QUALITY ASSURANCE PROJECT PLAN FOR THE TSP-LEAD AMBIENT AIR MONITORING PROGRAM

April 25, 2014

The Department of Environmental Quality protects and enhances Virginia's environment, and promotes the health and well-being of the citizens of the Commonwealth.

Document Revision Record

Revision Number	Changes From Previous Version	Revision Date
Revision No. 0	Original Version	April 25, 2014

FOREWORD

This document has been reviewed either by the EPA Regional QA Manger or QA Officer, or both, and has been found to provide enough detail about the Commonwealth of Virginia lead monitoring program to be considered acceptable. (See approval page.)

The following elements contain a description of the Quality Assurance Project Plan (QAPP) for the environmental data operations involved in monitoring for lead (Pb) as part of the ambient air monitoring program for the Commonwealth of Virginia. EPA regulation mandates the preparation of this QAPP; therefore, EPA approval must be obtained as a vital part of proper data collection quality assurance techniques.

The primary purpose of the QAPP is to provide an overview of the program, to describe the need for the measurement, and to characterize the QA/QC activities to be applied. Every aspect of the program is discussed in this report. In addition, the document identifies key personnel and provides an explanation of the tasks each will perform.

This QAPP was written in accordance with EPA regulations and guidance as described in the *EPA QA/R-5, EPA Requirements for Quality Assurance Project Plans, EPA QA/G-5, Guidance for Quality Assurance Project Plans,* and EPA's Model QAPP. All pertinent elements of the QAPP regulations and guidance are addressed herein.

ACKNOWLEDGMENTS

This QAPP is based closely on a QAPP produced by the Virginia DEQ for the PM2.5 Project and the Lead QAPP produced by the Alaska DEC. The PM2.5 QAPP was originally based on the Model QAPP that resulted from the combined efforts of staff members from the EPA Office of Air Quality Planning and Standards, the EPA National Exposure Research Laboratory, and the EPA Regional Offices, as well as by representatives from state and local organizations. The Virginia DEQ TSP-LEAD QAPP Work Team developed and reviewed the material found in this QAPP. The Virginia DEQ TSP-LEAD QAPP Team would also like to acknowledge the help of the Alaska DEC for the use of their QAPP document. The work of these people as well as the entire DEQ Office of Air Quality Monitoring and EPA Region III is appreciated.

ACRONYMS AND ABBREVIATIONS

AQS	Air Quality System
ANSI	American National Standards Institute
APTI	Air Pollution Training Institute
ASTM	American Society for Testing and Materials
AWMA	Air and Waste Management Association
CAA	Clean Air Act
CFR	Code of Federal Regulations
COC	Chain of Custody
DAS	Data Acquisition System
DCLS	Division of Consolidated Laboratory Services
DCO	Document Control Officer
DEQ	Department of Environmental Quality
DQA	Data Quality Assessment
DQIs	Data Quality Indicators
DQOs	Data Quality Objectives
EDO	Environmental Data Operation
EMAD	Emissions, Monitoring, and Analysis Division
EPA	Environmental Protection Agency
FAR	Federal Acquisition Regulations
FEM	Federal Equivalent Method
FIPS	Federal Information Processing Standards
FRM	Federal Reference Method
GIS	Geographical Information Systems
GLP	Good Laboratory Practice
IMPROVE	Interagency Monitoring of Protected Visual Environments

LAN	Local Area Network
MPA	Monitoring Planning Area
MQAG	Monitoring and Quality Assurance Group
MQOs	Measurement Quality Objectives
MSA	Metropolitan Statistical Area
MSR	Management System Review
NAAQS	National Ambient Air Quality Standards
NIST	National Institute of Standards and Technology
NPAP	National Performance Audit Program
OAQM	Office of Air Quality Monitoring
OAQPS	Office of Air Quality Planning and Standards
OARM	Office of Administration and Resources Management
ORD	Office of Research and Development
PAMS	Photochemical Assessment Monitoring Site
PC	Personal Computer
POC	Pollutant Occurrence Code
PD	Percent Difference
PE	Performance Evaluation
PM2.5	Particulate Matter $\leq$ 2.5 microns in diameter
PQAO	Primary Quality Assurance Organization
PTFE	Polytetrafluoroethylene
Q_a	Monitor flow rate at ambient (actual) conditions of temperature and pressure.
QA/QC	Quality Assurance/Quality Control
QA	Quality Assurance
QAAR	Quality Assurance Annual Report

QADD	Quality Assurance Division Director
QAM	Quality Assurance Manager
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
QMP	Quality Management Plan
SIPs	State Implementation Plans
SLAMS	State and Local Monitoring Stations
SOP	Standard Operating Procedure
SOW	Statement or Scope of Work
SPMS	Special Purpose Monitoring Stations
SYSOP	System Operator
T_a	Temperature, ambient or actual
TSA	Technical System Audit
TSP	Total Suspended Particulate
VA	Virginia
V_a	Air volume, at ambient or actual conditions
VOC	Volatile Organic Compound
VSLA	Virginia State Library and Archives
WAM	Work Assignment Manager

1.0 QA PROJECT PLAN IDENTIFICATION AND APPROVAL

Title: Virginia DEQ QA Project Plan for the TSP-Lead Ambient Air Monitoring Program.

The attached Quality Assurance Project Plan for the Virginia TSP-Lead Ambient Air Monitoring Program is hereby recommended for approval and commits the Program to follow the elements described within.

Virginia Department of Environmental Quality

Signature _____ Date 5/5/14
Charles L. Turner, Director, Office of Air Quality Monitoring (OAQM)

Signature _____ Date 5/5/14
Thomas F. Jennings, OAQM, Manager, Criteria Pollutant Instrumentation Group

Signature _____ Date 5/5/14
Carolyn Stevens, OAQM, Quality Assurance Officer, Air Quality Data Specialist

Signature _____ Date 5-5-2014
Rudley A. Young, OAQM, Particulate Data Coordinator, Air Quality Data Specialist – Particulates

EPA Region III

Signature _____ Date 5/6/14
Associate Director - Office of Air Monitoring and Analysis

Signature _____ Date 5/6/14
QA Officer - Office of Air Monitoring and Analysis

Signature _____ Date 5-6-14
Technical Lead - Office of Air Monitoring and Analysis

Signature _____ Date 5-6-14
Grants Manager

2.0 TABLE OF CONTENTS

3.0 DISTRIBUTION

A copy of Quality Assurance Project Plan for the Virginia TSP-Lead will be distributed to the individuals listed in Table 3.1. The Office of Air Quality Monitoring (OAQM) for the Virginia Department of Environmental Quality (DEQ) will post the quality assurance project plan and associated standard operating procedures on the DEQ Air Quality Division website.

Table 3.1: Contact List

Name and Position	AGENCY	Contact Information
Michael Dowd Director, Air Division	DEQ, Air Division	804-698-4284 Michael.Dowd@deq.virginia.gov
Charles L. Turner Director, Office of Air Quality Monitoring	DEQ, Air Division, OAQM	804-527-5178 Charles.Turner@deq.virginia.gov
Thomas F. Jennings Manager, Criteria Pollutant Instrumentation Group	DEQ, Air Division, OAQM	804-527-5182 Thomas.Jennings@deq.virginia.gov
Namita Verma Team Leader, Data Processing and Evaluation Group	DEQ, Air Division, OAQM	804-527-5190 Namita.Verma@deq.virginia.gov
Carolyn Stevens Quality Assurance Officer	DEQ, Air Division, OAQM	804-527-5181 Carolyn.Stevens@deq.virginia.gov
Kara A. Jones OAQM Instrument Auditor	DEQ, Air Division, OAQM	804-527-5179 Kara.Jones@deq.virginia.gov
Rudley A. Young Particulate Data Coordinator	DEQ, Air Division, OAQM	804-527-5191 Rudley.Young@deq.virginia.gov
Frank Adams Air Compliance Manager – Blue Ridge Regional Office	DEQ, Blue Ridge Regional Office	540-562-6773 Frank.Adams@deq.virginia.gov
David Robinett Air Compliance Manager – Piedmont Regional Office	DEQ, Piedmont Regional Office	804-527-5128 David.Robinett@deq.virginia.gov
Howard Schmidt Technical Lead	EPA Region 3, Air Protection Division, Office of Air Monitoring and Analysis	schmidt.howard@epa.gov
Kia Hence QA Officer	EPA Region 3, Air Protection Division, Office of Air Monitoring and Analysis	hence.kia@epa.gov

4.0 PROJECT/TASK ORGANIZATION

4.1 Roles and Responsibilities

Federal, state, regional and tribal agencies have important roles in developing and implementing air quality assessment and monitoring programs. EPA is responsible for developing National Ambient Air Quality Standards (NAAQS), defining the quality of the data necessary to make comparisons to the NAAQS and identifying a minimum set of quality control (QC) samples from which to judge data quality. The state and local organizations are responsible for taking this information and developing and implementing an air quality assessment and monitoring project that will meet the data quality requirements. It is the combined responsibility of EPA, the state and local organizations to assess the quality of the data and take the appropriate actions to assure compliance with the NAAQS monitoring requirements.

4.1.1 Office of Air Quality Planning and Standards (OAQPS)

Within EPA, OAQPS is the organization charged under the authority of the Clean Air Act (CAA) to protect and enhance the quality of the nation's air resources. OAQPS sets standards for pollutants considered harmful to public health or welfare and, in cooperation with EPA's Regional Offices and the States, enforces compliance with the standards through state implementation plans (SIPs) and regulations controlling emissions from stationary sources. The OAQPS evaluates the need to regulate potential air pollutants and develops national standards; works with State and local agencies to develop plans for meeting these standards; monitors national air quality trends and maintains a database of information on air pollution and controls; provides technical guidance and training on air pollution control strategies; and monitors compliance with air pollution standards.

Within the OAQPS Air Quality and Assessment Division, the Ambient Air Monitoring Group (AAMG) oversees the ambient air quality monitoring network. MQAG (Monitoring and Quality Assurance Group) is responsible for the following:

- ensuring that the methods and procedures used in making air pollution measurements are adequate to meet the programs objectives, and that the resulting data are of satisfactory quality
- operating the Performance Evaluation Program (PEP) and the Federal Reference Method/Federal Equivalent Method (FRM/FEM) performance evaluation program.
- evaluating the performance, through technical systems audits and management systems reviews, of organizations making air pollution measurements of importance to the regulatory process
- implementing satisfactory quality assurance programs over EPA's ambient air quality monitoring network
- ensuring that national regional laboratories are available to support chemical speciation and QA programs

- ensuring that guidance pertaining to the quality assurance aspects of the ambient air program are written and revised as necessary
- rendering technical assistance to the EPA Regional Offices and air pollution monitoring community

4.1.2 EPA Region 3

Regional Offices have been developed to address environmental issues related to the states within their jurisdiction and to administer and oversee regulatory and congressionally mandated programs. The major quality assurance charge of EPA's Region III Office, with regard to the Ambient Air Quality Program, is coordinating quality assurance matters at the Regional level with the state and local agencies. This is accomplished by the appointing EPA Regional Project Officers who manage the technical aspects of the program, including the following:

- reviewing QAPPs by Regional QA Officers who are delegated the authority by the Regional Administrator to review and approve QAPPs for the Agency.
- supporting the FRM/FEM Performance Evaluation Program
- evaluating quality system performance, through technical systems audits and network reviews whose frequency is addressed in the Code of Federal Regulations
- acting as a liaison by making available the technical and quality assurance information developed by EPA Headquarters and the Region to the State and local agencies, and making EPA Headquarters aware of the unmet quality assurance needs of the state and local agencies

The Virginia DEQ will direct all technical and QA questions to Region III.

