QUALITY ASSURANCE PROJECT PLAN FOR THE STATE OF FLORIDA LEAD AMBIENT AIR QUALITY MONITORING PROGRAM

Prepared for:

U.S. EPA

REGION 4

July 2021

Florida Department of Environmental Protection

Division of Air Resource Management

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QUALITY ASSURANCE PROJECT PLAN IDENTIFICATION AND APPROVAL

Title: *Quality Assurance Project Plan for the State of Florida Lead Ambient Air Quality Monitoring Program, Revision 1, July 2021.*

The attached Qu*ality Assurance Project Plan for the State of Florida Lead Ambient Air Quality Monitoring Program* is hereby recommended for approval and commits the State of Florida Department of Environmental Protection to follow the elements described within.

Environmental Protection Commission of Hillsborough County (EPC)

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EPA Region 4, Designated Approving Officer

Document History

Revision No.	Date	Responsible Person	Description of Change
0	November 2018	Alain Watson	Initial draft
0.1	February 2019	Alain Watson	Update to initial draft pursuant to SESD comments, QT15-0104
1	July 2021	Missy Smith	Removed references to FAMAS and replaced with AirMVP, Review

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1.0 DISTRIBUTION LIST

Table 1-1: Distribution List for Lead QAPP

U.S. EPA Region 4 Science and Ecosystem Support Division 980 College Station Road Athens, GA 30605-2720
U.S. EPA Region 4 Air, Pesticides, and Toxics Management Division 61 Forsyth Street, SW Atlanta, GA 30303-3104
Environmental Protection Commission of Hillsborough County 3629 Queen Palm Dr. Tampa, FL 33619
Note: This document will be distributed electronically to all personnel within the Primary Quality Assurance Organization (PQAO) involved in the ambient lead air monitoring project. Additionally, it will be available within the Air Monitoring Validation Program (AirMVP) database (or any subsequent statewide database system).

2.0 PROJECT AND TASK ORGANIZATION

The Florida Department of Environmental Protection (DEP) is the coordinating agency to oversee the single Primary Quality Assurance Organization (PQAO) in Florida. As a local air monitoring program within the Florida PQAO, the Environmental Protection Commission of Hillsborough County (EPC) operates and maintains the ambient air sampling network and analytical laboratory for lead. Since the lead monitoring network is wholly contained within Hillsborough County, it is operated and maintained by the EPC, as described in the Florida Annual Air Monitoring Network Plan. The quality assurance oversight and lead data certification in the US Environmental Protection Agency (EPA), Air Quality System (AQS) is performed by the Florida DEP.

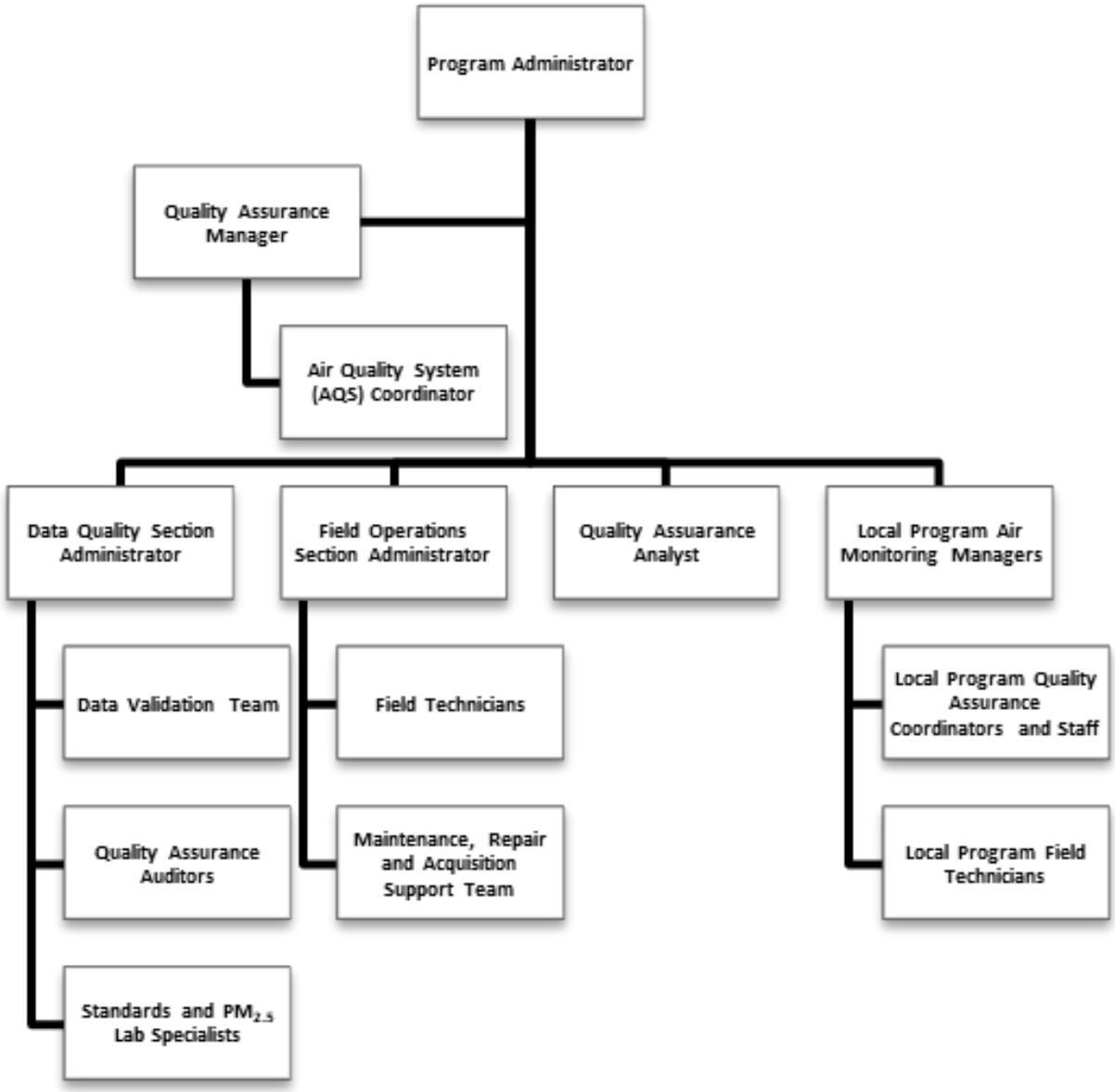
The Florida Department of Environmental Protection's (DEP) Division of Air Resource Management (DARM) is the primary organization in charge of the overall quality assurance for the Florida Ambient Air Monitoring Program. Since the EPC is responsible for deployment, operation and quality assurance of the lead monitoring program, the project organization description in this QAPP focuses on the EPC structure and DEP's interaction with the lead network. The DEP structure is defined in greater detail in the Florida Gaseous QAPP.

2.1 The Florida DEP Office of Air Monitoring

The Florida Department of Environmental Protection's (DEP) Division of Air Resource Management (DARM) has the overall responsibility for managing and implementing quality programs and procedures in accordance with the Quality Management Plan. The direct responsibility for assuring air monitoring data quality rests with the Program Administrator of the Office of Air Monitoring (OAR) and reporting quality assurance and data quality managers.

The Florida Department of Environmental Protection's (DEP) Office of Air Monitoring contains the functions of Ambient Monitoring Quality Assurance, Data Quality Management, and Field Operations. It is responsible for coordinating all aspects (quality assurance, data collection, and data processing) of Florida's Ambient Air Quality Monitoring Program. It is represented by the organizational chart in Figure 2-1.

Figure 2-1: Office of Air Monitoring Organizational Chart



OAM Program Administrator. The Program Administrator of the Office of Air Monitoring has direct access to the director on all matters relating to the air monitoring program's operation. The Program Administrator's responsibilities include:

- Maintaining oversight of all lead monitoring activities related to the statewide ambient lead monitoring program,
- Specifying funding for future changes in the lead network, and
- Responding to public inquiries and public records requests relating to ambient lead monitoring.

Quality Assurance Manager. The Quality Assurance Manager (QAM) reports to the Program Administrator of the Office of Air Monitoring and is responsible for the management of quality control and quality assurance activities for the program. The QAM's responsibilities include:

- Interpreting EPA QA policy especially for the purposes of developing, with the direction from management, the policy for the statewide monitoring organization,
- Reviewing QA documentation to ensure the latest federal and state requirements, policies and procedures are met, as it relates to the lead network,
- Reviewing the lead monitoring network design to ensure compliance,
- Ensuring timely and appropriate updates and revisions to the air monitoring Quality Management Plan (QMP), Standard Operating Procedures (SOP) for lead monitoring equipment, and the Lead Quality Assurance Project Plan (QAPP),
- Identifying quality problems and initiating action which results in solutions,
- Providing technical advice and assistance to the EPC regarding data quality issues arising during routine operations for the lead network,
- Providing QA related training support to the EPC lead monitoring staff, and
- Providing support to the agency databases and data reporting through the Air Quality System (AQS) database.

Quality Assurance Analyst. The Quality Assurance Analyst reports to the Program Administrator of the Office of Air Monitoring and provides support to quality control and quality assurance activities for the program. The analyst's responsibilities include:

- Interpreting EPA QA policy especially for the purposes of developing, with the direction from management, the audit policy for the statewide monitoring organization, as it relates to the lead network,
- Reviewing QA documentation to ensure the latest federal and state requirements, policies and procedures are met,
- Identifying quality problems and initiating action which results in solutions,
- Providing technical advice and assistance to the EPC lead monitoring staff regarding data quality issues arising during routine operations, and

- Providing QA related training support to the EPC lead monitoring staff.

Data Quality Section Administrator. The section administrator reports to the Program Administrator of Florida DEP's Office of Air Monitoring and is responsible for coordinating the activities of the Air Quality System (AQS) Coordinator, the Data Validation Team, the Quality Assurance Auditors, and the Standards and $PM_{2.5}$ Gravimetric Laboratory staff. The Section Administrator's responsibilities include:

- Supervising section staff and their activities,
- Identifying data quality problems and initiating action which results in solutions,
- Providing technical advice and assistance to the EPC lead monitoring staff regarding data quality issues arising during routine operations,
- Providing data quality-related training support to the EPC lead monitoring staff,
- Coordinating performance and quality assurance systems audits for the lead monitoring network,
- Coordinating the collection, verification, validation and reporting of ambient lead monitoring and quality assurance data to the EPA's Air Quality System (AQS), which includes performing Level 3 data review activities in accordance with the PQAO Data Handling and Data Validation SOP,
- Assuring procurement of needed supplies and equipment for audit and standard laboratory activities, as it relates to the lead network,
- Assuring data handling, audit and standards laboratory SOPs are maintained and up to date, and
- Ensuring staff training availability and utilization as it relates to the section's functions.

AQS Coordinator. The AQS coordinator reports to the Data Quality Section Administrator and is responsible for coordinating and performing the statewide ambient air data submittal to the EPA AQS. The AQS coordinator's responsibilities include the following:

- Performing Level 3 data review activities, in accordance with the PQAO Data Handling and Data Validation SOP,
- Verifying accuracy and completeness of data entry into the AQS database,
- Assisting the QAM with the Annual PQAO Data Certification,
- Providing data management and data upload support to statewide databases and data reporting through the Air Quality System (AQS) database, and
- Assisting the QAM with data quality assessments and conducting investigations, when needed, to determine root causes if DQOs/DQIs for the lead network are not met.

Quality Assurance (QA) Auditor(s). The QA auditor reports to the Data Quality Section Administrator and is responsible for coordinating and performing audit functions related to the ambient lead monitoring program. The auditor's responsibilities include the following:

- Conducting performance audits on ambient lead monitoring equipment in accordance with established procedures, guidelines and schedules,
- Conducting site characterization audits for compliance with Appendix E of 40 CFR Part 58, siting criteria,
- Conducting data and technical systems audits of the lead monitoring program as needed or required,
- Preparing audit finding reports and tracking progress on corrective actions related to the lead network,
- Reporting audits to AirMVP or any subsequent statewide database system,
- Participating and/or assisting in EPA conducted systems and technical audits of the lead network, and
- Maintaining audit SOPs (see Appendix C of this QAPP).

Standards and $PM_{2.5}$ Gravimetric Laboratory Staff. The Standards Laboratory staff report to the Data Quality Section Administrator and provide support to the lead monitoring program with the following:

- Coordination and tracking of glass fiber filter orders with EPA, Office of Air Quality Planning and Standards,
- Perform the annual certification of the transfer standard orifice for measuring lead sampler flow rates, and
- Performing certifications of transfer standards for temperature probes, pressure sensors, and manometers, as needed.

2.2 The Environmental Protection Commission of Hillsborough County

The EPC Air Management Division Director has the overall responsibility and authority in meeting the commitments to the lead monitoring program. The direct responsibility for assuring data quality and integrity rests with the air monitoring program manager (a.k.a. the Quality Assurance Coordinator). The EPC Air Monitoring Program manager is directly responsible for the field sampling, quality assurance/quality control (QA/QC) activities associated with the lead monitoring network, and data reporting to FDEP. Lead samples collected by the air monitoring program are delivered to the Water Management Division laboratory (EPC Laboratory). The EPC Laboratory manager is directly responsible for sample analysis by EPA Compendium Method, QA/QC of the laboratory instrumentation, and data reporting to the Air Monitoring Program manager.

The overall organizational structure of the EPC is shown in Figure 2-2, the structure of the Air Management Division is shown in Figure 2-3, and the EPC Laboratory organization is shown in Figure 2-4. The charts are followed by information listing the responsibilities of each position within the Air Management Division, Air Monitoring program and the Water Management Division, EPC Laboratory.

Figure 2-2: EPC Organizational Chart

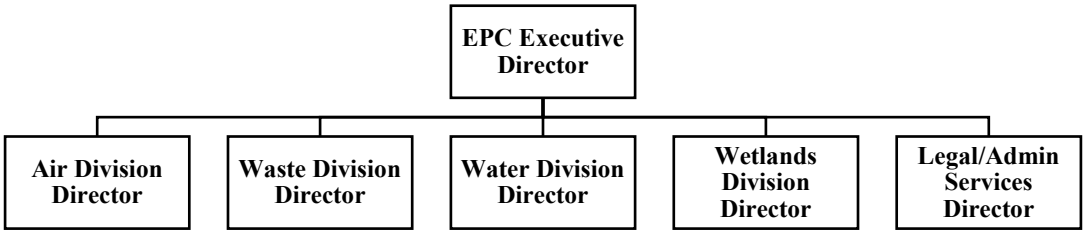


Figure 2-3: EPC Air Division Organizational Chart

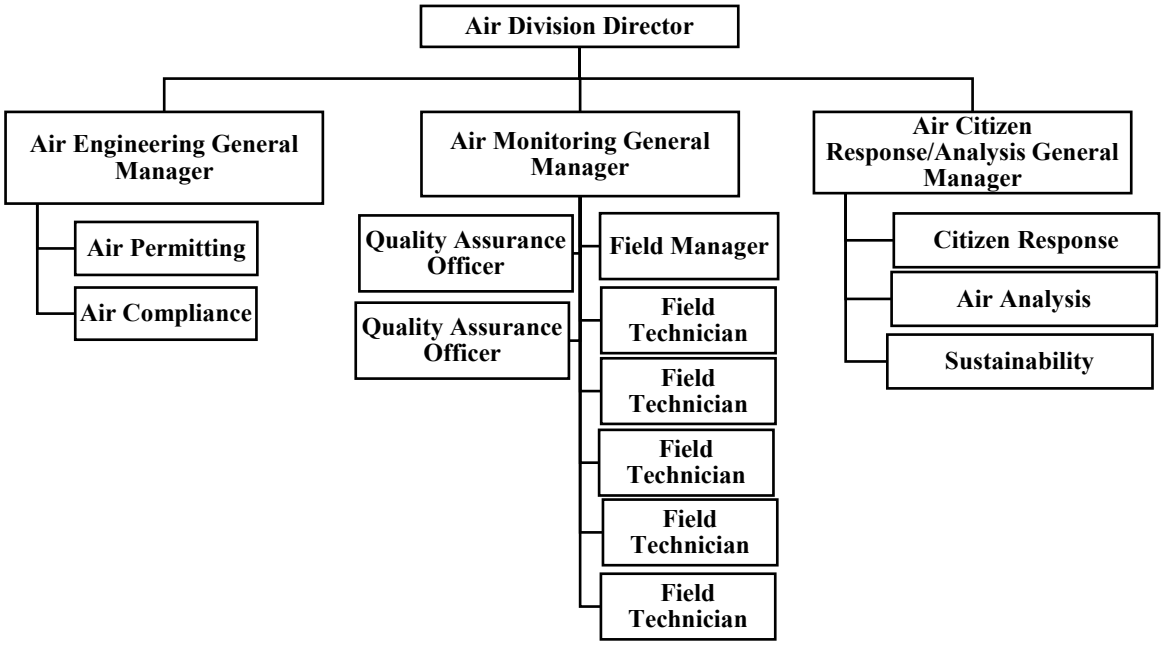
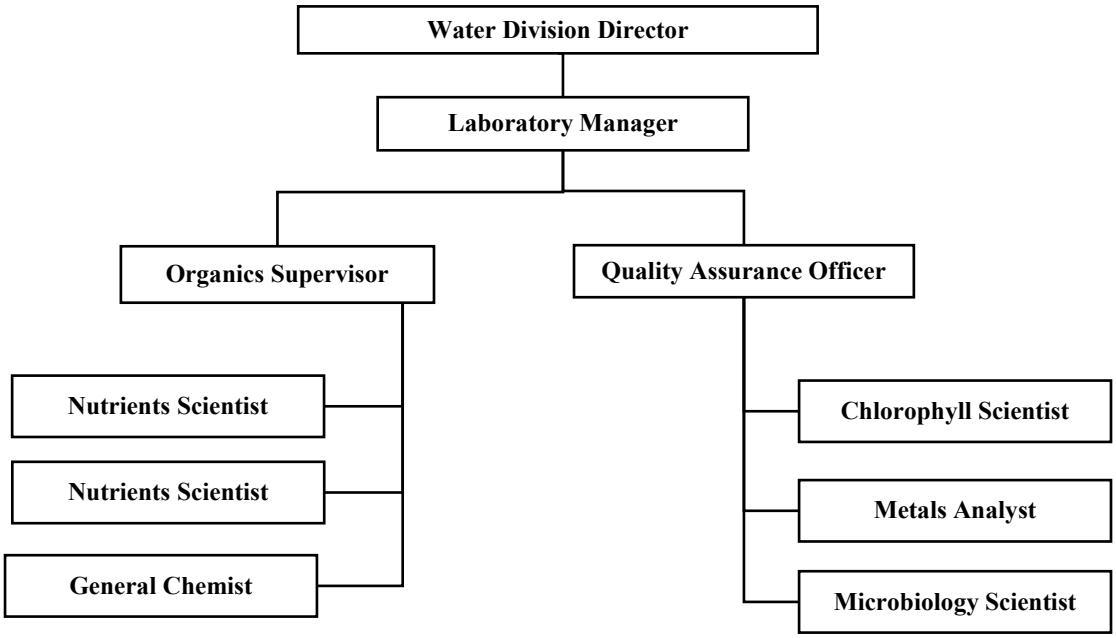


Figure 2-4: EPC Laboratory Organizational Chart



Environmental Protection Commission of Hillsborough County Air Division Director. The Air Division Director has direct access to the FDEP DARM Division Director and the OAM Program Administrator on all matters relating to the department's air monitoring program operation. The administrator's duties include:

- Ensuring that department policies and procedures are maintained by the local program office to ensure data quality excellence,
- Assuring that budgets and staff are maintained by the local program office to ensure network operational excellence and ongoing data collection activities,
- Ensuring that sufficient inventory supplies of tools, equipment, and materials are available and usable to ensure impacts to data collection activities are minimized,
- Providing input to the director and program administrator on problems which may be occurring in their areas of concern that may require monitoring program support, and
- Ensuring that agency monitoring staff are properly trained to perform their job functions to ensure data quality objectives are maintained.

Environmental Protection Commission of Hillsborough County Air Monitoring Staff. The local program monitoring staff's duties include:

- Ensuring that the lead monitoring program incorporates QA elements of SOPs and the Lead QAPP, and implementing day-to-day QA/QC activities for the ambient air quality monitoring program for lead,
- Reviewing environmental data prior to submittal,
- Assisting with data quality assessments and other internal audits,
- Calculating and/or reviewing precision and bias data generated by the collocated monitors,
- Assisting in the acquisition of resources and maintenance of equipment and inventories to ensure network operational readiness and avoidance of disruptions to data collection activities,
- Collecting, calculating, reporting and reviewing environmental data,
- Participating in training and certification activities,
- Verifying that all required QC activities are performed and that measurement quality objectives are met as prescribed in the QAPP/SOPs,
- Documenting deviations from established procedures and methods,
- Reporting nonconforming conditions and corrective actions to their managers and QA staff,
- Assessing data quality and flagging suspect data,
- Preparing internal reports for their management, and
- Documenting appropriate responses/corrective actions.

Environmental Protection Commission of Hillsborough County Quality Assurance Coordinator. The Quality Assurance Coordinator is responsible for data handling, data validation and data verification. They serve as members of FAMAC

to guide policy for data quality in Florida. Local Program Quality Assurance Coordinators responsibilities include:

- Ensuring necessary performance audits are completed,
- Ensuring completeness and efficacy of the work,
- Ensuring field and data processing personnel maintain their documentation,
- Assigning response/corrective actions to specific personnel,
- Completing additional narratives on the data such as comments in AirMVP (or subsequent statewide database system) and exceedance reports,
- Assessing audit findings, issuing appropriate response/corrective actions,
- Disseminating information appearing in audit reports, lab data packages and other quality-related documents to operational personnel, and
- Verifying that all submitted data are correct and complete by applying the verification flag to data.

Environmental Protection Commission of Hillsborough County Laboratory Manager. The laboratory manager is responsible for coordinating the activities of the laboratory staff and the data handling and laboratory QA/QC data for the analysis of lead in total suspended particulate (Pb-TSP) by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The laboratory manger's duties include:

- Ensuring that the laboratory incorporates QA elements of SOPs and QAPPs, and implements the day-to-day QA/QC activities for the analysis of lead in ambient air by ICP-MS,
- Maintaining laboratory equipment, supplies, and certifications,
- Calculating and/or reviewing precision and bias data generated by the analytical method, and
- Perform a final review of the EPC Laboratory lead data package and submittal to the EPC Air Monitoring QA Coordinator.

Environmental Protection Commission of Hillsborough County Laboratory Staff

- Performs filter preparation for each sample,
- Performs the analytical method, ICP-MS, for the analysis of lead in total suspended particulate (Pb-TSP), and
- Prepares the data reporting package containing the final analytical results and laboratory QA/QC reports.

3.0 PROBLEM DEFINITION AND BACKGROUND

In 1970 the Clean Air Act was signed into law, and its amendments provide the framework for protecting air quality. To protect air quality, active environmental data collection operations must be established and operated in a manner that assures the most applicable and highest quality data are collected. The National Ambient Air Quality Standards (NAAQS) established primary and secondary standards (i.e. limits) for each of the criteria pollutants, where the primary standards were designed to protect public health, while the secondary standards were created to protect public welfare, such as damage to animals, crops, vegetation, and buildings.

Ambient air quality monitoring programs monitor criteria pollutants (particulate matter [particles with an average aerodynamic diameter of 10 micrometers (PM_{10}) or less ($PM_{2.5}$)], sulfur dioxide [SO_2], carbon monoxide [CO], nitrogen dioxide [NO_2], ozone [O_3], and lead [Pb]). The gaseous and $PM_{2.5}$ pollutants are addressed in separate QAPPs. The NAAQS for lead is shown in Table 3-1, below.

Primary standards are set at a level adequate to protect public health within an acceptable margin of safety, while secondary standards are set at a level that is requisite to protect public welfare. The CAA and its amendments provide the framework for the monitoring of these criteria pollutants by state, local, and tribal air monitoring organizations. Under the area designations process, data from ambient air monitors are typically used to characterize air concentrations for identification of areas that are either meeting or violating a particular pollutant standard. Monitors used for comparisons against a NAAQS are typically designated as State and Local Air Monitoring Stations (SLAMS) monitors and must meet the requirements stipulated in 40 CFR Parts 50, 53, and 58. For most of the criteria pollutants, three years of valid, quality-assured data are needed for comparison against the NAAQS.

Lead is a toxic heavy metal which, once taken into the body, distributes throughout the body in the blood and is accumulated in the bones. Exposure to lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Lead in the ambient air consists of particulate matter less than 100 μm in diameter suspended in the atmosphere. Particulate matter, itself, is made up of tiny airborne particles and aerosols. Sources of lead emissions include ore and metals processing, piston-engine aircraft operating on leaded aviation fuel, waste incinerators, lead-acid battery manufacturers and secondary lead processing facilities. Currently, the only lead emission source of concern in Florida is in Hillsborough County which warrants lead monitoring for compliance with NAAQS.

The objective of Florida's Ambient Air Quality Monitoring Program for Lead is to protect the health and sustainability of the state by identifying any violations of the NAAQS for lead, locating the highest ambient lead concentrations across the area, and determining the general background concentration of lead. The lead monitoring network in Florida has been continuously operated, maintained, and updated since 1988, in accordance with county, state, and federal monitoring requirements. The ambient lead monitoring data collected are

used to support the local, state, regional, and federal air monitoring programs, County organizations, and the general population. In addition, the ambient lead data is used in support of revisions to the State Implementation Plan as it pertains to lead.

The area surrounding EnviroFocus Technologies, LLC (formally Gulf Coast Recycling Co.) a secondary lead smelting facility in Hillsborough County, was designated by the EPA as "unclassifiable" for the 1978 lead standard (1.5 $\mu g/m^3$). As such, the EPC monitored for the ambient lead concentrations in the vicinity of the facility and recorded violations of the 1978 standard in 1991, 1995, 1996, 2000, and 2007.

The EPA revisited the lead standards in 2008. As a result, the original lead standard (quarterly average of 1.5 $\mu g/m^3$) was reduced by a factor of 10 to 0.15 $\mu g/m^3$ based on a 3-month rolling average. This standard was retained in EPA's 2016 review. Only Pb concentrations collected by federal reference methods (FRMs) or federal equivalent methods (FEMs) are used in NAAQS comparisons and attainment/non-attainment designations.

This QAPP ***only*** covers ambient lead for State and Local Air Monitoring Stations (SLAMS) and Special Purpose Monitors (SPM) in Florida's ambient air monitoring network. The gaseous criteria pollutants, National Core (NCore), and particulate matter monitors ($PM_{2.5}$ and PM_{10}) are addressed in separate QAPPs.

