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

Prepared for:

U.S. EPA

REGION 4

April 2022

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 Gaseous Ambient Air Quality Monitoring Program, Revision 2.*

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

Florida Department of Environmental Protection (PQAO)

1) Signature: Kyrsteen J. Webster Date 4/8/2022
Quality Assurance Manager, Office of Air Monitoring

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Program Administrator, Office of Air Monitoring

3) Signature: Date 4/8/2022
Director, Division of Air Resource Management

U.S. Environmental Protection Agency

4) Signature: KEVIN SIMMONS Digitally signed by KEVIN SIMMONS Date: 2022.04.18 18:04:00 -04'00' Date 4/18/22
EPA Region 4 Designated Approving Official

Document History

Revision No.	Date	Responsible Person	Description of Change
0.1	August 2018	Saphique Thomas	**Section 12.0 Quality Control Requirements** – Updated frequency for multi-point verification to reflect current activities in the PQAO: *A multi-point verification is conducted every 6 months (182 days), if manual zero/span checks are performed biweekly (every 14 days) and annually, if automated zero/span checks are performed nightly. Additionally, a multi-point verification must consist of 4 upscale points and a zero concentration, similar to calibrations.*
1	October 2019	Saphique Thomas	**Section 1.0 Distribution List** – Updated the EPA division names to reflect their recent reorganization. **Section 2.0 Project and Task Organization** – Updated Figure 2-3 and QAM roles and responsibilities in Section 2.2 to reflect recent reorganization. **Section 4.0 Project and Task Description** – Updated Figure 4-1 and all hyperlinks within this section, where applicable. **Section 6.0 Training Requirements** – Added information about the PQAO Quality Assurance Proficiency Evaluation that was developed and deployed earlier this year. **Section 12.0 Quality Control Requirements** –Added clarification about performing multi-point verifications and updated Table 12-1 with revised operating and calibration ranges. **Section 14.6 Quality Control Requirements** – Updated the required timeframe for ozone certifications performed in the Standards Laboratory from a 6-day to a 3-day requirement. **Section 21.0 Data Verification and Validation Methods –** The note regarding the 8/30/2017 OAQPS technical memorandum was updated to reflect the anticipated implementation date.
1	November 2019	Saphique Thomas	Addressed EPA Region 4 Laboratory Services & Applied Science Division comments for the October 2019 submission.
1	November 2019	Saphique Thomas	**Section 2.2 Florida DEP and Local Air Programs** – Updated Standards Lab Specialist roles to include sending primary standards to a vendor for annual certification, where applicable. **Appendix C** – Added Standards Lab SOPs for equipment used within the gaseous network.
2	August 2021	Daisy Anderson	**Updated the data management system-** Replaced Florida Air Monitoring and Acquisition System (FAMAS) with Air Monitoring Validation Program (Air MVP) **Figure 2-1 –** Updated FDEP Organizational Chart **Section 3.0 Problem Definition and Background –** Updated FAMAC communication methods to include virtual meetings. **Section 5.5 Measurement Quality Objectives–** Added frequency of warning limit exceedances that require action. **Section 9.3.2 Shelter Criteria-**Added information about residence time calculations and documentation requirements.

			Section 12.0 Quality Control Requirements – Updated frequency of One-point QC checks and Zero/Span/Precision checks to reflect current activities in the PQAO: *manual checks are performed every 14 days (at all sites) if automated checks are not performed, every 30 days if automated checks are performed.* Combined language of the Multipoint Verification/Calibration QC procedures for an improved explanation. **Section 13.0 Instrument/Equipment Testing, Inspection, And Maintenance Requirements-** Updated frequency of In-line particulate filters for TTP checks to reflect current activities in the PQAO: **Section 18.6 Internal (Florida DEP Quality Assurance) Systems Audits-** Updated 18.6.1 Post Audit Activities and 18.6.2 Follow-up and Corrective Action Requirements to reflect changes to the systems audit protocol. **Section 18.7 Data Quality Assessments –** Updated AMP report requirement for quarterly data assessments to generate the AMP 430(Data Completeness), AMP504(Extract QA Data), and AMP 501 (Extract Raw Data) **Section 20.4 Quality Control** – Updated data handling policy to reflect EPA's memo titled, " Steps to Qualify or Validate Data after an Exceedance of Critical Criteria Checks, 1/21/2022" **Appendix A Quality Assurance Systems Audit Protocol –** Updated Systems Audit Protocol **Appendix B Quality Assurance Systems Audit Questionnaire –** Updated Systems Audit Questionnaire **Appendix C Florida Standard Operating Procedures –** Updated list of Gaseous and Ancillary SOPs in use by the PQAO