4.1.3 Virginia Department of Environmental Quality

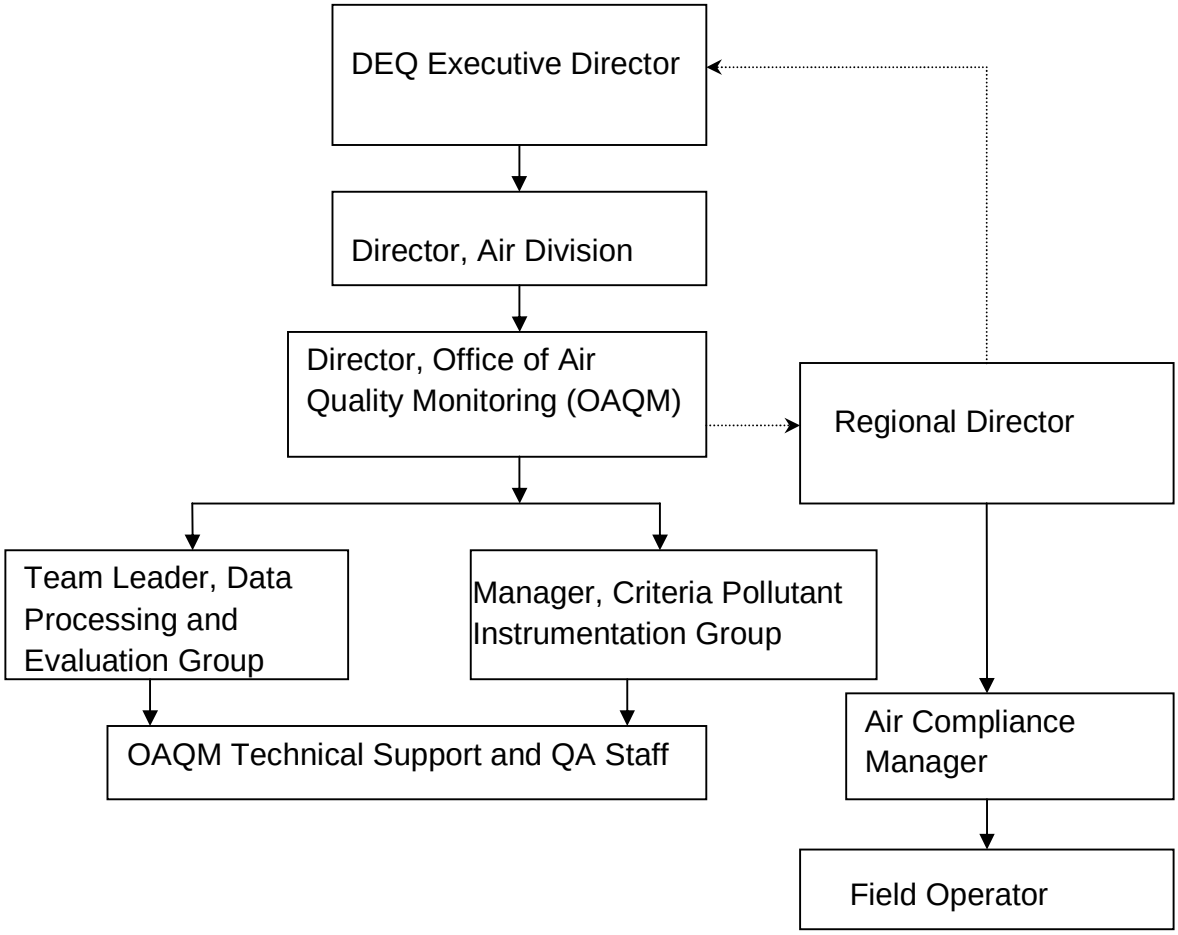
40 CFR Part 58 defines a State Agency as "the air pollution control agency primarily responsible for the development and implementation of a plan (SIP) under the Act (CAA)". Section 302 of the CAA provides a more detailed description of the air pollution control agency.

40 CFR Part 58 defines the Local Agency as "any local government agency, other than the state agency, which is charged with the responsibility for carrying out a portion of the plan (SIP)."

The major responsibility of state and local agencies is to implement a satisfactory monitoring program, which will include putting into action a meticulous quality assurance program. State and local agencies will perform quality assurance programs in all phases of the environmental data operation (EDO); including the field, their own laboratories, and in any consulting and contractor laboratories they may use to obtain data. An EDO is defined as work performed to obtain, use, or report information pertaining to environmental processes or conditions.

Figure 4.1 represents the organizational structure of the areas of the DEQ that carry out the activities of the lead ambient air quality monitoring program.

Figure 4-1 Virginia Lead Monitoring Program – DEQ Organizational Scheme



For the lead air monitoring program the major responsibilities are divided between the Office of Air Quality Monitoring and the staff from the various DEQ regional offices. The Office of Air Quality Monitoring performs major program tasks, including sample procurement, major monitor repair, site installations, supply, data handling, and training, as well as various quality assurance functions. Regional staff operate the monitors and perform various field QA and maintenance functions.

Various persons have been assigned direct responsibility and accountability for program operations and quality assurance. The following listing describes the program's organizational structure for data collection and QA/QC activities at DEQ.

The title and responsibilities of key project personnel are:

DEQ, Air Division Director

- Responsible for overall management of the Air Division
- Coordinates with the Department Commissioner to establish Division goals and objectives
- Testifies before the State Legislature on funding issues and coordinates with staff on legislative initiatives
- Coordinates with the EPA to meet regulatory priorities as established by the Clean Air Act and facilitate implementation of the Virginia SIP
- Coordinates with the EPA on grant funds
- Sets Division priorities, coordinates funding, and approves budgets among Division programs
- Provides general supervisor to Division program managers

DEQ, Office of Air Quality Monitoring (OAQM), Director

- Responsible for overall management of the Air Monitoring program
- Facilitates funding, reviews and approves of program expenditures
- Sets monitoring program priorities
- Coordinates with the OAQM QA Officer to review audit results and data validation issues
- Coordinates with the OAQM Manager(s) to direct all monitoring efforts
- Communication with EPA project officers and EPA QA personnel
- Network evaluation, design, and site selection
- Project planning and implementation

DEQ, OAQM, Quality Assurance Officer

- Supervises or directs all quality assurance activities within the Office of Air Quality Monitoring
- Reviews and approves of all QA documents (i.e. QAPP and associated SOPs)
- Reviews performance and system audits
- Reviews and verifies traceability of all quality control standards
- Assures the lead monitoring program is compliant with NAAQS data quality objectives
- Prepares quarterly QA audit reports for submission to OAQM Manager.
- Coordinates with OAQM managers on issues concerning data validation and corrective actions
- 3rd tier data review and validation of monitoring data and report approval
- Directs all corrective actions to assure data quality

DEQ, OAQM, Criteria Pollutant Instrumentation Group, Manager

- Overall technical management of the lead monitoring program to assure compliance with NAAQS monitoring requirements
- Air monitoring equipment procurement
- Site and utility contracts

- Station installation and operation coordination
- Development and implementation of QAPP and SOPs, and work plans

DEQ, OAQM, Particulate Data Coordinator

- Serves as the main contact with field operators and the DCLS lab.
- Reviews filter envelopes, maintenance forms, motor calibration data, and flow check data.
- Assures repairs and preventive maintenance are complete.
- Provides information and assists the QA officer in preparing QA reports and summaries.
- Delivers filters to the DCLS lab and receives concentration data from the lab.
- Delivers (to the DCLS lab) the lead sample strips to be used for the analysis audit.

DEQ, OAQM, Instrument Auditor

- Makes sure lead monitors get audited twice per year
- Makes sure the flow check audit reports are complete and sent to the field operator, OAQM director, OAQM manager(s), and QA officer.

DEQ, Air Monitoring Technical Support Staff

- Assure strict adherence to all standard operating procedures (SOPs) for: field sampling and data collection, recordkeeping and shipping; data processing; and reporting
- Coordinate equipment mobilization, transport, installation, and initial calibration of on-site monitoring sites
- Oversee training of site operators
- Provide on-going technical oversight of all field operations including assistance to site operators, and facilitate logistics for shipment of supplies, and equipment
- Schedule and conduct routine site visits for on-going review and training of site operators and perform non-routine site maintenance
- Receive and log all sample and data deliveries from site operators
- Document chain-of-custody and facilitate transfer of filter samples to the DEQ/Division of Consolidated Laboratory Services (DCLS) laboratory
- Enter field data with analytical data to calculate preliminary sample results
- Compile sample results, QA/QC data, and generate preliminary report
- Report finalized data to the EPA Air Quality System (AQS)

DEQ Management

Name and Title: Mike Dowd Director of Air Division
QA Responsibilities: Senior Air Manager; program direction

DEQ - Office of Air Quality Monitoring

Name and Title: Chuck Turner Environmental Manager II
QA Responsibilities: Director, Office of Air Quality Monitoring

Name and Title: Thomas F. Jennings Environmental Manager I
QA Responsibilities: Criteria Pollutants Instrumentation Manager;

Name and Title: Jeff McKnight Senior Monitoring Specialist
QA Responsibilities: Monitor installation; supply; maintenance; training; calibration

Name and Title: Boris Leonoff Senior Monitoring Specialist
QA Responsibilities: Monitor installation; supply; maintenance; training; calibration

Name and Title: Thomas Drake Senior Monitoring Specialist
QA Responsibilities: Monitor installation; supply; maintenance; training; calibration

Name and Title: Kara A. Jones Instrument Auditor, Senior Monitoring Specialist
QA Responsibilities: Performance Audits Leader; data QA

Nam and Title e: Carolyn Stevens Quality Assurance Officer, Senior Monitoring Specialist
QA Responsibilities: Data QA Review Leader

Name and Title: Rudley Young Particulate Data Coordinator, Senior Monitoring Specialist
QA Responsibilities: Data QA; data submittal

DEQ Regional Offices

Name and Title: Frank Adams Air Compliance Manager
QA Responsibilities: Regional monitor operation oversight

Name and Title: Blake Apo Enforcement/Compliance Specialist Senior
QA Responsibilities: Monitor operations; field QA

Name and Title: David Robinett Air Compliance Manager
QA Responsibilities: Regional Monitor operations oversight

Name and Title: Denis Schmidt Regional Monitoring technician

QA Responsibilities: Monitor operations, field QA

4.1.4 Division of Consolidated Laboratory Services (DCLS)

The Division of Consolidated Laboratory Services (DCLS) does the analysis of the filters for the lead program. The title and responsibilities of key project personnel are:

DCLS Lab Manager Analytical Chemistry

- Coordinate with the OAQM Director or his representative to develop and receive approval of an analytical SOP which meets EPA Federal Equivalent Method (FEM) requirements
- Provide direct technical oversight all laboratory operations
- Assure strict adherence to laboratory SOPs for ICP/MS (inductively coupled plasma/ mass spectrometry)analyses including receipt of samples, chain of custody, sample preparation, chemical digestion, instrumental analysis, and QA/QC
- Perform supervisory review of analytical data, chemical calculations, and verify results
- Coordinate with Laboratory QA/QC Manger on validated results
- Prepare and submit final report with analytical results and associated laboratory QA/QC to the OAQM Quality Assurance Officer.