Table 3-1: 2008 National Ambient Air Quality Standard for Lead

Pollutant	Averaging Time	Standard Value [a]	Standard Type	Description
Lead (Pb)	Rolling 3-month	0.15 $\mu g/m^3$	Primary and Secondary	Not to be exceeded

[a] Current concentration levels

4.0 PROJECT AND TASK DESCRIPTION

4.1 Description of Work to be Performed

This QAPP was developed to ensure that Florida's air monitoring network for lead collects ambient air quality data that meet or exceed EPA quality assurance requirements. These data are entered into the EPA AQS database, available for regulatory decision-making purposes – i.e. determination of compliance with the NAAQS for lead. Other purposes of the lead data include determining trends over time, determining effects on air quality from adjustments to source emissions, verifying air quality modeling programs, and providing monitoring data to the public.

In accordance with 40 CFR Part 58, Appendix D, Section 1.1, SLAMS monitoring networks must be designed to meet three basic monitoring objectives: provide air pollution data to the public in a timely manner; support compliance with ambient air quality standards and emissions strategy development; and support for air pollution research studies. Florida's ambient air monitoring network for lead is designed to support the following objectives:

- Determining the lead network design value for comparison to the NAAQS for lead.
- Determining the highest concentrations expected to occur in the area covered by the network.
- Determining the impact on ambient lead levels of significant sources emitting lead in the area.
- Determining the general background concentration levels.

Data will be reported to AQS in accordance with the requirements stated in 40 CFR 58.16. Florida's lead monitoring network will operate and collect data in accordance with the schedules codified in 40 CFR 58.12(b) which specifies one 24-hour sample collected every 6 days. A collocated quality control sample will be collected in accordance with 40 CFR Part 58, Appendix A, Section 3.4.4, on a 1-in-12-day schedule. The ambient lead concentration data will be collected by monitors that are designated as Federal Reference Method (FRM), in accordance with 40 CFR Part 58, Appendix C, Section 2.1. The types of data collected by Florida's lead monitoring network, overall, will include:

- Ambient lead concentrations at local temperature and pressure conditions;
- Precision and bias measurements;
- Ambient temperature and pressure measurements; and,
- Geographic measurements (e.g. locational, demographic, topographical).

The work required to collect, document, and report this data includes, but is not limited to, the following:

- Establishing a monitoring network that has:
    - Appropriate density, location, and sampling frequency;
    - Accurate and reliable monitors, data recording equipment, and software;
- Developing encompassing documentation for:
    - Data and report format, content, and schedules;
    - Quality objectives and criteria;
- Establishing standard operating procedures, which provide activities and schedules for:
    - Equipment operation and preventative maintenance;
    - Instrument calibrations, precision checks, and accuracy evaluations;
- Establishing assessment criteria and schedules; and
- Verifying and validating the data produced by network monitors in accordance with the criteria and schedules established herein.

Towards this end, Florida's work products also include a series of assessments and reports in order to ensure the network and resulting data continuously meet or exceed regulatory requirements. Similarly, the Florida PQAO maintains this QAPP and its associated SOPs, reviewing and revising them as needed, to ensure they continuously reflect the requirements of the PQAO and EPA.

4.2 Field Activities

All monitoring personnel will perform those activities that support the continued successful operation and maintenance of the ambient air quality monitoring network for lead. Personnel will perform field activities according to the SOP for Pb-TSP High-Volume Samplers, DEP 03-18 (Pb-TSP Hi-VOL SOP). These activities include, but are not necessarily limited to, conducting periodic preventative maintenance and servicing equipment at State and Local Air Monitoring Stations (SLAMS) and special purpose monitoring stations (SPMs) located within the State of Florida. Operational servicing activities may include, but are not limited to, collecting samples, recording pertinent field data, and restocking consumables at the monitoring sites. Additional field activities include relocating sites and/or locating suitable monitoring sites for possible expansion of the network.

4.3 Florida DEP Standards Laboratory Activities

For the lead network samplers, the standards laboratory specialist will provide support for the successful operation of the statewide ambient lead monitoring network through instrument certification activities. These include, maintaining a rootsmeter for the annual certification of flow orifice transfer standards. Maintaining local primary standards for certification of temperature probes, barometric pressure sensors, and manometers used by QA auditors in the lead monitoring network.

4.4 EPC Laboratory Activities

The EPC Laboratory is responsible for all lead analyses in the network and its personnel will assure completion of those activities that support continued successful operation of the ambient lead air quality monitoring network. The EPC, in coordination with DEP, orders glass fiber filters from the national contract with the EPA OAQPS. The filters are shipped directly to the EPC Lab for pre-sampling inspection, conditioning, and QA/QC checks. This includes, but is not limited to, performing analyses on materials prior to and after exposure to the ambient atmosphere, preparing and analyzing control samples, maintaining consumable inventories for the laboratory analytical instruments, shipping and receiving activities, and performing maintenance and calibrations of the analytical instruments. All duties will be performed according to the laboratory SOPs related to the preparation and analysis of lead compounds, such that the data quality provided meets or exceeds EPA QA requirements. The QA requirements are specified in the Environmental Protection Commission Laboratory Quality Manual and the 2017 QA Handbook.

Laboratory personnel visually inspect filters prior to delivery to the air monitoring staff. As part of the analytical method, the laboratory analyst performs initial and continuing calibrations, reagent blanks, and matrix spikes as part of the QA/QC activities.

4.5 Project Assessment Techniques

An assessment is an evaluation process used to measure the performance or effectiveness of a system and its elements. As used here “assessment” is an all-inclusive term used to denote any of the following: audit, performance evaluation, inspection, or surveillance. Section 18 will discuss the details of assessments. Information on the parties implementing assessments and their frequency is provided in Table 4-1.

Table 4-1: Assessment Schedule

Assessment Type	Assessment Agency	Frequency
Technical / Quality Assurance System Audits	EPA Region 4 and/or State	Every 3 to 5 Years
Network Plan/Review	EPA Region 4 & State	Annually
Network Assessment	State	Every 5 years
Performance Evaluations (flow audits)	State	Semi-annual
Standard Operating Procedures Reviews	State & EPC	Annually
QAPP Review	State & EPC	Annually
Data Quality Audits	State	Periodically, per State schedule
Data Quality Assessment	State & EPC	Quarterly
Lead Analysis Audit	EPA	Each calendar quarter
Lead Audit Strips	EPA	Monthly
Lead Performance Evaluation Program	EPA	Quarterly collocated instrument
Data Certification	EPA Region 4 & State	Annually

4.6 Project Records

Each program within the PQAO, including Florida DEP, has its internal procedures for the timely preparation, review, approval, issuance, use, control, revision, and maintenance of documents and records. However, for the ambient lead monitoring network described by this QAPP, these records are compiled and stored annually in the EPC data management system, as well as the Florida DEP local area network servers, following the Data Handling and Data Validation SOP. The categories and types of records and documents are presented in Table 4-2 below.

Table 4-2: Critical Documents and Records

Categories	Record/Document Type
Site Information	▪ Network Descriptions ▪ Site Files ▪ Site Maps ▪ Site Pictures

Categories	Record/Document Type
Environmental Data Operations	▪ Quality Assurance Project Plans ▪ Standard Operating Procedures ▪ Field and Laboratory Notebooks ▪ Sample Handling/Custody Records ▪ Inspection/Maintenance Records
Raw Data	▪ Any Original Data (routine and quality control) including data entry forms
Data Reporting	▪ Data/Summary Reports
Data Management	▪ Data Algorithms ▪ Data Management Plans/Flowcharts ▪ Data Management Systems ▪ Pollutant Data ▪ Meteorological Data
Quality Assurance	▪ Network Reviews ▪ Data Quality Assessments ▪ Quality Assurance Reports ▪ Technical System Audits ▪ Response/Corrective Action Reports ▪ Performance Evaluations

4.7 Site Locations

Florida's ambient air monitoring network description is provided on Florida DEP's website: https://floridadep.gov/air/air-monitoring. The lead monitors are located proximate to the major source of lead emissions for determining compliance with the lead NAAQS and measuring background concentrations for the local area. Table 4-1 list the lead network site, sampling method, and general monitoring objective. Figure 4-1 shows the relative geographic site locations for Florida's Ambient Lead Monitoring Network in 2017.

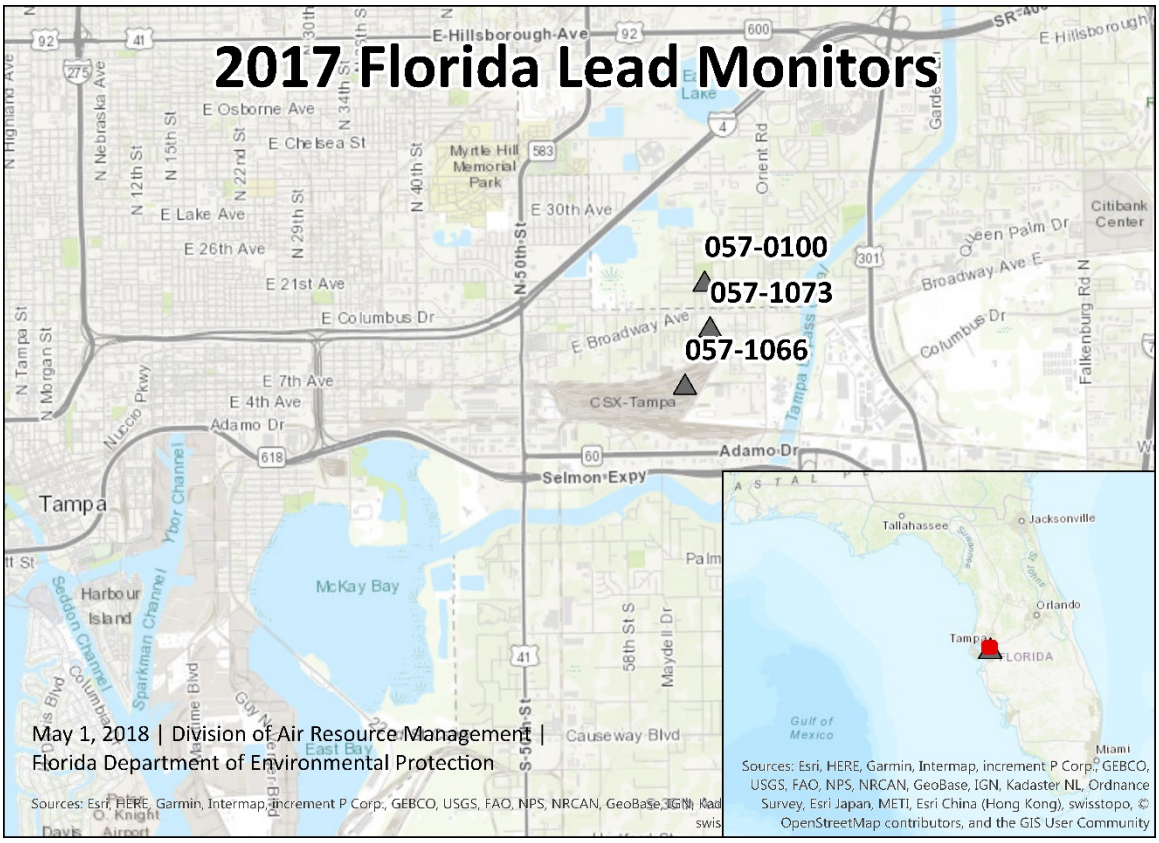
Table 4-3: Lead Network Monitoring Stations

AQS#	Site Name	Sampler	Method	Objective
12-057-0100	Kenly	Tisch TE-1000	High-Volume	Area Background
12-057-1066	CSX Rail Yard [1]	Tisch TE-1000	High-Volume	Source Oriented
12-057-1073	Patent	Tisch TE-1000	High-Volume	Source Oriented

1. The site contains a collocated sampler for QA purposes.

The CSX Rail Yard site (formally known as Gulf Coast Lead), AQS #12-057-1066, is the station measuring the highest concentrations of ambient lead. It is the site with the highest design value in the lead monitoring network. The CSX site also runs the collocated Pb-TSP Hi-VOL sampler for determining sampler precision.

Figure 4-1: Florida Lead Network Map



5.0 DATA AND MEASUREMENT QUALITY OBJECTIVES AND CRITERIA

Florida operates under an EPA-approved Quality Management Plan (QMP) that describes the system for communicating and implementing quality within the PQAO.

A quality system is a structured and documented set of management activities in which an organization applies sufficient quality control practices to ensure that the data produced by an operation will be of the type and quality needed and expected by the data user. Quality control defines the procedures implemented to assure that acceptability is obtained and maintained in the generated dataset. Quality control procedures, when properly executed, provide data that meet or exceed the minimally acceptable quality criteria established to assist management in making confident decisions. Florida's policy is to implement a QA program to assure that data of known and acceptable precision, bias, completeness, comparability, and representativeness are collected within its Ambient Air Quality Monitoring Program.

Precision, bias, completeness, sensitivity, and comparability, and representativeness are the principle Data Quality Indicators (DQI) that provide qualitative and quantitative descriptions used in interpreting the degree of acceptability of data. Establishing acceptance criteria for these DQIs sets quantitative goals for the quality of data generated in the measurement process. The principal DQIs, precision, bias, and sensitivity, are the quantitative measures, representativeness and comparability are qualitative measures, and completeness is a combination of both qualitative and quantitative measures. The specific requirements of these DQIs are established before data collection commences. The goal is to locate and eliminate (or minimize) bias, so the data collected show the true conditions of the area being sampled. This includes consideration of siting criteria, spatial scales, monitoring objectives, climatic change, source configurations, and the duration of the study.

The written procedures and methodologies in this QAPP for operating air monitoring instrumentation and handling data must be adhered to by all individuals to assure quality data for purposes of Florida's air quality designations with regards to attainment of the NAAQS. The EPA-approved Federal Reference Method (FRM) for high volume sampling of lead is the designated methodology and basis for operating Pb-TSP sampling equipment within the network and analysis of the sample by Inductively Coupled Plasma Mass Spectrometry (ICP-MS).

5.1 Data Quality Objectives

This section describes the data quality objectives (DQOs) for the ambient air quality monitoring program for the State of Florida. Data quality objectives are qualitative and quantitative statements that:

- Clarify the intended use of the data,
- Define the type of data needed, and

- Specify the acceptable probability limits for deciding errors due to uncertainty in the data.

5.2 Intended Use of Data

Data collected from the lead monitoring network will be used to:

- Evaluate compliance with the NAAQS,
- Establish a historical baseline concentration of natural and anthropogenic air pollutants,
- Monitor the current dynamic concentrations of these air pollutants,
- Monitor progress made toward meeting ambient air quality standards,
- Provide data upon which long term control strategies can be reliably developed,
- Observe pollution trends for the scale of representativeness, and
- Provide a database for researching and evaluating effects.

5.3 Type of Data Needed

The type of data needed is determined by its intended use. Because the primary use of Florida's monitoring data is for comparison to the NAAQS, data must be collected per 40 CFR Parts 50, 53, and 58 requirements, and be of such quality that decision-makers can make comparisons to the NAAQS with confidence and certainty. Therefore, the filter-based lead (Hi-Volume sampler) is an integrated 24-hour sample collected from midnight to midnight for the scheduled sampling day, is compiled by the Florida PQAO to achieve a high percentage of valid data samples (>75 % per calendar quarter) while maintaining integrity and accuracy. 40 CFR 58.16 specifies the data reporting requirements that the Florida PQAO will follow, and Appendix R to 40 CFR Part 50 explains the data handling convention and computations necessary for determining whether the NAAQS for Pb are met.

In addition to these requirements, the data needed for the Florida PQAO monitoring program will meet the following principle quality objectives:

- All data should be traceable to a National Institute of Science and Technology (NIST) primary standard.
- All data shall be of a known and documented quality. As noted above, two key quantitative indicators for assessing data quality are precision and bias. Precision and bias requirements are established herein.
- All data shall be comparable. This means all data shall be produced similarly and scientifically. The use of the standard methodologies for sampling, calibration, auditing, etc. found in the QAPP should achieve this goal.
- All data shall be representative of the parameters being measured concerning time, location, and the conditions from which the data are obtained. The use of the standard methodologies contained in the QAPP should ensure that the data generated are representative.

- The QAPP and its associated SOPs must be dynamic to continue to achieve its stated goals as techniques, systems, concepts, and technology change.

The following bullets provide the specifications on the types of data needed to compare Florida's lead (Pb) design values to the NAAQS:

- Calculate the concentrations for 24-hour composite samples in micrograms per cubic meter of air ($\mu g/m^3$) to three decimal places, truncating additional digits to the right.
- Calculate the arithmetic mean concentration each month to three decimal places, truncating additional digits to the right.
- Determine the rolling 3-month mean, rounded to the nearest hundredth in µg/m3.
- The highest 3-month mean is the design value which is compared to the NAAQS.

Specific information on the Pb NAAQS calculation, as well as data completeness for valid means, is found in Appendix R of 40 CFR Part 50.

5.4 Tolerable Error Limits

The Data Quality Objective (DQO) process defines limits on the probability of deciding errors due to uncertainty in the data. That is limits on the probability of measuring a false positive or false negative error. With regards to air quality data, a false positive error occurs when data indicates that the lead NAAQS has been exceeded when in fact, due to random deviations in the data, it has not been exceeded. Alternatively, a false negative error occurs when data indicate that the lead NAAQS has not been exceeded when in fact, due to random deviations in the data, it has been exceeded.

Utilizing the formal DQO process, EPA established the tolerable error limits for ambient air monitoring precision and bias data to reduce the probability of decision errors. 40 CFR Part 58, Appendix A Section 2.3.1.3, defines the acceptable measurement uncertainty for Pb methods. Florida formally adopts EPA's DQOs for Pb; reprinted below:

> *2.3.1.3 Measurement Uncertainty for Pb Methods. The goal for acceptable measurement uncertainty is defined for precision as an upper 90 percent confidence limit for the CV of 20 percent and bias as an upper 95 percent confidence limit for the absolute bias of 15 percent.*

5.5 Measurement Quality Objectives

The DQO process functions to identify the allowable measurement uncertainty for a given objective. 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. Measurement quality objectives (MQOs) are designed to evaluate and control various phases (sampling, preparation, analysis) of the measurement process to ensure that total measurement uncertainty is within the range prescribed by the DQOs. MQOs are derived from the DQOs and can be established to evaluate overall measurement uncertainty, as well as be established for an individual phase of a measurement process.

The MQOs for Florida's Ambient Lead Monitoring Network are defined in terms of the following data quality indicators (see section 5.5.2 of this QAPP for more information):

- ***Precision -*** Precision is a measure of agreement between two replicate measurements of the same property, under prescribed similar conditions. This agreement is calculated as either the range or as the standard deviation. This calculation represents the random component of error.
- ***Bias -*** Bias is the systematic or persistent distortion of a measurement process that causes errors in one direction. Bias is determined by estimating the positive and negative deviation from the true value as a percentage of the true value.
- ***Sensitivity –*** Sensitivity is a quantitative estimate for the minimum detection limit (MDL) of the analytical instrument used to determine lead concentrations. The MDL and sample quantification limit (SQL) provide information on the concentration at which both positive identification and accurate quantification are expected, respectively.
- ***Completeness -*** Completeness is a metric quantifying the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct, normal conditions. Completeness can be expressed as a ratio or a percentage. Data completeness requirements are included in the reference methods (40 CFR Part 50).
- ***Comparability -*** Comparability is the qualitative term that expresses the confidence that two data sets can contribute to a common analysis and interpolation. Comparability must be carefully evaluated to establish whether two data sets can be considered equivalent in regard to the measurement of a specific variable or groups of variables.
- ***Representativeness -*** Representativeness is a measure of the degree to which data accurately and precisely represent a characteristic of a population parameter at a sampling point or for a process condition or environmental condition. Representativeness is a qualitative term that should be evaluated to determine whether in situ or other measurements are made and physical samples collected in such a manner that the resulting data appropriately reflect the media and phenomenon measured or studied.

For each of these attributes, acceptance criteria have been developed for these DQIs using various parts of 40 CFR Parts 50, 53, 58, 136 and EPA guidance documents. Specifically, the MQOs for the criteria pollutants have been compiled into "validation templates" found in the EPA 2017 Quality Assurance Handbook for Air

Pollution Measurements Systems, Volume II (i.e., 2017 QA Handbook). The validation template for Pb-TSP is reproduced here and is included in Table 5-2. Florida adopted this table and established it as the MQOs for the State-wide Ambient Air Monitoring Program for Lead.

As described in the 2017 QA Handbook and implemented here, for the criteria pollutant lead, three validation criteria are listed: critical, operational, and systematic. The table discriminates between criteria that must be met to ensure the quality of the data (i.e., critical criteria), criteria that indicate that there may be issues with the quality of the data, and further investigation is warranted before deciding about the validity of the sample or samples (i.e., operational criteria), and criteria that indicate a potentially systematic problem with the environmental data collection activity, that may impact the ability to make decisions with the data (i.e., systematic criteria). For each criterion, the tables include: (1) the requirement, (2) the frequency with which compliance is to be evaluated, (3) the acceptance criteria, and (4) information where the requirement can be found or additional guidance on the requirement.

In addition to adopting the MQOs, Florida has created and implemented warning limits. Warning limits are defined as the level of allowable imprecision before an analyzer calibration or another corrective action is warranted. These limits will be set lower than the MQOs (i.e., control limits) to reduce imprecision and bias and enhance data recovery.

Control limits are defined as the level of allowable imprecision before data invalidation and corrective actions are required. The control limits cannot be set higher than the MQOs and these limits are to be used when validating ambient air measurements against single-point precision checks. This will strengthen the precision of these measurements and improve the data validation practices to meet regulatory requirements. The warning and control limits for precision checks used by the Florida PQAO are listed in Table 5-1, below.

Table 5-1: Control and Warning Limits for Pb-TSP Hi-VOL Sampling

Parameter	Control Limit (MQO)	Warning Limit
	Acceptance Criteria	
Semi-Annual Flow Rate Audit	< ± 7.1%	<± 4.1%
1-Point Flow Verification	< ± 7.1%	<± 4.1%
Operational Flow Rate	1.1 – 1.7 m^3/min	N/A

Florida's implementation of EPA's validation tables as well as the warning limits/levels – how they will be used to validate data and drive data quality decision-making – will be described in more detail in Section 20 of this QAPP, and in the Data Handling and Data Validation SOP (DEP 18-27).

Table 5-2: Pb-TSP Validation Template

1) Criteria	2) Frequency	3) Acceptable Range	4) Information/Action
CRITICAL CRITERIA- Pb in TSP Local Conditions			
Field Activities			
Sampler/Monitor	NA	*Meets requirements listed in FRM/FEM/ARM designation*	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list Also described in 40 CFR Part 50 App B Sec. 7.2
Filter Holding Times			
Sample Recovery	*all filters*	*ASAP*	1, 2 and 3) 40 CFR Part 50 App B Sec. 6.3
Sampling Period	*all filters*	*1440 minutes ± 60 minutes midnight to midnight local standard time*	1, 2 and 3) 40 CFR Part 50 App B Sec. 8.15
Sampling Instrument			
Average Flow Rate	*every 24 hours of op*	*1.1-1.70 m^3/min (varies with instrument) in actual condition*	1, 2 and 3) 40 CFR Part 50 App B Sec. 8.8
One-point Flow Rate Verification	*every 90 days and 4 times a calendar year*	< ±7.1% from transfer standard	1 and 2) 40 CFR Part 58 App A Sec. 3.4.2 3) Method 2.2 Sec. 2.6
Lab Activities			
Filter			
Visual Defect Check (unexposed)	*all filters*	*Initial backlight inspection- no pinholes or imperfections. Visual inspection prior to shipping to analytical lab*	1, 2 and 3) 40 CFR Part 50 App B Sec. 8.2
Collection Efficiency	*all filters*	*99 %*	1, 2 and 3) 40 CFR Part 50 App B Sec. 7.1.4
Pressure Drop Range	*all filters*	*42-54 mm Hg*	1, 2 and 3) 40 CFR Part 50 App B Sec. 7.1.5
pH	*all filters*	*6-10*	1, 2 and 3) 40 CFR Part 50, App B Sec. 7.1.6
Pb Content	*all filters pre-sampling batch check*	*< 75 µg/filter*	1, 2 and 3) 40 CFR Part 50, App G Sec. 6.1.1.1 Method 2.8 Sec. 6.2.1. More information relative to whether filters should be corrected for blanks.
Calibration Reproducibility Checks	*Beginning, every 10 samples and end*	*± 5% of value predicted by calibration curve*	1, 2 and 3) 40 CFR Part 50, App G Sec. 9.3 May be FEM dependent
Initial Calibration Blank	*Before first sample*	*< 0.001 µg/mL*	1, 2 and 3) 40 CFR Part 50, App G Sec.8.8

1) Criteria	2) Frequency	3) Acceptable Range	4) Information/Action
Reagent Blank	Every analytical batch	< LDL	1, 2 and 3) Recommendation
Daily Calibration	Daily (on day of analysis)	until good agreement is obtained among replicates	1, 2 and 3) Method 2.8 Sec. 2.8.5
OPERATIONAL EVALUATIONS TABLE Pb in TSP Local Conditions			
Field Activities			
Verification/Calibration			
System Leak Check	During precalibration check	Visual and Auditory inspection with faceplate blocked	1, 2 and 3) Recommendation
FR Multi-point Verification/Calibration	After receipt, after motor maintenance or failure of 1-point check and every 365 days and once a calendar year	5 points over range of 1.1 to 1.7 m^3/min $\leq \pm$ 5.1% limits of linearity	1, 2 and 3) Method 2.2 Sec. 2.6
Precision			
Collocated Samples	*15% of each method code in PQAO Frequency - every 12 days*	CV < 20.1% of samples $\geq$ 0.02 µg/m^3 (cutoff value)	1 and 2) 40 CFR Part 58 App A Sec. 3.3.4.3 3) Recommendation for early evaluation of DQOs
Semi Annual Flow Rate Audit	*every 180 days and twice a calendar year*	$< \pm$ 7.1% of audit standard	1 and 2) 40 CFR Part 58, App A, Sec. 3.4.3 3) Method 2.2 Table 8.2
Monitor Maintenance			
Inlet cleaning	every 90 days and 4 times a calendar year	cleaned	1, 2 and 3) Recommendation
Motor/housing gaskets	~400 hours	Inspected replaced	1, 2 and 3) Method 2.2 Sec. 7
Blower motor brushes Manufacturer-Recommended Maintenance	400-500 per manufacturers' SOP	Replace per manufacturers' SOP	1, 2 and 3) Method 2.2 Sec. 7 NA
Lab Activities			
Analysis Audits	*6 strips/quarter 3 at each concentration range*	<10.1% (percent difference)	1 and 2) 40 CFR Part 58, App A, Sec. 3.4.6 3) Recommendation
Field Filter Blank	1/quarter	< LDL	1, 2 and 3) Recommendation
Lab Blanks	1/ sample run	< LDL	1, 2 and 3) Recommendation
Control Standards (1 µg Pb/ml and a standard between 1-10 µg Pb/ml)	1st, every 10 samples and last sample.	Deviation of < 5.1% from value predicted by calibration curve	1, 2 and 3) Method 2.8 Sec. 5.7.3
SYSTEMATIC CRITERIA - Pb Filter Based Hi-Vol Local Conditions			
Siting	Every 365 days and 1/ calendar year	*Meets siting criteria or waiver documented*	1) 40 CFR Part 58 App E, Sections 2-5 2) Recommendation 3) 40 CFR Part 58 App E, Sections 2-5
Data Completeness	*3-year standard*	*average of the 3 constituent monthly means $\geq$ 75%.*	1, 2 and 3) 40 CFR Part 50 App. R, Sec. 4. In addition there are substitution tests that can be used for data not meeting completeness criteria.

