the PEP is implemented comparably across the Nation. By testing, evaluating and scoring each module, the trainer(s) will be able to identify where individuals will require additional training. If there are enough individuals failing a particular module, it may also indicate that the classroom or hands-on training were not appropriate. In any case, failure by individuals of parts of either written or performance evaluation will indicate that additional training in these areas are required. Trainees will be required to attend additional training on these modules. Trainers will be available for an additional day of field/lab training and will ensure personnel are certified by the end of the training session.

If the certification/retraining activities identifies individuals that appear to be incapable of performing the field/lab activities, the ESAT Regional Project Officers will be notified and appropriate action will be taken.

9.6 Additional/Out Year Training

It is expected that there will be contractor personnel turnover and therefore the need for additional training. Regional ESAT WAMs will be trained and certified along with ESAT contractors. These WAMs will be given all training course material and will be certified to train additional ESAT personnel. In addition, OAQPS will make available to the Regions an opportunity for training additional personnel by two mechanisms:

- Individual training any time at the RTP ATF.
- Scheduled training across the country- OAQPS will work with the Regions to schedule additional training at sites across the nation at some scheduled frequency (i.e., two times a year).

OAQPS will work with the $PM_{2.5}$ QA Workgroup in order to develop an implementation schedule for this activity

10.0 ASSESSMENT AND REPORTING

The Office of Air Quality Planning and Standards (OAQPS) uses assessments and reports to evaluate and improve the quality of the routine air quality data. The assessments are an independent process of evaluating the ability of an organization to function as documented and help ensure the integrity of environmental data collection programs. This environmental data is the basis for regulatory and guidance development and compliance assessment across OAQPS and the Agency. The FRM PEP is one type of independent assessment that OAQPS uses to evaluate the measurement uncertainty of the data. In order to ensure the quality of PEP data, it will undergo a number of assessments and reporting activities, many of which have been already described in Sections 8.6 and 8.7. This section will focus on the process of evaluating the routine data collected by the State and local organizations to the PEP data collected by the ESAT contractors.

One criteria that must be met prior to evaluating the routine monitoring and the PEP data is establishing confidence in the quality of the data. In order to provide this confidence, the data must:

- have been collected as required in approved SOPs
- followed all QA procedures as documented in approved QAPPs
- be verified/validated in a consistent manner
- be of known quality (precision /bias)

Although State and locals and the PEP will develop SOPs and QAPPs independently, all organizations will be using the same regulations and guidance (*QA Hand Book Document 2.12*) which will serve to generate comparable data. It is also anticipated that a consistent method of validating data will be developed by 1/1/99 that all organizations will be encouraged to follow. The PEP will follow this validation scheme.

PEP Data Reporting

As mentioned in CFR and earlier in this document, the intent of the PEP is to provide for an NPAP like evaluation. The NPAP provides for a somewhat independent assessment of bias in that the concentrations or values of the audit devices are unknown to the agency being evaluated and the data evaluation occurs at a level independent of the organization being evaluated. The PEP data reporting scheme will follow a similar process. Once data is accepted by the Region 4 or 10 WAM, it will be uploaded for reporting purposes to AIRS. It is expected that the PE data would be uploaded to AIRS by the ESAT contractor within 15 working days of post-sample weighing.

Routine Data Reporting

State and local organizations, are required to submit routine data within 90 days from the end of the quarter the data was collected. It is hoped that data for samples from which a PE was conducted could be uploaded in a quicker time frame in order for evaluations of this information to take place.

Data Quality Assessments (DQA)

As mentioned in Section 8, a DQA is the scientific and statistical evaluation to determine if data are of the right type, quality, and quantity to support their intended use. Since DQOs have been developed for the $PM_{2.5}$ attainment/nonattainment objective, the PEP data can be statistically assessed at various levels of aggregation to determine whether the DQOs have been attained. Data quality assessments will be aggregated at the following three levels.

1. **Monitor**- monitor/method designation
2. **Reporting Organization**- monitors in a method designation, all monitors
3. **National** - monitors in a method designation, all monitors

OAQPS felt it important to stratify monitors by method designation in order to assist in the determination of instrument specific bias.

The statistical calculations for the DQAs are found in *40 CFR Part 58 Appendix A.* Once both the routine and PE data are in AIRS , these calculations will be performed on the data which will allow for the generation of reports at the levels specified above.