DCLS Lab Quality Systems Manager

- Review and approves quality assurance documents for all analytical methods and procedures
- Assure strict adherence to analytical SOPs
- Coordinate four-tier quality review process among laboratory staff including technical review by the analyst, senior peer review, supervisory review, and an administrative review for completeness.

DCLS Lab Analyst

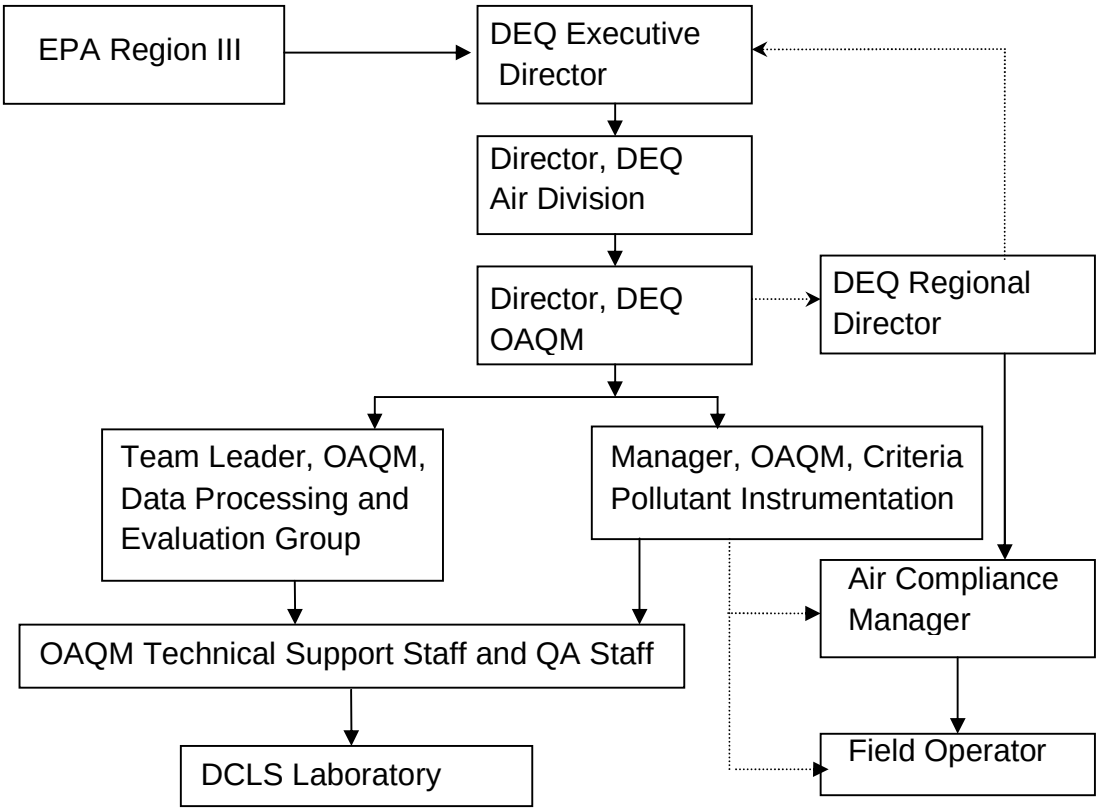
- Perform all sample preparation, chemical digestion, instrumental analysis, data compilation, and analysis in strict adherence with the analytical SOP.
- Conduct initial data quality review and coordinate with senior staff for peer review and supervisory review

4.2 Communications

Formal lines for communicating information about the status of the quality assurance program and its needs are essential to ensure that an effective quality assurance program is put into action within the DEQ. Accordingly, the DEQ routinely will be provided with assessments of the quality assurance program status, its problems, if any, and its needs.

Communication amongst the manager, the quality assurance officer, appropriate EPA staff, the DCLS Laboratory, and DEQ is a key element in developing and implementing the DEQ's quality assurance program. The following organizational chart demonstrates the official and the unofficial lines of communication for this project (Figure 4-2).

Figure 4-2 Lines of Communication



5.0 PROBLEM DEFINITION/BACKGROUND

5.1 Problem Statement and Background

The EPA established a national ambient air quality standard (NAAQS) for lead in 1978 at 1.5 micrograms per cubic meter ($\mu g/m^3$). Between 1978 and now, more than 6000 studies have bolstered the underpinnings of the study of lead's deleterious health effects. Of primary importance is the finding that lead can cause neurological defects and learning disabilities in children at lower levels than previously thought. Low levels of lead can result in decreases in IQ and memory, slower learning and changes in behavior. For children and infants there is no known lead concentration that is safe. The EPA projects that the revised standard will result in $3.7 to $6.9 billion in health benefits. Based on this new evidence, on October 15, 2008, the EPA lowered the primary (health based) standard for lead from 1.5 $\mu g/m^3$ to 0.15 $\mu g/m^3$. This represents a reduction of the NAAQS by a factor of 10 times.

Lead is a metal found naturally in the environment as well as in manufactured products. Lead can be emitted into the air in the form of particles small enough to stay suspended in the air. EPA measures lead air pollution with monitors that capture all of those suspended particles, known as total suspended particles or TSP. Lead emitted into the air can be inhaled directly or ingested after it settles onto surfaces or soils. Ingestion is the main route of human exposure to air lead. Once in the body, lead is rapidly absorbed into the bloodstream and can affect many of the body's organ systems. Exposures to low levels of lead early in life have been linked to effects on IQ, learning, memory, and behavior that may persist into adulthood. This QAPP focuses on the QA activities associated with monitoring lead.

Air quality monitoring is performed generally for one or more of the following purposes:

- To judge compliance with and/or progress made towards meeting the National ambient air quality standards.
- To observe pollution trends throughout the region, including non-urban areas.
- To provide a data base for research and evaluation of effects.

With the end use of the air quality samples as a prime consideration, various networks can be designed to meet one of six basic monitoring objectives listed below:

- To determine the highest concentrations to occur in the area covered by the network,
- To determine representative concentrations in areas of high population density,
- To determine the impact on ambient pollution levels of significant source or source categories,
- To determine general background concentration levels,
- To determine the extent of Regional pollutant transport among populated areas, and in support of secondary standards,
- To determine the impact on health in more rural and remote areas.

The monitoring network consists of three major categories of monitoring stations that measure the criteria pollutants. These stations are described as follows.

The **State and Local Air Monitoring Sites (SLAMS)** make up the ambient air quality monitoring sites that are primarily needed for NAAQS comparisons, but may serve other data purposes. They consist of a network of monitoring stations whose size and distribution is largely determined by the needs of state and local air pollution control agencies to meet their respective State Implementation Plan (SIP) requirements.

The **National Core multipollutant monitoring stations or NCore** site employs new, more sensitive measurement methods to complement existing methods, and is part of a national network of sites designed to characterize urban and regional-scale patterns or air pollution. Monitors at these sites are required to measure particles ($PM_{2.5}$, speciated $PM_{2.5}$, $PM_{10-2.5}$), O_3, SO_2, CO, nitrogen oxides (NO/NO_2/NOy), Pb, and basic meteorology.

The **Special Purpose Monitoring Stations (SPMS)** provide for special studies needed by the state and local agencies to support their State Implementation Plans (SIPs) and other air program activities. The SPMS are not permanently established and, thus, can be adjusted easily to accommodate changing needs and priorities. The SPMS are used to supplement the fixed monitoring network as circumstances require and resources permit. If the data from SPMS are used for SIP purposes, they must meet all QA and methodology requirements for SLAMS monitoring.

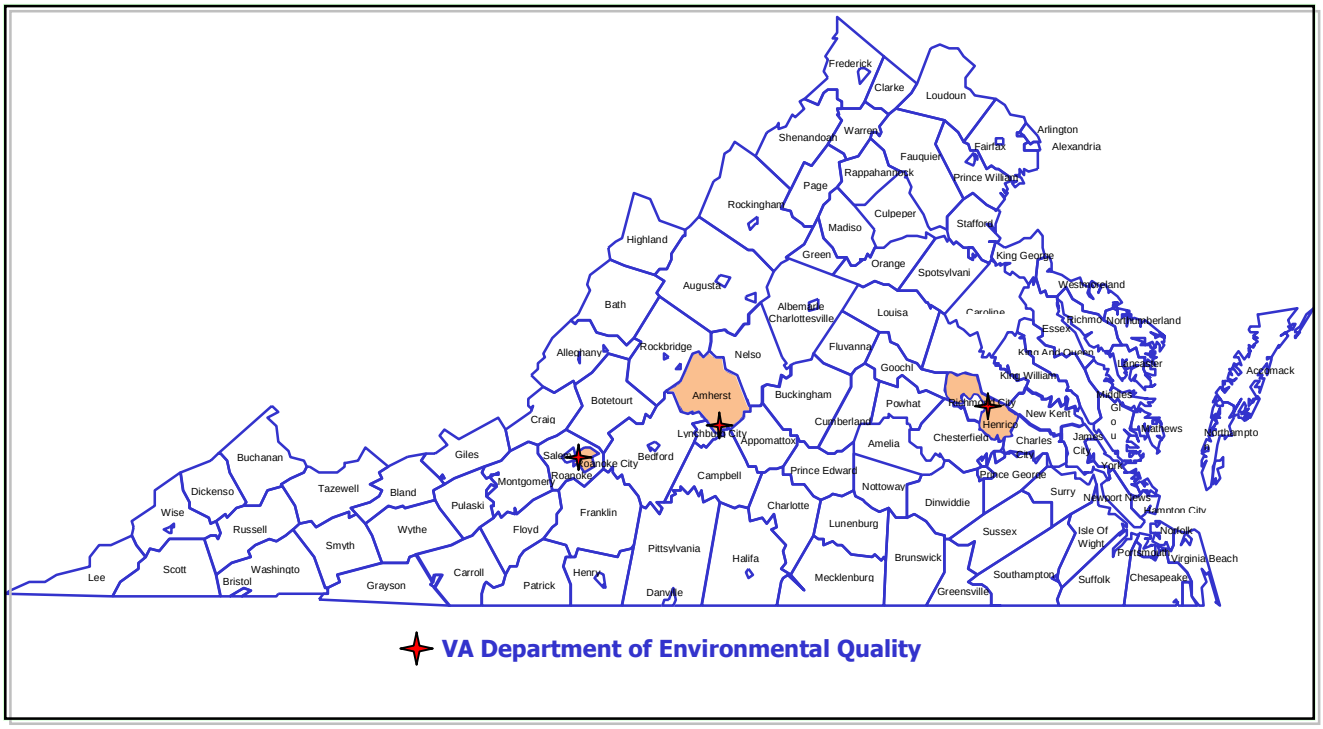
5.2 Site Selection Process

The siting of the lead monitors is driven by Federal Regulation. Specifically, 40 CFR Part 58 Appendix D contains the requirements for the number of TSP-Lead monitors. 40 CFR Part 58 Appendix E contains the siting criteria that direct the location of the monitors within the MSA (Metropolitan Statistical Area). The Virginia lead monitoring network has been in place since January 1, 2010. The current locations are consistent with the Annual Air Monitoring Network plan submitted annually to EPA Region III.