1) Criteria	2) Frequency	3) Acceptable Range	4) Information/Action
Reporting Units	*all filters*	*µg/m^3 at local temperature and pressure.*	1, 2 and 3) 40 CFR Part 50 App R Sec. 3 (b)
Rounding convention for design value calculation (3-month arithmetic mean)	*quarterly*	*Report data to 3 decimal places (data after 3 are truncated.*	1, 2 and 3) 40 CFR Part 50 App R Sec. 3 (b) The rounding convention is for averaging values for comparison to NAAQS not for reporting individual values.
Lower Detectable Limit (AA)	*all samples*	*0.07 µg Pb/m^3*	1, 2 and 3) 40 CFR Part 50 App G Sec. 2.3
Precision			
Single analyzer	every 90 days and 4 times a calendar year.	Coefficient of variation (CV) < 20.1% ≥0.02 µg/m^3	1 and 2) 40 CFR Part 58 App A Sec. 3.4.4 3) Recommendation related to DQO
Primary Quality Assurance Org.	*Annual and 3 year estimates*	*90% CL of CV < 20.1% ≥ 0.02 µg/m^3*	1, 2 and 3) 40 CFR Part 58 App A Sec. 3.4.4 and Sec. 2.3.1.3
Bias			
Performance Evaluation Program (PEP)	*5 audits for PQAOs with ≤ 5 sites* *8 audits for PQAOs with > 5 sites*	*95% CL Absolute bias < ±15.1% ≥ 0.02 µg/m^3*	1, 2 and 3) 40 CFR Part 58 App A Sec. 3.4.7 and Sec. 2.3.1.3 The PEP include 1 or independent collocated audits and 4 or 6 samples from the monitoring organizations collocated monitor sent to the independent National PEP Laboratory.
Field Activities			
Verification/Calibration Standards and Recertifications - All standards should have multi-point certifications against NIST Traceable standards			
Flow Rate Transfer Std.	every 365 days and once a calendar year	*Resolution 0.02 m^3/min* *± 2% reproducibility*	1) 40 CFR Part 50, App. B Sec. 7.8 2) Method 2.2 Sec. 2.5 3) 40 CFR Part 50, App. B Sec. 7.8
Field Thermometer	every 365 days and once a calendar year	*2° C resolution*	1) 40 CFR Part 50, App. B Sec. 7.5 2) Recommendation 3) 40 CFR Part 50, App. B Sec. 7.5
Field Barometer	every 365 days and once a calendar year	*± 5 mm Hg resolution*	1) 40 CFR Part 50, App. B Sec. 7.6 2) Recommendation 3) 40 CFR Part 50, App. B Sec. 7.6
Clock/timer Verification	every 90 days and 4 times a calendar year.	± 2 min/24-hour	R1, 2 and 3) Method 2.2. Sec. 2.3
Lab Activities			
Analytical Standards			
Reagents (HNO_3 and HCL)	*all*	*ACS reagent grade*	1, 2 and 3) 40 CFR Part 50 App G Sec.6.2.1
Pb nitrate Pb $(NO_3)_2$	*all*	*ACS reagent grade (99.0% purity)*	1, 2 and 3) 40 CFR Part 50 App G Sec.6.2.8

SD= standard deviation
CV= coefficient of variation

5.5.1 Specific Data Quality Objective

The purpose of ambient air quality monitoring for lead in Florida is to determine whether the air monitoring data meet the NAAQS for lead. Specifically, whether the rolling three-month average concentration is ≤ 0.15 $\mu g/m^3$.

5.5.2 Data Quality Indicators

Pb-TSP Hi-VOL sampler precision is estimated by collocated samples measured on a 1-in-12 day schedule for each calendar quarter. The statistic for assessment of precision is the upper bound of the coefficient of variation (CV), calculated according to §4.2.1 of 40 CFR 58, Appendix A. The acceptance criterion is CV < 20.1%.

The sampler flow rate bias estimate is based on the percent difference calculated, according to §4.2.2 of 40 CFR 58, Appendix A, for one-point flow rate verifications performed every 90-days and semi-annual flow rate audits. The acceptance criterion is % Diff < ± 7.1%.

The DQI for sensitivity is acceptable when the MDL < 5% of Pb NAAQS (0.0075 $\mu g/m^3$), as per the Federal Reference Method (RFLA-0813-813). The MDL has been verified annually, according to 40 CFR 136, Appendix B, paragraph (4)(f).

The DQI for comparability and representativeness are assessed with each sample collection by the elapsed run time and average flow rate. Each valid sample run shall be 1440 ±60 minutes and have an average flow rate ≥ of 1.1 and ≤ 1.7 m^3/min.

The DQI for completeness is assessed by evaluating whether the data capture rate for three constituent monthly means is ≥ 75%.

5.6 Network Scale

Representativeness is defined as a measure of the degree to which data accurately and precisely represent a selected characteristic of a monitored system. Support in achieving representativeness is provided through adhering to the requirements provided in:

- 40 CFR Part 58, Appendix D (Network Design for State and Local Air Monitoring Stations [SLAMS], National Core Monitoring Stations [NCore]; and
- 40 CFR Part 58, Appendix E (Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring).

Each monitor operated is assigned a scale of representativeness based on the definitions of 40 CFR Part 58, Appendix D.

- ***Microscale -*** describes the concentrations in air volumes associated with area dimensions ranging from several meters up to about 100 meters (m).
- ***Middle Scale -*** describes the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 to 500 meters.
- ***Neighborhood Scale -*** describes concentrations within some extended area of the city that has relatively uniform land use with dimensions in the range of 500 to 4000 meters.
- ***Urban Scale -*** describes concentrations within an area of city-like dimensions, on the order of 4000 to 50,000 meters. This scale will usually require more than one site to represent air quality on an urban scale.
- ***Regional Scale -*** describes usually a rural area of reasonably homogeneous geography without large sources and extends from tens to hundreds of kilometers.

As described, the lead monitoring sites are established for Middle Scale monitoring of a lead emission source.

6.0 TRAINING REQUIREMENTS

Adequate education and training are essential to any monitoring program that strives for reliable and comparable data. Personnel within the PQAO will meet the educational requirements, accountability standards, and training requirements for their positions. All staff is required to take specific, mandatory governmental training courses, such as safety training, operation of government vehicles, and EEO courses, among others. Records on personnel qualifications and training for EPC staff supporting the ambient lead monitoring program are maintained by the EPC Air Monitoring section and the EPC Laboratory, dependent upon the applicability of the information.

In general, training for the ambient lead monitoring program consists of a combination of required reading, on-the-job training by experienced staff, monthly air monitoring conference calls, active cross-training amongst staff, completion of EPA-lead training classes (when available), and attendance at Florida DEP and/or EPA workshops and conferences. Observations made during internal systems audits may result in the need for specific refresher training to be provided to staff. Completion of additional training – such as self-instructional air monitoring courses (e.g., online APTI) and EPA-provided webinars (e.g., AQS) – is encouraged for the air monitoring staff.

A large component of Florida's air monitoring training program is centered around equipment and quality assurance cross-training, to build and ensure staff redundancy. Training occurs when backup roles are needed to maintain coverage for a site or QA procedure. With that in mind, individuals within each program are assigned as "back-ups" for various roles. For example, within the EPC/HC, all air monitoring staff are trained and capable of servicing the Pb-TSP Hi-VOL samplers and sample collection. Likewise, the EPC Laboratory staff are cross-trained in the analytical method for Pb-TSP using ICP-MS.

The following describes the base training that is required for support of the ambient lead monitoring program.

Air Monitoring Quality Assurance Staff - The foundation of the ambient air monitoring program is an understanding of basic quality assurance and the overall ambient air monitoring program goals. To achieve this understanding, the following activities are required:

- Reading and understanding the QAPP for the State of Florida Lead Ambient Air Quality Monitoring Program. All Air Monitoring QA staff are required to read this QAPP and sign and date their training plans upon completion.
- Reading and understanding the most recent version of the EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II.
- Review and understanding of 40 CFR Part 58, Appendix A, C, D, and E.
- Reading and understanding of the Florida Data Handling and Data Validation SOP (DEP 18-27).
- Participation in monthly air monitoring meetings to stay current with PQAO policies, procedures, and guidance. The monthly PQAO air monitoring meetings are typically held via teleconferencing on the first Tuesday of each month. These

meetings serve as a knowledge-sharing tool to expose staff to new policies and regulations; modifications within the PQAO and to provide clarification/explanation of an existing policy or procedure. The agendas vary each meeting but may include any of the following topics: quality assurance, instrument maintenance, and troubleshooting, operational procedures, and SOP form revisions.

Air Monitoring Field Technicians - The ambient lead monitoring program involves operation, maintenance, and troubleshooting of Pb-TSP sampling equipment. Field technicians are trained on the procedures involved for proper installation of equipment, sampler operation, required QA/QC check procedures, preventative maintenance, and troubleshooting. Proper implementation of this QAPP requires the following specific training regimen for all lead monitoring field technicians:

- Reading and understanding the monitoring-specific SOPs associated with the equipment for which the trainee is responsible for operating. Staff will sign and date their training plans, upon completion.
- General and background knowledge of installation, operation, and maintenance of specific equipment. This is provided by reading and understanding the manufacturer's operating manuals and guides and is supplemented by vendor-offered formal training sessions, when available.
- Completion of "on-the-job training," which includes learning an instrument hands-on through collaboration with a senior air monitoring staff member. The trainee will operate the instrument until deemed proficient by the training staff member and the Field Operations Administrator/Local Program Manager. Close attention is paid to the typical operation of the equipment and the understanding of data flow from the preparation of a new filter to the recording and archiving of a lead sample. The trainee will also be required to complete a Field Proficiency test, which covers "big picture" air monitoring items as well as instrument-specific questions related to equipment.
- Applicable health and safety training was conducted for the EPC Air Monitoring program.

EPC Laboratory QA Staff – The ambient lead filters are inspected and analyzed by the EPC Water Management Division laboratory. The quality and integrity of the lead data are dependent upon skilled and knowledgeable managers within the laboratory. Therefore, the following qualifications are required:

- Reading and understanding the EPC Laboratory Quality Manual.
- Complete the personnel qualifications specified in section 3.0 of the EPC Laboratory Quality Manual.
- Retain documentation of the qualifications specifically for the laboratory Quality Manager, as described in section 3.1.1 of the EPC Laboratory Quality Manual.

EPC Laboratory Analyst – The laboratory analyst must be qualified and competent to analyze lead samples by Manual Reference Method: 40 CFR Part 50, Appendix G: RFLA-0813-813. As such, the following qualifications are required:

- Reading and understanding the EPC Laboratory Quality Manual.
- Complete the personnel qualifications specified in section 3.0 of the EPC Laboratory Quality Manual.
- Retain documentation of the qualifications specifically for the Demonstration Of Capability – Air Monitoring, as described in section 3.3 of the EPC Laboratory Quality Manual.

7.0 DOCUMENTATION AND RECORDS

This section includes information concerning the management of documentation and records, including this Quality Assurance Project Plan (QAPP). As one PQAO, QAPP and SOP revisions, including changes to forms, must be submitted to Florida DEP for approval before use and be sufficiently document controlled. Additionally, SOPs must not conflict with any part of this QAPP or with any other relevant local, state, or federal regulation.

The majority of documentation and records produced by Florida's ambient lead monitoring program consist of data and information gathered to support the data collection activities. Documentation and records include:

- This Quality Assurance Project Plan and EPC Laboratory Quality Manual,
- EPC Air Monitoring and Laboratory Standard Operating Procedures (SOPs),
- Logbooks and data collection records in electronic and/or hardcopy format,
- Instrument and equipment calibration information,
- Quality assurance documentation in electronic and/or hardcopy format, and
- Documentation that supports data review, validation, and certification activities.

Section 17 of this QAPP contains more detailed information regarding how data will be managed from Florida's lead monitoring network, including information on data recording, transmittal, storage, and retrieval.

7.1 Statewide Policy and Procedure Documentation

Florida's PQAO maintains records of program policy and procedure documentation. Documents in this category are published with the date and revision information noted, generally in a document header. Documents in this category include:

- Quality Assurance Project Plans (QAPPs – i.e., this document),
- Standard Operating Procedures (SOPs), which contain the electronic QA/QC data forms that must be documented, and
- Quality Assurance and Technical Notes, which provide air monitoring policy interpretations or best practices.

All these records/documents are distributed electronically to the PQAO by Florida DEP Administrators and the QAM and are posted to the statewide air monitoring database, AirMVP. When a document is superseded by a newer version, the replacement document clearly states the effective date of the document. All individuals within the PQAO receive notification that a new version is available and has been posted to AirMVP.

Copies of current program policy and procedure documents are retained in electronic file format (i.e., pdf) in a secured folder on the Florida DEP network, where access is limited to a read-only status to personnel other than the Florida DEP

Administrators and the QAM. When replaced by a newer version, the previous (older) version is moved to a subfolder on the network that is marked for archived documents. Moreover, documents posted to AirMVP are linked to the files on Florida DEP's network drive, so once a newer version replaces a file, the title of the hyperlink, as well as the hyperlink itself, is updated by Florida DEP's webmaster. As such, the superseded document is no longer available in AirMVP, as it has been moved to the archived folder. In this manner, older versions of the policy/procedure documents are always available, in case procedures from a specific period in the past ever need to be revisited.

7.2 Data Collection Records and Logbooks

To reduce the potential for data entry errors, automated systems are used where appropriate and record the same information that would be recorded on hardcopy data entry forms. Information on data collection is detailed in Section 17 of this QAPP.

Field and laboratory technicians are responsible for obtaining, maintaining, and documenting the appropriate field and lab logbooks, associated QA/QC data forms, and chain-of-custody (COC) records. Logbooks are used to record information about the site and laboratory operations, as well as document routine operations. QA/QC forms are used to document the QA/QC activities described in Section 7.3 below. COC records are used to track the transfer of clean filters and physical lead samples between the EPC Laboratory and EPC Air Monitoring Section; see Section 10 of this QAPP for greater detail regarding COC records.

Data collection for each lead sampling site is recorded in site-specific logbooks. Laboratory logbooks will retain all records pertaining to equipment certifications, performance acceptance testing, calibrations, materials tracking, general comments, and notations as well as other pertinent information required for support of the ambient lead monitoring network data integrity activities.

Logbooks, QA/QC forms, and COC records can be either electronic or hardcopy records. Electronic documents performing calculations must contain locked (e.g. password-protected) cells so that formulas cannot be overwritten; be filled out clearly and completely; dated and electronically signed. Hardcopy logbooks must be legible; filled out completely in ink; dated and signed. Corrections to these records shall be made either electronically or manually. For electronic logbooks, QA/QC forms, and COC records, corrections will be traceable back to the original through an audit trail or retained as different versions of the document. The corrected information shall be obvious, dated, and electronically signed. For hardcopy logbooks, QA/QC forms, and COC records, corrections will be made by crossing out the incorrect entry with a single line, initialing, and dating with the date the correction was made. The correct information should then be written beside the incorrect entry, if there is space to legibly do so, or should be written in a space nearby. Hardcopy records are then

scanned and stored on the network drive and archived in the Record Management System (RMS) described in further detail, Section 7.5, below.

Copies of the electronic and scanned hardcopy field records are compiled into annual data packets for each site within the PQAO, and then stored on the DEP's local area network servers per the Data Handling and Data Validation SOP. The electronic laboratory records are stored on EPC's network servers; however, bound logbooks are stored in cabinets within the laboratory. Please refer to Appendix J of the 2017 QA Handbook for further information on the use and document control of electronic logbooks, guidance to which Florida strives to adhere.

7.3 QA/QC Records

Quality assurance and quality control are achieved through the performance of periodic activities such as:

- Technical systems audits (TSAs)
- Quality assurance systems audits
- One-point operational flow checks
- Multi-point flow verification/calibration procedures
- Maintenance activities
- Semi-annual flow audits
- EPA performance audits (i.e. Pb-PEP)
- Traceability certifications/calibrations
- Corrective actions

Except for the TSAs and systems audits (which are documented in the form of a written report), the QA/QC activities listed above are typically documented and maintained using a variety of methods which include: Excel spreadsheets (as data forms), fillable PDF data forms, worksheets, and data management systems (AirMVP/AirVision – e.g., data annotations and electronic logbooks which are included with this software). The use of these methods to create the air monitoring QA/QC records is described in the associated PQAO SOPs (see Appendix C of this QAPP). These records are retained and archived according to the procedures identified in Section 7.5 below. If the entire QA/QC record needs to be corrected, then a new form should be created and appended to the incorrect form, to ensure traceability.

7.4 Reference Materials

Because of the technical nature of ambient lead monitoring and sample analysis by ICP-MS, numerous reference materials are required to effectively administer the

program. Publications such as instrument operation manuals, troubleshooting guides, EPA guidance documentation, EPA technical memoranda, and various other reports are included in this category. Florida's PQAO maintains access to applicable reference materials as long as they are administratively valuable. These documents are maintained in the EPC and Florida DEP offices and/or on the organization's network drive.

7.5 Archiving and Retrieval

Documentation is classified according to its intended use, future applicability, and regulatory requirement for retention. The information listed in Table 7-1 will be retained for a minimum of ten (10) complete calendar years from the date of collection per the Florida Administrative Code and Florida Administrative Register, Chapter 1B-26.003 – Records Management: Standards and Requirements, as well as Florida's Quality Management Plan. Additionally, if any litigation, claim, designation, audit, or other action involving the records has been started before the expiration of the ten-year period, the records will be retained until completion of the action and resolution of all issues which arise from it, or until the end of the regular (ten-year) period, whichever is later.

The original electronic records are stored within the data management system of the EPC, and on the Florida DEP network server for the Florida DEP-portion of the network. Specifically, the records for the lead monitoring network, generated by the Air Monitoring section and EPC Laboratory, are stored on the EPC network servers and in the EPC record management system, OCULUS, which is proprietary software used to index and archive electronic files.

The Air Monitoring catalog within the EPC OCULUS database is configured to track the workflow of any file inserted as a draft under an individual's password-protected user account. All versions of the document are saved within the system until the final version is reviewed and approved by the QA Coordinator (Air Monitoring General Manager/Section Chief). Each file is categorized by originating location (e.g. site, air monitoring lab, QA office), parameter, and date, at a minimum. Final documents are archived in a searchable, read-only database that is accessible to any system user. Furthermore, the OCULUS software maintains a record of the audit trail for each document in the system. More detailed information on the EPC RMS in OCULUS is contained in the SOP for Air Monitoring Document Management Using OCULUS, AM SOP 3.1, June 1, 2014 (see Appendix C of this QAPP).

Consequently, the OCULUS system provides an audit trail of each user handling the document within the workflow showing any changes or corrections. Records are electronically backed up, nightly to an off-site recovery server and copies of all final records are submitted to the DEP FTP site for DEP review, annually.

Additionally, data stored in the statewide data management system (AirMVP), as well as records on the network server, are backed up nightly by the OTIS Department

and stored off-site. The Florida DEP central polling computer writes the data to network drive daily, and therefore, the data it contains is automatically backed up by OTIS staff nightly as well.

Table 7-1: Documentation and Records

Categories	Record/Document Type	Location
Management and Organization	▪ State Implementation Plan ▪ Reporting Agency Information ▪ Quality Management Plan ▪ Personnel Qualifications and Training ▪ Training Certification ▪ Organizational Structure ▪ Document Control Plan ▪ EPA Directives ▪ Grant Allocations ▪ Support Contracts	Tallahassee, FL – Florida DEP's Central Office & EPC Offices
Site Information	▪ Network Descriptions ▪ Site Files ▪ Site Maps ▪ Site Pictures	Tallahassee, FL – Florida DEP's Central Office & EPC Offices
Environmental Data Operations	▪ Quality Assurance Project Plans ▪ Standard Operating Procedures ▪ Field and Laboratory Logbooks ▪ Sample Handling/Custody Records ▪ Inspection/Maintenance Records	Tallahassee, FL – Florida DEP's Central Office & EPC Offices
Raw Data	▪ Any Original Data (routine and quality control)	Tallahassee, FL – Florida DEP's Central Office & EPC Offices
Data Management	▪ Data Algorithms ▪ Data Management Plans/Flowcharts ▪ Data Management Systems	Tallahassee, FL – Florida DEP's Central Office & EPC Offices
Data Reporting	▪ Data/Summary Reports ▪ Data Certification Reports	Tallahassee, FL – Florida DEP's Central Office & EPC Offices
Quality Assurance	▪ Network Reviews ▪ Data Quality Assessments ▪ Quality Assurance Documents and Reports ▪ Technical System Audits ▪ Response/Corrective Action Reports ▪ Site Audits (Performance Evaluations)	Tallahassee, FL – Florida DEP's Central Office & EPC Offices

8.0 NETWORK DESCRIPTION

The primary function of the ambient lead monitoring program is to verify compliance with the NAAQS. The sites are representative of middle and micro-scale lead concentrations. As mentioned in Section 4.6, more detail on the lead monitoring network description is provided in the annual Network Plan located on Florida DEP's website.

The lead sampling network design and monitoring site selection comply with the following appendices of 40 CFR Part 58:

- 40 CFR Part 58, Appendix A – Quality Assurance Requirements for Monitors used in Evaluations of National Ambient Air Quality Standards
- 40 CFR Part 58, Appendix D – Network Design for Ambient Air Quality Monitoring
- 40 CFR Part 58, Appendix E – Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring

8.1 Network Objectives

The ambient air quality monitoring network for lead is designed to meet these monitoring objectives:

- Determine the area's compliance with the lead NAAQS,
- Determine the highest concentrations expected to occur in the area covered by the network,
- Determine the impact of significant sources of lead emissions on ambient pollution levels, and
- Determine general background concentration levels.

The department utilizes the network design criteria specified in 40 CFR Part 58, Appendix D, to establish the appropriate network configuration necessary to meet these objectives. This appendix describes the monitoring objectives and general criteria for establishing ambient air quality monitoring stations as well as the specific requirements for the number and location of FRM sites for specific pollutants based on the Core-Based Statistical Areas (CBSAs) and Metropolitan Statistical Areas (MSAs).

8.1.1 Monitoring Objectives and Spatial Scales

Each sampler within Florida's ambient lead monitoring network is assigned one of the following monitoring objective designations:

- ***Population exposure*** **–** the monitor is located within an area associated with high population density,
- ***General Background*** **–** the monitor is located where man-made pollutant emissions are minimal,

- ***Highest Concentration*** **–** the monitor is located where a high concentration of the pollutant is expected,
- ***Quality Assurance*** **–** the monitor is collocated for precision reporting,
- ***Other*** **–** the monitor objective is not well described by any other objective.

Data collected within the network must be representative of the spatial area under study. The goal in siting a monitoring station is to match the spatial scale represented by the samples obtained with the spatial scale most appropriate for the monitoring objective of the station. For a description of representative measurement scales, see Section 5.6.

Florida's lead network utilizes the "*Highest Concentration," "Quality Assurance,"* and *"General Background"* monitoring objectives. All the lead samplers within the network are strategically placed to monitor lead sources. The monitors closest to the lead source are placed in the predominant wind direction and located closest to the high concentration receptors identified in the source modeling for the Lead Nonattainment State Implementation Plan (SIP).

8.2 Site Selection

The selection of a specific monitoring site includes the following activities:

- Developing and understanding the monitoring objective and appropriate data quality objectives,
- Identifying the spatial scale most appropriate for the monitoring objective of the site,
- Identifying potential locations where the monitoring site could be placed,
- Identifying the specific monitoring site, and
- Following the site selection criteria specified in 40 CFR Part 58, Appendix E.

8.2.1 Site Location

Four criteria should be considered when evaluating potential sites for expansion of the lead network. Monitoring sites should be oriented to measure the following (singly or in combination as appropriate for the sampling objective):

- Impacts of known pollutant emission categories on air quality,
- Population density relative to receptor-dose levels, both short- and long-term,
- Impacts of known pollutant emission sources (area and point) on air quality, and
- Representative air quality.

Selection consistent with these criteria requires detailed information concerning the location of sources, geographic variability of ambient lead concentrations, meteorological conditions, and population density. Selection of the number, geographic locations, and types of sampling stations is, therefore, a complex process.

The sampling site selection process also involves consideration of the following factors:

- ***Economics*** **–** The number of resources required to accomplish all data collection activities, operations, including instrumentation, installation, maintenance, data retrieval, data analysis, QA, and data interpretation, must be established.
- ***Security*** **–** In some cases, a preferred location may have associated problems that compromise the security of monitoring equipment (i.e., high risk of theft, vandalism, etc.). If such problems cannot be remedied using standard measures such as additional lighting, fencing, etc., then an attempt to locate the site as near to the preferred location as possible shall be made.
- ***Logistics*** **–** This process includes procurement, maintenance, and transportation of material and personnel for the monitoring operation. The logistics process requires full knowledge of all aspects of the data collection operation: planning, reconnaissance, training, scheduling, safety, staffing, procuring goods and services, communications, and inventory management.
- ***Atmospheric Considerations*** **–** These considerations may include spatial and temporal variability of pollutants and their transport. Effects of buildings, terrain, and heat sources or sinks on-air trajectories can produce localized anomalies of pollutant concentrations. Meteorology must be considered in determining the geographic location of a site as well as the height, direction, and extension of sampling probes. Evaluation of winds is essential to properly locate many monitoring sites (e.g., siting either to detect or avoid emissions from specific sources).
- ***Topography*** **–** Evaluation of the local topography based upon land use maps, U.S. Geological Survey topographic maps, and other available resources must be completed. Minor and major topological features that impact both the transport and diffusion of air pollutants must be identified and evaluated. Minor features may consist of an adjacent tree-lined stream or tall structures either upwind or downwind of a point source, each of which may exert small influences on pollutant dispersion patterns. Major features in Florida include large lakes and bays.
- ***Pollutant Considerations*** **–** Evaluation of the changes that pollutants undergo temporally and spatially must be considered to determine the applicability of each site for lead monitoring. For example, the fate and transport of elemental lead emitted from a blast furnace and lead refining kettles would be close to the stack emissions point. Therefore, the best siting location for a Pb-TSP Hi-VOL sampler is to be proximate to the facility boundary.