Since the DQO is based upon the NAAQS, which are based upon three years of data from individual monitors, it is important to assess the PE data against the DQO at the same frequency and level of aggregation. However, since the evaluation frequency of the PEP is 25% , any one monitor would receive an evaluation once every four years. Therefore, the PE data has limited use at the monitor level of aggregation, other than the actual assessment of the particular monitor. As one moves to the reporting organization and national levels there will be sufficient amount of data to evaluate bias.

Over the FY98 and 99 time frame, OAQPS, with the assistance of the QA Workgroup and contractors, will develop the appropriate statistical techniques for assessing the data at the levels of aggregation mentioned above. The assessments will include the consequences of failing to meet the acceptable levels of bias. Consequences for failure to meet acceptance criteria can be developed at the same three levels:

1. **Monitor** - Flagging data and development of corrective action (i.e., immediately conduct another PE)

2. **Reporting Organization** - Additional QA/QC procedures and corrective action
3. **National** - Potential for decertification of method designation, additional field/lab study of instrument.

The actual details of these activities will be included in the *QA Handbook for Air Pollution Measurement Systems- Volume II Ambient Air Specific Methods*

11.0 SUMMARY

The intent of this Implementation Plan is to describe the implementation of the PEP, identify how and when various activities will be accomplished and who is responsible to accomplish them. It is intended to establish a framework for communication among the organizations participating in this program, as well as allowing interested parties to understand the implementation aspects of the PEP.

It must be understood that this document represents the current thinking (based on the date of the document) of the organizations that helped develop the information. As the PEP progresses, and strategies or implementation activities change, the Implementation Plan will change to reflect this. After the completion of each calendar year of implementation, the Implementation Plan will be reviewed and revised as necessary.

11.1 Potential Problems and Resolutions

As with any large program, problems are to be expected. Communication is the most important mechanism for solving problems and avoiding the same problems recurring. The communication strategies developed in this Implementation Plan should ensure a quick resolution of issues and a dissemination of this information to all parties.

The following are some potential problems and solutions.

Program Implementation Issues

ESAT Contract- The PEP is currently utilizing the ESAT contracts as the vehicle for providing field and laboratory personnel to implement the program. The contracts will run out in various years and although they are expected to be renewed, contingencies for this not occurring should be developed. OAQPS has included language into the National Performance Audit Program contract for the PEP.

State and local implementation- At some point, State and local agencies may decide to implement the PEP. Mechanisms for this are discussed in Section 5. There may come a time when using the ESAT contract in all Regions may not be cost efficient. Based upon the schedule for STAG fund distribution, the $PM_{2.5}$ QA Workgroup should be able to review this information in enough time to make decisions on resource allocations to each Region and how best to implement the PEP.

Field/Laboratory Issues

There can be a number issues related to field and laboratory activities such as:

Personnel-Due to injury, sickness, or unexpected leave, ESAT personnel may not be available to perform field and laboratory activities. In certain circumstances these unplanned absences may not pose a problem, in other cases they may. Resolutions for this issue may be:

- ensuring additional ESAT personnel are trained and available
- EPA Regional personnel (WAMs) replacements
- OAQPS and/or contractor (if trained/certified) replacements

In addition, site visit schedules (see Section 6) should be developed with a ceratin amount of downtime to allow for short delays.

Field site problems- such as:

- power failure constant, intermittent, or insufficient for additional sampler
- routine site sampler not operational
- room to appropriately collocate the audit sampler with the routine sampler not available

will delay or postpone site visits. These issues will be recorded by the site operator who will inform the Regional WAM by phone as soon as possible. Since the Regional WAM will be contacting reporting organizations one week prior to the visit, issues like the ones mentioned above may be resolved prior to implementation. Replacement sites may eventually have to be selected in order to meet the PEP site visit requirements.

Equipment malfunctions- Field and laboratory equipment may malfunction. Spare equipment for critical equipment like portable monitors, balances, and laptops have been purchased and should reduce downtime. In addition, maintenance agreements will be purchased for balance repairs.

Appendices

Appendix A

Training Certification Evaluation Forms

The following forms will be used by the PEP Trainers to certify the $PM_{2.5}$ field and laboratory personnel have performed environmental data operations at a satisfactory level.