5.3 Sampling Site Location

Virginia DEQ has 2 source oriented lead monitoring sites. There is a monitor for Roanoke City (AQS No. 51-770-0016) which is the source oriented monitor for Steel Dynamics, Inc. In Amherst County at the Central Virginia Training Center, there is a collocated site (AQS no. 51-009-0007) which has source oriented monitors for Griffin Pipe and Products company. The NCore lead monitor is located at the MathScience Innovation Center site in Eastern Henrico County (AQS No. 51-087-0014).

Figure 5-1: The map below shows the three lead (Pb) sites. From east to west, MathScience Innovation Center (Henrico County), Madison Heights (Amherst County), and Roanoke City.



6.0 PROJECT/TASK DESCRIPTION

6.1 Lead Monitoring Sites in Virginia

The lead sites in Virginia are NCore or source specific and sample with a 1/6 day frequency except for collocated samplers which have a 1/12 day frequency.

Table 6-1 Lead monitoring sites in Virginia

Site	EPA Designation	Installation Date	Monitor Scale	Comments
(109-N) **Roanoke**	51-770-0016	2014	Source Oriented	Steel Dynamics, Inc.
(53-G) **Amherst Co.** (collocated site)	51-009-0007	November 2010	Source Oriented	Griffin Pipe Products, Inc.
(72-M) **Henrico Co.**	51-087-0014	November 2010	Community Based	NCore Site

6.2 Field Activities

The performance requirements of the air monitors have been specified by EPA and can be found in 40 CFR Part 50. The design and performance specifications must be met before a specific monitor can receive official EPA designation as a FRM or FEM type monitor. Virginia acquires and uses only EPA approved monitors; therefore Virginia assumes that these monitoring instruments are adequate for the monitoring of particulate ambient air pollutants.

6.3 Office of Air Quality Monitoring Activities

Monitoring Laboratory personnel will perform those activities that support continued successful operation of the statewide ambient air-quality monitoring network. The monitoring laboratory personnel and field operators shall perform those duties such that the data quality provided meets or exceeds EPA QA requirements. Monitoring laboratory personnel shall be responsible for preparing consumables for field use. This may include, but not be limited to; maintaining standards, maintaining consumable inventories, shipping and receiving activities, and performing instrument audits (performance evaluations).

6.4 Project Assessment Techniques

An assessment is an evaluation process used to measure the performance or effectiveness of a system and its elements. Table 6-4 provides information on the type of assessment and its frequency.

Table 6-4 Assessment Schedule

Assessment Type	Assessment Agency	Frequency
Technical Systems Audit	EPA Regional Office DEQ - Office of Air Quality Monitoring (OAQM)	1 every 3 years 1 every 3 years
Network Review	EPA Regional Office DEQ - OAQM and Regional Offices	Every year App B 1/year
EPA Performance Evaluation Program (PEP)	EPA	5 audits per year (1 PEP, 4 collocated)
Laboratory Pb audit strip analysis	DCLS	24 strips/year 6 strips/quarter - 3 at each of 2 concentration ranges
FRM/FEM Performance Evaluation	DEQ - OAQM	Minimum of twice per year
Data Quality Assessment	DEQ - OAQM	Every year

6.5 Project Records

The DEQ has a records retention schedule that is in conformance with the records retention regulations for the Commonwealth of Virginia and administered by the Virginia State Library and Archives. Additional information on the records retention program is provided in Section 9.

7.0 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

7.1 Data Quality Objectives (DQOs)

DQOs are qualitative and quantitative statements derived from the DQO Process that:

- Clarify the monitoring objectives.
- Define the appropriate type of data to be collected.
- Specify the tolerable levels of decision errors for the monitoring program.

By applying the DQO Process to the development of a quality system the Air Quality Program guards against committing resources to data collection efforts that do not support a defensible decision.

The DQOs are assessed using Data Quality Indicators (DQIs) which are the quantitative statistics and the qualitative descriptors used to interpret the degree of acceptability or utility of data to the user. The DQIs can then be used to establish the MQOs which will be discussed below. Once the Measurement Quality Objectives (MQOs) are established and monitoring is implemented, Data Quality Assessments (DQAs) are performed to determine whether the DQOs were achieved. If not, the monitoring program should take steps to identify the major sources of uncertainty and find ways to reduce these uncertainties to the acceptable levels.

The goals of the Virginia Ambient Air Quality Monitoring Program are to meet the six basic monitoring objectives listed in Section 5.

The data generated by the Virginia ambient air monitoring network will be used to:

- Evaluate compliance with the NAAQS,
- Establish an historical baseline concentration of air pollutants,
- Monitor the current dynamic concentrations of these air pollutants,
- Monitor progress made toward meeting ambient air quality standards,
- Activate emergency control procedures that prevent or alleviate air pollution episodes,
- Provide data upon which long term control strategies can be reliably developed,
- Observe pollution trends throughout the region, and
- Provide a database for researching and evaluating effects.

7.2 Define Appropriate Type of Data

In order to accomplish the monitoring objectives, the appropriate data needed is defined by the NAAQS. For criteria pollutants, compliance with the NAAQS is determined by specific measurement requirements. The sampling will follow the Hi-Vol method for the TSP sampler. The measurement system is designed to produce criteria pollutant concentration data of the appropriate quantity and quality necessary to determine compliance with these standards.

7.3 Specify Tolerable Levels of Decision Errors for the Monitoring Plan

DQOs for criteria pollutant monitoring are based on data requirements of the EPA which can be found in 40 CFR Part 58 Appendix A 2.3.1.4. Regarding the quality of the measurement system, the objective is to control precision and bias in order to reduce the probability of decision errors.

7.4 Measurement Quality Objectives (MQOs)

Once a DQO is established, the quality of the data must be evaluated and controlled to ensure that it is maintained within the established acceptance criteria. MQOs are designed to evaluate and control various phases (sampling, preparation, and analysis) of the measurement process to ensure that total measurement uncertainty is within the range prescribed by the DQOs. MQOs can be defined in terms of precision, bias, representativeness, detectability, completeness and comparability.

Various parts of 40 CFR, as well as U.S. EPA Quality Assurance Guidance Documents, and additional DEQ ambient air regulatory monitoring methods, have identified acceptance criteria for some of these attributes. Details of MQOs are located in Appendix B in the Pb High Volume (TSP) Validation Template.

Precision - Precision is a measure of mutual agreement among individual measurements of the same property usually under prescribed similar conditions, or how well side-by-side measurements of the same parameter agree with each other. It is important that the measurements be as similar as possible, using the same, or comparable, equipment. Precision represents the random component of uncertainty. Precision is estimated by various statistical techniques using the standard deviation or, if you only have two measurements, the percent difference.

Bias – Bias (accuracy) is the systematic or persistent distortion of a measurement process that causes uncertainty in one direction. (e.g., results are either higher than or lower than they should be). It is estimated by evaluating the instrument measured result against a known standard used as the "true" value. It is expressed as a positive or negative percentage of the "true" value. Bias is measured by conducting independent performance audit(s) of the monitoring equipment used to measure and report data. The audit standards used as well as the audit personnel must be completely independent from standards used to calibrate the monitoring equipment and the personnel responsible for site operations.

Representativeness - Representativeness is defined as a measure of the degree which data really represent some characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. The representativeness of measurements made in this program is ensured by following EPA siting guidelines.

Detectability – Detectability is defined as the lowest value that a method procedure can reliably discern a measured response above background noise; in other words, that level below which the

instrument cannot discriminate from zero. Because there is always variation in any measurement process (precision uncertainty), the level of detectability depends on how much precision error is in the process. Detection limits for ADEC-M&QA air quality instruments are consistent with the requirements listed in 40 CFR 53. For Federal Reference Methods (FRM) and Federal Equivalent Methods (FEM), the detection limits are specified with the respective EPA FRM/FEM designation.

Completeness - Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct, normal conditions. Data completeness requirements are included in the reference methods (40 CFR 50) and 40 CFR 58 Appendix A.

Comparability – Comparability is a measure of confidence with which one set of data can be compared to another. Comparability is important so that data sets within one part or area of the country can be compared with another area or data from another year.

8.0 TRAINING REQUIREMENTS/CERTIFICATION

Air monitoring personnel receive sufficient training in their appointed duties to contribute to the gathering and reporting of complete and high quality data. OAQM staff train the local site operator. Records documenting each employee's qualifications and training are maintained in personnel files, and are accessible for review during audit activities, to the extent allowable under Virginia law and under the regulations of the Virginia Department of Human Resource Management.

The education and the training of each employee is a critical quality-control component of any monitoring program. To that end, senior staff has undergone special supervisory training on such topics as elements of performance evaluation. In addition, experienced air monitoring staff members train junior staff members on the job.

8.1 Ambient Air Monitoring Training

Pertinent training is available to employees supporting the ambient air quality monitoring program, commensurate with their duties. Such training may consist of classroom lectures, workshops, teleconferences, and on-the-job training. Requirements for DCLS lab personnel are determined by DCLS. The lab maintains its own SOPs for all lab procedures.

Over the years, a number of courses have been developed for personnel involved with ambient air monitoring and quality assurance aspects. Formal QA/QC training is offered through the following:

- Air Pollution Training Institute (APTI) Learning Management System
  http://www.apti-learn.net
- Air & Waste Management Association (A&WMA)
  http://awma.org/
- American Society for Quality (ASQ)
  http://www.asq.org/education/training/overview.html
- EPA's Quality System for Environmental Data and Technology
  http://www.epa.gov/QUALITY
- EPA Regional Offices

In Table 8-1 is shown a sequence of core ambient air monitoring and QA courses for ambient air monitoring staff and managers. The suggested course sequences are based upon the assumption that a staff member will have little or no experience in QA/QC or air monitoring. Persons already knowledgeable about the subject matter should choose the course that is germane to his or her experience level and professional focus. Courses not included in the core sequence may be selected according to available resources, and in keeping with individual responsibilities and preferences.