An interdependence exists between all the factors listed above. Consequently, an iterative procedure must be employed to successfully select appropriate sites that can provide the data necessary to accomplish the project's stated objectives. In situations where the sites do not specifically meet the requirements necessary to obtain the project objectives, reevaluation of the project may be necessary. Staff familiar with

the operation of air quality measurement systems; estimates of air quality, field, and theoretical studies of air diffusion; and considerations of atmospheric chemistry and air pollution effects make up the required expertise needed to select the optimum sampling site for obtaining data necessary to fulfill the monitoring objectives.

8.2.2 Monitor Placement

The placement of each monitor is generally determined by the defined monitoring objectives. Therefore, monitors are usually placed in accordance with the potential exposure to pollution. Due to the various factors discussed above, tradeoffs are often necessary to locate a site for the collection of optimally representative data. The final placement of a monitor at a selected site is dependent on physical obstructions and activities in the immediate area. Monitors must be placed away from obstructions such as trees and fences so that their effects on airflow can be avoided. To prevent sampling bias, airflow around the monitor's sampling probes must be representative of the general airflow in the area. In addition, the availability of utilities (i.e., electricity and communications services) is critical.

8.3 Probe Siting Criteria for Pollutant Sampler/Analyzer

General probe and monitoring path siting criteria for lead monitoring shall adhere to the requirements listed in 40 CFR Part 58, Appendix E, below. Florida's Site Review Protocol provides further details on how these criteria are interpreted and implemented.

- The vertical placement of the sampler inlet shall be 2-7 meters above ground level,
- The horizontal placement of the sampler inlet shall be at least 2 meters from supporting structures,
- The sampler inlet shall be at least 10 meters from the dripline of trees and obstructions,
- Unrestricted airflow 270 degrees around the sampler, and
- The collocated sample shall be within 2-4 meters of the primary sampler.

8.4 Rationale for Florida's Ambient Lead Monitoring Network

The emphasis of Florida's Ambient Lead Monitoring Network has been in areas near major sources of lead emissions. Expanded monitoring (i.e. increased number of sites and sampling frequency) may occur in areas where a previous exceedance of a standard has been recorded. The lead monitoring network is established for monitoring the local lead source's compliance with the NAAQS for areas near the facility. In 2010, the EPA designated a 1.5-kilometer area surrounding a lead recycling facility in Hillsborough County. As part of the Florida Lead Nonattainment

SIP submitted in 2013, the source modeling for NAAQS compliance reaffirmed the locations of the monitoring sites to measure the highest concentrations outside the facility fence line and the appropriate location of the background site.

9.0 SAMPLING METHODS

The ambient lead sampling method utilized in the Florida air monitoring network is by Hi-VOL collection of TSP onto a glass fiber filter substrate. The filter is then analyzed for Pb in TSP by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) using a heated block (hot block) digester with HNO_3 for filter extraction according to Appendix G to 40 CFR Part 50, and further described in Sections 11 and 17 of this QAPP.

The Pb-TSP Hi-VOL sampler uses an electric motor to draw a known volume of ambient air at a constant flow rate. The air is drawn through a gabled-lid inlet and then through glass filter media. It is collected over a 24-hr (nominal) sampling period every six days. The Hi-VOL samplers utilize a volumetric flow control (VFC) system to maintain the constant flow rate through the inlet. A choked-flow venturi is operated such that the air attains sonic velocity in the throat of the device. In this "choked" mode, the flow rate is unaffected by downstream conditions such as motor speed or exit pressure and is a predictable function of upstream conditions, such as the stagnation pressure ratio and temperature. Florida agencies sampling for lead follows the *Standard Operating Procedure for Pb-TSP High-Volume Samplers, DEP 03-18, Revision 1, June 2021* (see Appendix C of this QAPP).

Although there are various manufactures for Hi-VOL TSP samplers, Florida uses only samplers meeting the Manual Reference Method, 40 CFR Part 50, Appendix B, for high-volume particulate sampling. These samplers are extremely durable and can be easily refurbished due to the simplicity of the sampling system. The Pb-TSP Hi-VOL sampler can be equipped with electronic temperature and pressure recorders. However, the current systems in use are not equipped with ambient temperature and pressure recorders. Instead, the average ambient temperature and pressure for the sampling day are obtained from sensors or instruments located at the Sydney air monitoring station (AQS# 12-057-3002), 9 miles east of the lead network. The ambient temperature sensor at the Sydney station and daily barometric pressure from other particulate sampling instruments at Sydney are recorded on the site data acquisition system. The daily barometric pressure may also be obtained from the local primary standard at the EPC office.

Preventative maintenance and routine quality control checks are prescribed in the Florida Hi-VOL sampling SOP (DEP 03-18). The high-volume lead samplers are configured with components manufactured by Tisch Environmental, Inc., or equivalent, as described in Table 9-1, below.

Table 9-1: Pb-TSP Hi-VOL Sampler Configuration

Component	Model/Serial Number	Description
Shelter housing	TE-5001	Anodized Aluminum Shelter
Volumetric Flow Controller	P#### TSP	Sampler-specific VFC
Blower Motor Assembly	TE-5070	VFC Blower Motor
Filter media holder	TE-5003V	Stainless steel filter holder assembly
Digital timer	TE-300-312	Electronic on/off and elapsed time recorder

10.0 SAMPLE HANDLING AND CUSTODY

The ambient lead data is used for comparison to the NAAQS for lead and therefore, extreme care in sample preparation, collection, and sample custody procedures must be followed. EPC laboratory and air monitoring field personnel follow the procedures detailed in the *Determination of Lead in Ambient Air by Heated Nitric Hot Block Digestion and ICP-MS* SOP and the procedures detailed in the Florida Hi-VOL sampling SOP (DEP 03-18), as pertaining to them (see Appendix C of this QAPP).

10.1 Pre-Sampling Custody

The glass fiber filters used in the Florida lead network for Pb-TSP sampling are ordered annually from the US EPA national contract. Accordingly, each lot of filters is evaluated by the EPA's acceptance testing protocol for glass fiber filters prior to shipment and delivery to the EPC Laboratory. The EPA acceptance testing results are distributed by the US EPA Ambient Air Monitoring Group (C304-06) along with the boxes of filters ordered for use each calendar year. The acceptance protocol includes:

- Visual inspection,
- Assessment of the physical characteristics,
- Filter thickness and tensile strength,
- Flow rate and retention acceptance criteria, and
- Background lead content.

Once the filters are received by the EPC laboratory, the lab analyst(s) conduct additional visual inspections, analyze batch blanks, and other quality control procedures.

As per the SOP for Pb-TSP High-Volume Samplers, DEP 03-18, each box of glass fiber filters is relinquished to the EPC Ambient Monitoring section for scheduled sampling events. The laboratory analyst provides the chain-of-custody, Form No. DEP 03-18-F, indicating the range of glass fiber filter numbers in the header section of the form and each filter number in the box. Upon receipt, the Air Monitoring section personnel receiving the box of filters verifies the information and then signs the form entry, "Received by". The field technicians in the Ambient Monitoring section complete their entries on Form No. DEP 03-18-F as they prepare individual filters for installation and sampling by the Pb-TSP Hi-VOL sampler. Since the signatures and entries made by the air monitoring field technicians are hand-written, this form is printed in hardcopy and remains with the box of glass filters until all filters are used for sampling or are rejected. Then the completed form is submitted to the Air Monitoring QA officer for review, signature, and then scan to submit into the EPC RMS. An example of Form No. DEP 03-18-F is shown in figure 10-1, below.

As per Section 9.2 of the field sampling SOP, DEP 03-18, the field technician loads the glass fiber filter into the filter holder cassette wearing disposable, non-powdered latex, vinyl, or nitrile gloves. A cassette cover is placed over the clean filter and then the loaded cassette is transported to the Pb-TSP Hi-VOL sampler site.

Figure 10-1: COC Form No. DEP 03-18-F Pb-TSP Filter COC Log

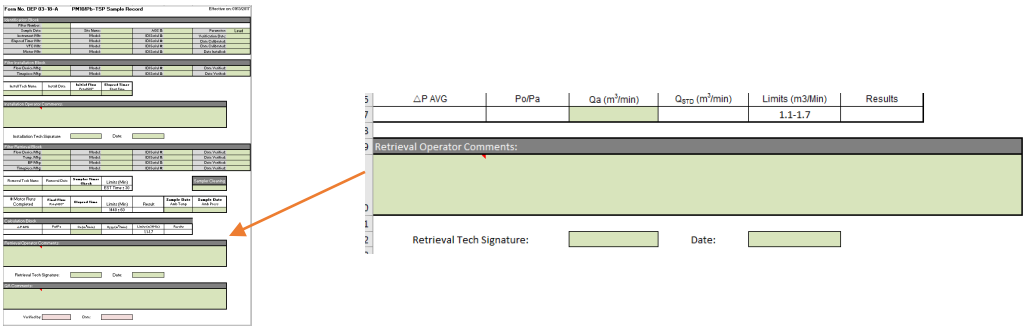
DEP Form No. 03-18-F			Pb-TSP Filter COC Log					Effective on: July 2021
FILTER BATCH	Filter Range		Signatures	Date		QA Review	Signature	Date
FROM:		Released by:						
TO:		Received by:						

Filter #	Lab Analyst	Date Released	Field Technician	Date Received	Site AQS#	Comments

10.2 Post-Sampling Custody

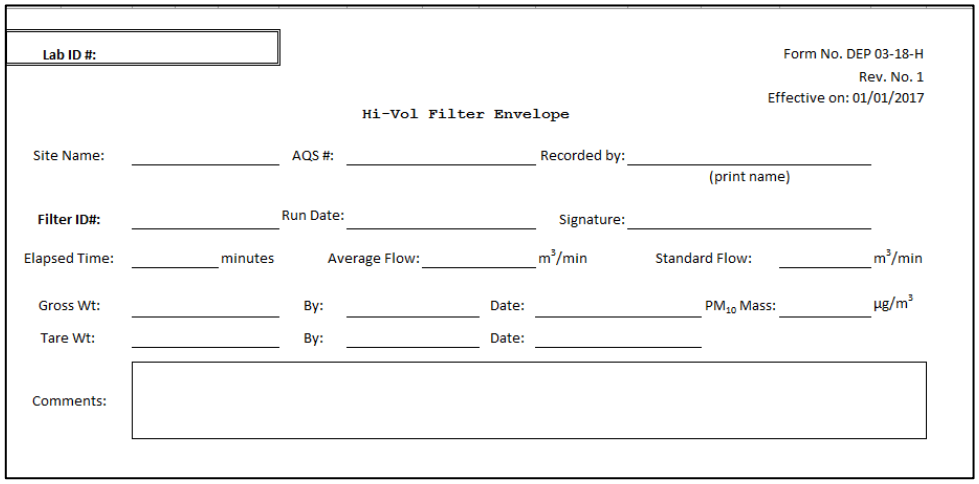
Ambient monitoring field technicians collect the Pb-TSP filters as soon as practical after the scheduled sampling run date. Technicians observe the sample filter and note any damage or unusual appearance on the sample record comment section, Form No. DEP 03-18-A (see figure 10-2). If it is determined by the technician or subsequent quality assurance staff that the damage to the filter is significant, the sample is invalid, and then notated as such on the sample record form. The sample record, DEP 03-18-A, is an electronic form recording sampler information associated with the filter installation event and the filter retrieval/sample collection event. These two events may be performed by two different field technicians. Therefore, the sample record form is not considered part of the COC documentation to track the sample from the site to the EPC Lab. Instead, the sample is placed into a clean filter holder cassette and protected by a cassette cover, as per Section 9.3 of DEP 03-18, for transport to the EPC office.

Figure 10-2: Form No. DEP 03-18-A Sample Record



The field technician removes the sample from the filter holder cassette while in the designated "clean" room for post-processing of Hi-VOL filters, according to the procedures in Section 9.6 of DEP 03-18. The filters are folded lengthwise and placed in a protective envelope, Form No. DEP 03-18-H (see figure 10-3), for review by the EPC Air Monitoring QA staff and subsequent delivery to the EPC Lab. Pertinent sampling information is transferred from the sample record to the storage envelope, DEP 03-18-H, for the laboratory analyst to calculate lead concentrations and maintain the sampling information with the filter archive. The COC is recorded on Form No. DEP 03-18-G, the log for all collected lead samples received by the EPC Lab.

Figure 10-3: Form No. DEP 03-18-H Storage Envelope


Lab ID #:

Form No. DEP 03-18-H
Rev. No. 1
Effective on: 01/01/2017

Hi-Vol Filter Envelope

Site Name: _____ AQS #: _____ Recorded by: _____
(print name)

Filter ID#: _____ Run Date: _____ Signature: _____

Elapsed Time: _____ minutes Average Flow: _____ m^3/min Standard Flow: _____ m^3/min

Gross Wt: _____ By: _____ Date: _____ PM_{10} Mass: _____ $\mu g/m^3$

Tare Wt: _____ By: _____ Date: _____

Comments:

Upon receipt, the EPC lab analyst documents the chain-of-custody of exposed filters on Form No. DEP 03-18-G (see figure 10-4). The complete COC for all filters is recorded by Form No. DEP 03-18-F, Pb-TSP Filter COC Log and Form No. DEP 03-18-G, Lab Delivery Log. These logs are maintained in the EPC RMS for the Air Monitoring Section and laboratory, respectively.

Figure 10-4: COC Form No. DEP 03-18-G Lab Delivery Log

Form No. DEP 03-18-G	**Pb-TSP FIlter Lab Delivery Log**			Effective on: July 2021
Submitting Field Operator	Date Submitted	Receiving Lab Analyst	Date Received	
Filter #	Station Name	Sample Date	Comments	Lab Sample ID #

After analysis, the unused portion of exposed filters is archived and stored in the protective envelope by the EPC laboratory. The samples are retained for 1 year on-site and then transferred to a climate-controlled storage facility for 5 years. Thereafter, samples are discarded.

10.3 Make-up sampling

At times, scheduled samples may be missed or voided by the quality assurance officer. Since it is important to maintain high data capture per 40 CFR Part 50, Appendix R, make-up samples are taken to replace missed or invalid/void samples. The installing technician's comments on the sample record (Form No. DEP 03-18-A) will clearly indicate that the sample is a "make-up" sampling event.

According to Appendix R of 40 CFR Part 50, the make-up sample will only be scheduled within the current calendar year of lead sampling with no more than two (2) make-up samples scheduled for each calendar month. If a scheduled sample run is missed or invalid, the Florida lead monitoring network will schedule a make-up sample for the next 1-in-3 sampling day that does not coincide with a 1-in-6-day sample.

11.0 ANALYTICAL METHOD

Lead in ambient air samples collected by the Florida lead monitoring network are determined per the federal reference method (FRM), 40 CFR Part 50, Appendix G. The method ID is RFLA-0813-813. The FRM specifies that lead samples are collected on a glass fiber filter. As such, the Florida lead monitoring program utilizes an 8x10 inch glass fiber filter provided by the EPA national contract for particulate matter and lead filters. Detailed procedures and equipment used by the EPC laboratory to perform this analysis are described in the current lab SOP for the determination of lead in ambient air.

The Appendix G reference method for lead analysis describes the acid extraction of lead in particulate matter collected on glass fiber filters with subsequent measurement of Lead by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The EPC laboratory uses a solution of dilute nitric acid (HNO3) to solubilize a strip of filter in a hot block digester.

After extraction, sample solutions are introduced into a plasma, in which desolvation, atomization, and ionization occur. Ions are extracted from the plasma and separated based on their mass-to-charge ratio by a quadrupole mass spectrometer. Ion intensities are recorded and compared to external calibration standards to determine concentration values for the sample.

EPC laboratory quality assurance is the responsibility of the lab-quality manager and laboratory manager as described in Section 2.0 of this QAPP. The EPC Laboratory equipment for the analysis of ambient lead samples is listed in Table 11-1.

Figure 11-1: EPC Analytical Instrument for Lead

Instrument	Manufacture	Model
ICP-MS	Perkin Elmer	NexION 300X

The laboratory QA/QC requirements for lead analysis and analytical equipment include but are not limited to those outlined here. If a QA metric is outside of tolerable levels, the parameter must be redone, or the sample must be re-analyzed. Greater detail and acceptance criteria are provided in Table 5-2, above:

- The holding time for all-glass fiber filters is 180 days, stored at room temperature (15 – 30 °C).
- The Pb content of a filter, pre-sampling, is < 75 µg/m^3.
- An Initial Calibration using at least 5 Pb containing standards and a calibration blank.
- Performing an Initial Calibration Verification (ICV) at a mid-range concentration with 90-110% recovery.
- Performing Continuing Calibration Verifications (CCV) after every 10 samples and at the end of the analysis with 90-110% recovery.

- Running a Continuing Calibration Blank (CCB) before each CCV to assure the concentration is < 0.001 µg/ml.
- Analyze a matrix spike every 20 samples with 80-120% recovery.
- Repeat a sample analysis for every 20 samples with a relative percent difference < 20% from the initial analysis.

When the analysis is complete, all associated data are saved in the Laboratory Information Management System (LIMS) for review by the analyst and laboratory QA manager. All QC checks are reviewed and calculations for determining sample Pb concentrations are verified by the QA manager before generating a final data report for the Air Monitoring QA review and data validation.

12.0 QUALITY CONTROL

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

Quality control is the overall system of technical activities that measure the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer. In the case of the ambient air quality monitoring network, QC activities are used to ensure that measurement uncertainty is maintained within acceptance criteria for the attainment of the DQOs. Lists of pertinent QC checks are provided in the standard operating procedures for the sampling instrument.

Quality control is achieved through periodic maintenance; flow rate audits; acceptance test procedures; accuracy, bias, and precision checks; collocated instruments, and other verification techniques.

12.1 Calibrations

Calibration is the process employed to verify and rectify an instrument's measurements to minimize deviation from a standard. This multiphase process begins with certifying a calibration or transfer standard against an authoritative standard. The sampling or analytical instrument's measurements are then compared to this calibration/transfer standard. If significant deviations exist between the instrument's measurements and the calibration/transfer standard's measurements, corrective action is implemented to rectify the analytical instrument's measurements. Calibration requirements for the critical field and laboratory equipment are found in the SOPs and the specific instruments' operations manuals.

Calibration acceptance for the Pb-TSP Hi-VOL sampler equipped with a volumetric flow controller (VFC), is determined by a multipoint flow rate verification indicating that each point is <± 5.1% of the calibration line generated by the calibration/transfer standard orifice. These are the "limits of linearity" describing the relationship between the VFC and the calibration orifice.

There are two types of transfer standard orifice used in the Florida lead network: a variable resistance or fixed-plate orifice. Either type is acceptable for multipoint flow rate verifications. The flow rates are set by the operator using the adjustment knob on a variable resistance orifice, or by the set of plates associated with the fixed-plate orifice. The flow rates must include the operational range of the Hi-VOL sampler, 1.1 – 1.7 cubic meters per minute (m^3/min). The multipoint verification is performed upon initial sampler installation and annually (365 days) thereafter, following a failed

1-point verification, following motor maintenance, and following motor replacement. The Hi-VOL sampler flowrate points must be within ± 5% of the calibration curve produced by the transfer standard orifice. The procedure and equations for multipoint flowrate verifications are described in Section 10.2 of the instrument SOP, DEP 03-18.

If the multipoint flow rate verification fails (i.e., exceeds acceptance criteria) and the sampler itself is determined to be in good working order, the only adjustment (i.e. calibration) of the sampler is to replace the VFC in the Hi-VOL. The VFC on a Hi-VOL sampler is designed to attain a critical flow and therefore, no adjustments can be made to the flow rate. Instead, the corrective action is to inspect, clean, and/or replace the VFC. Before the recalibration is performed, all typical troubleshooting techniques should be applied to verify the complete system is in good working order (which, in turn, verifies the failed verification is valid).

12.2 Precision Checks

Precision is the measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. To meet the DQOs for precision, the determination will ensure the entire measurement process is within statistical control. Periodically challenging instruments with QC checks, and employing collocated monitoring, will provide evidence of deviations from the required precision measurement.

Under Section 3.4.4 of 40 CFR Part 58, Appendix A, precision for the Pb-TSP Hi-VOL sampler is estimated by the operation of a collocated sampler at the site measuring the highest concentrations in the lead monitoring network. Collocated measurements are collected on a 1-in-12-day schedule and evaluated each calendar quarter, annually, and at the 3-year aggregate level. The calculation and equations for assessing precision are described in Section 4.2.1 of 40 CFR Part 58, Appendix A.

Precision tolerance for the Pb-TSP Hi-VOL sampler equipped with a volumetric flow controller (VFC), is determined by a 1-point flow rate verification indicating that the flow is <± 7.1% of the calibration/transfer standard orifice. The 1-point flow rate verification is described in greater detail in the instrument SOP and is performed every 90 days, at a minimum.

The 1-point flow rate verification confirms the sampler is in good working order. If it should fail, the technician must perform all typical troubleshooting techniques to determine the problem and then perform a multipoint flow rate verification.

12.3 Accuracy and Bias Checks

Accuracy is defined as the degree of agreement between an observed value and an accepted reference value. Accuracy is a combination of random error (precision), and

systematic error (bias). Although collocated monitors are primarily used for evaluating and controlling precision, they can also be used to determine accuracy or bias. Accuracy and bias requirements for the Pb-TSP Hi-VOL sampler are found in Table 5.2 Pb-TSP Validation Template in this QAPP.

12.4 Performance Evaluation Audits

A performance evaluation audit on each Pb-TSP Hi-VOL sampler is conducted by the DEP every 180 days. The transfer standard orifice used by the auditor must not be the same standard used by the site operator for the multipoint calibration verifications or the 1-point flow rate verifications. However, all transfer standard orifices used for audits or verifications may be referenced to the same primary standard for the Florida PQAO. Personnel conducting audit procedures are designated staff of DEP or EPC that are not normally involved in routine operational activities for lead sampling.

12.5 Laboratory Analytical Audits

A laboratory analytical procedure audit will be performed monthly or more frequently if required by regulation, policy, or the SOP. The audit is performed using 6 lead (Pb) audit strips separated into 2 known concentration levels; a low concentration (30-100% of Pb NAAQS) and a high concentration (200-300% off Pb NAAQS). Three audit strips in each concentration range will be analyzed by the EPC Lab. The audit samples are prepared by depositing a lead solution of known concentration onto unexposed glass fiber filters. The reagent batches used to prepare the audit strips must be different from those used in calibrating the analytical instruments. The audit strips are then analyzed, and the results are submitted to AQS along with the concentration of the lead solution on the audit/calibration worksheet associated with the equipment undergoing the audit. Details for implementing laboratory analytical procedure audits may be found in the applicable instruments' SOP, and in 40 CFR Part 58, Appendix A, Sec. 3.4.6.

12.6 External Agency Audits

The Florida PQAO participates in the US EPA Performance Evaluation Program for lead (Pb-PEP). The pertinent regulations for this performance evaluation are found in 40 CFR Part 58, Appendix A, Section 3.4.7. The Pb-PEP is used to evaluate total measurement system bias, which includes measurement uncertainties from both field and laboratory activities. The US EPA conducts one independent audit by collocating a portable Pb-TSP Hi-Volume sampler with one of the samplers in the Florida lead monitoring network each year. The audit data is reported on the EPA National Air Monitoring Programs QA Website.

In addition, one routinely collected collocated sample from the network is shipped to the EPA Region 9 laboratory each calendar quarter The EPC Air Monitoring QA

Coordinator completes the chain-of-custody/field data sheet (COC/FDS) form on the EPA QA Webpage and then sends a copy of the COC/FDS along with the site-collocated sample to the EPA laboratory for Pb-PEP analysis.

12.7 Corrective Actions

Corrective action measures within the PQAO are taken as necessary to ensure the MQOs are attained. In a properly functioning monitoring network, issues may be anticipated in advance, and staff should be prepared and equipped to address issues as they arise.

Corrective actions may also be implemented on an "as-needed" basis when unexpected or unforeseen circumstances are encountered, such as a failed QA/QC check. The field technicians and laboratory analysts should consult the appropriate instrument SOP and manual for technique-specific checks, required frequency of checks, acceptance criteria, and additional corrective action guidance (i.e., Corrective Action SOP). Section 21 of the EPC Lab SOP, the *Determination of Lead in Ambient Air by Heated Nitric Hot Block Digestion and ICP-MS Analysis*, provides instruction for laboratory metrics outside the acceptable range.

The Corrective Action SOP (DEP 01-4) contains procedures for corrective actions and corrective action reports initiated by the Air Monitoring Section QA staff or field technician. For greater details, refer to the Corrective Action and Data Handling and Data Validation SOPs on completing the corrective action form, DEP 01-4, and appropriate data handling procedures.

12.8 Documentation

All field sampling-related events, including routine site visits, calibrations, precision checks, PEs, Pb-TSP sampler maintenance, and calibration equipment maintenance are documented in the appropriate field data records and logbooks, as specified in the instrument-specific SOPs. Corrective actions are documented per the Corrective Action SOP.

All laboratory-related events, including analytical instrument calibrations, verifications, maintenance, and lead data reports are documented in logbooks and the LIMS (discussed in more detail in Section 17). Corrective actions for laboratory issues are addressed according to the EPC Laboratory Quality Manual.

13.0 EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Preventative maintenance is a foundational element to an effective QA program. This section discusses the procedures used to verify that all instruments and equipment are maintained in sound operating conditions and can operate at acceptable performance levels. All instrument inspection and maintenance activities must be documented and filed. See Section 7 of this QAPP for document and record management details.

13.1 Performance Testing

All Pb-TSP Hi-VOL samplers used in the ambient lead monitoring network shall be either EPA equivalent or reference methods. As such, they are assumed to be of sufficient quality for the data collection operation. All laboratory equipment and supplies shall meet EPA requirements under approved analytical methods.

Before field installation of the Pb-TSP Hi-VOL samplers and laboratory installation of the ICP-MS, the samplers and instrument shall successfully undergo an operational check including a leak check and verification that all system components are functioning properly according to the instrument manual and SOP. In general, the following acceptance/testing activities are performed upon receipt of new field sampling or laboratory analytical instruments, and after any significant repair of the instrument. If the equipment is new and fails to meet the operational readiness certification described below, the vendor will be contacted for repair or replacement.