Training Certification Evaluation Form
Field Sampling Procedures

Trainee: _____ Date _____

Evaluator: _____ Score: _____

Activity	Successful	Comment
Prepare for Site Visit on Scheduled Date/time		
1) Preweighed sampling filter in cassette, packed in a labeled metal carrier. Also take spares.		
2) Three preweighed field blank filters in cassettes, packed in labeled metal carriers, if a field blank study is scheduled		
3) $PM_{2.5}$ Sampler Run Data Sheet for each sampler, site notebook; calculator		
4) Transfer standard for ambient temperature measurements		
5) Transfer standard for ambient atmospheric pressure measurements		
6) Transfer standard for volumetric flow-rate measurements		
7) Laptop computer and connecting cables to download sampler data		
8) Spare parts and tools to include O-rings, silicone grease, lab wipes, voltmeter, etc.		
9) Operator's manual for sampler(s) to be serviced		
SCORE	/9	
Fifth Day Maintenance Check		
1) Clean impactor well assembly or filter/lab wipes/diffusion oil to clean and service the one at the site		
2) Sample inlet adapter and flow rate measurement transfer standard		
3) Clean, unused flow check filter in its cassette		
4) Sampler Flow Check Data Sheet		
SCORE	/4	
Install Filter/Cassette and Begin Sampler Operations		
1) Remove the new filter/cassette from its protective metal case and visually inspect the filter/cassette for flaws. Verify that this is the correct filter for this sampler, site, and run date		
2) Be sure sampler is **not** operating.		

Activity	Successful	Comment
3) Fill in initial information on $PM_{2.5}$ Run Data Sheet.		
4) Remove the sampler's filter holder assembly (if required by the manufacturer's instructions). Inspect the O-rings inside the filter holder.		
5) Install the filter/cassette in the filter holder assembly, and then install the loaded filter holder assembly in the sampler per the manufacturer's instructions. If you touch or scratch the filter, void the filter and get another one from the set of extra filters brought to the site.		
6) Program the sampler to energize at the beginning of a sampling period (consult the instruction manual).		
7) Make independent measurements of ambient temperature (T_a) and ambient pressure (P_a) using transfer standards. Record these values and the T_a and P_a values indicated by the sampler on the data sheet		
8) Ensure that the sampler(s) begins operation at the designated time. Record the start time on the data sheet. 15 minutes after sampling begins, record the sampler's display value for the indicated flow rate, Q, in L/min on the data sheet.		
SCORE	/8	
Remove Filter/Cassette; End Sampling Operations		
1) Determine P_a and T_a using transfer standards. Enter on data sheet.		
2) When sampling ends, record stop time, total elapsed time, final Q, Q_{avg}, Q_{cv}, total volume sampled, T_a, P_a, etc, on data sheet		
3) After each completed run, download data from the sampler data port to a laptop or other computer storage disk.		
4) Open the filter holder assembly (consult the instruction manual); remove the used filter/cassette; visually inspect the filter for tears, oil, insects, moisture, etc; and record observations on the data sheet.		
5) Place the filter/cassette inside a properly labeled protective metal container. Verify the container's label versus the site name, date, etc.		
6) Place the metal container inside a cooled storage chest. Do not allow the metal container to come into contact with ice or water. Sealed cooling blocks are recommended. Protect the containers from condensed water.		
7) Inspect the interior of the filter housing. Note any abnormalities.		
8) Inspect the interior of the impactor housing and the exterior of the impactor well. Remove any moisture or dust with a lint-free wipe and make notes on the data sheet.		

Activity	Successful	Comment
9) Without opening the impactor well, inspect the well's interior. Note any abnormalities. Clean or replace the impactor well if necessary or if the recommended 5-day servicing is due. Reinstall the impactor assembly. (If another sampling run is to begin, insert a new filter/cassette in the filter holder assembly and set up the sampler for the next run.)		
10) Review the recorded data for sample elapsed time, flow rate, filter quality, and temperature to start the process of determining if the sample is valid, questionable, or invalid. Scan through the sampling summary on the sampler display and note flags. Record observations and reasoning for questioning or invalidating a run on the data sheet.		
11) Make a final check of the site, and observe and record the presence of any activity that may have affected the particulate loading of the sample.		
12) Keep the metal container holding the filter/cassette at a temperature of less than 25 C (preferably cooled to 4 C), and promptly deliver it and the original of the data sheet to the sample custodian or balance operator in the weighing laboratory. Keep a copy of the data sheet with the site records.		
SCORE	/12	
FINAL SCORE	/33	
PERCENTAGE	%	