Table 8-1. Ambient Air Training Courses

Course Title (SI = self instructional)	Department Number	Source
Basic Math for Air Pollution Control	100	APTI
Air Pollution Control Orientation Course (Revised), SI:422	422	APTI
Principles and Practices of Air Pollution Control, 452	452	APTI
Introduction to Ambient Air Monitoring (Under Revision), SI:434	434	APTI
General Quality Assurance Considerations for Ambient Air Monitoring (Under Revision), SI:471	471	APTI
Quality Assurance for Air Pollution Measurement Systems (Under Revision), 470	470	APTI
Data Quality Objectives Workshop	QA2	QAD
Quality Assurance Project Plan	QA3	QAD
Atmospheric Sampling (Under Revision), 435	435	APTI
Analytical Methods for Air Quality Standards, 464	464	APTI
Chain-of-Custody Procedures for Samples and Data, SI:443	443	APTI
Data Quality Assessment	QA4	QAD
Management Systems Review	QA5	QAD
Beginning Environmental Statistical Techniques (Revised), SI:473A	473	APTI
Introduction to Environmental Statistics, SI:473B	473B	APTI
AQS Training	AQS	OAQPS

8.2 Certification

For the ambient air monitoring program, the DEQ human resources office, in conjunction with OAQM, issue certifications to employees upon their successful completion of each training activity. Certification is based upon the qualitative and the quantitative assessment of each person's adherence to the SOPs.

9.0 DOCUMENTATION AND RECORDS

Within three months after the end of the quarter is finished, the data are validated and finalized by the QA officer. The QA officer certifies, prepares, and, if necessary, flags the data for entry into AQS. In addition the quality control data such as flow checks and audits are entered as required. The information from this monitoring will be used to evaluate the ambient air for compliance with the lead NAAQS of 0.15 µg/m^3.

A number of documents and records must be retained for the Ambient Air Monitoring Program. From a records management perspective a document is a volume that contains information that describes, defines, specifies reports, certifies, or provides data or results pertaining to environmental programs.

The DEQ maintains a records management program in compliance with the Virginia Public Records Act, Section 42.1-76, and et. Seq. of the *Code of Virginia,* "Appendix A." This records management program is a cooperative effort between the Virginia State Library Archives and Records Division, and state and local agencies of the Commonwealth of Virginia.

The following information describes the DEQ's document and records management procedures for lead Program. In EPA's QAPP regulation and guidance, EPA uses the term reporting package. Although this is not a term currently used by the DEQ, it will be defined as follows: all the information required to support the concentration data reported to EPA, which includes all data required to be collected, as well as data deemed important by the DEQ under its policies and its records management procedures. Figure 9-1 contains a listing of these documents and records as they apply to the Air Quality Monitoring Program.

9.1 Information Included in the Rerporting Package

9.1.1 Routine Data Activities

The DEQ has a structured records management retrieval system that allows for the efficient archive and retrieval of records. The lead information is included in this system.

Figure 9.1 includes a listing of the documents and records that are filed according to the records retention and disposal schedule allowed by the Virginia State Library and DEQ filing practices. The documents and records are stored in the filing cabinet located in the data specialist for particulates office and/or on the U: drive (common drive). The site operators may also store backup copies of the information.

FIG.9-1 LEAD REPORTING PACKAGE INFORMATION

Commonwealth of Virginia

Virginia State Library and Archives

Records Management

(804) 692-3500

RECORDS RETENTION AND DISPOSITION SCHEDULE

SPECIFIC SCHEDULE NO. 422-019

AGENCY: Department of Environmental Quality

DIVISION: Air Division

SUBUNIT: Office of Air Quality Monitoring

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This schedule is continuing authority under the provisions of the Virginia Public Records Act, §§42.1-76 et. seq. Code of Virginia, for the retention and disposition of the records as stated. This schedule supersedes previously approved applicable schedules. Request approval on Form RM-3. Certificate of Records Disposal, for the destruction of record series noted in this schedule. Any records created prior to the Constitution of 1902 must first be offered to VSL&A before applying these disposition instructions.

EFFECTIVE SCHEDULE DATE:

RECORD SERIES NUMBER AND TITLE

DATA SECTION

1. Air quality data handling system in master file
2. Annual report- Virginia ambient air monitoring data
3. Downtime, analyses for criteria pollutants
4. Environmental systems corporation specifications for monthly polled data values
5. Exceeding of air quality standards

INSTRUMENT SECTION

6. Quality Assurance-Instrument Log Books
7. Quality Assurance-Calibration Sheets
8. Quality Assurance-drift control charts
9. Quality Assurance-operator daily check sheets
10. Quality Assurance-preventive maintenance
11. Quality Assurance-primary standard certification
12. Quality Assurance-station log books
13. Annual monitoring network review
14. Data assessment reporting forms for precision and accuracy
15. Exposed filer weights
16. Filter weights-quality control
17. Monitor calibrations
18. Monitor preventive maintenance schedule
19. Material Safety data sheets
20. Monitoring site information
21. National performance audit program performance audit program records
22. Orifice-type flow-rate standard calibrations
23. Quality assurance checks
24. Quality assurance manual

*This page contains information on multiple pollutants so some of the information (such as drift control charts and operator daily check sheets) do not apply to lead.

9.1.2 Annual Summary Reports Submitted to EPA

As indicated in 40 CFR Part 58, the DEQ shall submit to the EPA Administrator, through the Region III Office, the AMP-450 Quick Look report which is an annual summary report of all the ambient air quality monitoring data from all monitoring stations designated as SLAMS. The report is submitted by May 1 of each year for the data collected from January 1 to December 31 of the previous year. The report contains the following information:

- City name (when applicable),
- County name and street address of site location.
- AQS site code.
- AQS monitoring method code.
- Monitoring schedule
- Summary Data

Michael Dowd, as the senior air pollution control official for the DEQ will certify that the annual summary is accurate to the best of his knowledge. This certification is based on the various assessments and reports performed by the organization. DEQ also submits the 600 report.

9.2 Data Reporting Package Format and Documentation Control

Figure 9-1 represents the documents and records that, at a minimum, must be filed into the reporting package. The details of these various documents and records are discussed in the appropriate sections of this document.

All raw data required for the calculation of concentration, the submission to the AQS database, and the QA/QC data are collected electronically or on data forms that are included in the field and analytical methods sections. All hard-copy information is filled out in indelible ink. Corrections are made by inserting one line through the incorrect entry, and placing the correct entry alongside the incorrect entry, provided this can be done legibly, or, if not, by providing the information on a new line. The staff member making the correction writes the initial letters of his or her name next to the correction.

9.3 Data Reporting Package Archiving and Retrieval

In general all the information listed in Figure 9-1 will be retained for five years from the date the grantee submits the final expenditure report, unless otherwise noted in the funding agreement. Instrument raw data records will be retained at the Office of Air Quality Monitoring for 5 years. However, if any litigation, claim, negotiation, audit, or other action involving the records has been started before the expiration of the five-year period, the records will be retained until the action is complete, until all issues which arise from it are resolved, or until the end of the regular five-year

period, whichever is later. DEQ will extend this regulation in order to store records until the litigation, claim, negotiation, audit, or other action is completed.

9.4 Revisions to SOPS and QAPP

The SOP group at OAQM reviews the SOPs and QAPP for lead and makes revisions when appropriate. Revisions to the SOPs are sent to the managers at OAQM for comments and approval before they become final. Revisions to the QAPP are sent to the individuals listed in the DEQ part of the approvals page of the QAPP. Once these individuals comment and approve of the changes the QAPP is sent to EPA. The goal is to review the QAPP annually.

10.0 MONITORING NETWORK DESCRIPTION

The purpose of this section is to describe all relevant components of the SLAMS lead monitoring network operated by the Commonwealth of Virginia. This entails describing the rationale for the locations of the lead monitors, the types of monitors used at each site, and the monitoring schedule. The network design components comply with the regulations contained in 40 CFR Part 58, Section 58.12, Appendix A, Appendix D, and Appendix E.

The primary function of the Air Monitoring Program is to verify compliance with the NAAQS. Other purposes include but are not limited to determining trends over time, determining effects on air quality from adjustments to source emissions, developing algorithms based on historical air quality and other conditions which will forecast air quality, verifying air quality modeling programs, providing lead data to the public, and correlating health effects to air quality.

10.1 Design Assumptions

The monitoring design is based on the assumption that the rules and guidance provided in the CFR will result in data that can be used to measure compliance with the national standards. The only issue at Virginia's discretion is the monitor siting.

10.2 Rationale For Monitoring Network Design

To determine whether the chosen monitoring characteristics are quantified with sufficient confidence, Virginia must address monitor type, monitoring schedule, and monitor siting. The DEQ will select all monitoring sites in accordance with the siting regulations contained in 40 CFR Part 58, Appendix D - Network Design Criteria for Ambient Air Quality Monitoring.

10.2.1 Monitor Type

To evaluate compliance with the lead NAAQS, Virginia operates only FRM/FEM monitors in accordance with 40 CFR Part 58. These monitors are operated in accordance with all applicable SLAMS requirements and EPA guidance.

10.2.2 Monitoring Schedule

By complying with the requirements in 40 CFR Part 58 Section 58.12, the DEQ assumes its monitoring schedule is sufficient to properly characterize air quality in the vicinity of each monitor.

10.2.3 Monitoring Siting

Selection of a site or sites must address EPA siting criteria and selection-specific considerations. The primary guidance for siting monitoring systems is to adhere to 40 CFR Part 58 Appendix E - Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring requirements. This is

generally possible, but some locations present challenges due to availability of power, resource impacts, site access, logistics, and other considerations. The sites are also selected to be as representative as possible of overall air quality. In general, funding levels restrict selections to one site, which is chosen to be most representative of the locality, county or region. Some special studies that require additional and broad ranging information to support research and investigative functions may require more than one station.

The procedure for siting the lead monitors is based on judgmental monitoring, as is the case for most ambient air monitoring networks. Judgmental monitoring uses data from existing monitoring networks, knowledge of source emissions and population distribution, and inference from analyses of meteorology to select optimal monitor locations.

The number of SLAMS sites where lead monitoring occurs and their locations were determined based upon the information contained in 40 CFR Part 58 Appendix D.

A listing of monitoring locations by MSA is provided in the DEQ Annual Report and in the Annual DEQ Network Review.

10.3 Monitoring Thresholds

The minimum amount of monitored data required for appropriate summary statistics should be taken. At least 75% of the total possible monitoring operating time must be collected before summary statistics are calculated. The exact requirements appear in Table 10-2.

Table 10-2 Requirements for Calculating Summary Statistics

Pollutant	**Completeness Requirement** (%)	**Time Frame**
Lead	75%	running 3-month period

11.0 MONITORING METHODS REQUIREMENTS

11.1 Purpose/Background- Sampling Site Coordinates

The purpose of this section is to identify the sampling methods and the procedures for collecting the required environmental samples. Individual criteria pollutant SOPs contain more detailed descriptions of the equipment used in the data collection network; necessary support facilities; implementation requirements; required materials; and processes for preparing, calibrating and performing QA checks on monitoring equipment.