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1.0 DISTRIBUTION LIST

Table 1-1: Distribution List for Gaseous QAPP

U.S. EPA Region 4 Air and Radiation Division 61 Forsyth Street, SW Atlanta, GA 30303-3104	U.S. EPA Region 4 Laboratory Services & Applied Science Division 980 College Station Road, Athens, GA 30605-2720
Florida Department of Environmental Protection Division of Air Resource Management, Office of Air Monitoring 2600 Blair Stone Road, Tallahassee, FL 32399	Broward County Natural Resources Division Air Quality Program 115 S Andrews Ave, Room 329-H | Fort Lauderdale, Florida 33301
City of Jacksonville Environmental Quality Division 214 N Hogan Street, Jacksonville, FL 32202	Hillsborough County Environmental Protection Commission Air Management Division 3629 Queen Palm Drive, Tampa, FL 33619
Manatee County Natural Resources Department Air & Watershed Management 1112 Manatee Avenue, W, 2nd Floor Bradenton, FL 34205	Miami-Dade Regulatory and Economic Resources Environmental Resources Management Division Overtown Transit Village, 701 NW 1st Court, Miami, FL 33136
Orange County Environmental Protection Division Air Quality Management 3165 McCrory Place, Suite 200 Orlando, FL 32803	Florida Department of Health Palm Beach County Division of Environmental Public Health 800 Clematis Street, West Palm Beach, FL 33401
Pinellas County Air Quality Division 509 East Avenue, S South Clearwater, FL 33756-5338	Sarasota County Planning and Development Services Air and Water Quality 1001 Sarasota Center Boulevard, Sarasota, FL 34240
Note: This document will be distributed electronically to all personnel within the Primary Quality Assurance Organization (PQAO) involved in the gaseous ambient air monitoring project (see Section 2 of this QAPP for these personnel positions). The PQAO includes all Florida ambient air monitoring programs listed in Table 1-1. *Additionally, this QAPP will be available and document controlled within the Florida Air Monitoring Validation Program (AirMVP) database (or any subsequent statewide database system).*	

2.0 PROJECT AND TASK ORGANIZATION

EPA is responsible for developing National Ambient Air Quality Standards (NAAQS), defining the quality of the data necessary to make comparisons to the NAAQS, and identifying a minimum set of quality control samples from which to judge data quality. State and local ambient air monitoring organizations are responsible for taking this information and developing and implementing a quality assurance program that will meet the data quality requirements. It is the responsibility of the EPA and the monitoring organizations to assess the quality of the data and take corrective action, when appropriate. The State of Florida's PQAO operates within the jurisdiction of EPA Region 4 and collaborates with the EPA Region 4, as necessary, to ensure the PQAO's ambient air monitoring network meets or exceeds regulatory requirements. The State of Florida's PQAO consists of Florida Department of Environmental Protection and 9 local air monitoring organizations.

The Florida Department of Environmental Protection's (FDEP) Division of Air Resource Management (DARM) is organized into four offices: The Office of Business Planning; the Office of Permitting & Compliance; the Office of Air Monitoring; and the Siting Coordination Office. The director has the overall responsibility for managing these offices per stated policy. The director delegates the responsibility and authority to develop, organize, and maintain quality programs to the administrators of the offices. The director also delegates the responsibility and authority to implement quality programs and procedures to the administrators of each section, in accordance with the Quality Management Plan. The direct responsibility for assuring data quality rests with these administrators and the line managers beneath them.

There are many specialized groups that support others across the agency, such as the information technology and administration staff (for personnel and purchasing support). While these groups do not conduct monitoring, they support the Office of Air Monitoring in accomplishing their mission. An overall organizational chart for DEP is presented in Figure 2-1. The organizational structure for the implementation of the monitoring program is shown in Figure 2-2 and the structure of the Office of Air Monitoring is shown in Figure 2-3. (Specific information about the structure and support groups in the local programs is presented at length in the FDEP Air Quality Management Plan, 2019). The charts are followed by information listing the specific responsibilities of each significant position and area within the Office of Air Monitoring.