- Verify that all expected parts arrived with the instrument and that nothing is physically broken. Contact the vendor if there are issues.
- For Pb-TSP Hi-VOL samplers, verify that the instrument contains its EPA equivalent or reference method decal and meets the specifications of the purchase request.
- For ICP-MS, verify that the instrument conforms to all the required specifications of the purchase request and is shown to perform as described by the manufacturer.
- Perform field readiness “certification” testing for Pb-TSP samplers, summarized as follows. Although the designation of the FRM status ensures the make/model of the instrument meets EPA requirements for use in a SLAMS network, air monitoring staff must still ensure that individual instruments perform as expected before deploying to the field and/or before the beginning of ambient air (NAAQS comparable) data collection.
    - Check and document the diagnostics of the sampler, looking for any fault indicators or warning signs. Ensure that parameters such as sample flow rate, temperatures, pressures, and so forth are within

specifications (see user manuals). Perform a leak check(s) on the sampler.

- Perform flow verification check(s). If all points fall within the acceptance criteria (see Table 5-2 of this QAPP), the sampler is deemed "field ready". If any point fails, the verification fails, and troubleshooting must be performed. The performance/maintenance log is documented with the results of this testing.
- Allow the sampler to run in its normal sampling mode in the shop (or the field). Verify that all instrument settings and data generated meet the FRM method requirements.

Following site installation, the field operators will initiate, observe, and document the successful completion of a multipoint flow rate verification. If the sampler meets the acceptance criteria, it will be assumed to be operating properly. These tests will be properly documented according to the instrument SOP.

Following laboratory installation of the ICP-MS by a manufacturer-certified technician, the instrument is confirmed as fully operational and meeting required analytical specifications by undergoing a series of performance tests as described in the instrument operation manual. The laboratory technician will set up an analytical method specific to the EPA method requirements for Pb-TSP analysis. The method is then verified to meet QA/QC requirements as described in the EPC Laboratory SOP for the *Determination of Lead in Ambient Air by Heated Nitric Hot Block Digestion and ICP-MS Analysis* before beginning sample analysis.

Before starting up the ICP-MS, the laboratory technician shall inspect the instrument sampling path to ensure there are no visible leaks, damaged components, or obvious obstructions. The ICP-MS must be verified to pass a "daily performance test", as described in the instrument operation manual. This test shows that the instrument can produce reliable responses for analyte concentrations and that there are no electronic system errors, sample or gas flow corruptions, or sample-path contamination. The daily performance test must be completed each day, before beginning sample analysis during the required 30-minute instrument warm-up period.

13.2 Inspection and Maintenance

Preventive maintenance is important to maintaining data quality as well as minimizing sampler downtime. Field technicians are to use the maintenance schedule prescribed in the instrument's SOP as a tool to ensure the timely completion of all maintenance activities. The routine preventive maintenance activities and schedules are detailed in the Pb-TSP Hi-VOL SOP and supplemented by the instrument instruction manual.

Laboratory technicians operating the ICP-MS must perform daily, monthly, and annual instrument maintenance as referenced in the laboratory SOP for the

Determination of Lead in Ambient Air by Heated Nitric Hot Block Digestion and ICP-MS Analysis. Maintenance must also be performed on an as-needed basis to maintain data integrity and adherence to QA/QC requirements. These maintenance tasks are recorded on a spreadsheet by the analyst and records are maintained in the LIMS. Annually, preventative maintenance is performed by an instrument manufacturer-certified technician as described in the laboratory SOP.

If the ICP-MS has undergone significant repair and fails to pass the performance testing, the instrument vendor will be contacted for additional troubleshooting guidance. If after working with the vendor, the instrument cannot be repaired such that it passes performance testing, then the instrument will be decommissioned (i.e. permanently removed from service).

Similarly, if the Pb-TSP Hi-VOL sampler fails to pass flow rate verifications after replacement with spare VFCs, the instrument will be decommissioned (i.e. permanently removed from service).

14.0 INSTRUMENT CALIBRATION AND FREQUENCY

The Pb-TSP Hi-VOL samplers in Florida's ambient air monitoring network for lead are all designed as a volumetric flow controlled (VFC) instrument; no adjustment of the flow rate is possible. The use of the term "calibration" indicates that an adjustment either in the instrument or the software occurred. EPA recommends that adjustments be minimized to prevent introducing measurement uncertainty and that verifications, "i.e., checks without correction (adjustment)," be used to confirm whether an instrument is operating within its acceptance range. Consequently, calibration refers to the replacement of the instrument's VFC and a calibration check is the multipoint flow rate verification.

Calibrations checks (multipoint flow rate verifications) are discussed in more detail in Section 12 of this QAPP and the specific procedures for performing those checks are described in the Pb-TSP Hi-VOL sampler SOP. Furthermore, 40 CFR Part 58, Appendix A, §3.4 specifies the frequency of flow rate verifications for Pb-TSP Hi-VOL samplers.

Calibration checks of the ICP-MS occur daily, with each batch analysis. Trace-metal grade reagents and NIST-traceable standards are used for ICP-MS instrument calibration and preparation of matrix spike samples. An initial calibration (ICAL) is performed before each analysis and an initial calibration verification (ICV) check is performed after the ICAL using a second source standard. Immediately following the ICV, an initial calibration blank (ICB) is run.

To maintain an ongoing process of quality control, a continuing calibration verification (CCV) is performed every 10 samples and at the end of the batch run using a second source standard. Immediately following each CCV, a continuing calibration blank (CCB) is run. Additional calibration check standards, spike samples, and duplicate samples are defined in greater detail in the EPC Laboratory instrument SOP, the *Determination of Lead in Ambient Air by Heated Nitric Hot Block Digestion and ICP-MS Analysis*.

14.1 Calibration of Local Primary Standards

Primary standards used to verify instrument sensors or field transfer standards are maintained in the DEP Standards Laboratory, the EPC Laboratory, and the EPC Air Monitoring Program office. Each is briefly described below:

- The local primary flow rate standard used to calibrate the flow orifice transfer standards is a certified rootsmeter manufactured by Dresser (SN 0812472). The DEP Standards Laboratory maintains the rootsmeter and is responsible for annual recertification against a higher-order, NIST-traceable flow rate standard.

- The local primary temperature standard used to verify the accuracy of the field temperature transfer standards is a certified mercury-in-glass thermometer maintained by the EPC Air Monitoring Program.
- The local primary pressure standard used to verify the accuracy of the field barometer transfer standards is a wall-mounted mercury barometer maintained by the EPC Air Monitoring Program.

14.2 Calibration of Transfer Standards

Transfer standards used to verify instrument sensors and flow controllers are certified against a NIST-traceable standard of a higher-order every 365 days. Each is briefly described below:

- The flow orifice transfer standards used for flow rate verifications are initially certified by the orifice manufacturer. The original manufacturer's certification is archived in the EPC RMS. Subsequent annual recertifications are traceable to the local primary flow rate standard in the DEP Standards Laboratory. A calibration relationship for the flow rate standard, such as an equation, curve, or family of curves, is established by the manufacturer as accurate to <± 2.1% over the expected range of ambient temperatures and pressures at which the flow rate standard is used. The flow rate standards shall be recalibrated and recertified at least annually. The unit's observed flow must be within the acceptance criteria established in Table 5-2 of this QAPP.
- The field temperature transfer standards used for calibration of temperature sensors will be handheld digital thermometers that have their certification. They will be certified at least annually against a local primary temperature standard in the EPC Air Monitoring Program office, to <± 2.1°C (see Table 5-2) of the expected range of ambient temperatures at which the temperature standard is to be used.
- The field pressure transfer standards will be handheld digital aneroid barometers that will have their certification and will be certified at least annually against the local primary pressure standard in the EPC Air Monitoring Program office, to ≤ ± 5 mmHg (see Table 5-2) of the ambient barometric pressure.

15.0 ACCEPTANCE OF SUPPLIES AND CONSUMABLES

The field sampling and laboratory SOPs itemize the apparatus, equipment, materials, and supplies required for various monitoring equipment. In general, supplies and consumables are procured directly from the vendor manufacturing the instrument used within the lead network. Parts lists, including recommended replacement schedules, are itemized in most manufacturers' operating manuals as well. Florida uses this information to determine the appropriate procurement schedule and volume of consumables required to support continuing operations.

The EPC Laboratory is responsible for the procurement of consumables required for Pb-TSP analysis by ICP-MS. All reagents and standards conform to requirements for purity and concentrations are certified by the manufacturer. Certification forms include lot ID numbers for gases, reagent acids, and stock analyte standards and are received with each item and kept as laboratory records. Each reagent and standard are used within and discarded by the expiration date given by the manufacturer. Secondary source standards are employed to verify the concentration of reference standards for lead analysis as described in the SOP for the *Determination of Lead in Ambient Air by Heated Nitric Hot Block Digestion and ICP-MS Analysis.*

Consumable items such as disposable plastic ware and pipet tips are also certified by the manufacturer as free of contaminants and for measurement accuracy. The analyst confirms the cleanliness of plastic ware by analyzing reagent blank samples with each analytical batch of samples and keeping a record of plastic ware lot numbers associated with a sample batch.

Supplies and consumables for the lead monitoring network are tracked by the air monitoring and laboratory managers, as applicable. When replacements are needed, the manager is responsible for purchasing. Supplies are inventoried by each program for later distribution. Received materials are inspected to ensure the proper part number was received as ordered. General inspection to identify any damaged products is also performed. A revolving inventory system (first in, first out) is used to ensure that storage times do not affect the material's integrity. If a manufacturer or EPA requirement indicates a specific expiration period for supplies, those supplies exceeding expiration dates are discarded if not used within the acceptable period.

The glass-fiber sample filters for Pb-TSP sampling by high-volume sampler are obtained from the US EPA national contract which is required to pass EPA acceptance testing according to 40 CFR Part 50, Appendix G, Section 7.0. The sample filters are placed into a filter holder cassette which uses a gasket to create a good seal with the sampler body. The continuous wear and condition of gaskets and other consumable parts of the sampler body and blower motor are tracked by the field technicians and replaced from the spare parts inventory. The spare parts are inventoried annually, and replenished as necessary.

16.0 NON-DIRECT MEASUREMENTS

The monitoring objective for the Florida lead network is to determine the highest concentration from source-oriented emissions and subsequent compliance with the Lead NAAQS. Therefore, the non-direct data obtained in support of establishing monitoring sites and investigating high sampling results include lead emissions and facility operations from the source(s) proximate to the site.

According to Section 4.5 of 40 CFR Part 58, Appendix D, the criteria for the design of a lead network requires a source-oriented SLAMS monitor for all non-airport, lead emitting sources with 0.50 or more tons per year of lead emissions. Therefore, source emissions are reviewed with the release of the National Emissions Inventory by EPA and as part of the 5-yr network assessment.

In addition, meteorological data from the National Weather Service may be used in the data validation process and the establishment of new lead monitoring locations. Any use of outside data is reviewed for data quality, to the greatest extent possible, following QA procedures outlined in this document and applicable EPA guidance documents.

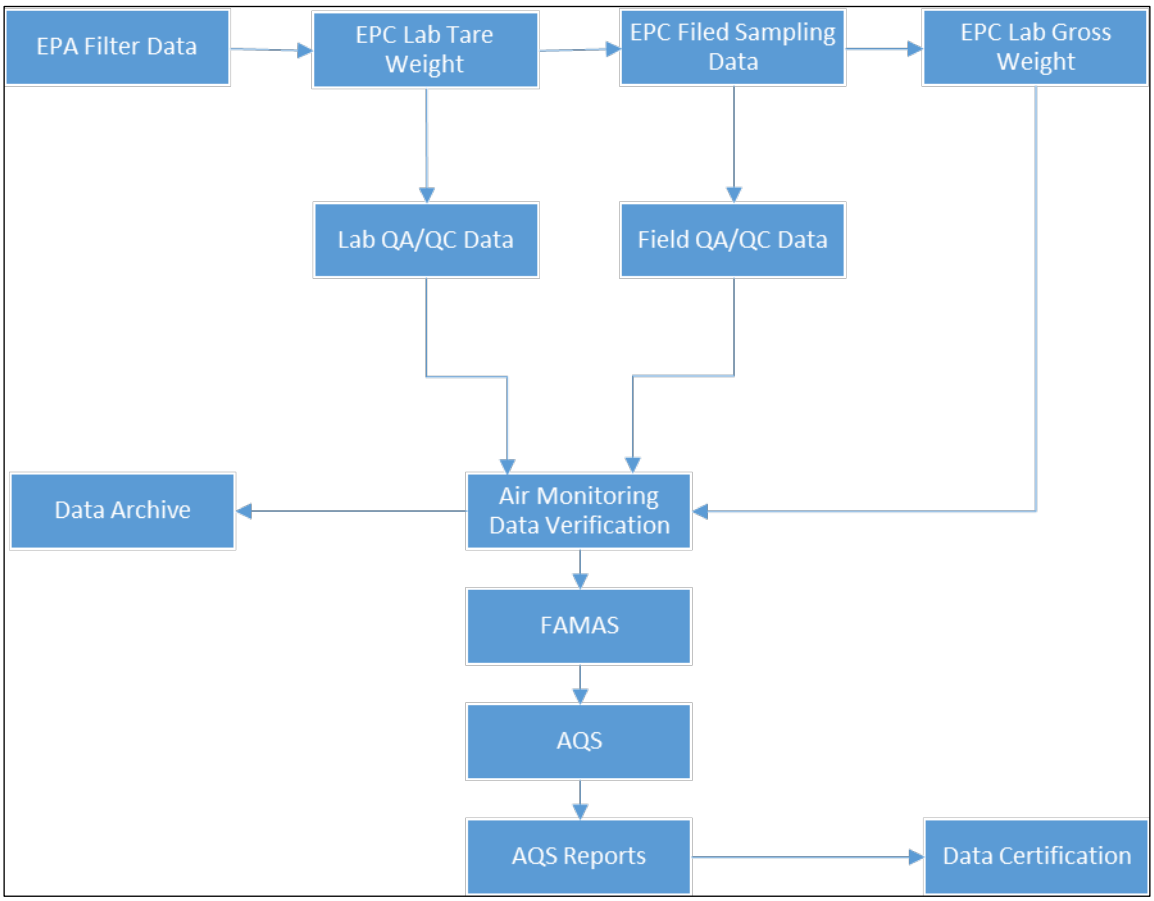
17.0 DATA MANAGEMENT

The primary work product of Florida's Ambient Lead Monitoring Program is data. Accordingly, formalized procedures are required to ensure successful data management. Data Management identifies the processes and procedures followed to acquire, transmit, transform, reduce, analyze, store, and retrieve data. These processes and procedures will maintain data integrity and validity through the application of the identified data custody protocols. Furthermore, these data processing steps are integrated, to the extent possible, into AirMVP, the data processing system used for the statewide SLAMS network, and the EPC AirVision database.

Field sampling data and all QA/QC records generated by the EPC Air Monitoring section are managed as electronic records in the database system for Air Monitoring, referred to as "OCULUS". OCULUS is proprietary software and described in Section 17.5 of this QAPP. Analytical laboratory raw data and all laboratory QA/QC records are managed within the EPC Laboratory Information Management System (LIMS). The LIMS is a Microsoft ACCESS™ database that imports raw data from the ICP-MS along with meta data for each sample and batch run. It is used to track the filter number of each sample handled, perform data transformations and QA/QC checks, and generate a final data package to the EPC Air Monitoring Section for data recording, validation, and transmittal.

The data flow diagram illustrated in figure 17-1, shows the general flow path of the data associated with ambient lead monitoring.

Figure 17-1: Data Flow Diagram



17.1 Data Generation

The ambient lead monitoring samplers in the Florida lead network used to collect the criteria lead pollutant data for determining NAAQS compliance are designated by EPA as the federal reference method. The data generated is recorded both in hardcopy and electronic formats. Field data associated with glass fiber filters are recorded on electronic data forms specified in the field sampling SOP, DEP 03-18. Similarly, the laboratory data associated with glass fiber filters are recorded on electronic data forms specified in the lab SOP the *Determination of Lead in Ambient Air by Heated Nitric Hot Block Digestion and ICP-MS Analysis*. The only hand-written information is recorded on the hardcopy COC logs; DEP 03-18-F for preconditioned clean filters, DEP 03-18-G for exposed filters collected from the lead monitoring sites, and the sampling event information written on the protective sample storage envelope, DEP 03-18-H.

The EPC Laboratory documentation begins with the initial QC inspection of the glass fiber filters provided by the EPA national contract. The laboratory analyst records their observations and measurements in the LIMS and then generates a hardcopy

COC form for the filters, DEP 03-18-F, for each batch provided to the Air Monitoring field technicians. The field technician annotates form DEP 03-18-F as individual filters are prepared for sampling. Once all filters listed on the COC form for the filters are used, the form is submitted to the Air Monitoring Section QA staff for review, and then archived in the OCULUS database, as described in Section 17.5, below.

The data associated with filters used to collect ambient lead samples or field blanks are recorded on the sample record, Form No. DEP 03-18-A, by the air monitoring field technicians and finally archived in the OCULUS database. Similarly, all QA/QC records such as flow rate verifications (Form No, DEP 03-18-C), sampler maintenance logs (Form No. DEP 03-18-D), and elapsed timer verifications (Form No. DEP 03-18-E) are all generated by the field technician and archived in the OCULUS database.

Once the lead sample is collected from the field, the exposed filter is placed in a protective envelope, DEP 03-18-H, and delivered to the EPC Lab for filter analysis and storage. The field technician transcribes pertinent site and flow rate information from the electronic sample record onto the envelope, necessary for the lab analyst to calculate analytical results reported in micrograms per cubic meter ($\mu g/m^3$) of ambient air. Additional details for this procedure are in the Pb-TSP Hi-VOL sampler SOP, DEP 03-18.

The transfer of the lead sample to the laboratory is recorded on the Exposed Filter COC, Form No. DEP 03-18-G. This COC form is retained by the EPC Lab. The lab analyst manually enters the flow rate and elapsed sample time into the LIMS which, combined with the analytical results, performs the calculation for lead concentration in $\mu g/m^3$. The filter analysis data and QC records from the ICP-MS instrument are generated by the laboratory analyst and quality manager. Raw analytical data in micrograms of lead per milliliter (µg Pb/ml) and final lead concentrations in $\mu g/m^3$ are stored in the LIMS and provided to the Air Monitoring QA staff as part of the lead data package. Additional details for this procedure are in the laboratory SOP the *Determination of Lead in Ambient Air by Heated Nitric Hot Block Digestion and ICP-MS Analysis*.

17.2 Data Transmittal and Transformation

Lead sampling data from the Pb-TSP Hi-VOL field sampler is entered into the electronic form DEP 03-18-A, sample record completed by the field technician is then saved to the network drive (I drive), for QA review. QA personnel will submit the reviewed forms into the EPC record management system (OCULUS) for archiving. All associated data such as sampler logbooks, filter COC logs, flow rate verifications, and transfer standard certifications are also stored electronically in the OCULUS database.

Filter sampling records and sampler logbooks, located on the EPC central file server, are accessed and updated remotely by the field technicians. When the activity is

complete, the sample record and/or QC form(s) are reviewed by the EPC QA Officer(s) and EPC QA Coordinator. Greater detail of document handling is found in the SOP for Air Monitoring Document Management Using OCULUS (AM SOP 3.1).

After receiving the lead data package from the EPC Lab and validating the sampling data, the lead concentration results, and any associated QA/QC data are entered in AirMVP by the Air Monitoring QA staff on a monthly frequency. The DEP reports to AQS each calendar quarter all ambient lead data and other information specified in the appropriate regulations, coded in the appropriate format. Such air quality data and information will be fully screened and verified by the DEP before transfer to the EPA AQS on the established quarterly schedule. Annually, the EPC QA Coordinator transmits a copy of all records associated with the lead monitoring network in Hillsborough County to the DEP central FTP folder.

Calculations for transforming raw data from measurement units to final concentrations are relatively straightforward and are made following procedures spelled out in 40 CFR Part 50, Appendix G. The final lead concentrations represent a 24-hour (daily) sample, collected on the national 1-in-6-day sampling schedule. According to Appendix R to 40 CFR Part 50, the daily concentrations are aggregated into a monthly mean and then further averaged to obtain a rolling 3-month parameter to establish the site-level design value.

17.3 Data Verification and Validation

Field technicians record instrument parameters at the time of filter installation and sample collection according to the sampler SOP (DEP 03-18). This is the first level of quality assessment and QC checks recorded on the sample record. The sample record is then reviewed by the Air Monitoring QA staff to verify the correctness of the data entries and determine the validity of the sample according to the Data Handling and Data Validation SOP (DEP 18-27).

Lead filter analysis data is recorded by the laboratory analyst. The analytical data is verified by the laboratory Quality Manager and then, a final lead data package is submitted to the Air Monitoring QA staff for their review. The Air Monitoring QA staff review the QA/QC results and data flagging codes in the lead data package. This information is validated against the *Lab Activities* performance criteria in Table 5-2 of this QAPP.

Data verification is also performed once the data is entered in AirMVP. The DEP reviews the lead data by electronically searching for status flags and comparing reported values to criteria that identify whether the data are within acceptable range criteria. If data are flagged as questionable, DEP air quality analysts evaluate the associated data to identify underlying causes and make the decision whether the data are valid. If the data are invalid, they are not used in design value calculations. If the data are valid but flagged due to some extenuating circumstance, then the data will

be used in calculations and accompanied by a comment documenting the situation. Further details on the data verification and validation process are provided in the Data Handling and Data Validation SOP (DEP 18-27).

Data validation is an important routine process that involves several steps to ensure that field and data processing operations have been carried out correctly. The validation process will identify data with errors, biases, and physically unrealistic values before they are used for the identification of exceedances, further analyses, or modeling. Once these problems have been identified, the data can be corrected or invalidated. If necessary, corrective actions can be taken by field personnel as they relate to field sampling, or laboratory personnel as they relate to the analytical method.

Furthermore, the lead samplers in the Florida air monitoring network undergo periodic audits and annual verifications. These procedures are outlined in the field sampling and data handling SOPs. Performance audits and calibrations ascertain the accuracy, precision, and repeatability of each instrument in performing its required function.

17.4 Data Reduction and Analysis

Data reduction occurs throughout the data management process. In general, the raw data set in AirMVP is compiled to yield the appropriate averaging period value. The result is then compared to the NAAQS for lead. Any concentrations above the NAAQS require additional documentation to describe the circumstances that resulted in the exceedance.

In addition, precision, bias, and completeness statistics generated from AirMVP and AQS reports are reviewed monthly, quarterly, and again on an annual basis before data certification.

17.5 Data Storage and Retrieval

Once collected, data is stored in a variety of ways and for varying periods. Sampling parameters like the daily barometric pressure, ambient temperature, and elapsed sampling time, are initially stored in the sampler, sensor, or station data logger. Other data associated with the collected sample, like the initial and final sampler flow rates, are collected on the sample record data sheet by the field technician and subsequently stored in the EPC record management system, OCULUS, or on the EPC network server. Similarly, raw laboratory data and laboratory QA/QC records are initially stored in the LIMS and/or on the EPC network server. Records in OCULUS and the network server are electronically backed up, nightly to an off-site recovery server.

The sample concentration data and QA/QC results are entered into AirMVP and shall be stored for ten (10) years, unless any litigation, claim, negotiation, audit, or other action involving the records has been started before the expiration of the ten years.

If this happens, the records will be retained until completion of the action and resolution of all issues that arise from it, or until the end of the regular ten-year period, whichever is later.

After the storage period has passed, the storage media may be disposed of or recycled. However, the validated dataset, including quality assurance data, is uploaded to the EPA Air Quality System (AQS) for long-term storage.

18.0 ASSESSMENTS AND OVERSIGHT

Assessments or evaluations are designed to determine whether the ambient lead monitoring program is being implemented in conformance with this Quality Assurance Project Plan, as approved. These activities are conducted to increase confidence in the information obtained, and ultimately to determine whether the information may be used for its intended purpose. Table 4-1 provides a summary of the relevant assessments performed in Florida's ambient lead monitoring network.

18.1 Assessments and Response Actions

To ensure the adequate performance of the quality system, the Florida PQAO performs and/or participates in the following assessments. These assessments are used to measure the performance and effectiveness of the quality system, the ambient air quality monitoring network design and operation, and various measurement phases of the data operation.

- Network Plan/Assessments
- Performance Evaluations
- Technical Systems Audits
- Pb Analysis Audits
- Lead Performance Evaluation Program
- Data Quality Assessments
- Data Quality Audits
- Data Certification

18.2 Network Plans and Assessments

40 CFR §58.10 provides the requirements for annual network plans and the more intensive 5-year assessment. These assessments are completed primarily by the Quality Assurance Manager in conjunction with other air monitoring staff, when necessary.

In summary, the annual monitoring network plan provides documentation of the establishment and maintenance of Florida's air monitoring network, which includes the lead monitoring network and consists of SLAMS and SPM monitoring stations. The goal of the network plan is to determine conformance with network requirements as outlined in 40 CFR Part 58, Appendices A, C, D, and E. Any proposed changes to the monitoring network are detailed in the annual plan; proposed additions and discontinuations of SLAMS monitors are subject to EPA approval per 40 CFR §58.14. The annual air monitoring network plan is made available for public inspection and comments for at least 30 days before submission to EPA Region 4

and the submitted plan addresses, as appropriate, any received comments. Annual network plans, per 40 CFR §58.10, began July 1, 2007. Annual network plans are due to EPA Region 4 on July 1 of each year.

The 5-year network assessment is a more extensive evaluation of the air monitoring network. The assessment determines, at a minimum, if the network meets the monitoring objectives defined in 40 CFR Part 58, Appendix D, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network.

During the network assessment, the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), as well as the potential impact any sites proposed for discontinuance may have on other data users are considered. Specifically, the 5-yr assessment evaluates the ability of the lead monitoring network to meet the monitoring objectives, as stated in Section 4.0 of this QAPP. The assessment includes an evaluation of emissions data from lead sources to determine if any new source monitoring should be included in the lead monitoring network. Florida DEP submits a copy of the 5-year assessment, along with a revised annual network plan, to the EPA Region 4. These assessments began in 2010 and are due to EPA every five years on July 1.

For more information about the monitoring locations in Florida's network please see the Annual Network Plan at this link: https://floridadep.gov/air/air-monitoring/content/air-monitoring-publications-and-reports.

18.3 Performance Evaluations

Performance evaluations (PEs) are a type of audit in which the quantitative data generated in a measurement system are obtained independently and compared with routinely obtained data to evaluate the proficiency of the instruments. As stated in Section 2.2 of this QAPP, the Florida DEP QA auditors conduct performance audits of the lead monitoring samplers.