Table 11.1 Monitoring site locations (The lat and long are approximate for Roanoke City.)

State ID	AQS ID	City/County	Latitude	Longitude
53-G	51-009-0007	Amherst County	37.41222	-79.116233
72-M	51-087-0014	Henrico County	37.55652	-77.40027
109-N	51-770-0016	Roanoke City	37.27488	-79.98559

11.2 Monitoring Technology/Methodology - Total Suspended Particulate (TSP) High Volume (HI-VOL) Method

The TSP Hi-Vol method collects a 24-hour sample of total suspended particulate from the atmosphere. The 24-hour sample is then analyzed (see section 13) to determine the lead (Pb) content of the collected particulate matter. The field sampler apparatus specifications and data collection procedures will be in accordance with Title 40 of the Code of Federal Regulations, Part 50, Appendix B. By means of a vacuum motor, the TSP Hi-Vol sampler draws air at a rate of 1.1 to 1.7 m^3 per minute through a glass fiber filter. Particles of 25 to 50 µg/m3 aerodynamic diameter collect on the surface of the filter for 24 hours. The sampler is equipped with a calibrated flow gauge and an elapsed time indicator to determine total sample flow. All calibration standards used to assure data quality will be traceable to the National Institute of Standards and Technology (NIST).

12.0 SAMPLE HANDLING AND CUSTODY

12.1 Sample Handling

DEQ OAQM personnel prepare and ship unexposed filters to the field operators. OAQM also ships field data sheets, envelopes and inserts for sample recovery and return shipment. Sample collection, record keeping and handling are performed by the site operator. Collected samples and data sheets are mailed as soon as practical to OAQM where they will be received, logged in, and appropriately stored prior to analysis. See Appendix B validation template for specific requirements.

12.2 Sample Custody

Sample and sample data integrity will be strictly maintained by tracking samples and sample data throughout the sampling/analytical process through data reduction, data validation/verification, data reporting, and archiving of sample/sample data. Sample handling and custody procedures are addressed in the DEQ's Standard Operating Procedures (SOP) for lead monitoring using a TSP high volume sampler referenced in Appendix C and in DCLS's SOPs. OAQM personnel gather the filters and personally deliver them to the DCLS laboratory where a DCLS representative signs for them.

13.0 ANALYTICAL METHODS REQUIREMENTS

The TSP sampler is a filter-based method. The analysis procedures used to determine the lead content of the particulate matter collected on the filter will include sample preparation by acid digestion and instrumental analysis by inductively coupled plasma/mass spectrometry (ICP/MS). The lead analysis will be performed in accordance with a Federal Equivalent Method (FEM) for ICP/MS, as approved through the EPA Office of Research and Development (ORD). The DCLS laboratory located in Richmond will conduct the lead analysis using Method EQL-0510-191 – *"Determination of Lead in TSP by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) with Heated Ultrasonic Nitric and Hydrochloric Acid Filter Extraction,"* as approved May 28, 2010 in Federal Register Vol. 75, No. 103, page 30022. The DCLS laboratory has developed specific standard operating procedures (SOP) for Method EQL-0510-191. The analytical SOP is maintained at the Division of Consolidated Laboratory Services.

Lead Analysis Audit program

VA DEQ will subscribe to the EPA Lead Analysis Audit Strip program. This program is overseen by EPA OAQPS as an EPA National Contract. By VA DEQ's inclusion in this contract, a separate filter strip audit of the DCLS's Lead analyses will not be necessary.

By mid-year, VA DEQ will make their intentions known to EPA to be included in the program for the following calendar year. Lead sample strips to be used for the analysis audit will be shipped to the OAQM Air Quality Data Specialist for Particulates. This person will in turn, deliver the audit strips to the VA Division of Consolidated Laboratory Services. DCLS will conduct the analysis on the strips and report their results to EPA.

14.0 QUALITY CONTROL REQUIREMENTS

To assure the quality of data from air monitoring measurements, two distinct and important interrelated functions must be performed. One function is to control 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 to control the measurement process through the implementation of specific quality control procedures, such as audits, calibrations, checks, and routine self-assessments. In general, the greater the control of a given monitoring system, the better will be the resulting quality of the monitoring data.

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 EPA methods. QC is both corrective and proactive in establishing techniques to prevent the generation of unacceptable data, and so the policy for corrective action should be outlined.

14.1 Field Quality Control

QC for the TSP-Lead sampling conducted on-site at the sample location(s) is performed in accordance with the EPA Federal Reference Methods as presented in the 40 CFR 50 Appendix B. The DEQ SOP for lead monitoring using a TSP high-volume sampler contains specific information on how to perform the calibrations and checks as well as the criteria. OAQM reviews all operator checks and makes determinations about flagging and invalidating data when criteria are not met.

14.2 Collocation Requirements for PEP-Lead Samples

VA DEQ as a Primary Quality Assurance Organization (PQAO) has three lead monitoring sites and is required by regulations (40 CFR Part 58 Appendix A Section 3.3.4.4) to sample and submit four collocated samples (one per quarter) every year. These samples come from the DEQ's collocated site in Amherst County at Madison Heights. The samples would be "extra samples", meaning they would not be a sample from the minimum collocation schedule of every 12th day. The four PEP collocated samples are sampled in between the minimum sampling schedule of every 12th day, and they are sent to the EPA Region 9 Pb-PEP laboratory for independent analysis. DEQ uses TSP filters from its filter stock for these PEP-collocated samples. Prior to sampling, the field operator fills out Part I of the Pb-PEP Collocated Hi Volume Sample Field Data and Chain-of-Custody form. Upon completion of the sample run, the field operator fills out Part II and Part III. EPA provides each PQAO with UPS

shipping labels that are pre-labeled with the EPA Region 9 Pb-PEP Laboratory address, the type of shipment, and the EPA National Billing Number.

14.3 Laboratory Quality Control

QC for the lead analyses at the lab will be performed in accordance with the EPA approved FEM and the DCLS laboratory SOP for ICP-MS. The filters can be re-analyzed if needed since the entire filter isn't consumed during analysis.

Table 14.1 PEP-Lead Collocated Field Sheet and Chain of Custody Form

Pb-PEP Collocated Hi Volume Sample Field Data Sheet and Chain-of-Custody Form

(*Red- Required Field)

PART I – SAMPLING EVENT INFORMATION					
AQS Site ID*	51-009-0007		Filter ID Number*		
Site Name*	CVCT		*Collocated Sampler POC		2
Site Operator*	Blake Ado		Primary Sampler Serial No		VA 002
Other Operators or Observers			Collocated Sampler Serial No.		VA 005
PART II – SAMPLING EVENT FILTER AND EXPOSURE DATA					
*Sample Date (MM:DD:YY)			*Retrieval Date (MM:DD:YY)		
*Elapsed Time (ET) (hr)			*Total Volume ambient (m3)		
*Start Date/Time			*Initial Flow Rate ambient (m3/min)		
*Stop Date/Time			*Final Flow Rate ambient (m3/min)		
Summary Information					
Flow Rate ambient (m3/min)	Max:		Min:	Avg:	
Temperature (o C)	Max:		Min:	Avg:	
Barometric Pressure (mm Hg)	Max:		Min:	Avg:	
Sampler Flags			Field Flags:		
PART III – FIELD FILTER SHIPPING INFORMATION--- Region 9 Laboratory					
*Shipment Date			*Shipped via	UPS	Other
*Affiliation of Shipper	VA DEQ, Lynchburg Office		*Airbill No		
*Shipped by (Signature)			Comments		
Do you want a portion of the filter sent back to the PQAO?	N				
PART VI – NATIONAL PB-PEP LABORATORY RECEIVING INFORMATION					
Date Received			Received by (Signature):	Integrity Flag:	
Notes:					

14.4 Lead Sampler Audits

OAQM performs lead sampler flow rate audits according to the requirements set forth in the Code of Federal Regulations (CFR) Title 40, Appendix A to Part 58. The DEQ OAQM document "How To Do the Audit Job" covers details about the audit procedure, audit equipment, audit equipment certifications, audit reports, and any corrective action(s) needed based on the results of the audit.

15.0 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

This section details the procedures used for procuring, inspecting, testing, and accepting instruments, supplies and consumables that directly or indirectly affect data quality. By having documented inspection and acceptance criteria consistency can be assured.

15.1 Procurement and Acceptance Testing of Equipment

The DEQ OAQM Manager is responsible for identifying field equipment needs and equipment purchases. The following protocol is used in procurement of air monitoring equipment:

- **Equipment evaluation and selection:** Prior to purchase, the equipment's performance is evaluated and other users queried in regard to the performance, dependability and ease of operation.
- **Purchase specifications:** The purchase contract will state the performance specifications that insure only equipment of the desired quality is obtained, will require a one year warranty, and will indicate payment will not be made until the equipment has passed an acceptance test.
- **Acceptance Testing:** Prior to payment, the equipment is tested to ensure that it meets the requirements listed in the purchase specifications.

15.2 Maintenance of Equipment

Utilizing the specifications in EPA's "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II" and DEQ's TSP SOP, preventive and remedial maintenance tasks, schedules, parts and supplies are maintained by site operators with assistance from DEQ. For monitoring systems not covered by EPA guidance, preventive and remedial maintenance tasks, schedules, parts and supplies, are performed in accordance with manufacturer guidelines. The site operators maintain maintenance log sheets and immediately inform DEQ staff of any irregularities at the site. Major maintenance and repairs will be performed by the DEQ OAQM technical staff.

16.0 INSTRUMENT/EQUIPMENT CALIBRATION

16.1 TSP Calibration

DEQ staff train the on-site operators to perform full calibrations of the TSP samplers. Site operators calibrate the TSP samplers (motors) quarterly. The on-site operators perform calibrations once per quarter and as necessary whenever the samplers malfunction and require repair, whenever they fail a flow check or an audit check, whenever they are moved, whenever a flow gauge is replaced or whenever a unit has received unusual punishment. Details about the 5 point calibration can be found in DEQ's TSP SOP.

The equipment used for operator flow checks and motor calibrations is certified once per year by OAQM personnel.

16.2 Laboratory Instrument Calibrations

Instrument and laboratory equipment procurement and acceptance testing is the responsibility of the DCLS Laboratory and is detailed in laboratory quality assurance program documents. Calibration of laboratory instrumentation is the responsibility of the DCLS lab and follows EPA Method requirements and the laboratory SOPs for the ICP-MS determinations.

17.0 INSPECTION /ACCEPTANCE OF SUPPLIES AND CONSUMABLES

17.1 Purpose

This element establishes and documents the system for inspecting and accepting all supplies and consumables that may directly or indirectly affect the quality of the lead program. Various supplies and consumables are critical to the effective operation of the Virginia DEQ lead monitoring network. By having meticulously documented inspection and acceptance criteria, consistent quality of the supplies is assured. This section is centered on a description of the supplies and consumables, the criteria for their acceptance, and the required tracking documentation.