Figure 2-1 Florida DEP Organizational Chart

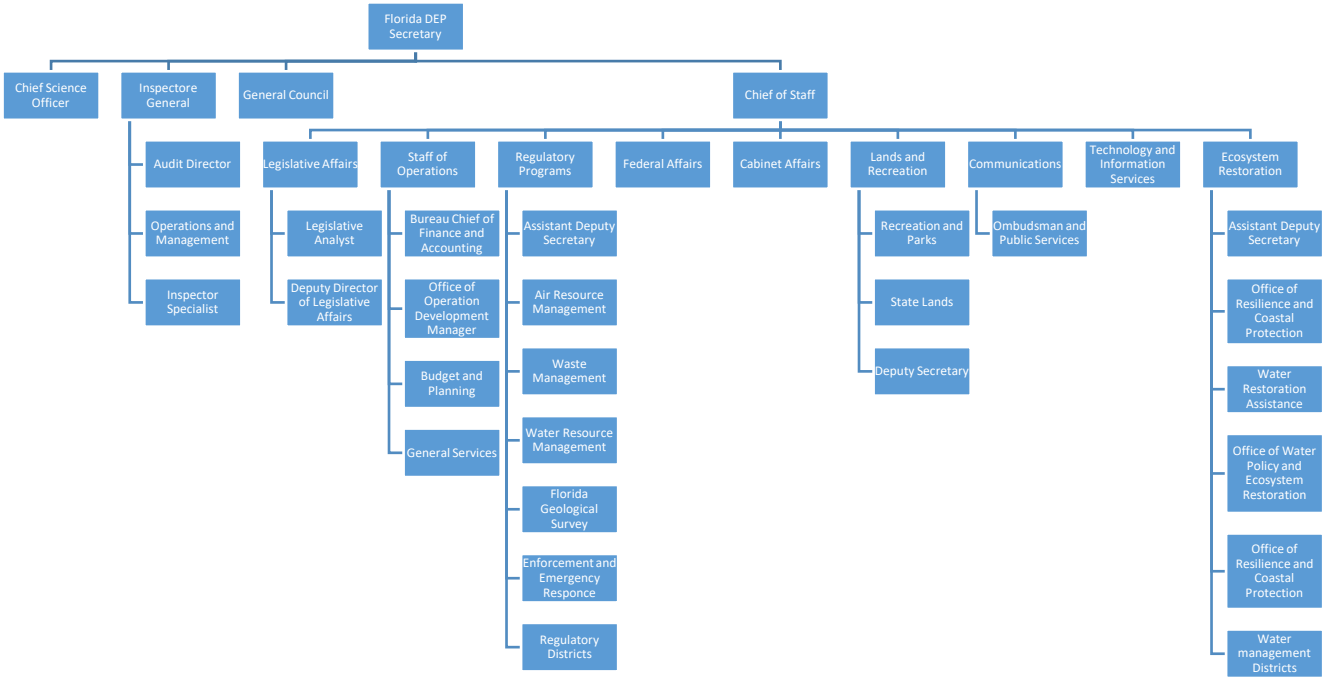


Figure 2-2 Division of Air Resource Management Organizational Chart

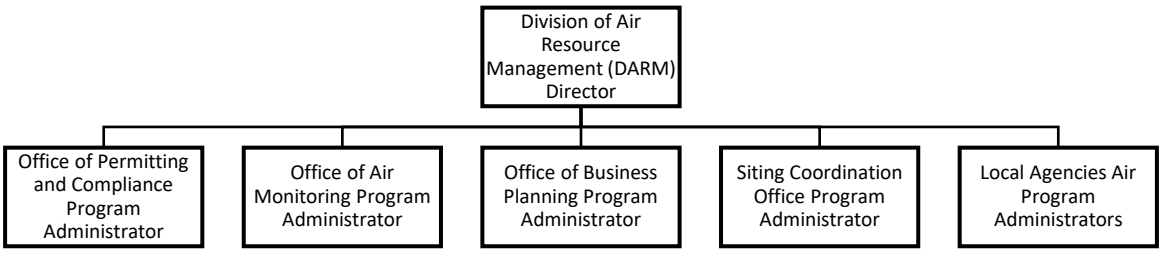
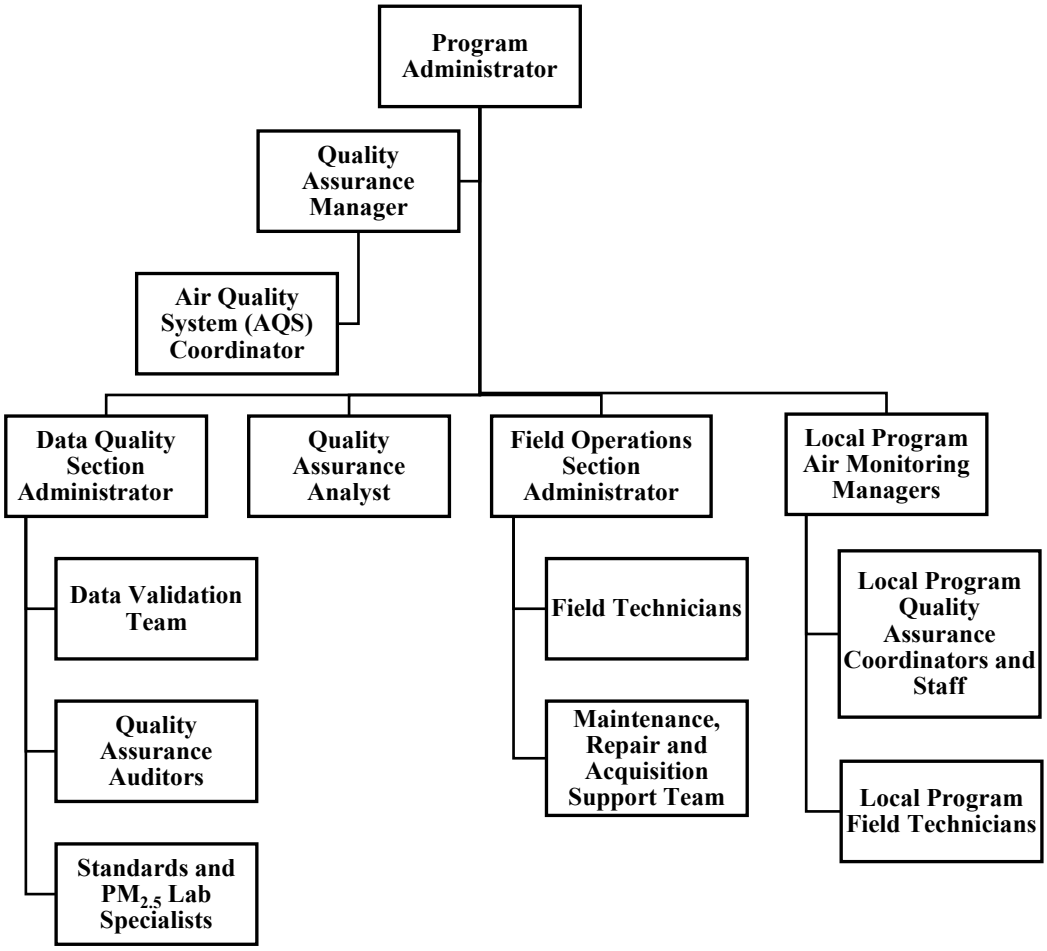