Training Certification Evaluation Form
Laboratory Procedures

Trainee: _____ Date _____

Evaluator: _____ Score: _____

Activity	Successful	Comments
PRESAMPLING PROCEDURES		
1) Clean the microbalance's weighing chamber with a fine brush, if necessary.		
2) Zero (i.e., tare) and calibrate the microbalance according to the manufacturer's directions. Record the tare weight on the laboratory data form and in the laboratory notebook or database.		
3) Using smooth, nonserrated, nonmetallic forceps, weigh two working mass reference standards as a QC check. Wait until the microbalance's display has remained steady for 30 to 60 seconds or until the microbalance indicates that a stable reading has been obtained. Record the certified and measured values of these standards on the laboratory data form and in the laboratory notebook or database.		
4) Record the relative humidity and temperature of the conditioning chamber on the laboratory data form and in the laboratory QC notebook or database.		
5) Laboratory blank filters and the current sampling interval's field blank filters should be weighed at least once in each weighing session. If many filters are weighed, you may want to weigh the set of laboratory blanks more than once. A new set of three laboratory blanks should be established for each distinct filter lot		
6) Weigh the filters. Operate the balance according to the balance manufacturer's directions. Take the filter from its filter-handling container (petri dish or equivalent) by gently slipping the filter-handling forceps under the outer polyolefin support ring. Hold the filter only by the ring. Place the filter, reinforcing ring side up, on a ^{210}Po Antistatic strip for 30 to 60 seconds. The Antistatic strip should be inside the weighing chamber or as close to the chamber door as is practical. Immediately transfer the filter to the microbalance's pan and close the weighing chamber door. After the microbalance's display has remained steady for at least 60 seconds or until the microbalance indicates that a stable reading has been obtained, record the balance number, the sampler number the filter is intended to be used with, the filter number, the filter lot number, and the filter's tare weight (presampling mass) on the laboratory data form.		

Activity	Successful	Comments
7) After every tenth filter weighing, the analyst should rezero the microbalance and reweigh the two working standards. Record the zero and working standard measurements on the laboratory data form and the laboratory QC notebook or database. If the zero and working standard measurements disagree from the first measurements of the day by more than 3 µg (i.e., three times the microbalance's reproducibility), repeat the zeroing process and reweigh the working standards. If the two measurements still disagree, contact the laboratory's QC supervisor, who may direct the analyst to (1) reweigh the previously weighed filters and/or (2) troubleshoot or repair the microbalance and repeat the weighing session.		
8) Newer microbalances are so easily rezeroed that analysts may elect to rezero before each weighing.		
9) Any unused filter whose weight is outside the normal range (i.e., 110 to 160 mg) must be investigated. If there is a consistent negative replication (>15 µg) for laboratory blank filters, it is usually a sign that the filters have not equilibrated long enough. In this case, notify the QC supervisor.		
10) Return the filter to the filter-handling container, replace the lid, and return it to storage.		
11) Prior to filters being taken to the sites, install each filter in a filter cassette, and put the filter/cassette assembly into a protective container for transport to the sampler. Attach a label with the sampler number and the unique filter number to the outside of the protective container. This label will also be used to identify the upcoming sample run date. Record the sampler number, sample date, and filter number on the $PM_{2.5}$ Sampler Run Data Sheet. Double-check the entries in the laboratory data form. Prepare several extra filters in case a filter is invalidated during the installation process.		
12) If filters are to be mailed, the field operator should be supplied with reinforcing envelopes or some other means (in addition to the protective container) to protect exposed filters during their shipment back to the analytical laboratory.		
SCORE	/12	
POSTSAMPLING DOCUMENTATION/INSPECTION PROCEDURES		
1) Examine the field data sheet. Determine whether all data needed to verify sample validity and to calculate mass concentration (e.g., average flow rate, ambient temperature and barometric pressure, and elapsed time) are provided. If data are missing or unobtainable from a field operator or if a sampler malfunction is evident, discard the filter and record in the laboratory data form that the sample has been voided and the reason. Notify the QC supervisor		