17.2 Acceptance Criteria

Acceptance criteria must be consistent with the overall technical and quality standards for the project. Some of the acceptance criteria are delineated in 40 CFR Parts 50. Others, such as observation of damage due to shipping, can be performed only after the equipment has arrived at OAQM.

17.3 Tracking and Quality Verification of Supplies and Consumables

The tracking and quality verification of supplies and consumables has two main goals: (1) for the end user to have an item of the required quality; and (2) for the purchasing department to have a faithful record of goods received so that payment or credit of invoices can be approved. In order to address these two issues, the following procedures outline the proper tracking and documentation procedures receiving personnel follow:

1. Perform a rudimentary inspection of the packages as they are received from the supplier, noting obvious problems, such as crushed or wet cardboard box.

2. Open and inspect each package, comparing the contents against the packing slip.

3. Compare supplies and consumables with the acceptance criteria.

4. Note any problem with the equipment/supplies on the packing list, and notify the appropriate supervisor to call the vendor.

5. If the equipment/supplies appear to be complete and in good condition, sign and date the packing list and give it to the purchasing coordinator so that payment can be made in a timely manner.

6. Notify appropriate personnel that equipment/supplies are available.

7. Stock equipment/supplies in the designated area in the OAQM warehouse area.

8. For supplies, consumables, and equipment used throughout the lead program, document when these items are changed out. Provided the information is available, include all relevant facts such as model number, lot number, and serial number.

18.0 DATA ACQUISITION REQUIREMENTS

ACQUISITION OF NON-DIRECT MEASUREMENT DATA

In this section we address data not obtained by direct measurement from the lead ambient air quality monitoring program. This includes data from outside sources, and historical data related to monitoring. Such data are used by the DEQ in a variety of ways. For instance, data may be used to draw comparisons. The policies and procedures described in this section apply not only to data acquired through the DEQ monitoring program, but also to information previously acquired, and to that acquired from outside sources.

The lead ambient air quality monitoring program relies on data that are generated through field and monitor operations; however, other significant data are obtained from sources outside the DEQ or from historical records. In this section we list these data and address quality-control issues related to the lead ambient air quality monitoring program.

18.1 Chemical and Physical Properties Data

Physical and chemical properties data and conversion constants often are required in the processing of raw data into reporting units. Such information as has not already been specified in the monitoring regulations will be obtained from nationally and internationally recognized sources. Other data sources may be used with approval of the director of the Office of Air Quality Monitoring. The following sources may be used in the lead ambient air quality monitoring program without prior approval:

- National Institute of Standards and Technology (NIST)
- ISO, IUPAC, ANSI, and other widely-recognized national and international standards organizations
- U.S. EPA
- The current edition of certain standard handbooks, for example, CRC Press' *Handbook of Chemistry and Physics,* and *Lange's Handbook.*

18.2 Monitor Operation and Manufacturers' Literature

Another important source of information needed for monitor operation is manufacturers' literature. Operations manuals and users' manuals frequently provide numerical information and equations pertaining to specific equipment. DEQ personnel are cautioned that such information sometimes is in error, and appropriate cross-checks will be made to verify the reasonableness and accuracy of information contained in manuals. Whenever possible, the field operators will compare physical and chemical constants in the operator's manuals to

those given in the sources listed above. If discrepancies are found, we will determine the correct value by contacting the manufacturer. The instrumentation technicians will correct all the operators' manuals and ask the vendor to issue an errata sheet discussing the changes. The DEQ also will inform the staff of the Region Ill Office of such errors, if necessary. The following kinds of errors are commonly found in such manuals:

- insufficient precision
- outdated values for physical constants
- typographical errors
- incorrectly specified units
- inconsistent values within a manual
- use of different reference conditions than those called for in EPA regulations

18.3 Geographic Location

Another type of data that will commonly be used in conjunction with the lead ambient air quality monitoring program is geographic information. The DEQ has located current sites using global positioning systems (GPS) that meet EPA Locational Data Policy of 25-meters accuracy.

18.4 Historical Monitoring Information

The DEQ has operated a network of ambient air monitoring stations since the late 1960s. Historical monitoring data, and summary information derived from those data, may be used in conjunction with current monitoring results to calculate and report trends in pollutant concentrations. In calculating historical trends, it is important to verify that the historical data are fully comparable to current monitoring data. If different methodologies were used to gather the historical data, the biases and other inaccuracies must be described in trends reports based on that data. Direct comparisons of lead with historical data will not be reported or used to estimate trends. Trends reports comparing lead data with historical data must be approved by the director of the Office of Air Quality Monitoring prior to release.

18.5 External Monitoring Quality Databases

As a matter of policy, the Office of Air Quality Monitoring does not use, without prior approval, data obtained from the internet, from computer bulletin boards, or from data bases from outside organizations to create reportable data or published reports. This policy is intended to ensure the use of high quality data in DEQ publications.

Data from the EPA AQS data base may be used in published reports with appropriate caution. Care must be taken in reviewing/using any data that contain flags or data qualifiers. If data is

flagged, such data will not be used unless it is clear that the data still meets critical *QA/QC* requirements. It is impossible to assure that a data base such as AQS is completely free from errors, including outliers and biases, so caution and skepticism is called for in comparing Virginia data from other reporting agencies as reported in AQS. Users should review available *QA/QC* information to assure that the external data are comparable with DEQ measurements and that the original data generator had an acceptable QA program in place.

18.6 U.S. Weather Service Data

Meteorological information is gathered from the U.S. Weather Service stations throughout the Commonwealth. Parameters can include temperature, relative humidity, barometric pressure, rainfall, wind speed, wind direction, cloud type/layers, percentage cloud cover, and visibility range. National Weather Service (NWS) data are occasionally included in summary reports.

19.0 DATA MANAGEMENT

19.1 Field Data Recording

The site operators will maintain operational and maintenance documentation. This documentation consists of the calibration information and any maintenance information on the monitor. The documentation will specifically include all site activity including time checks, calibrations, flow checks, maintenance, audits, and equipment changes. The documentation will also detail any site conditions that may affect data quality and explain any missing, suspect, or invalid data. The site operators will also complete the Hi-Vol sampler field operator forms that record specific information for each sample collected including, filter number, operator initials, date installed and recovered, sample run date, elapsed time indicator start/stop, and flow indicator start/stop.

19.2 Data Transmittal, Processing, and Reporting

Data transmittal occurs when data are transferred from one person or location to another or when data are copied from one form to another. Site operators send field operator forms to the OAQM staff on a monthly basis, and they are reviewed by the OAQM particulate data coordinator.

Analytical data for the gravimetric and ICP/MS determinations is submitted from the DCLS Lab to OAQM staff in an MS Excel spreadsheet format accompanied by a separate QA/QC report for the batch analyses. The analytical data is logged and uploaded to the OAQM sample calculation spreadsheet to determine the final ambient air concentration for each sample. All data is logged, reviewed, edited (if warranted) and validated.

See Section 22 for more detailed information about data review, validation, and verification.

19.3 Records Retention and Storage

Complete records of the monitoring project are maintained at the DEQ OAQM office in Glen Allen, Virginia. Complete electronic files of all validated data and final reports are maintained on the DEQ OAQM server located in the Glen Allen office. Electronic records on the server are backed up on a daily basis. Hardcopy and electronic records (including field/sampling records, laboratory analytical reports, QA/QC records, etc) are maintained for a minimum of 5 years, following the determination of NAAQS attainment status.

20.0 ASSESSMENTS AND RESPONSE ACTIONS

An assessment, for this plan, is defined as an evaluation process used to measure the performance or effectiveness of the quality assurance system, the establishment of the monitoring network and sites, and various measurement phases of the data operation.

20.1 Performance Audits

Utilizing the procedures and calculations specified in 40 CFR 58, Appendix A, “Quality Assurance Requirements for SLAMS, SPMs and PSD Air Monitoring”, the DEQ OAQM Instrument Auditor audits each ambient air quality monitor at least twice per year. Results of audit findings are reported to the Director of OAQM, station operator, and managers at OAQM. Further details about the audits are located in the DEQ OAQM document "How To Do the Audit Job".

20.2 Technical Systems Audit

The technical systems audit is an on-site review and inspection of the entire ambient air monitoring project to assess its compliance with the approved Quality Assurance Project Plan. The frequency of this audit is once every three years. To provide uniformity in the evaluation, the criteria and procedures identified in EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Section 2.0.11 are recommended. Results of audit findings are reported to the Director of OAQM with copies to the OAQM QA officer and managers.

20.3 Corrective Action and Response

Should audit findings identify a problem(s) with the monitoring project, the QA officer, in a timely fashion, notifies the OAQM Director and appropriate on-hand operations staff of the problem and recommends appropriate corrective actions. It is incumbent on the particulate data coordinator or his boss to ensure corrective actions are taken in a timely manner and to notify the QA officer in writing of the following info:

- identify the problem,
- specific actions taken to correct the problem,
- procedures implemented to limit problem recurring, and
- flag/invalidate affected data.

The QA officer makes the final recommendation whether to accept or reject the data.

21.0 REPORTS TO MANAGEMENT

The lead monitoring program is expected to operate for at least three years, pending demonstration of attainment status. Within a given year, data quality objectives for completeness are met at the monitoring site if there are 12 valid rolling 3 month means for the year. Monitoring data should be submitted to the EPA Air Quality System (AQS) within 90 days of completing a data collection quarter.

21.1 Network Reviews

The DEQ prepares annual network reviews as required in 40 CFR Part 58.10. The purpose of the annual network reviews is to determine if the system meets the monitoring objectives defined in 40 CFR Part 58 Appendix D. The review identifies needed modifications to the network including the termination or relocation of unnecessary stations or the establishment of new stations. Information gathering for these reviews is coordinated through the OAQM Director. Other personnel assist as necessary to provide information and support. The DEQ Air Division Director assures that such changes are included in future planning. The OAQM Director also implements other review findings that affect data quality.

As required by 40 CFR Part 58.10 the DEQ submits an annual monitoring network plan that includes a list of all monitoring sites and their AQS site identification codes to the EPA Regional Administrator each year. Whenever there is a change in this list of monitoring sites in a reporting organization, the DEQ OAQM reports this change to the EPA Regional Office and to AQS.

21.2 Quarterly Reports

Each quarter the DEQ OAQM reports to AQS the results of all flow rate verifications, flow rate audits, and audit sample strips it has carried out during the quarter. The quarterly reports are submitted, in compliance with the data-reporting requirements specified for air quality data as set forth in 40 CFR Parts 58.15 and 58.16.

The data-reporting requirements of 40 CFR Part 58 Appendix A Section 5 apply to those stations designated SLAMS. Required accuracy and precision data are reported on the same schedule as quarterly monitoring data submittals.