Figure 2-3 Florida DEP Office of Air Monitoring Organizational Chart



2.1 Office of Air Monitoring

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.

Florida DEP is the coordinating agency to oversee the single Primary Quality Assurance Organization (PQAO) in Florida.

2.2 Florida DEP and Local Air Programs

Division Director. The Division of Air Resource Management (DARM) Director has the overall responsibility of managing all matters related to air pollution programs within the state of Florida, including the ambient air monitoring statewide program. The Director has "stop work authority" and will make final decisions regarding monitoring issues, including resuming work after a stoppage. The Division Director's responsibilities include:

- Directing each office within DARM,
- Managing and reviewing budgets, contracts, grants and proposals,
- Reviewing, overseeing, and evaluating overall air monitoring activities,
- Assuring that the Office of Air Monitoring develops and maintains a current and germane quality system,
- Acquiring resources and maintaining budgets pertinent to the collection of environmental data,
- Maintaining an active line of communication with the Program Administrators.
- Delegating the responsibility and authority to implement quality programs and procedures to the Program Administrator, Quality Assurance Manager, Data Quality Section Administrator, Field Operations Section Administrator and Quality Assurance Analyst, and
- Reviewing and approving Quality Management Plans, Quality Assurance Project Plans, and Annual Data Certification packages for the ambient air monitoring program.

Program Administrator. The Program Administrator of Florida DEP's Office of Air Monitoring has direct access to the director on all matters relating to the air monitoring program's operation and serves as the monitoring liaison to EPA Region 4. The Program Administrator's responsibilities include:

- Maintaining oversight of all monitoring activities related to the statewide ambient air monitoring program,
- Has the authority to order the installation, replacement and discontinuance of ambient air monitors within the PQAO,

- Specifying funding for present and future network needs,
- Reviewing budgets, contracts, grants and proposals,
- Overseeing the responses to public inquiries and public records requests relating to ambient air monitoring, and
- Authorizes operational activities with approval from the Division Director.

Quality Assurance Manager. The Quality Assurance Manager (QAM) reports to the Program Administrator of Florida DEP's 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:

- Supervising section staff and their activities,
- 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,
- Reviewing the statewide monitoring network design to ensure compliance and preparing the Annual Air Monitoring Network Plan and 5-year Network Assessment,
- Performing Annual Primary Quality Assurance Organization (PQAO) Data Certification and preparing Exceptional Events packages,
- Ensuring statewide air monitoring Quality Management Plan (QMP), Standard Operating Procedures (SOPs) and Quality Assurance Project Plans (QAPPs) are created and/or revised timely and appropriately,
- Identifying quality problems and initiating action which results in solutions,
- Providing technical advice and assistance to monitoring staff regarding data quality issues arising during routine operations,
- Providing QA-related training support to statewide air monitoring staff,
- Tiebreaker for all QA-related impasses, in consultation with the Program Administrator,
- Managing the PQAO databases and coordinating data reporting of ambient air quality 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, and
- Chairing the Florida Air Monitoring Advisory Committee (FAMAC), which is made up of voting members from Florida DEP and the local air monitoring programs.

AQS Coordinator. The AQS coordinator reports to the Quality Assurance Manager 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 are not met.

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

- Conducting quality assurance systems audits relating to the collection and analysis of ambient air monitoring data,
- Interpreting EPA QA policy especially for the purposes of developing, with the direction from management, the audit policy for the statewide monitoring organization,
- 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 monitoring staff regarding data quality issues arising during routine operations, and
- Providing QA-related training support to statewide air 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 data validation team, and the audit, $PM_{2.5}$ gravimetric laboratory, and standards 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 monitoring staff regarding data quality issues arising during routine operations,
- Providing data quality-related training support to statewide air monitoring staff,

- Coordinating performance and quality assurance systems audits for the statewide ambient monitoring network,
- Coordinating the collection, verification, validation and reporting of ambient air quality monitoring and quality assurance data to the EPA's Air Quality System (AQS) for Florida DEP's air monitoring sites, which includes performing Level 3 data review activities in accordance with the PQAO Data Handling and Data Validation SOP,
- Reviewing and approving corrective action reports for Florida DEP,
- Assuring procurement of needed supplies and equipment for audit and standard laboratory activities,
- 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.