Activity	Successful	Comments
2) If the shipment was to be kept cold, verify that the temperature of the cooler's interior was maintained at the desired point, usually less than 4 C. If the protective metal container is cold, allow it to warm to the filter conditioning environment's temperature before opening, to preclude water condensation on a cold filter. Remove the filter from its protective container and examine the container. If particulate matter or debris is found in the protective container after the filter has been removed, record notes on the laboratory data form that the sample has been voided and the reason. Save the filter for inspection by the QC supervisor.		
3) Match the sampler number with the correct laboratory data form on which the original microbalance number, filter number, presampling filter weight, and other information were inscribed. Group filters according to the microbalance used to determine their initial tare weights. Initial separation of filters in this way will eliminate the risk of a measurement error that could result from the use of different microbalances for pre- and postsampling weighings.		
4) Remove the filter from both the protective container and the filter cassette. Be careful not to touch or otherwise disturb the filter and its contents. Transfer the filter to a filter-handling container labeled with the corresponding filter number. Place the used filter in the container "dirty-side" up. Keep the particles from contact with the walls of the container. The filter must be handled with clean, smooth forceps and must not be touched by hands. Inspect the filter for any damage that may have occurred during sampling. If any damage is found, void the sample, and record on the laboratory data form that the sample has been voided and why. Retain the filter for inspection by the QC supervisor.		
5) Transfer the filter in its filter-handling container to the conditioning chamber.		
6) Allow the filter to condition for not less than 24 hours		
SCORE	/6	
POST SAMPLING FILTER WEIGHING		
1) Group filters according to the microbalance used for pre-weighing and by their filter numbers. Reweigh each filter on the same microbalance on which its presampling weight was obtained.		
2) Clean the microbalance's weighing chamber with a fine brush, if necessary.		
3) Zero (i.e., tare) and calibrate the microbalance according to the manufacturer's directions. Record the tare weight on the laboratory data form and in the laboratory notebook or database.		

Activity	Successful	Comments
4) Using smooth, nonserrated, nonmetallic forceps, weigh two working mass reference standards as a QC check. Wait until the microbalance's display has remained steady for 30 to 60 seconds or until the microbalance indicates that a stable reading has been obtained. Record the certified and measured values of these standards on the laboratory data form and in the laboratory notebook or database.		
5) Record the relative humidity and temperature of the conditioning chamber on the laboratory data form and in the laboratory QC notebook or database.		
6) Laboratory blank filters and the current sampling interval's field blank filters should be weighed at least once in each weighing session. If many filters are weighed, you may want to weigh the set of laboratory blanks more than once. A new set of three laboratory blanks should be established for each distinct filter lot		
7) Weigh the filters. Operate the balance according to the balance manufacturer's directions. Take the filter from its filter-handling container (petri dish or equivalent) by gently slipping the filter-handling forceps under the outer polyolefin support ring. Hold the filter only by the ring. Place the filter, reinforcing ring side up, on a ^{210}Po Antistatic strip for 30 to 60 seconds. The Antistatic strip should be inside the weighing chamber or as close to the chamber door as is practical. Immediately transfer the filter to the microbalance's pan and close the weighing chamber door. After the microbalance's display has remained steady for at least 60 seconds or until the microbalance indicates that a stable reading has been obtained, record the balance number, the sampler number the filter is intended to be used with, the filter number, the filter lot number, and the filter's tare weight (presampling mass) on the laboratory data form.		
8) After every tenth filter weighing, the analyst should rezero the microbalance and reweigh the two working standards. Record the zero and working standard measurements on the laboratory data form and the laboratory QC notebook or database. If the zero and working standard measurements disagree from the first measurements of the day by more than 3 µg (i.e., three times the microbalance's reproducibility), repeat the zeroing process and reweigh the working standards. If the two measurements still disagree, contact the laboratory's QC supervisor, who may direct the analyst to (1) reweigh the previously weighed filters and/or (2) troubleshoot or repair the microbalance and repeat the weighing session.		
9) Newer microbalances are so easily rezeroed that analysts may elect to rezero before each weighing.		
10) Any unused filter whose weight is outside the normal range (i.e., 110 to 160 mg) must be investigated. If there is a consistent negative replication (>15 µg) for laboratory blank filters, it is usually a sign that the filters have not equilibrated long enough. In this case, notify the QC supervisor.		

Activity	Successful	Comments
11) Return the filter to the filter-handling container, replace the lid, and return it to storage.		
12) If the pre- and postsampling weights for the laboratory and field filter blanks disagree by more than 15 µg (i.e., three times the reproducibility for unexposed filters), repeat the measurements. If the two measurements still disagree, contact the laboratory's QC supervisor, who may direct the analyst to (1) reweigh the previously weighed filters and/or (2) troubleshoot or repair the microbalance, then reweigh.		
13) If the filter will receive further analysis, return it to the filter-handling container and note on the container and the laboratory data form that additional analyses are required. Transfer the filter to the laboratory responsible for performing the additional analyses.		
14) A filter's postsampling mass minus its presampling mass is the net mass loading for that filter. Record this value on the laboratory data form. Refer to Section 11.0 of Method 2.12 for the calculations required to compute and report ambient $PM_{2.5}$ concentrations in $\mu g/m^3$.		
SCORE	/14	
FINAL SCORE	/32	
PERCENTAGE	%	