All Pb-TSP Hi-VOL samplers in the lead network undergo a performance evaluation audit approximately every 182 days. The PE audit of a Hi-VOL sampler is a 1-point flow rate check against a certified transfer standard orifice. Audits will be conducted with independent equipment, i.e., equipment different than that used to calibrate the equipment, although both the calibration system and the audit system can be traceable to the same primary standard. In addition, the person performing the audit is not the operator for that specific site. Specifications for performance audits are detailed in the PQAO audit SOPs. Performance evaluation audits shall be performed per the schedule established by Florida DEP.

18.4 Technical Systems Audits

A Technical Systems Audit (TSA) is a thorough, independent, and systematic on-site qualitative assessment, where facilities, equipment, personnel, training procedures, protocols, and recordkeeping are examined for conformance with regulatory requirements and this QAPP. EPA Region 4 QA staff conducts a TSA of Florida's PQAO every 3 years, per 40 CFR Part 58, Appendix A, §2.5. The EPA reports its findings to Florida DEP and Local Program senior management such as the Director and Program Administrators (Florida DEP and Local Program). The Program Administrators (or delegate) regularly monitors progress on corrective action(s) required as a result of TSA findings and communicates progress to the Director and EPA Region 4.

TSAs conducted by EPA shall be performed once during every three years that the monitoring organization operates the network which collects data verifying compliance with the NAAQS. In the case of Florida, a PQAO made up of more than one monitoring organization, the lead network operated solely by the EPC, may be audited within 6 years (two TSA cycles of the PQAO).

EPA TSA auditors may segregate the lead network TSA activities into multiple categories, which include field, laboratory, and data management activities. The categories may be audited independently, or they may be combined. Key personnel with responsibilities for planning, field operations, laboratory operations, QA/QC, data management, and reporting are included in TSA audit activities and are often interviewed during the process.

Upon completion of the audit, EPA verbally alerts PQAO senior management of any deficiencies or findings during an on-site TSA exit briefing. This briefing allows Florida PQAO staff to begin formulating or implementing corrective actions. A draft TSA Report is typically distributed within 30 days of the completion of the audit. EPA Region 4 allows a brief comment period of the draft report for factual accuracy; after comments are received (if necessary), the TSA report will be finalized and resubmitted to the Program Administrator(s). A formal response to address the TSA findings must be completed and resubmitted to EPA Region 4 within 30 days. The Program Administrator(s) will communicate with EPA routinely after the Corrective Action Plan has been submitted and provide progress updates periodically until the corrective actions have been completed.

18.5 Internal (Florida DEP Quality Assurance) Systems Audits

Florida DEP performs a quality assurance (QA) systems audit on the lead network, every 3 to 5 years which is similar to a technical system audit (TSA). It is a thorough and systematic qualitative audit, where facilities, equipment, personnel, training procedures, protocols, and record-keeping are examined for conformance with established regulations and statewide policies governing the collection, analysis,

validation, and reporting of ambient air quality data. Additional information on the QA systems audit is provided in Appendices A and B of this QAPP.

A QA Systems Audit team or an individual QA Systems Auditor may separate systems audit activities into three categories for QA systems audits of the lead network. The categories may be audited independently, or they may be combined. The categories include:

- Field activities – Performing routine maintenance of equipment, maintaining certification records, performing associated QA/QC activities, etc.
- Lab activities – Performing routine maintenance of equipment, maintaining certification records, performing associated QA/QC activities, etc.
- Data management activities – Collecting, flagging, editing, and uploading data; providing data security, etc.

Key personnel to be interviewed during the audit are those individuals with responsibilities for planning, field operations, laboratory operations, QA/QC, data management, and reporting.

18.5.1 Post-Audit Activities

The major post-audit activity is the preparation of the systems audit report. The report will include:

- Audit title, date of report, and any other identifying information,
- Audit manager, audit team participants, and audited participants,
- Background information about the project, purpose of the audit, dates of the audit, specific measurement phases or parameters that were audited, and a brief description of the audit process,
- Summary and conclusions of the audit and corrective action required, and
- Attachments or appendices that include all audit evaluations and audit findings.

To prepare the report, the DEP audit team will meet and compare observations with collected documents and results of interviews with key personnel. Expected QAPP implementation is compared with observed accomplishments and deficiencies. The audit findings are reviewed in detail, and, within 10 calendar days of the completion of the audit, a comprehensive audit report will be generated by the DEP audit team and provided to the Office of Air Monitoring Program Administrator for review.

If the affected parties have written comments or questions concerning the audit report, the audit team will review and incorporate them as appropriate. Subsequently, a modified report will be prepared and resubmitted in final form within 30 days of receipt of the written comments. The report will include an agreed-upon schedule for corrective action implementation.

18.5.2 Follow-up and Corrective Action Requirements

As part of corrective action and follow-up, an audit finding response will be generated by the EPC Air Monitoring Program for each finding in the TSA report with a corrective action report where appropriate. The audit finding response is signed by the EPC QA Coordinator and sent to the Office of Air Monitoring Program Administrator, who reviews, and accepts or rejects the corrective action. The audit response will be completed within 30 days of receipt of the audit report.

The results of the QA systems audit may result in additional, refresher training for air monitoring staff. Training may be provided in the form of additional communications regarding the PQAO's approved practices, along with discussions of the elements necessary to satisfy these requirements. It may also be in the form of hands-on technical training.

18.6 Pb Analysis Audits

The Florida lead network participates in a Pb analysis audit conducted by EPA, according to Appendix A of 40 CFR Part 58, §3.4.6. Annually, the US EPA provides audit strips to the EPC lab for monthly lead analysis. A set of Pb audit strips are prepared with a concentration which is 30-100% of the NAAQS for Pb (Level 1), and a concentration which is 200-300% of the NAAQS for Pb (Level 2). The set is analyzed monthly, reported in units of µg/strip (AQS code 077) as part of the EPC Lab, lead data package. Each calendar quarter the EPC Air Monitoring QA staff reviews the audit strip results and submits the results to AQS for assessment by EPA. The EPC, in coordination with DEP, will assess the Pb Audit results in the first calendar quarter for the previous calendar year.

Since the Pb audit strips are an ongoing check of lab stability over the calendar year, any single analysis that exceeds the percent difference criteria, <±10.1% (Table 7-1 of this QAPP), is not intended to be an assessment of the samples analyzed within a particular batch or analytical run. However, the primary samples will be flagged in AQS with QA qualifiers, "4-Lab Issue" and "V-Validated Value" to draw the data user's attention to the lab analytical capability. Only if the analysis audit bias estimate, according to Appendix A of 40 CFR Part 58, §4.2.6, is flagged as positive or negative will the validity of sample data be further investigated.

18.7 Performance Evaluation Program for Pb (Pb-PEP)

The Florida lead network participates in the national Pb-PEP conducted by EPA, according to Appendix A of 40 CFR Part 58, §3.4.7. Each calendar quarter, a collocated sample is shipped to the designated EPA laboratory for analysis. The EPA OAQPS submits the results of the collocated sample analyzed by the EPA laboratory to AQS and compares the laboratory result to the result of the primary sample analyzed by the EPC laboratory assessing the accuracy of the analytical method.

Additionally, the EPA sets up a performance evaluation monitor which is collocated with an ambient lead sampler, to assess the total measurement system bias between the primary monitor and the performance evaluation monitor on an annual basis. The Pb-PEP results are retrieved from AQS by running the AMP 504 Report, and then the EPC Air Monitoring QA staff will manually enter the QA data into AirMVP. Each calendar quarter, the EPC Air Monitoring QA staff will review the Pb-PEP results for the collocated sample pairs and the collocated audit monitor. In the first calendar quarter, the EPC will review all Pb-PEP results for the previous calendar year.

18.8 Data Quality Assessments

A data quality assessment (DQA) is the statistical analysis of environmental data to determine whether the data meet the assumptions that the DQOs and data collection design were developed under and whether the total error in the data is tolerable. Calculations of measurement uncertainty are carried out by the EPA according to the procedures and equations identified in 40 CFR Part 58, Appendix A, §4. The DQIs are used to assess how well the monitoring data compare to the established DQOs and MQOs. AQS provides statistical software that evaluates the DQIs of precision, bias, and completeness for the monitoring organizations. With that in mind, the PQAOs (including Florida's) must report the data for QA/QC checks (per Section 12 of this QAPP) to AQS.

The statistical estimates of the data quality will be calculated in AQS based on single monitors, as well as aggregated for monitors within the PQAO for lead. The precision estimate (calculation) for the lead sampler is found in 40 CFR Part 58, Appendix A, §4.2.1; the bias estimates for 1-point flow rate, semi-annual flow rate audit, and the Pb-PEP bias estimate, are found in the §4.2.2, §4.2.3, and §4.2.4, respectively. The bias estimate for the Pb analysis audit is found in §4.2.6.

To complete the DQAs, the Quality Assurance Manager (QAM) and/or AQS Coordinator will generate a series of standard AMP reports from AQS to review and assess the PQAO data quality quarterly. For this quarterly assessment, the AMP 256 (Data Quality Indicator) reports are generated, evaluated, and then kept as a record to document the review. These reports provide the results of the statistical analyses, which are compared to the DQOs in Section 5 of this QAPP. If the monitoring data are found to meet the DQOs, the data are considered to be "in control" and no further action is needed. However, if issues are observed in the data during these assessments such that DQOs are not met, the issues will be investigated to determine the root cause, and then corrective actions implemented.

Also, during these quarterly data assessments, the Data Validation Team and the EPC Air Monitoring QA Coordinators/Staff will generate AMP 430 (Data Completeness) and AMP 504 (QA Data Extraction Report) reports. The results of these reports are compared to the MQOs in Section 5 of this QAPP, documented in Table 5-2. If issues are observed in the data, the QAM will discuss these issues with the QA staff and

determine the necessary course of action. If data completeness requirements have not been met, Florida DEP's Program and Data Quality Section Administrators will communicate this issue to EPA Region 4, per grant commitments.

18.9 Data Quality Audits

An audit of data quality (ADQ) reveals how data are handled, what judgments were made, and whether unresolved errors persist. An ADQ can often identify the means to correct systematic data reduction errors. Sufficient time and effort will be devoted to this activity so that the data reviewers and QA staff within the PQAO have a clear understanding and complete documentation of data flow.

The Florida DEP's Office of Air Monitoring conducts a Data Quality Audit of agencies within the PQAO, its version of an ADQ. A Data Quality Audit is an independent and periodic review of a select dataset. It is essentially a small-scale QA systems audit, to ensure that agencies are handling data correctly and performing processes and procedures per QAPPs, SOPs, and other formalized QA documentation.

The Data Quality Audit will serve as an effective framework for organizing the extensive amount of information gathered during the audit of laboratory, field monitoring, and support functions within the agency. Additionally, these audits help to alleviate the loss of large datasets, if there are systemic issues, the same reporting/corrective action requirements as the QA systems audit (discussed in Section 18.5 above), will apply.

Florida DEP performs these Data Quality Audits within the PQAO as necessary; therefore, all agencies are not reviewed each year. However, over 3 years each agency will receive at least one Data Quality Audit and the schedule will be determined based on whether the agency has had recent staff turnover, new processes have been implemented, and/or the agency has had significant data loss due to operator error. This audit includes a DQA of EPC lead monitoring program. The process involves the following:

- Pre-Data Review Activities
  - The Florida DEP contacts the agency to coordinate a review of the records that support the selected dataset.
- Data Audit Activities
  - Florida DEP conducts the records review (includes a review of records, AirMVP, QA documents, etc.), in conjunction with the review of the selected dataset.
- Post-Data Audit Activities
  - The agency is provided a summary report identifying the list of concerns/issues cited during the audit, the data audit period, the parameters that were reviewed, etc.
  - The agency proceeds with corrective action and/or follow-up if any.

- Florida DEP ensures that the all corrective action and/or follow-up is completed.

The schedule for the Data Quality Audits is at the discretion of the Florida DEP Program Administrator and Data Quality Section Administrator. Agencies that display potential issues or deficiencies (i.e. constant staff turnover, known problems with a particular parameter, etc.) are more likely to undergo a Data Quality Audit.

18.10 Data certification

Following 40 CFR 58.15, an annual air monitoring data certification letter is required to certify that the data collected at SLAMS and SPM sites within the Florida PQAO lead network meet the criteria in 40 CFR Part 58, Appendix A from January 1 to December 31 of the previous year. Along with the certification letter, Florida DEP must submit to EPA an annual summary report of all the ambient air quality data collected by the monitors, as well as a summary of the precision and accuracy data, for the previous year.

Data Certification of the lead data is the final process of assessing the PQAO's data for the previous calendar year. Data is verified and validated monthly, as discussed in Section 21 of this QAPP. Additionally, data is assessed every quarter when specific AQS reports are generated to assess the DQIs (as described in Section 18.7 above). With these assessments ongoing throughout the year, annual data certification, then, serves as the last assessment of the data – looking at it from an all-inclusive, annual perspective – to see if any unidentified anomalies or trends exist in the data that were not previously identified. The annual data certification process starts with running and reviewing AMP reports contained in AQS. The reports typically queried include the following:

- AMP 350 Raw Data
- AMP251 QA Data
- AMP430 Data Completeness
- AMP600 Certification Evaluation
- AMP256 Data Quality Indicator
- AMP504 Extract QA Data
- AMP450 Quicklook Criteria Parameters
- AMP450NC Quicklook All Parameters

The QAM and AQS coordinators review these reports and confirm everything is complete and accurate. The reports are also reviewed to ensure the statistical results indicate that the monitoring data were "in control" over the entire year and met the DQOs. If problems are identified, they are investigated per Section 22 of this QAPP.

Ultimately, this process verifies that the PQAO monitoring data submitted to AQS is correct and complete. Once any necessary corrections/additions/deletions have been completed in AQS and the dataset is finalized, the Florida DEP Program

Administrator and QAM officially recommend the data for certification to EPA Region 4. The data certification package provided to EPA includes a signed copy of the AMP 600 report, along with a letter signed by the Division Director, certifying that the ambient concentration and quality assurance data in AQS are complete and accurate, taking into consideration the quality assurance findings, to the best of his/her knowledge.

The annual lead data certification package is due to EPA Region 4 by May 1 of each year.

18.11 Reporting and Resolution of Issues

An important function of a quality system is a communication structure that ensures corrective actions, when needed, are implemented promptly and their effectiveness is confirmed. To address the findings from the assessments described above and noted in Table 4-1, the following structure and associated protocols shall be employed to identify and implement corrective actions.

All PQAO staff members are responsible for identifying the need for corrective actions. Identifying the need for corrective actions can occur during site visits, audits, data review activities, or other monitoring activities. This shared responsibility, coupled with diligent attention to detail and accuracy, will assure that Florida's ambient air monitoring network consistently collects quality data and that the data is reduced, analyzed, and presented in an accurate and representative manner. Any air monitoring staff member who perceives a need for corrective action(s) shall present the situation/concern to the EPC Air Monitoring section manager or Air Division Director.

If corrective action is deemed necessary, a suitable corrective action plan will be selected and disseminated to the field technician(s) or air monitoring staff member, generally within the week. If the issue is of major significance, the situation will be communicated by the Florida DEP Program Administrator to the Director, who may determine that the issue is of such import that works must stop until corrective action(s) can be implemented and the situation completely resolved. For example, although it is not a reactive corrective action measure, a proactive corrective measure that may involve the Director stopping work would be the circumstance of emergency weather conditions. The State of Florida is sometimes impacted by hurricanes and other significant weather events. During times such as these when a hurricane is approaching, the Program Administrator may communicate concern to the Director about the security and safety of the monitoring stations and equipment, as well as the air monitoring staff themselves. The Director may initiate emergency shutdown procedures at this time, as a safety measure.

Field technicians are primarily responsible for implementing corrective actions, however, any personnel within the air monitoring network may initiate the corrective action process following the PQAO Corrective Action SOP (DEP 01-4). The

Corrective Action SOP (DEP 01-4) describes the corrective action process and this process must be used whenever a failure or deviation from accepted standards arises and action is taken to rectify the problem.

The two common forms of corrective action within Florida's monitoring network are immediate and long-term corrective actions. Immediate corrective actions are typically performed by the field technicians and only require notations in the site logbooks, forms, and null codes/qualifiers (if applicable) in the data management system along with comments (e.g., AirMVP/AirVision). Some examples of immediate corrective actions include:

- Resetting the GFI circuit breaker, and
- Time synchronizations.

Long-term corrective actions identify and eliminate causes for systemic or systematic failures. It consists of a thorough assessment and identification of the cause of the problem as well as objectively developing preventative methods to avoid recurrence. Some examples of long-term corrective actions include:

- The update of PQAO quality assurance documents as a result of an external audit (e.g., EPA TSA),
- Supplemental training of air monitoring personnel as a result of a QA systems audit, and
- Resolution of siting criteria issues (e.g., site relocations, siting criteria waiver requests, and demonstrations).

Following the implementation of a corrective action, the air monitoring Administrators and/or Managers may, at their discretion, require a QA systems audit or Data Quality Audit to verify the efficacy of the corrective action. Both the action of implementing the corrective action and the influence of the corrective action on the operations of the ambient air quality monitoring network must be evaluated. Any deficiencies in the correction must be noted and the procedure should be updated to completely correct the discrepancy.

19.0 REPORTS TO MANAGEMENT

This section describes the quality-related reports and communications to management necessary to support ambient lead monitoring network operations and the associated data acquisition, validation, assessment, and reporting.

19.1 Frequency, Content, and Distribution of Reports

Reports to management required for the SLAMS program, in general, are discussed in various sections of 40 CFR. Guidance for management report formats and content are provided in reports developed by EPA's Air Quality Assessment Division within the Office of Air Quality Planning and Standards (OAQPS). These reports are described in the following subsections. Additionally, Florida DEP generates other internal reports within its PQAO, which are also described below.

19.2 EPA Exceedance Reports

The Quality Assurance (QA) Manager is responsible for notifying EPA Region 4 personnel in writing of any observed exceedance of the lead NAAQS within 30 days of receipt of the analytical results of the exceedance event. The notification will include a summary of statistics from AQS generated reports, such as design values.

Table 19-1: Report Flow for EPA Exceedance Reports

AUTHOR →	RECIPIENT(S)
DEP QA Manager	Program Administrator → EPA Region 4

19.3 Quarterly Data Submittal Reports

Each quarter, concentration data submitted for each reporting period will be edited, validated, and entered into AQS using the procedures described in the EPA's AQS User Guide, EPA's AQS Data Coding Manual, and Florida's Data Handling and Data Validation SOP (DEP 18-27). The Florida DEP Data Validation Team and the EPC QA staff are responsible for reviewing and validating the concentration data and submitting all applicable reports for data captures below 75% for the quarter. These reports will be accompanied by a memo from the EPC QA Coordinators/Staff which will be reviewed by the Data Quality Section Administrator before the data is transmitted to AQS.

Table 19-2: Report Flow for Quarterly Data Submittals

AUTHOR →	RECIPIENT(S)
Data Validation Team/Field Technicians	Data Quality Section Administrator
EPC QA Coordinators	

Florida PQAO will report to AQS the results of all valid precision and bias checks and quarterly performance audits performed during the previous quarter. The quarterly reports will be submitted consistent with the data reporting requirements specified for air quality data as outlined in 40 CFR 58, Appendix A. The data reporting requirements of 40 CFR 58.16 apply to those stations designated as SLAMS. Required quality assurance data are to be reported on the same schedule as quarterly monitoring data submittals. It is the responsibility of the Data Quality Section Administrator and QA Manager to ensure that the results of quality assurance data are used to validate concentration data.

Following 40 CFR 58.16, data is to be submitted to the AQS database no later than 90 days following the end of the quarter in which the data was collected. While not required, Florida makes every effort to upload each quarter's concentration and quality assurance data within 60 days following the end of the quarter that it was collected.

Table 19-3: Required AQS Data Reporting Periods

QUARTER	REPORTING PERIOD	AQS UPLOAD DEADLINE
Q1	January 1- March 31	June 29
Q2	April 1- June 30	September 28
Q3	July 1- September 30	December 29
Q4	October 1- December 31	~March 31 (following year)

19.4 Quarterly EPA Data Completeness Deficiency Reports

The Data Quality Section Administrator is responsible for notifying EPA Region 4 personnel if any lead sampler does not achieve at least 75% data completeness in any quarter. Notification is provided via a letter, which is written with the cooperation of the Program Administrator and QA Manager. The letter outlines the causes of data completeness deficiencies and the corrective actions taken to resolve the observed issues. The letter includes an AQS-generated summary of network-wide data completeness.

The Data Quality Section Administrator will notify EPA Region 4 within 90 days following a complete quarterly AQS data submittal, including the applicable quality assurance data, by the AQS Coordinator. A notification is not generated if each lead sampler achieves acceptable data recovery.

Table 19-4: Report Flow for Quarterly EPA Data Completeness Reports

AUTHOR →	RECIPIENT(S)
DEP Data Quality Section Administrator	Program Administrator → EPA Region 4

19.5 Semi-annual Performance Evaluations

Florida DEP QA auditors conduct performance evaluations (flow rate audits) of each instrument in the network twice per calendar year, using specially designated audit equipment. All transfer standards used to test sampler flow must be NIST Standard Reference Materials (SRM) or traceable to a NIST SRM.

The results of each performance evaluation are documented on Excel forms and are communicated via a written report. The report is issued by the QA auditors and is routed to the Data Quality Section Administrator for review and approval. After approval, the reports are then distributed to the Field Operations Section Administrator, QA Manager, the EPC QA Coordinators/Staff, and Field Technicians.

Table 19-5: Report Flow for Annual Performance Audit Reports

AUTHOR →	RECIPIENT(S)
DEP QA Auditor	Data Quality Section Administrator → QA Manager → Field Operations Section Administrator → EPC QA Coordinator → Field Technician(s)

19.6 Siting Criteria Evaluation Reports

Florida DEP QA auditors conduct siting criteria evaluations annually for each site in the network. The results are detailed on the Site Review form, which is distributed to the Data Quality Section Administrator, Field Operations Section Administrator, QA Manager, Local Agency Air Program Administrator, and any other applicable air monitoring staff. The reports outline an evaluation of the siting criteria, consistent with 40 CFR Part 58 Appendix E and Florida DEP's Site Review Protocol, identifying deficiencies in siting criteria, if any, and the necessary corrective actions. These reports will be filed and made available to EPA personnel during their TSAs.

Table 19-6: Report Flow for Annual Siting Criteria Evaluation Reports

AUTHOR →	RECIPIENT(S)
DEP QA Auditor	Data Quality Section Administrator → Florida Air Monitoring Staff

19.7 Annual Data Certification

The QA Manager will prepare a data certification package for signature by the Division Director by May 1 of each year. The report will consist of a letter, for signature, along with AQS generated summaries of lead concentration data collected during the previous year, and all applicable quality assurance data. The exact AQS reports that are required each year are specified by EPA Headquarters and EPA Region 4.

Table 19-7: Report Flow for Quality Assurance Systems Audit Reports

AUTHOR →	RECIPIENT(S)
DEP QA Manager	Program Administrator → Division Director → EPA Region 4

19.8 Annual Network Plan

Florida DEP conducts a network review following the requirements in 40 CFR 58.10. The purpose of the network reviews is to determine if a system meets the monitoring objectives defined in 40 CFR 58, Appendix D. The review identifies needed modifications to the network including termination or relocation of unnecessary stations or establishment of new stations.

As part of the review, Florida DEP submits an Annual Monitoring Network Plan to the EPA for approval by July 1 of each year. The document undergoes a 30-day public comment period before submission to the EPA. The Annual Network Plan provides a detailed description of all air monitoring sites.

Table 19-8: Report Flow for Annual Network Plan

AUTHOR →	RECIPIENT(S)
DEP QA Manager	Program Administrator → Division Director → Public Comment → EPA Region 4

19.9 Quality Assurance Systems Audit Reports

Florida DEP performs internal Quality Assurance (QA) Systems Audits and Data Quality Audits (see Sections 18.5 and 18.9, respectively). The QA audits are performed by assigned QA Systems auditor(s) on a 3 to 5-year basis, while Data Quality Audits are performed periodically over a 3-year timeframe. Written reports on the findings of these audits are issued to the Data Quality Section Administrator for review and approval. After approval, the reports are then distributed and reviewed by the Program Administrator. These reports will be filed and made available to EPA personnel during their TSAs.

External systems audits are conducted at least every three years by EPA Region 4 as required by 40 CFR Part 58, Appendix A, Section 2.5.

Table 19-9: Report Flow for Quality Assurance Systems Audit Reports

AUTHOR →	RECIPIENT(S)
QA Systems auditor(s)	Data Quality Section Administrator → Program Administrator → Local Agency Air Program Administrators

19.10 Five-Year Network Assessment

Following 40 CFR 58.10, Florida DEP conducts a Network Assessment every five years. A Network Assessment is a thorough analysis of the ambient air monitoring network to determine if the network meets the criteria set forth by 40 CFR 58.10(d). The Network Assessment is used as an internal planning document to guide potential improvements to the ambient air monitoring network. It is the responsibility of the QA Manager, with the assistance of assigned Florida air monitoring staff, to complete and submit a Network Assessment to the EPA by July 1 of each five-year interval (e.g. 2020, 2025, etc.).

Table 19-10: Report Flow for Five-Year Network Assessment

AUTHOR →	RECIPIENT(S)
DEP QA Manager	Program Administrator → Division Director → EPA Region 4

19.11 Response/Corrective Action Reports

The Corrective Action report is used to document corrective measures taken whenever a problem is found such as a safety defect, an operational problem, or a failure to comply with procedures. These four steps below will be documented per the procedures detailed in the Corrective Action SOP (DEP 01-4) with its associated forms from the date of the original problem or infraction.

- Identify the problem
- Identify why the problem occurred
- Identify a process in which it can be prevented from reoccurring
- Follow up after the process has been put into place

The corrective action reports are primarily designed to document any issues that can detrimentally impact data validity and a separate report will be required for each problem identified. This report is one of the most important ongoing reports to management because it documents primary QA activities and provides valuable records of QA activities that can be used in preparing other summary reports. Copies of corrective action reports will be distributed twice: first when the problem has been identified and the action has been scheduled, and second when the correction has been completed.

The field technician, data processing staff, and/or QA Coordinator assigned will generate the corrective action reports. The report will be distributed to the appropriate air monitoring supervisor(s)/manager(s) for review and approval and then ultimately Florida DEP.

Table 19-11: Report Flow for Corrective Action Reports

AUTHOR →	RECIPIENT(S)
Field Technician/QA Staff/QA Coordinator	Air Monitoring Supervisor/Manager → Local Program Administrator → Florida DEP

20.0 DATA VALIDATION AND USABILITY

20.1 Data Review, Verification, and Validation

Each of the network's Pb-TSP Hi-VOL samplers are employed to measure ambient concentrations of lead over 24 hours. To be useful, the data must undergo an evaluation to determine the degree to which each data point has met its quality specifications. The EPC QA staff and QA Coordinator evaluate the data to establish that data collection is consistent with this QAPP and the requirements specified in field and laboratory SOPs (see Appendix C of this QAPP).