Data Validation Team. The data validation team reports to the Data Quality Section Administrator and is responsible for coordinating and/or performing data validation and data verification functions on Florida DEP's air monitoring data. The data validation team's responsibilities include the following:

- Performing Level 2 data validation activities in accordance with the PQAO's Data Handling and Validation SOP, in order to ensure reported data is complete and accurate,
- Evaluating data for non-representative (irregular) data points that may be the result of monitoring system malfunctions, and
- Maintaining calibration and certification documentation according to the Florida PQAO's record retention policy.

Quality Assurance (QA) Auditor(s). The QA auditors report to the Data Quality Section Administrator and are responsible for coordinating and performing audit functions related to the statewide ambient monitoring program. The auditors' responsibilities include the following:

- Conducting performance audits on ambient air monitoring equipment in accordance with established procedures, guidelines and schedules,
- Performing field certification and verification services,
- Conducting annual siting evaluations,
- Conducting quality assurance systems audits of monitoring programs every 3 to 5 years,
- Conducting data quality audits of local program agencies and Florida DEP,
- Preparing audit finding reports and tracking progress on corrective actions,
- Ensure audits are entered into AirMVP or any subsequent statewide database system,

- Participating and/or assisting in EPA-conducted systems and technical audits, and
- Maintaining audit SOPs.

Standards and $PM_{2.5}$ Gravimetric Laboratory Specialists. The standards and $PM_{2.5}$ gravimetric laboratory specialists report to the Data Quality Section Administrator and are responsible for coordinating and performing laboratory functions related to the statewide ambient air monitoring program.

The Standards Laboratory specialist's responsibilities include the following:

- Scheduling and performing laboratory calibration, certification and verification services,
- Reviewing laboratory QC data supporting all certifications of standards,
- Assuring that laboratory repairs and preventive maintenance are completed and that the maintenance is effective,
- Maintaining laboratory standard operating procedures (SOPs),
- Assuring documentation files are as defined in the relevant SOPs,
- Tracking certifications to ensure that all equipment and gaseous standards used by air monitoring and QA staff meet minimum requirements and are traceable to National Institute of Standards and Technology (NIST) standards and that certifications are current, and
- Ensuring all equipment and gaseous standards used in the Standards Laboratory are sent to the vendor for recertification, when applicable.

The $PM_{2.5}$ Gravimetric Laboratory specialist's responsibilities include the following:

- Receiving, inspecting, conditioning, weighing, shipping, and archiving filters for $PM_{2.5}$ gravimetric analysis,
- Collecting, reviewing, and reporting gravimetric data for the statewide $PM_{2.5}$ network,
- Monitoring and maintaining regulatory laboratory conditions,
- Maintaining laboratory equipment, supplies, and certifications, and
- Reporting nonconforming conditions and corrective actions to management.

Note: Particulate monitoring within the State of Florida PQAO is addressed in a separate QAPP.

Field Operations Section Administrator. The section administrator reports to the Program Administrator of Florida DEP's Office of Air Monitoring and is responsible for the activities of the field and repair technicians. The supervisor's responsibilities include:

- Supervising section staff and their activities,
- Coordinating and reviewing the collection of environmental data,

- Ensuring timely and appropriate statewide ambient air monitoring updates and revisions to the air monitoring SOPs,
- Ensuring field technicians adherence to QAPP/SOPs,
- Ensuring field technicians correctly and timely complete monitoring operations and monitoring records,
- Reviewing corrective action activities and reports for Florida DEP,
- Training statewide field staff,
- Providing acquisition support to ensure Florida DEP's air monitoring network operational readiness,
- Providing site maintenance and repairs support, and
- Ensuring staff training availability and utilization as it relates to the section's functions.

Field Technicians. The field technicians report to the Field Operations Section Administrator and are responsible for day-to-day operation and maintenance of the air monitoring sites and equipment. The field technician's responsibilities include:

- Collecting, reviewing, reporting and documenting environmental data,
- Verifying that QC activities, such as precision checks, verifications, calibrations, and other scheduled checks and maintenance are performed and documented, and that measurement quality objectives (MQOs) are met as prescribed in the QAPP/SOPs,
- Tracking ambient air monitoring supplies and consumables,
- Reporting nonconforming conditions and corrective actions to management,
- Performing data verification activities (Level 1 review), which includes flagging and commenting on suspect data and troubleshooting, as needed, and
- Participating in training and certification activities.