In accordance with the Federal Register Notice of July 18, 1997, all QA/QC data collected are reported and flagged appropriately. This data includes: "results from invalid tests, from tests carried out during a time period for which ambient data immediately prior to or subsequent to

the tests were invalidated for appropriate reasons, and from tests of methods or monitors not approved for use in SLAMS monitoring networks. . ." (40 CFR Part 58 Appendix A, Section 5).

Air quality data submitted for each reporting period are edited, validated, and entered into AQS using the procedures described in the *AIRS Users Guide,* Volume II, Air Quality Data Coding. See Appendix E for codes. The DEQ OAQM, Data Processing and Evaluation Group is responsible for preparing the data reports, which are reviewed by the data QA officer before they are transmitted to EPA.

21.3 Technical System Audit Reports

External system audits are conducted at least every three years by the EPA Regional Office as required by 40 CFR Part 58, Appendix A, Section 2.5. Further instructions are available from the EPA Regional QA Coordinator or the Systems Audit QA Coordinator, Office of Air Quality Planning and Standards, Emissions Monitoring and Analysis Division (MD-14), U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

21.4 Responsibilities

This section outlines the responsibilities, of persons within the monitoring organization, for preparing quality reports, evaluating their impact, and implementing follow-up actions. Changes made in one area or procedure may affect another part of the project. Only by defining clear-cut lines of communication and responsibility can all the affected elements of the monitoring network remain current with such changes. The documentation for all changes will be maintained and included in the reports to management. The following paragraphs describe key personnel involved with QA reporting.

Air Division Director, DEQ-The ultimate responsibility for the quality of the data and the technical operation of the lead network rests with the Executive Director, DEQ. The Director's responsibilities with respect to air quality reporting are delegated through the Air Division Director, to the Director, Office of Air Quality Monitoring. These responsibilities include defining and implementing the document-management and quality assurance systems for the lead monitoring network.

Director, Office of Air Quality Monitoring-The Director, OAQM will direct the operations of the air quality network. The Director will be specifically responsible for assuring the timely submittal of quarterly and annual data summary reports.

Data Quality Assurance Officer – The data QA officer is responsible for the management and administrative aspects of the lead QA program, including coordinating audits and

preparing required reports. The QA Officer's responsibilities for QA reports to management include the following:

- assessing data quality and performing other internal audits ,
- reviewing QC materials,
- monitoring Response/Corrective Action Reports,
- ensuring access to data for timely reporting and interpretation,
- ensuring timely delivery of all required data to AQS.

Particulate Data Coordinator -The particulate data coordinator serves as the main contact with the field operators and the DCLS lab. He reviews the filter envelopes, maintenance forms, motor calibration data, and flow check data that he receives from the operators and assures that repairs and preventive maintenance are complete and effective. He provides information to assist the QA officer in preparing QA reports and summaries. The particulate data coordinator delivers filters to the DCLS lab and receives concentration data from the lab which he passes along to the QA Officer. He also delivers (to the DCLS lab) the lead sample strips to be used for the analysis audit.

OAQM Instrument Auditor -The OAQM instrument auditor is responsible for making sure the lead monitors get audited twice per year. She also makes sure the flow check audit reports are complete and sent to the field operator, OAQM director, OAQM manager(s), and QA officer.

Field and Laboratory Technicians -Individual technicians and analysts normally do not write reports to management. However, they participate in the process by generating calibration and flow check reports, identifying the need for new Response/Corrective Action Reports, and maintaining other quality-related information used to prepare QA reports.

22.0 DATA REVIEW, VALIDATION AND VERIFICATION REQUIREMENTS

The following data review, validation and verification processes provide for data that meets the project's quality assurance criteria. Data review and validation for this project is a three (3) tier process. The first tier review is with the site operators by their strict adherence to SOPs for field sampling, equipment repair/maintenance, record keeping, sample handling/shipping, and data transfer. The site operators are responsible for noting any conditions or equipment function issues which may affect data quality and communicating with the particulate data coordinator on corrective actions.

The particulate data coordinator is responsible for the second tier of data review and validation. Data processing and reporting begins with receipt of data from the field. Upon receipt, the particulate data coordinator reviews the filter envelopes, maintenance forms, motor calibration forms, and flow check forms. As part of quality review, he routinely checks calculations to assure the integrity of the equations. For any item that is incomplete or missing he contacts the field operator(s) for additional information.

Using an Excel spreadsheet with automatic calculations, the particulate data coordinator takes the information on each filter envelope and combines it with the calibration data to calculate the sample volume. Then he sends the filters to DCLS for analysis. DCLS sends the concentration data back to the particulate data coordinator and he sends a copy of it to the QA officer.

The QA officer is responsible for the third tier of data review and validation. After she receives the concentration data from the particulate data coordinator, the QA officer converts the data to local conditions using temperature and pressure data from weather service providers for the sample days. She verifies that samples were collected according to the method, required documentation was recorded, QC checks were conducted, etc. The QA officer reconciles any suspect data or data recommended for invalidation. In order for the data to be considered valid the following conditions must be satisfied:

- The air monitoring instrumentation must be calibrated and operated according to standard operating procedures that have been approved by the SOP group.
- All QA/QC checks performed in support of field and analytical measurements must conform to criteria as specified in Appendix B - the Pb High Volume (TSP) Validation Template.
- The data must be accompanied by back up documentation which meet the specifications outlined in Sections 12 - 14 of this Plan, and be identified with respect to

station name, station number, date, time, operator, instrument identification, parameter, scale and units.

- The data must be bracketed by documented quality control which substantiate that it meets the criteria in Appendix B - the Pb High Volume (TSP) Validation Template.

Data which is reviewed and found to satisfy these criteria is considered valid. Data that does not is flagged in accordance with AQS quality assurance qualifier codes. The QA officer directs final revisions, puts the data into AQS format, and submits the data to the U.S. EPA's Air Quality System (AQS) Database (http://www.epa.gov/ttn/airs/airsaqs) within 90 days of the end of the quarter.

23.0 VALIDATION AND VERIFICATION METHODS

The purpose of this element is to identify the procedures and responsible parties who will perform data validation and verification. Data verification is the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements. Data validation is an analyte and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e. data verification) to determine the analytical quality of a specific data set.

Many of the processes for verifying and validating the measurement phases of the SLAMS data collection operation have been discussed in Section 22. If these processes, as written in the QAPP, are followed, and the sites are representative of the conditions for which they were selected, one would expect to achieve the DQOs. However, exceptional field events may occur, and field and laboratory activities may negatively affect the validity of monitored results. In addition, it is expected that some of the QC checks will fail to meet the acceptance criteria. Information on problems that affect the integrity of data is identified in the form of flags. It is important to determine how these failures affect the routine data. The review of this routine data and the associated QC data will be verified and validated on a monthly basis. It is assumed that if measurement uncertainty can be controlled within acceptance criteria, then the overall measurement uncertainty will be maintained within the precision and bias DQOs.

24.0 RECONCILIATION WITH DATA QUALITY OBJECTIVES

This section of the QAPP outlines the procedures that the DEQ Office of Air Quality Monitoring follows to determine whether the monitors and laboratory analyses are producing data that comply with the DQOs and what action will be taken as a result of the assessment process. Such an assessment is termed a Data Quality Assessment (DQA) and is thoroughly described *in EPA QA/G-9: Guidance for Data Quality Assessment.*

24.1 Five Steps of DQA Process

The DQA process is comprised of five steps which are detailed below.

1. Review the DQOs and the monitoring network design. Ascertain that the DQOs are still valid and that the monitoring network is providing the necessary data with which to make attainment decisions.

2. Conduct a preliminary data review. This review is performed to uncover potential limitation to the use of the data, to reveal outliers, and for general data review. During data review, summary statistics, quality assurance reports, and some graphical representations of the data will be generated. Particular attention will be directed to the detection of anomalies in the data, missing values, and any deviations from standard operating procedures. The summary statistics will be generated for each monitoring site.

3. Select the statistical test. The primary objective for the monitoring of lead is for the determination of compliance with the lead NAAQS. These calculations are specified in 40 CFR Part 50. Virginia will utilize these calculations in the determination of NAAQS attainment/non-attainment determinations.

4. Verify assumptions of statistical test. EPA has already verified the assumptions of the statistical test prior to their inclusion in the regulations. To the extent possible, Virginia will use full years of data for NAAQS determinations, but as much data as is available will be used if there is less than three years. Acceptable measurement and decision error limits have been specified by EPA, and these limits will be applied during DEQ's DQO review. The review will identify any monitoring sites that violate the standard, have apparent non-normal measurement errors or have less that the required data capture rate. The following comes from 40 CFR Part 58 Appendix A "2.3.1.4 *Measurement Uncertainty for Pb Methods*. The goal for acceptable measurement uncertainty is defined for precision as an upper 90 percent confidence limit for the coefficient variation (CV) of 20 percent and for bias as an upper 95 percent confidence limit for the absolute bias of 15 percent." Quarterly and annual bias and precision estimates will be calculated.

5. Draw conclusions from the data. The DEQ will determine if any of the assumptions upon which the statistical tests are based have been violated. This determination will be made prior to any determinations of compliance with the lead NAAQS. If the tests indicate that the assumptions are valid, the DEQ will proceed with the calculations for determination of NAAQS attainment as described in 40 CFR Part 50. If not, further investigation will be needed before any attainment/nonattainment decisions can be made.

24.2 Action Plan Resulting From Data Quality Assessment

The DEQ will conduct a DQA each year. In addition, quarterly determinations of precision and bias will be made to check for any changes in field or laboratory operations that need to be addressed before the annual review. Based upon the results of the DQA, the DEQ may take one or more of the following actions:

1. Modify the monitoring network. Virginia will operate monitors in accordance with 40 CFR Part 58, Appendix A, at a minimum. The number of monitors may be increased if additional data is necessary to characterize the precision and bias of the lead monitoring network.

2. Modify other *QA/QC* activities. At a minimum, Virginia will perform all *QA/QC* operations in accordance with federal regulations and guidance. These operations include field and laboratory activities, equipment malfunctions, site problems, and operator training.

3. Determine level of aggregation at which DQOs are violated. Specific problem monitors may be identified as part of the DQA process. Should this occur, it will be determined if the problem is unique to a specific site(s) or whether there is a broader problem. If an investigation cannot determine a specific site problem, national reports will be reviewed for specific type monitor problems. In addition, neighboring reporting organizations' precision and bias reports will be reviewed.

4. Communication with the EPA Regional Office. The DEQ will maintain close contact with the EPA Region III Office concerning any problems with achieving bias and precision DQOs.

5. Review of quarterly data. The DEQ will review the quarterly QA reports and the QC summaries to ensure attainment of bias and precision limits.

References Cited

Code of Federal Regulation, Title 40, Parts 50, 53, and 58

Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Ambient Air Quality Monitoring Program, EPA-454/B-13-003, May 2013. A link to the .pdf file can be found at: http://www.epa.gov/ttn/amtic/qalist.html

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