Data review is the in-house examination to ensure that the data has been recorded, transmitted, and processed correctly. It includes completeness checks to determine if there are any deficiencies such as missing data or lost integrity. The data under evaluation are compared to actual events, as per guidance (Guidance on Environmental Verification and Validation (EPA QA/G-8)). In addition, it is expected that some of the QC checks will indicate that the data fail to meet the acceptance criteria. Data identified as suspect, or does not meet the acceptance criteria, shall be flagged with AQS codes before uploading to AQS. The review of the routine and the associated QC data will be verified and validated monthly. Corrective action is taken if errors or anomalies are found. In cases when data does not meet quality goals, it may be flagged or invalidated.

Data verification is the process for evaluating the completeness, correctness, and conformance/compliance of the dataset against method, procedural and contractual specifications. Verification can be further defined as a confirmation, through the provision of objective evidence, that specified requirements have been fulfilled. Unacceptable or questionable data will be flagged by the Field Technicians/QA staff during the data review process. All flagged data will be re-verified by the QA staff and QA Coordinator. The procedures for verifying data are detailed in Florida's Data Handling and Data Validation SOP (DEP 18-27).

Data validation is a routine process designed to ensure that reported values meet the quality goals of the environmental data operations. Data validation is further defined as the examination and provision of objective evidence that the particular requirements for specific intended use are fulfilled. The primary intended use for Florida's dataset is NAAQS compliance. A progressive, systematic approach to data validation must be used to ensure and assess the quality of data. Data validation includes the review of the PQAO datasets against the individual pollutant MQOs, the review of data against the QA/QC results, as well as the comparison of the data against basic statistics (such as completeness). Reviewing data long-term (over a quarterly or annual timeframe) provides information about the structure of the data and may identify patterns, relationships, or potential anomalies. Invalidated data are replaced with AQS Null Data codes before uploading to AQS. Deviations from operational procedures or quality assurance requirements that do not result in data invalidation may require that data be qualified with QA qualifier flags before

uploading to AQS. The Florida DEP Data Quality Section Administrator and AQS Coordinator spot-checks these data after validation by the QA Coordinator is completed, before AQS upload. The procedures for validating data are detailed in Florida's Data Handling and Data Validation SOP (DEP 18-27).

20.2 Sampling Design

Sampling network design and monitoring site selection must comply with:

- 40 CFR Part 58, Appendix A – Quality Assurance Requirements for SLAMS and SPMs
- 40 CFR Part 58, Appendix D – Network Design Criteria for Ambient Air Monitoring
- 40 CFR Part 58, Appendix E – Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring

Additional guidance is provided in Guidance for Choosing a Sampling Design for Environmental Data Collection, (EPA QA/G-5S).

Any deviations from the minimum siting criteria (e.g., sampler location, probe placement, and/or monitor sight path requirements) shall be thoroughly documented in the site review documentation. Examples of deviations include, but are not limited to, insufficient distance from roadways (i.e. marginal terrain criteria) and insufficient distance from influencing objects (e.g. drip line of an adjacent tree or a cell phone tower that was installed after the monitoring site was established). The impact of the deviations is evaluated and appropriate adjustments to the sampling design are determined.

20.3 Sample Collection Procedures

Sample collection procedures are outlined in Section 10 of this QAPP and greater detail in the Pb-TSP Hi-VOL Sampling SOP, DEP 03-18. Potentially unacceptable data points are routinely identified in the sample record by the field technician or QA staff. The unacceptable data point is associated with a unique error code/flag. These error flags are routinely reviewed as part of the data validation process. This activity assists in identifying suspect (potentially bad) data points that could invalidate the resulting lead concentration. A compilation of error flags used of all air monitoring data by the Florida PQAO is presented in Tables 20-1 and 20-2, where those used for the lead monitoring program are highlighted.

Any deviation from the established sample collection plan must be documented in the appropriate logbook and on the field sample data sheet. Accurate and complete documentation of any sample collection deviations will assist in any subsequent investigations or evaluations. Investigations and evaluations may be necessary to determine whether the data obtained from a site may qualify as a baseline or indicator for other sites.

The data may also require qualifier flags, null codes, and text comments within the data management system (i.e., AirMVP/AirVision), which are typically applied to the data by the EPC QA staff. The qualifier flags, listed in Table 20-1, are applied to valid data, providing additional information. The null codes, listed in Table 20-2, are applied to invalidated data where the code replaces the data value. Both qualifier flags and null codes are transmitted to AQS and provide the principal means of communicating data quality characteristics to the EPA. Tables 20-1 and 20-2 are reprinted from the PQAO Data Handling and Data Validation SOP providing a general list of the commonly used null codes and quality assurance flags. The flags and codes highlighted in yellow, designate those used for the lead monitoring program data.

Table 20-1: Qualifier Flag Description

Qualifier Flag	Qualifier Description
1	Deviation from a CFR/Critical Criteria Requirement
2	Operational Deviation
3	Field Issue
4	Lab Issue
5	Outlier
6	QAPP Issue
7	Below Lowest Calibration Level
9	Negative value detected - zero reported
CB	Values have been Blank Corrected
CC	Clean Canister Residue
CL	Surrogate Recoveries Outside Control Limits
DI	Sample was diluted for analysis
EH	Estimated; Exceeds Upper Range
FB	Field Blank Value Above Acceptable Limit
FX	Filter Integrity Issue
HT	Sample pick-up hold time exceeded
LB	Lab blank value above acceptable limit
LJ	Identification Of Analyte Is Acceptable; Reported Value Is An Estimate
LK	Analyte Identified; Reported Value May Be Biased High
LL	Analyte Identified; Reported Value May Be Biased Low
MD	Value less than MDL
MS	Value reported is 1/2 MDL substituted.
MX	Matrix Effect

Qualifier Flag	Qualifier Description
ND	No Value Detected
NS	Influenced by nearby source
QX	Does not meet QC criteria
SQ	Values Between SQL and MDL
SS	Value substituted from secondary monitor
SX	Does Not Meet Siting Criteria
TB	Trip Blank Value Above Acceptable Limit
TT	Transport Temperature is Out of Specs.
V	Validated Value
VB	Value below normal; no reason to invalidate
W	Flow Rate Average out of Spec.
X	Filter Temperature Difference out of Spec.
Y	Elapsed Sample Time out of Spec.

Table 20-2: Null Code Description and Type

Null Data Code	Code Description
AA	Sample Pressure out of Limits
AB	Technician Unavailable
AC	Construction/Repairs in Area
AD	Shelter Storm Damage
AE	Shelter Temperature Outside Limits
AF	Scheduled but not Collected
AG	Sample Time out of Limits
AH	Sample Flow Rate out of Limits
AI	Insufficient Data (cannot calculate)
AJ	Filter Damage
AK	Filter Leak
AL	Voided by Operator
AM	Miscellaneous Void
AN	Machine Malfunction
AO	Bad Weather
AP	Vandalism
AQ	Collection Error
AR	Lab Error
AS	Poor Quality Assurance Results
AT	Calibration
AU	Monitoring Waived
AV	Power Failure
AW	Wildlife Damage
AX	Precision Check
AY	Q C Control Points (zero/span)
AZ	Q C Audit
BA	Maintenance/Routine Repairs
BB	Unable to Reach Site
BC	Multi-point Calibration
BD	Auto Calibration
BE	Building/Site Repair
BF	Precision/Zero/Span

Null Data Code	Code Description
BG	Missing ozone data not likely to exceed level of standard
BH	Interference/co-elution/misidentification
BI	Lost or damaged in transit
BJ	Operator Error
BK	Site computer/data logger down
BL	QA Audit
BM	Accuracy check
BN	Sample Value Exceeds Media Limit
BR	Sample Value Below Acceptable Range
CS	Laboratory Calibration Standard
DA	Aberrant Data (Corrupt Files, Aberrant Chromatography, Spikes, Shifts)
DL	Detection Limit Analyses
FI	Filter Inspection Flag
MB	Method Blank (Analytical)
MC	Module End Cap Missing
QV	Quality Control Multi-point Verification
SA	Storm Approaching
SC	Sampler Contamination
ST	Calibration Verification Standard
TC	Component Check & Retention Time Standard
TS	Holding Time or Transport Temperature Is Out Of Specs.
XX	Experimental Data

20.4 Quality Control

Quality control activities are outlined in Chapter 12 of this QAPP. Prior to upload of data to AQS, the impact of any deviations shall be evaluated by the Data Validation Team and EPC QA Coordinator/Staff during the data validation process. While not exhaustive, the list below contains some examples of data loss/invalidation and the associated methods of data handling.

- All periods of missing concentration data (e.g. for sampler maintenance or power failures) will be replaced with the appropriate AQS Null Data codes.
- The percent difference calculations comparing the Hi-VOL sampler flow rate to the design flow rate and a NIST-traceable flow standard during a QA Performance Evaluation must be within the acceptable operational criteria control limits (i.e. meet the MQOs) noted in Table 5-2. Otherwise, an investigation and assessment of the instrument must be conducted to ensure data quality is maintained.

It is the responsibility of the EPC QA Coordinator/Staff to ensure that all invalidated concentration data is coded appropriately, and then correctly uploaded to AQS.

20.5 Calibration

Section 12.1 and Section 14 of this QAPP address the calibration specifications and information that should be presented to verify calibration procedures and verify the results are acceptable. When calibration problems are identified, any data produced between the suspect calibration event and any subsequent recalibration should be flagged to alert data users.

20.6 Data reduction and Processing

As mentioned in the above sections, both internal and external technical systems audits will be performed to ensure the data reduction and processing activities mentioned in this document are being followed. Periodically, raw data will be reviewed, and final concentrations will be calculated by hand. The final values submitted to AQS should match the hand calculations. The data will also be reviewed to ensure that associated flags or any other data qualifiers have been appropriately associated with the data and that appropriate corrective actions were taken.

21.0 DATA VERIFICATION AND VALIDATION METHODS

40 CFR Part 58, Appendix A, states the following in Section 1.2.3:

Each PQAO is required to implement a quality system that provides sufficient information to assess the quality of the monitoring data…Failure to conduct or pass a required check or procedure, or a series of required checks or procedures, does not by itself invalidate data for regulatory decision making. Rather, PQAOs and the EPA shall use the checks and procedures required in [Part 58, Appendix A] combination with other data quality information, reports, and similar documentation that demonstrate overall compliance with Part 58. Accordingly, the EPA and PQAOs shall use a "weight of evidence" approach when determining the suitability of data for regulatory decisions…Consensus built validation templates or validation criteria already approved in QAPPs should be used as the basis for the weight of evidence approach.

As stated in Section 5.5 of this QAPP, Florida has adopted the consensus-built data validation templates in the EPA 2017 QA Handbook. The lead data validation template is provided in Table 5-2 and will be used for the weight of evidence approach afforded to PQAOs within the regulation. The 2017 QA Handbook provides the following guidance regarding the use of the templates, which the Florida PQAO will follow when validating data.

- Critical Criteria- Deemed critical to maintaining the integrity of a sample (or ambient air concentration value) or group of samples. Observations that do not meet each criterion on the critical table should be invalidated unless there are compelling reasons and justifications for not doing so. The sample or group of samples for which one or more of these criteria are not met is invalid until proven otherwise. In most cases, the requirement, the implementation frequency of the criteria, and the acceptance criteria are found in CFR and are therefore regulatory.
- Operational Criteria - Violation of a criterion or several criteria may be cause for invalidation. The data validator should consider other quality control information that may or may not indicate the data are acceptable for the parameter being controlled. Therefore, the sample or group of samples for which one or more of these criteria are not met is suspect unless other quality control information demonstrates otherwise and is documented. The reason for not meeting the criteria should be investigated, mitigated, or justified.
- Systematic Criteria - include those criteria which are important for the correct interpretation of the data, but do not usually impact the validity of a sample or group of samples. An example criterion is that at least 75% of the scheduled samples for each quarter should be successfully collected and validated. The DQOs are also included in this table. If the data quality objectives are not met, this does not invalidate any of the samples, but it may impact the confidence in the attainment/non-attainment decision.

- The designation of QC checks or QC samples as Operational or Systematic do not imply that these quality control checks need not be performed. Not performing an operational or systematic QC check that is required by regulation can be a basis for invalidation of all associated data. The validation templates are meant to be applied to small datasets (single values or a few weeks of information) and should not be construed to allow a criterion to be in non-conformance simply because it is operational or systematic.

The review procedures for lead samples begin with the collection of the exposed filter from the Pb-TSP Hi-VOL sampler. The field technician records the elapsed time (ET) and the average ambient temperature and pressure for the sampling day on Form No. DEP 03-18-A, the sample record. This is the first indication of sample validity based on raw data measurements.

The next step in the verification and validation process is performed by the Air Monitoring section QA staff review of the sample record (DEP 03-18-A) submitted by the field technician. The QA reviewer verifies all entries on the sample record for completeness, accuracy, and validity. If the lead sample is determined valid at this stage of review, the exposed sample is delivered to the EPC Laboratory for analysis. If it is invalid, the EPC Laboratory is instructed to store and archive the voided sample without analyzing the filter for lead.

After the sample is analyzed by ICP-MS, the laboratory Quality Manager reviews the QA/QC results of the analysis and the calculations used to report the final results. A lead data package is then submitted to the Air Monitoring QA staff for further review, coding/flagging of the data point, and final sample validation.

The final level of review is performed by the Florida DEP Data Quality Section before submittal to AQS.

The following levels of data review describe the overall data verification and validation process, including the individuals responsible for the stated activities.

RAW– Level 0 (All Staff)

These data are obtained directly from the sampling event and recorded on the field sampling record or the laboratory activities recorded in the LIMS. Raw data may have been reduced, but are unedited, not reviewed, and are not adjusted. Raw data are consulted regularly to ascertain instrument functionality and to identify potential episodes prior to the monthly data validation process.

Since the Pb-TSP Hi-VOL sampler is a filter-based monitor programed to sample the ambient air for 24-hours on a set schedule, the raw data recorded by the instrument is limited to elapsed time, average sampling temperature, and barometric pressure. For example, a Level 0 review may identify erroneous ET, temperature, or pressure measurements due to a faulty sensor or meter.

REVIEW (Verification)– Level 1 (Lab Analyst/Field Technician/QA Staff)

This is the next step in the verification process, that occurs after the Level 0 data review. Data are revised (in the edited database only; original data remains intact in the unedited database, see Section 17 of this QAPP). Verification and associated data edits include the following:

- Coding of the lead measurement data point when monitoring instruments fail specified validation criteria.
- Verifying database (AirVision, LIMS, AirMVP) entries against data sheets/logbooks, where appropriate.
- Identification and flagging of data that are beyond reasonable bounds, significantly deviate from measurement assumptions, or that may be deemed unrepresentative.
- Verifying extraction efficiency recoveries for the analytical method.
- Verifying calibration standards and recoveries for the analytical method.
- Identification and flagging of laboratory blanks and spike samples.

QA REVIEW (Validation)– Level 2 (QA Staff/Lab Manager /QA Coordinators)

QA validation is the next step in data analysis. In addition to a Level 1 review of the data, the laboratory and air monitoring QA staff verify the measurement assumptions, review comparisons of collocated measurements, laboratory repeats, and blank data to ensure the data results meet the MQOs found in Table 5-2. Data that do not meet the requirements of the critical criteria elements will be invalidated unless compelling evidence and justification exist for not doing so. In the case of the latter, the reason(s) for not invalidating the data will be documented. Qualifier flags may be applied to data that are found to not meet operational or systematic criteria. If multiple operational criteria flags are applied to the data, the Lab Manager and QA Coordinator/Staff may deem that the data should be invalidated instead of qualified. Level 2 verification and validation of the field sampling records, and laboratory data packages include the following:

- Verification of calibration standards and recoveries for the analytical method.
- Application of qualifying flags on the analytical results, where applicable.
- Verification of field sample record data and calculations.
- Verification of laboratory calculations to determine lead concentration.
- Application of qualifying flags and/or null codes for the reported sample results, where applicable.

AQS READY– Level 3 (QA Coordinator/Data Quality Section Administrator and AQS Coordinator)

Data is prepared for AQS submission and text files are created (see Data Handling SOP). The data is reviewed by an EPC QA Coordinator/Staff, in collaboration with the DEP Data Quality Section Administrator and Quality Assurance Manager and if deemed ready for AQS, will be reviewed by the Data Quality Section Administrator before submittal approval is granted to the AQS Coordinator. Once submitted successfully, AQS AMP reports will be reviewed by the Data Validation Team and QA Coordinators/Staff to verify data upload (transfer) was successful. The data will also be spot-checked for accuracy by the Data Quality Section Administrator.

22.0 RECONCILIATION WITH DATA QUALITY OBJECTIVES

The Florida Ambient Lead Monitoring program follows procedures that verify the data collected by the PQAO complies with the DQOs for lead. Actions will be taken based on the assessment of the DQOs to maintain compliance.

To reiterate, the data collected by the Florida PQAO will be used to:

- Monitor the ambient concentrations of lead,
- Evaluate compliance with the lead NAAQS, and
- Observe pollution trends.

The quantitative DQOs are established in 40 CFR Part 58, Appendix A, and stated in Section 5.1 of this QAPP. To review the results of required statistical analyses (codified in Section 4 of 40 CFR Part 58, Appendix A), the AMP256 and AMP600 AQS reports will be generated.

While DQOs will be assessed quarterly throughout the year, Florida DEP will evaluate whether these objectives are achieved on an annual basis as well. Evaluation of measurement uncertainty will occur in conjunction with Annual Data Certification, which is to be completed by May 1 of each year. The evaluation will be conducted by the AQS Coordinator under the supervision of the DEP Quality Assurance Manager. The data used to calculate measurement uncertainty will be obtained from AQS, which will have been previously quality assured, coded, qualified, and evaluated based upon applicable MQOs.

If and when the data from at least one of the monitors violates the DQI bias and/or precision limits, then the AQS Coordinator will investigate to uncover the cause of the violation. If all the monitors in the network of a similar type or pollutant violate the DQI, the cause may be at the agency level (operator training) or higher (problems with method designation). If only one monitor or site violates the DQI, the cause is more likely specific to the site (particular field technician, problem with the site).

Tools for determining the cause include reviewing:

- Data from the collocated lead sampler,
- Data from performance audits, and
- QC trends.

Once the cause(s) of non-conformance has been determined, Florida DEP will institute and document corrective actions to correct quality system deficiencies. Corrective actions may include revising the following:

- Pollutant MQOs (e.g., to make them more stringent),
- This QAPP, and
- Specific SOPs.

While multiple staff members will be involved in any such investigation, the DEP Quality Assurance Manager and EPC QA Coordinators/Staff will be responsible for oversight of the investigation. Modification of the MQOs, QAPP, and related SOPs will be the

responsibility of the Quality Assurance Manager, with revisions subsequently approved by EPA Region 4. The Quality Assurance Manager will contact EPA Region 4 for guidance during this process, when/if necessary. Ultimately specifying tolerable error limits reduces the probability of deciding error due to uncertainty in the data. Decision-makers, such as EPA, need to determine if the data collected within Florida's lead monitoring network will be less than, equal to, or greater than the level of the NAAQS for lead. The annual data certification process, and reports generated as part of the certification, provide a quantitative assessment of the measurement uncertainty within the PQAO criteria pollutant dataset. By controlling uncertainty in the data to the extent prescribed by the DQOs, decision-makers can use Florida's ambient lead monitoring data with confidence.

23.0 REFFERENCES

Environmental Protection Agency. 2002. *Guidance for Quality Assurance Project Plans (QA/G-5)* (EPA/240/R-02/009). Washington, D.C.

Environmental Protection Agency. 2001a. *EPA Requirements for QA Project Plans (QA/R-5)* (EPA/600/R-98/018). Washington, D.C.

Environmental Protection Agency. 2017. *QA Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring Program* (EPA/454/B-17/003). RTP, North Carolina. March 2017.

Environmental Protection Agency. 2006. *Data Quality Assessment: A Reviewer's Guide (QA/G-9R)* (EPA/240/B-06/002). Washington, D.C.

Environmental Protection Agency. 2015. *List of Designated Reference and Equivalent Methods*. RTP, North Carolina. Updated routinely; at the time of this QAPP, it was last published on June 17, 2017.

Environmental Protection Commission of Hillsborough County. 2018. *Hillsborough County Environmental Protection Commission Laboratory Quality Manual* (QM_6.9_05062018). Tampa, Florida.

APPENDIX A - QUALITY ASSURANCE SYSTEMS AUDIT PROTOCOL

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Air Monitoring

Quality Assurance Systems Audit Protocol

Revised July 2021

This document provides the auditors, as well as those being audited, with a protocol of how quality assurance (QA) systems audit conducted by the Florida Department of Environmental Protection (Florida DEP) Division of Air Resource Management (DARM) Office of Air Monitoring (OAM) will be conducted. This protocol does not specify all of the individual records, procedures, etc., that will be reviewed, but rather, denotes a broad specification of the process that will be used for managing the systems audit.

1.0 Introduction

The authority to perform systems audits is derived from the Code of Federal Regulations (Title 40); specifically, 40 CFR Part 58, which deals specifically with the installation, operation and quality assurance of the SLAMS networks. The regulations in 40 CFR Part 58, mandate the performance of the systems audits of agency air monitoring programs.

It is a review and inspection of the agency's ambient air monitoring program, performed to verify that applicable elements of the air quality monitoring quality control system are suitable and have been developed, documented, and effectively implemented in accordance with specified requirements. The specific elements of the State of Florida's QA systems audit are to:

- Evaluate the management performance related to the quality control of the ambient air monitoring program;
- Evaluate the quality control performance for elimination of systematic errors;
- Identify areas of significant concern requiring corrective action;
- Assist in the positive development of the agency's ambient air monitoring activities; and
- Provide a forum for the dissemination and discussion of ideas and procedures which enhance data quality between agencies.

The scope of the systems audit is of major concern to both Florida DEP and the agency being evaluated. A systems audit, as defined in the context of this document, includes an appraisal of the following program management areas: network, field and laboratory operations, data handling and reporting, and quality assurance activities. The depth of coverage within these areas may be

increased or decreased based on the past or current agency activities and results. The intent of the audit is to define areas in which the supervisory/management staff needs to improve their overview and direction of the program.

Guidance for conducting systems audits are contained in the EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Quality Monitoring Program, Section 15.3 and Appendix H (EPA-454/B-17-001, dated January 2017) and EPA's Quality Assurance Guidance Document Conducting Technical Systems Audits of Ambient Air Monitoring Programs (EPA-454/B-17-004, dated November 2017).

2.0 QA Systems Audit Procedures

2.1 Audit Schedules

The systems audits should be conducted within a three to five-year cycle unless an agency has one or more major findings, in which case a follow-up systems audit will be conducted during the next audit cycle. A master audit schedule for the current year will be published in early January of that year. Each agency being audited will be contacted at least six weeks prior to the start of the audit to establish a schedule and to identify the agency personnel who will represent the agency during the audit. It is requested that the agency's Monitoring Manager and the QA Coordinator/Staff be present to answer questions throughout the audit. Pertinent files, logs, and other documents which may be subject to review will be requested by the auditor at least six weeks prior to the audit.

Each agency will be audited during the dates specified to minimize scheduling conflicts and ensure timely completion of the systems auditing process. When possible, an attempt will be made by the auditors to accommodate unexpected conflicts such as leave taken due to illness or other emergencies. The agency's Air Program Director/Administrator shall notify OAM’s Data Quality Section Administrator as soon as possible when a scheduling conflict becomes apparent. However, if the auditors are unable to adjust the audit schedule, available staff shall be provided by the agency to assist the auditors as necessary to complete the audit as previously scheduled.

2.2 Audit Questionnaire

The questionnaire will be emailed to the agencies scheduled to be audited along with a copy of this protocol at least six weeks prior to the start date of the audit. The receiving agency should review, address all applicable issues, and submit the electronic version of the completed questionnaire to OAM’s Data Quality Section Administrator at least two weeks prior to the audit. The questionnaire will be utilized by the auditors during the audit in accordance with Section 2.3 below and during the preparation of the audit report.

2.3 Audit Guidelines

The audit will be performed using the OAM prepared audit questionnaire. While this document is not all inclusive, it is meant to be used as a tool by the agency and the auditor to ensure an adequate review of all aspects of the agency's ambient air monitoring and quality assurance programs. The auditors will adhere to the audit questionnaire, including the order in which the items are arranged, but may deviate as necessary if questions arise during the systems audit process that need further examination.

2.4 Auditor Documentation Review

Prior to auditing an agency, the auditors will conduct a review of the audited agency's documentation. This request of records to the agency from OAM will be made well in advance of the actual audit date to allow audit staff ample time to review the records. It is imperative that agency staff work closely with audit staff to provide requested records in a timely manner. Documents could include, but are not limited to, Quality Management Plans (QMPs), Quality Assurance Project Plans (QAPPs), Standard Operating Procedures (SOPs), control charts, raw data, Quality Assurance/Quality Control (QA/QC) data, laboratory and field records, etc. An "approved" status does not preclude the auditors from finding omissions or discrepancies between the document and any applicable regulation, policy document, QA Plan, or other proper operational practice. A missing document is an issue of concern which may be noted in the audit report. Omissions or discrepancies in currently approved agency documentation which conflict with rules or regulations shall also be noted. Issues found during the review process that may still be impacting data quality should immediately be brought to the attention of the OAM Data Quality Section Administrator.

Note: Florida is a single Primary Quality Assurance Organization (PQAO), so SOPs, QAPPs, and QMPs, are statewide documents.

2.5 Audit Briefings

The entire interview process is expected to be conducted within a single day; however, if warranted additional interviews may be scheduled. At the onset of the interview, the auditor will explain the purpose and scope of the systems audit. Then, the interview will transition into the questionnaire followed by specific questions or possible findings relative to issues or concerns resulting from the auditors' review of the agency's records. A formal exit interview with the agency's Air Program Administrator/Manager will be held, if requested, the day of or the day after the completion of the interview process. Prior to the interview, the auditors will discuss their findings with the OAM Data Quality Section Administrator. The OAM Administrators will give the auditors specific guidance for issues to be included in the interview. See Section 2.6

Agency staff are encouraged to take notes during the audit so that corrective actions may be initiated for each area of concern before the draft systems audit report is submitted to the agency.