Maintenance, Repair and Acquisition Support Team. This team reports to the Field Operations Section Administrator and are responsible for Florida DEP's equipment repair and maintenance, new site installation, operational infrastructure, consumables supply and instructional support to field technicians. The team's duties include the following:

- Coordinating and supporting the installation of new monitoring sites, and the installation/integration of new hardware/software required by the DARM air monitoring program,
- Coordinating and/or providing the repair and/or replacement of field instrumentation required for the Florida DEP's air monitoring program,
- Providing acquisition support to ensure the operational readiness of Florida DEP's air monitoring network,
- Maintaining Florida DEP's air monitoring inventory system of equipment and parts,
- Providing technical support to the statewide air monitoring program,

- Providing training support for the statewide air monitoring program, and
- Maintaining SOPs related to maintenance and repair activities.

Local Agency Air Program Administrators. The Local Program Administrators have direct access to the Division Director and Program Administrator on all matters relating to the operation of the ambient air monitoring program within the PQAO. The Local Program Administrator's duties include:

- Ensuring that PQAO policies and procedures are maintained by the local program office to ensure data quality excellence,
- Ensuring 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, and
- Providing input to the Division Director and Program Administrator on problems which may be occurring within their jurisdiction/program that may require monitoring program support.

Local Agency Air Program Managers. The local program managers report directly to their Local Program Administrators; however, they have direct access to the Program Administrator, Quality Assurance Manager, Data Quality Section Administrator, Field Operations Section Administrator and Quality Assurance Analyst. The Local Program manager's duties include:

- Ensuring that monitoring staff are properly trained to perform their job functions to ensure data quality objectives are maintained,
- Ensuring that monitoring programs incorporate QA elements of SOPs and QAPPs,
- Implementing day-to-day QA/QC activities for the ambient air quality monitoring program,
- Reviewing environmental data and reports prior to submittal,
- Assisting with data quality assessments and systems audits,
- 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,
- Assigning response/corrective actions to specific personnel,
- Reviewing and approving corrective action activities and reports, and
- Assisting in network decisions and modifications.

Local Program Quality Assurance Coordinators/Staff. Local Program Quality Assurance Coordinators/Staff are 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/Staff responsibilities include:

- Ensuring necessary performance evaluations are completed,
- Ensuring completeness and efficacy of the work,
- Ensuring field and data processing personnel maintain their documentation,
- Preparing internal reports for their management,
- Completing additional narratives on data quality, such as comments in AirMVP (or any subsequent statewide database system) and exceedance reports,
- Assessing systems audit findings and issuing appropriate response/corrective actions,
- Overseeing investigations into assessment results in conjunction with the QAM,
- Maintaining calibration and certification documentation according to the Florida PQAO's record retention policy.
- Disseminating information appearing in audit reports and other quality-related documents to field technicians, and
- Verifying that all submitted data are correct and complete by performing Level 2 data review activities, as described within the PQAO's Data Handling and Validation SOP.

Local Agency Air Program Monitoring Staff. The local program monitoring staff's duties include:

- Verifying that QC activities such as precision checks, verifications, calibrations, and other scheduled checks and maintenance are performed and documented, and that measurement quality objectives (MQOs) are met as prescribed in the QAPP/SOPs,
- Collecting, calculating, reporting and reviewing environmental data,
- Calculating and/or reviewing precision and bias data,
- Performing data verification activities (Level 1 review), which includes flagging and commenting on suspect data and troubleshooting, as needed,
- Documenting deviations from established procedures and methods,
- Tracking ambient air monitoring supplies and consumables,
- Completing day-to-day operations and maintenance of the air monitoring sites and equipment,
- Reporting nonconforming conditions and corrective actions to their Local Program Managers and Quality Assurance Coordinators/staff,
- Conducting and documenting appropriate corrective actions, and
- Participating in training, calibration and certification activities.

2.3 Office of Technology and Information Services

The Office of Technology and Information Services (OTIS) is responsible for the management and security of the systems that provide the agency with information technology (IT) solutions to promote mission success. OTIS responsibilities include:

- Providing support for the department's databases, including Air Monitoring Validation Program (AirMVP), Particulate Matter Tracking System (PMTS), and Laboratory Information Management System (LIMS), as well as any subsequent system, and data reporting to the Air Quality System (AQS) database, and
- Identifying quality problems as they relate to database systems and initiating actions which result in solutions.
- Maintaining backup-systems and ensuring data recovery is adequate in the event of a significant loss of data.

3.0 PROBLEM DEFINITION AND BACKGROUND

In 1970 the Clean Air Act (CAA) 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. 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]). Table 3-1 below shows the criteria pollutants and their designated National Ambient Air Quality Standards (NAAQS).

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. Additionally, several NO_2 SLAMS monitors within Florida's air monitoring network are also used to support the 2010 revision of the 1-hour NO_2 NAAQS, which promulgated new minimum monitoring requirements for the NO_2 monitoring network. The new monitoring requirements required state and local air monitoring agencies to install near-road NO_2 monitoring stations at locations where peak hourly NO_2 concentrations are expected to occur within the near-road environment of larger urban areas. All required near-road sites in Florida are currently operational, except one for which a monitoring waiver was obtained while the interstate construction is ongoing. For more information about these sites, please refer to the State of Florida Ambient Air Monitoring Annual Network Plan located on Florida DEP's website: https://floridadep.gov/air/air-monitoring.

The objective of Florida's Ambient Air Quality Monitoring Program is to protect the health and sustainability of the state by identifying any violations of the NAAQS, locating the highest ambient pollution concentrations across the area, and determining the general background concentration. The ambient air monitoring networks in Florida have been continuously operated, maintained, and updated for over 50 years, in accordance with county, state, and federal monitoring requirements. The ambient air monitoring data collected are used to support the local, state, regional, and federal air monitoring programs, County organizations, and the general population. Additional goals for Florida's environmental protection are to encourage the wise and beneficial use of the natural environment, to minimize the adverse impact of environmental contaminants on human health and welfare, to assess the air quality, to identify air quality trends, to develop air

models and emission inventories, and to foster public awareness of environmental considerations.

On January 1, 2015, the U.S. Environmental Protection Agency (US EPA) designated the State of Florida as one Primary Quality Assurance Organization (PQAO) responsible for monitoring air pollution. 40 CFR Part 58, Appendix A defines each PQAO such that measurement uncertainty among all stations in the organization can be expected to be reasonably homogeneous as a result of common factors. These factors include:

(a) Operation by a common team of field operators according to a common set of procedures;
(b) Use of a common quality assurance project plan (QAPP) and standard operating procedures;
(c) Common calibration facilities and standards;
(d) Oversight by a common quality assurance organization; and
(e) Support by a common management organization (i.e., state agency) or laboratory.

Florida's PQAO consists of Florida DEP as the lead agency, and 9 local air monitoring organizations throughout the state, see Table 1-1 a list of these organizations. This statewide program includes the operation of the ambient air monitoring network (including the gaseous monitors discussed within this QAPP), laboratory analysis, data reporting, and quality assurance activities to ensure the quality of the data generated by the PQAO. Florida also developed the Florida Air Monitoring Advisory Committee (FAMAC), which is an internal committee consisting of Florida DEP and local program representatives to aid in coordinating quality assurance (QA) and quality control (QC) policies and guidance. This committee identifies practices that strengthen data quality objectives, promote innovative and efficient operations, and sets the minimum QA and QC requirements by which all agencies within the PQAO shall operate their air monitoring quality assurance programs. FAMAC communicates on a routine basis, including bi-monthly calls and semi-annual face-to-face or virtual meetings, to ensure a continuous flow of information, team building, and problem-solving within the PQAO. The meeting minutes are recorded by the Chair and Secretary and then distributed to all air monitoring staff within the PQAO.

The Quality Assurance Project Plan (QAPP) is a compilation of QA/QC requirements, procedures, and guidelines that are designed to achieve a high percentage of valid data samples, while maintaining integrity and accuracy. The US EPA regulations require that all projects involving the generation, acquisition, and use of environmental data are planned, documented, and have an approved QAPP. Adherence to the requirements set forth in this QAPP will ensure consistent, repeatable results, and improve the reliability and comparability of all data collected. This QAPP will be used by all of Florida's monitoring staff within the PQAO as a reference document, providing the framework for the monitoring network's QA program. Additional details and technical specifications are set forth in individual SOPs utilized by the air monitoring staff for each aspect of the monitoring program, such as instrument operations, data handling and certification, and

will be referenced in later sections of this QAPP. It is the responsibility of all air monitoring staff to ensure that all procedures and guidelines in this QAPP are properly implemented.

This version of the QAPP is the second full revision to the original document, approved by EPA in April 2018. The original QAPP is retained in an archived subfolder on the Florida DEP network. The PQAO will adhere to the principles and procedures herein, unless a special project requires more stringent requirements. If any special project requires more stringent requirements, the QAPP will be revised or, depending on the purpose and scope of the project, a separate QAPP will be developed to address the requirements of the special project. This QAPP and its associated SOPs (see Appendix C of this QAPP) will be reviewed annually and revised as necessary, at least every 5 years, per grant commitments. QAPP revisions are subject to the approval of the EPA's Region 4 QA staff.

This QAPP covers ***only*** the gaseous pollutants for State and Local Air Monitoring Stations (SLAMS) and Special Purpose Monitors (SPM) in Florida's ambient air monitoring network. Lead, National Core (NCore), and particulate matter monitors are addressed in separate QAPPs.