Issues noted by the auditors with which the audited agency disagrees should be brought to the attention of the OAM Data Quality Section Administrator. The auditors will note in their draft report those issues with which they and the agency did not agree. In addition, it is recommended that the audited agency summarize its disagreements in detail and submit them to the OAM Data Quality Section Administrator for inclusion in the systems audit file. These comments, along with the auditors' notes, will be reviewed by the OAM Data Quality Section Administrator and discussed further with the OAM Quality Assurance Manager, if warranted, to determine the validity of the issue for inclusion in the draft systems audit report. The auditors or the agency staff should call the OAM Data Quality Section Administrator when problems arise which require an immediate solution.

Issues which, while outside the purview of the routine systems audit structure, may be considered of concern by the auditor, will be discussed with the OAM Data Quality Section Administrator who will decide whether he/she or the auditor should discuss the issue with the audited agency's program management. For example, the audit period may cover calendar years 2018 thru 2019;

however, the audit staff notes an issue that appears in late calendar year 2019 but spill over into calendar year 2020 during their reviews. The OAM Program Administrator will also be kept apprised of these issues in addition to the normal preview of the audit reports. These issues may be considered as part of the formal written audit report and/or may be included in the cover letter for the audit report.

2.6 Audit Draft Report

The auditors will provide the OAM Data Quality Section Administrator with a summation of their notes and possible findings at least four weeks prior to the audit (see Table 1 for categorization of audit findings). The OAM Data Quality Section Administrator will discuss these notes and possible findings with the auditors prior to the audit interview to ensure that these are valid possible findings. However, if there is any concern for a finding that may still be impacting data quality, the OAM Data Quality Section Administrator should be immediately informed by the audit staff. The auditors will utilize these notes during the interview process with the audited agency. The final draft of the agency's audit report will be prepared by the auditors after the interview process and will include only those issues and areas of concern noted during the audit interview and discussed with the OAM Data Quality Section Administrator.

The audit staff should consider the following when conducting the review and preparing the draft report:

- Findings from the previous OAM's systems audit of the agency. Be aware of past mistakes. Are they recurring? Have they been addressed, and appropriate actions been taken to correct them? Determine if a repeat of the finding is warranted.
- Findings from the most recent Environmental Protection Agency's (EPA) systems audit of the agency. Were there findings in the EPA systems audit that have since been addressed by the agency?
- The fact that Florida is a single PQAO (i.e. consider whether and how much of the agency's time/efforts need to be placed in addressing certain issues associated with documentation that is currently undergoing statewide revision).
- Recent changes to the agency's network (i.e. new equipment, updates, etc.) and/or the agency's staff (i.e. new employees, retired staff, etc.). New equipment could account for improved data completeness (or decreased data completeness if equipment had malfunctions or inherent issues). Staff turnover could indicate a need for training or more intimate direction and guidance.
- The OAM is to provide guidance and assistance to the audited agency. If there are equipment or training needs, the OAM could possibly meet these types of provisions.

The draft report will be completed within ten (10) calendar days after the audit and submitted to the OAM Data Quality Section Administrator. The auditors' draft report will be submitted in a standard format, to include:

- A summary page which addresses the parties involved in the audit from both the Florida DEP and the audited agency,
- The audited agency's network description,

- The audited agency's data completeness (including a table summarizing the data completeness for each year of the audited time period),
- The audited agency's compliance with the EPA's precision and accuracy goals,
- The audited agency's participation in the National Performance Audit Program,
- The audited agency's site reviews (indicate whether all recent issues have been addressed or identify issues that require the agency's attention), and
- Findings and recommendations/direction (which will have been discussed with the agency's staff and OAM's management before inclusion in the report) along with citations (i.e. CFR, QAPP, SOP, QA Handbook, etc.).

Audit findings will be categorized as detailed in Table 1 below:

Table 1. QA Systems Audit Findings Categorization

Finding	Nonconformance with or absence of a specified requirement (regulatory, QMP, QAPP, SOP, etc.) or guidance deviation which could significantly impact data quality.
Concern	Practices with the potential detrimental effect on the ambient air monitoring program's operational effectiveness or the quality of sampling or measurement results.
Observation	An infrequent deviation, error, or omission which does not impact the output of the quality of the work product but may impact the record for future reference.

The draft report will be approved by both the OAM Data Quality Section Administrator and the OAM Program Administrator. The draft report will be provided to the agency's air program Director/Administrator no later than thirty (30) days after completion of the systems audit interview with the agency.

Once the agency receives the draft report from Florida DEP, the agency will be provided a 15-day review period to "fact check" the written information. If the agency identifies an incorrect statement or datum within the draft, then the agency should provide corrections and/or edits to Florida DEP within the 15-day timeframe. Helpful edits the monitoring organization can provide include factual corrections such as staff names/titles, spellings, site names, and other typographical/minor errors made by the audit team. If the agency fails to respond to Florida DEP within the 15-day timeframe, Florida DEP will consider this as no corrections are warranted and issue the final report.

2.7 Audit Final Report

The final QA systems audit report should be issued to the agency no later than thirty (30) days following the receipt of the draft comments or the expiration of the 15-day review period), whichever comes first.

2.8 Agency Response Review

No later than thirty (30) days after receipt of the systems audit report, the audited agency is required to respond in writing addressing the management activities proposed or implemented to rectify or prevent the occurrence of findings identified in the final report. Agency responses should be detailed enough to allow the OAM Data Quality Section Administrator to decide the viability of the resolution of each issue. Agency responses to the issues should include such items as copies of revised forms, copies of missing data forms, or any other documentation which demonstrates the action taken (or to be taken) to completely respond to each specific issue. For each issue which is not able to be resolved expeditiously, a proposed completion date must be included in the agency's response. For example, a response to an audit finding which requires the agency to order a replacement instrument or part should include documentation that the order has been placed.

The audit report will remain open until all issues have been satisfactory resolved (or proposed resolutions have been made). It is at the discretion of the OAM Data Quality Section Administrator to recommend to the OAM Program Administrator that the audit be closed. Depending on the severity of the findings, additional action may be taken to ensure that the agency's air monitoring program has resolved issues satisfactorily before citing audit closure. For example, Florida DEP may have to continue to work closely with the agency by implementing recurring meetings (i.e. weekly, bi-weekly, monthly, etc.) with the agency. These meetings provide an opportunity for Florida DEP to remain abreast of the status of field and QA tasks, for example, that were cited in the report and to provide intimate training or guidance to the agency. This is also an opportunity for the agency to ask questions and address their concerns.

2.9 Audit Close Out

When the audit report issues have been satisfactorily addressed, a letter closing out that year's report will be submitted to the agency by the OAM Program Administrator. The letter must be filed with the systems audit report, to document all actions as having been completed or otherwise satisfied. When all agency audit reports have been finalized, the OAM Data Quality Section Administrator will compile the reports and pertinent correspondence from the Department and local air programs into a comprehensive systems audit report package. The audit report will indicate the issues noted during the audited period. Copies of the package are then forwarded to the appropriate EPA offices for review and subsequent filing. The cover letter to the EPA will indicate that all issues noted in the audit reports have been satisfactorily resolved as of the date of the DEP submission.

3.0 Summary

The process outlined above is dynamic and may be subject to future revision. The "QA Systems Audit Protocol" is designed to assist state and local air program quality assurance and management staff in satisfying the systems audit reporting requirements in the most effective and efficient manner possible.

APPENDIX B – QUALITY ASSURANCE SYSTEMS AUDIT QUESTIONNAIRE

Florida Department of Environmental Protection

Division of Air Resource Management

Office of Air Monitoring

Quality Assurance (QA) Systems Audit Questionnaire

A. GENERAL INFORMATION
A1. BASIC PROGRAM INFORMATION AND ORGANIZATION
Agency:
Agency Mailing Address:
City:
Zip:
Date of QA Systems Audit:
Agency's Air Program Administrator:
Ambient Air Monitoring Network Manager:
QA Manager:
Attach a program organizational chart.
A2. KEY POSITION STAFFING
Enter the number of personnel available to each of the following program areas and any vacancies, if applicable.

Program Area	**Number of People (Primary)**	**Number of People (Backup)**	**Vacancies**
Network Management (i.e. site setup, siting, etc.)			
Field Operations (i.e. QC checks, site visits, site maintenance, etc.)			
Quality Management (i.e. audits, QA documentation, certifications, etc.)			
Data and Data Management (i.e. data review, validation and acquisition system, etc.)			
Technical Support (i.e. equipment repair and maintenance)			
Comment on the need for additional personnel, if applicable:			

A3. FACILITIES

Ambient Air Monitoring Function	**Facility Location**	**Comment on any significant changes to be implemented within the next one to two years.**
Instrument Repair		
Certification of Standards (i.e. gases, flow transfers, MFCs, etc.)		
Pb Analysis		
Data Verification and Processing		
General Office Space		

General Lab/Workspace		
Storage Space – Short-Term and Long-Term		
Air Toxics		

Indicate below any facilities that should be upgraded or any needs for additional physical space (laboratory, office, storage, etc.).

A4. GENERAL DOCUMENTATION POLICIES

Question	**Yes**	**No**	**Response**
Does the agency have a documented records management plan?			
If yes to previous question, does this include electronic records?			
Does the agency have a schedule for retention and disposition of records?			
Are records kept for at least ten years?			
Who is responsible for the storage and retrieval of records?			
What security measures are utilized to protect records?			

Where/when does the agency rely on electronic files as primary records?			
What is the system for storage, retrieval and backup of the electronic files?			
Does the agency have a training plan?			
Where is it documented?			
Does it make use of seminars, course, EPA-sponsored college-level courses, etc.?			

Are personnel cross-trained for other ambient air monitoring duties?			
Are training funds specifically designated in the annual budget?			
Does the training plan include the following:			
• Training requirements by position?			
• Frequency of training?			
• Training for contract personnel?			
• A list of core QA-related courses?			

Indicate below the most recent training events attended since the last QA audit and identify the personnel who participated in them.

Event	**Dates**	**Participant(s)**

B. QUALITY MANAGEMENT

B1. STAFF

Identify key individuals (i.e. QA Manager, Internal Auditor, etc.)

Position Title	**Name**

B2. QA ACTIVITIES			
Question	**Yes**	**No**	**Response**
Does the agency perform all QA activities with internal personnel (i.e. developing QMPs, QAPPs, SOPs and DQOs; performing system audits, assessments and performance evaluations, corrective actions, validating data, QA reporting, etc.)? If no, in the response field indicate who is responsible and which QA activities are performed.			
If the agency has contracts or similar agreements in place with either another agency or contractor to perform audits or calibrations, please name the organization and briefly describe the type of agreement.			
Does the agency perform all QC activities with internal personnel (i.e. zero, span, one-point QC checks, calibrations, flowrate, temperature, pressure and humidity checks, certifying standards, lab and field blanks, data collection, balance checks, leak checks, etc.)?			

B3. QC ACCEPTANCE CRITERIA

Question	**Yes**	**No**	**Response**
Has the agency established and documented criteria to define agency acceptable QC results?			

Complete the following table.

Pollutant	**Does the agency adhere to the critical QC acceptance criteria for criteria pollutants[1] and meteorological measurements1?**	**QC Acceptance Criteria (if other than validation templates1)**	**Action or Warning Limits**	**Corrective Action**

[1]QA Handbook Volume II, Appendix D Validation Templates; Handbook for Air Pollution Measurement Systems, Appendix C Validation Templates; Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV: Meteorological Measurements Version 2.0

B4. QAPPs			
Note: QMPs, QAPPs, and SOPs are created, updated, and maintained by the entire Florida PQAO under the leadership of Florida DEP.			
Question	**Response**		
How often does the air monitoring agency review QAPPs?			
How does the agency verify that the QAPP is fully implemented?			
How are staff notified and trained when a QAPP is revised?			
What personnel regularly receive updates?			
B5. SOPs			
Question	**Yes**	**No**	**Response**
Are SOPs available to all field operations personnel?			
How are staff notified and trained when a SOP is revised?			
B6. CORRECTIVE ACTION			
Complete the following table.			
Question	**Response**		
How is responsibility for implementing corrective actions assigned?			

How does the agency follow-up corrective actions are implemented?	
Briefly describe recent examples of the ways in which the above corrective action system was employed to remove the problems.	
B7. QUALITY IMPROVEMENT	

Question	**Response**
What actions were taken to improve the quality system since the last QA systems audit (Florida DEP) or technical systems audit (EPA)?	
Have there be any criteria pollutants with a completeness of less than 75% (90% for ozone) in the past 3 years? If so, list the pollutant and the corresponding year/quarter.	
Have all deficiencies indicated on the previous QA systems audit (Florida DEP) or technical systems audit (EPA) been corrected? If no, please list and explain.	
What are your agency's plans for quality improvement?	

B8. EXTERNAL PERFORMANCE AUDITS			
Question	**Yes**	**No**	**Response**
Does your agency participate in the following external performance audits? If the agency does not participate, please explain why.			
• NPAP			
• $PM_{2.5}$			
• PEP			
• Pb-PEP			
• Pb Strip Audit			
• Ambient Air Protocol Gas Verification Program (AA_PGVP)			
• Round Robin Metal PT			

List other performance audit participation (aside from Florida DEP)?			
Who performs NPAP and PEP audits?			

B9. INTERNAL PERFORMANCE AUDITS

Note: Florida DEP auditors usually conduct performance audits for the Florida PQAO. However, due to the COVID19 pandemic, the Florida DEP auditors began conducting only gaseous performances audits beginning late March 2020. Performance audits are conducted in accordance with 40 CFR Part 58 Appendix A. Complete the following sections (B9 thru B13) **only if** your agency conducts additional performance audits aside from those conducted by Florida DEP. Otherwise, enter "N/A". Performance audits include gaseous, particulate, and lead parameters.

Question

Question	Yes	No	Response
Does the agency maintain a laboratory to support quality assurance activities?			
Has the agency documented and implemented specific audit SOPs separate from monitoring SOPs?			
Are the QA personnel organizationally independent from the personnel responsible for generating environmental data (40 CFR Part 58 Appendix A Section 2.2)?			
Are performance audits conducted by technician(s) other than the routine site operator(s)? If no, please explain in the response field.			
Does the agency have identifiable auditing equipment and standards (specifically intended for sole use) for audits? If no, please explain in the response field.			
Are audit equipment and standards ever used to support routine calibrations and QC checks required for monitoring network operations? If yes, please explain in the response field.			

B10. INTERNAL PERFORMANCE AUDIT PROCEDURES	
If the agency does not have a performance audit SOP (included as an attachment), describe the performance audit procedure for each type of pollutant.	
Pollutant	**Performance Audit Procedure**

B11. CERTIFICATION OF AUDIT STANDARDS			
Use the table below to provide information on certification of audit standards (i.e. flowmeters, gas standards, etc.).			
Vendor	**Audit Standard**	**Last Certification Date**	**Certification Frequency**

Question	**Yes**	**No**	**Response**
Does the agency have a separate certified source of zero air for performance audits?			

Does the agency have procedures for auditing and/or validating performance of meteorological monitoring?			

B12. AUDIT EQUIPMENT		
Manufacturer	**Make and Model Number**	**Purchase Year or Year Acquired**

B13. AUDIT ACCEPTANCE CRITERIA			
Question	**Yes**	**No**	**Response**
Has the agency established and documented criteria to define agency acceptable audit results? If yes, comment where (i.e. page number, section, etc.).			

C. NETWORK MANAGEMENT

C1. STAFF	
Identify key individuals.	
Position Title	**Name**

C2. NETWORK DESIGN

Florida DEP submits an Annual Network Plan for the entire Florida PQAO. If there are any additional proposed changes that have not been provided to or discussed with Florida DEP already, please list below.

Site Name	AQS Site ID#	Pollutants Monitored	Proposed Changes

C3. SITING

Florida DEP performs siting evaluation for the entire Florida PQAO in accordance with 40 CFR Part 58.

Question	Yes	No	Response
Are there any issues?			
If yes, please identify site, issue, and briefly describe plans to resolve the issue(s).			

C4. WAIVERS			
Question	**Yes**	**No**	**Response**
Does your agency have any waivers? If yes, identify waivers in the response section.			
Does your agency plan to request any waivers? If yes, identify waivers in the response section.			

D. FIELD OPERATIONS	
D1. STAFF	
Identify key individuals (i.e. Field Manager, Field Supervisor, Field QA Manager, Operator, etc.).	
Position Title	**Name**

D2. FIELD SUPPORT			
Question	**Yes**	**No**	**Response**
On average, how often are most of your stations visited by a field operator?			
On average, how many stations is a single operator held responsible?			
What material is used for instrument sampling lines?			
How often are sampling lines changed?			
Do you utilize uninterruptable power supplies or backup power sources at your sites?			

D3. INSTRUMENTATION			
List the instruments in your inventory.			
Pollutant	**Number of Instruments**	**Make and Models**	**Reference or Equivalent Number**

List instrument needs in order of priority.			
D4. VERIFICATION/CALIBRATION			

Indicate the frequency of multipoint verifications/calibrations.

Pollutant	**Frequency**

Question	**Yes**	**No**	**Response**
How are field calibration procedures documented and how are the results recorded?			
Do standards used for calibrations meet the requirements of appendices to 40 CFR Part 50 (EPA reference methods) and Appendix A to 40 CFR Part 58 (traceability of materials to NIST, SRMs, or CRMSs)?			
Are all flow-measurement devices NIST traceable?			

D5. CERTIFICATION

List the authoritative standards used for each type of flow measurement and indicate the certification frequency of standards to maintain field material/device credibility.

Flow Device	**Serial Number**	**Primary Standard**	**Certification Frequency**	**Use (i.e. Calibration, Audit, Spare, etc.)**

Question	**Yes**	**No**	**Response**
How are certifications performed (i.e. internally, vendor, third party, etc.)?			
Where do field operations personnel obtain gas standards?			
How are the gas standards verified after receipt?			

What equipment is used to perform calibrations (i.e. dilution devices, etc.)?			
Do the dilution air flow control and measurement devices conform to CFR requirements?			
Is calibration equipment maintained at each site?			
How is the functional integrity of this equipment documented?			
Who has responsibility for maintain field calibration standards?			

Please list the authoritative standards and certification frequency.

Calibrator/Primary Standard	**Frequency of Certification/Calibration**

D6. REPAIR

Question	**Yes**	**No**	**Response**
Who is responsible for performing preventive maintenance?			
Is special training provided to them for performing preventive maintenance? Briefly comment on background or courses.			

What is the preventive maintenance schedule for each type of field instrumentation?			
How is control of logbook maintained?			
If preventive maintenance is MINOR, it is performed at:			
• Field Station?			
• Headquarters Facilities?			
• Manufacturer?			
• PQAO?			
If preventive maintenance is MAJOR, it is performed at:			
• Field Station?			
• Headquarters Facilities?			
• Manufacturer?			
• PQAO?			
Does the agency have service contracts or agreements in place with instrument manufacturers? Indicate in the response section or attach additional pages to show which instrumentation is covered.			
Comment briefly on the adequacy and availability of the supply of spare parts, tools, and manuals available to the field operator to perform any necessary maintenance activities. Do you feel that this is adequate to prevent any significant data loss/			
Is the agency currently experiencing any recurring problem with equipment or manufacturer(s)? If so,			

please identify the equipment or manufacturer, and comment on steps taken to remedy the problem.			
D7. RECORDKEEPING			
Question	**Yes**	**No**	**Response**
What type of station logbooks are maintained at each monitoring station (i.e. maintenance logs, calibration logs, personal logs, etc.)?			
What information is included in the station logbooks?			
Who reviews and verifies the logbooks for adequacy of station performance?			
How is control of logbook maintained?			
Where is the completed logbook archived?			
What other records are used? Comment on the use and storage of these documents?			
Are calibration records (or calibration constants) available to field operators?			

E. DATA MANAGEMENT

Identify key individuals.

Position Title	**Name**

E2. DATA HANDLING			
Question	**Yes**	**No**	**Response**
Is there a procedure, description, or chart which shows a complete data sequence from point of acquisition to point of submission of data to EPA?			
Are procedures for data handling (i.e. data reduction, review, etc.) documented? If yes, comment where.			
In what media (i.e. flash drive, telemetry, wireless, etc.) and formats do data arrive at the data processing location?			
How often are data received at the processing location from the field sites and laboratory?			
Are there any activities being done before data is released to agency internal data processing?			
How are data entered into the computer system (i.e. computerized transcription, manual entry, digitization of strip charts, etc.)?			
For manual data, is a double-key entry system used?			
Attach a flow diagram indicating the data flow within the reporting organization.			

E3. SOFTWARE DOCUMENTATION			
Question	**Yes**	**No**	**Response**
Does your agency use an AQS manual?			

Does the agency have information on the reporting of precision and accuracy data available?			
What software is used to prepare monitoring data for release into AQS and AirNow databases? Include the names of the software packages, vendor or author, revision numbers, and the revision dates of the software.			
What is the recovery capability in the event of a significant computer problem (i.e. how much time and data would be lost)?			
Has your agency tested the data processing software to ensure its performance of the intended function are consistent with the QA Handbook Volume II, Section 14.0?			
How are data entered into the computer system (i.e. computerized transcription, manual entry, digitization of strip charts, etc.)?			
Does your agency document software tests? If yes, provide the documentation.			
E4. DATA VALIDATION AND CORRECTION			
Question	**Yes**	**No**	**Response**
Is there documentation regarding data that has been identified as suspect and subsequently flagged?			
Please describe what action the data validator will take (i.e. flags, null code, etc.) if they find data with exceeded QC criteria.			

Please describe how changes made to data that were submitted to AQS and AirNow are documented.			
What criteria are used to determine a data point to be deleted or invalidated?			
What criteria are used to determine if data needs to be reprocessed?			
Are corrected data resubmitted to the issuing group/record generator for crosschecking prior to release?			

E5. DATA PROCESSING			
Question	**Yes**	**No**	**Response**
Does the agency generate data summary reports?			
Please list at least three reports routinely generated, including the information requested below.			

Report Title	**Distribution**	**Period Covered**

Question	**Yes**	**No**	**Response**
Please describe how changes made to data that were submitted to AQS and AirNow are documented.			
Who has signature authority for approving corrections?			
What criteria are used to determine a data point be deleted or invalidated?			
What criteria are used to determine if data needs to be reprocessed?			
Are concentrations of PM_{10} corrected to EPA standard temperature and pressure conditions (i.e. 298K, 760mmHG, etc.) before input to AQS?			
Are concentrations of $PM_{2.5}$ and Pb reported to AQS under actual (volumetric) conditions?			

Are data precision and accuracy checked each time they are calculated, recorded, or transcribed to ensure incorrect values are not submitted to EPA?			
Are audits on data reduction procedures performed on a routine basis? If yes, at what frequency?			
E6. DATA SUBMISSION			
Florida DEP currently submits data to AQS for the entire state of Florida. Data are submitted in accordance with 40 CFR Part 58.			
Question	**Yes**	**No**	**Response**
Are records kept by the agency for at least 3 years in an orderly, accessible form? If yes, does this include:			
• Raw Data?			
• Calculations?			
• QC Data?			
• Reports (list them)?			
E7. INTERNAL REPORTING			
Question	**Yes**	**No**	**Response**
Do either the audit or precision check reports include a discussion of corrective actions initiated based on audit or precision check results?			

E8. RESPONSIBILITIES			
Identify the individuals within the agency responsible for the calculation and preparation of data summaries. To whom are such summaries delivered?			
Name	**Title**	**Type of Report**	**Recipient**
Identify the individuals within the agency responsible for reviewing and releasing the data?			
Name		**Program Function**	

APPENDIX C - FLORIDA STANDARD OPERATING PROCEDURES

Statewide PQAO SOPs				
Document Control No.	**Document Name**	**Revision No.**	**Effective Date**	**Author/Contact**
DEP 01-4	Corrective Action	2	May 2021	Florida PQAO
DEP 03-18	Hi-VOL Pb-TSP	1	July 2021	Florida PQAO
DEP 18-27	Data Handling and Data Validation	1	Dec. 2019	Florida PQAO
EPC QA & Lab SOPs				
Document Control No.	**Document Name**	**Revision No.**	**Effective Date**	**Author/Contact**
QM_7.1_04162020	Laboratory Quality Assurance Plan	7.1	04/16/2020	J. Barron
SOP_RFLA-0813-813_2.5	Determination of Lead in Ambient Air by Heated Nitric Hot Block Digestion and ICP-MS Analysis	2.6	02/25/2021	J. Barron

APPENDIX D - GLOSSARY OF AIR MONITORING TERMS

AirMVP	Air Monitoring Validation Program
AQS	Air Quality System – EPA's repository of ambient air quality data.
CFR	Code of Federal Regulations
CO	Carbon monoxide – an odorless, colorless gaseous; one of the "Six Common Air Pollutants," also known as "Criteria Pollutants," regulated by EPA.
DEP	Florida Department of Environmental Protection
DQI	Data Quality Indicators
DQO	Data Quality Objectives
EPC	Environmental Protection Commission of Hillsborough County
FEM	Federal Equivalence Method – method approved for comparison to NAAQS.
FRM	Federal Reference Method – method approved for comparison to NAAQS.
ICP-MS	Inductively Coupled Plasma Mass Spectrometry – analytical method for determining lead concentrations
LIMS	Laboratory Information Management System
MQO	Measurement quality objectives
NAAQS	National Ambient Air Quality Standards – maximum threshold concentrations above which adverse health effects may occur. EPA established NAAQS for Criteria Pollutants based on the 1970 Clean Air Act.
NCore	National Core multi-pollutant monitoring stations – a collection of monitors that integrates several advanced measurement systems for particles, pollutant gases and meteorology.
NIST	National Institute of Science and Technology
NO	Nitrogen oxide
NO_2	Nitrogen dioxide – a by-product of incomplete combustion that is intimately involved in photochemistry and ozone formation, as well as acid rain formation.
NO_x	A measure of total oxides of nitrogen, consisting primarily of nitrogen dioxide (NO_2) and nitric oxide (NO).
O_3	Ozone – a gaseous pollutant and a component of smog at ground level; one of the "Six Common Air Pollutants," also known as "Criteria Pollutants," regulated by EPA.
Pb	Lead – a particulate pollutant; one of the "Six Common Air Pollutants," also known as "Criteria Pollutants," regulated by EPA.
Pb-PEP	Performance Evaluation Program for Lead
Pb-TSP	Lead in Total Suspended Particulate
PM	Particulate Matter – also known as particle pollution.
PM_{10}	Particulate Matter 10 micrometers in diameter and smaller.
$PM_{2.5}$	Particulate Matter 2.5 micrometers in diameter and smaller.
PQAO	Primary Quality Assurance Organization
QAPP	Quality Assurance Project Plan
SLAMS	State and Local Air Monitoring Stations
SO_2	Sulfur dioxide
SOP	Standard Operating Procedure
SPM	Special Purpose Monitors
TSA	Technical Systems Audit
VFC	Volumetric Flow Controller