Table 3-1: National Ambient Air Quality Standards

Pollutant	Averaging Time	Standard Value [a]	Standard Type	Description
Carbon Monoxide (CO)	8-hour	9 ppm [b]	Primary	Not to be exceeded more than once per year
	1-hour	35 ppm	Primary	
Nitrogen Dioxide (NO_2)	Annual	53 ppb [c]	Primary and Secondary	Annual Mean
	1-hour	100 ppb	Primary	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Ozone (O_3)	8-hour	0.070 ppm	Primary and Secondary	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Lead (Pb)	Rolling 3-month	0.15 µg/m^3	Primary and Secondary	Not to be exceeded
Particulate Matter (PM_{10}) [d]	24-hour	150 µg/m^3	Primary and Secondary	Not to be exceeded more than once per year on average over 3 years
Particulate Matter ($PM_{2.5}$) [e]	Annual	12.0 µg/m^3	Primary	Annual mean, averaged over 3 years
	Annual	15.0 µg/m^3	Secondary	Annual mean, averaged over 3 years
	24-hour	35 µg/m^3	Primary and Secondary	98th percentile, averaged over 3 years
Sulfur Dioxide (SO_2)	1-hour	75 ppb	Primary	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	3-hour	0.5 ppm	Secondary	Not to be exceeded more than once per year

[a] Current concentration levels
[b] Parts per million
[c] Parts per billion
[d] Particulate with diameters of 10 micrometers or less
[e] Particulate with diameters of 2.5 micrometers or less

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 collects ambient data that meet or exceed EPA quality assurance requirements. Criteria pollutant data collected by Florida is used for regulatory decision-making purposes – i.e., determination of compliance with the NAAQS – and will be submitted to EPA via the EPA's national database, AQS. Other purposes of the data include determining trends over time, determining effects on air quality from adjustments to source emissions, developing algorithms based on historical air quality and other conditions which will forecast air quality, verifying air quality modeling programs, and providing real-time 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 is designed to support these objectives. Additional specific goals of Florida's Ambient Air Quality Monitoring Program include:

- Determining the highest concentrations expected to occur in the area covered by the network.
- Determining representative concentrations in areas with high population density and\or heavily congested areas.
- Determining the impact on ambient pollution levels of significant sources emitting pollutants in the area.
- Determining the general background concentration levels.
- Providing data to the US EPA to assist in determining regional transport of specific pollutants and in support of secondary standards and visibility impairment issues.
- Determining the extent of regional pollutant transport among populated areas and in support of secondary standards.
- Determining the welfare-related impacts in rural and remote areas (such as visibility impairment and effects on vegetation).

Data will be reported to AQS in accordance with the requirements stated in 40 CFR 58.16. Florida's gaseous monitoring network will operate and collect data in accordance with the schedules codified in 40 CFR 58.12. The ambient air monitoring concentration data will be collected by monitors that have been designated as Federal Reference Method (FRM) or Federal Equivalent Method (FEM), in accordance with

40 CFR Part 58, Appendix C, Section 2.1. The types of data collected by Florida's gaseous monitoring network, overall, will include:

- Continuous (near real-time) hourly-averaged pollutant concentration data collected by FRMs or FEMs;
- Continuous (near real-time) five-minute averaged SO_2 concentration data collected by FRMs or FEMs;
- Continuous shelter temperature measurements for ensuring conformity to environmental requirements of the air monitoring equipment;
- Precision measurements;
- Bias 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 expansion of the statewide ambient air quality monitoring network. Personnel will perform field activities that include, but are not necessarily limited to, conducting periodic preventative maintenance and servicing equipment at SLAMS and special purpose monitoring stations (SPMs) located within the State of Florida. Operational servicing activities may include, but are not limited to, collecting data, recording pertinent field data, and restocking consumables, such as calibration gases, at the monitoring sites. Annual instrument performance audits, field equipment certifications, and annual siting evaluations, which include visiting and assessing monitoring stations in the field, will also be performed. Additional field activities include relocating sites and/or locating suitable monitoring sites for possible expansion of the network.

4.3 Standards Laboratory Activities

For the gaseous pollutants, the laboratory specialist will assure completion of those activities that support continued successful operation of the statewide ambient air quality monitoring network through instrument certification activities. These include, but are not limited to, comparing equipment to standards for certification, maintaining consumable inventories, shipping and receiving activities, and performing instrument audits.

4.4 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: technical systems audit, performance evaluation, peer review, 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/Siting Evaluations	State	Annually
Data Quality Review	State	Monthly & Quarterly
Standard Operating Procedures Review	State	Annually
QAPP Review	State	Annually; QAPP revised every 5 years, minimally"

Data Quality Audits	State	Periodically, per State schedule; Each local program every 3 years, minimally
Data Quality Assessment	State	Quarterly
National Performance Audit Program[1]	State/EPA	As scheduled; 20% of PQAO sites per year; 100% of sites every 6 years
Data Certification	EPA Region 4 & State	Annually

4.5 Project Records

Each program within the PQAO, including Florida DEP, has its own internal procedures for the timely preparation, review, approval, issuance, use, control, revision, and maintenance of documents and records. However, for the gaseous monitoring network described by this QAPP, these records are compiled and stored annually in Florida's data management system, as well as the department's local area network servers, in accordance with the Data Handling and Data Validation SOP. Please note that these records are also stored within the local program servers, to ensure backup copies are available, if needed. The categories and types of records and documents are presented in Table 4-2 below.

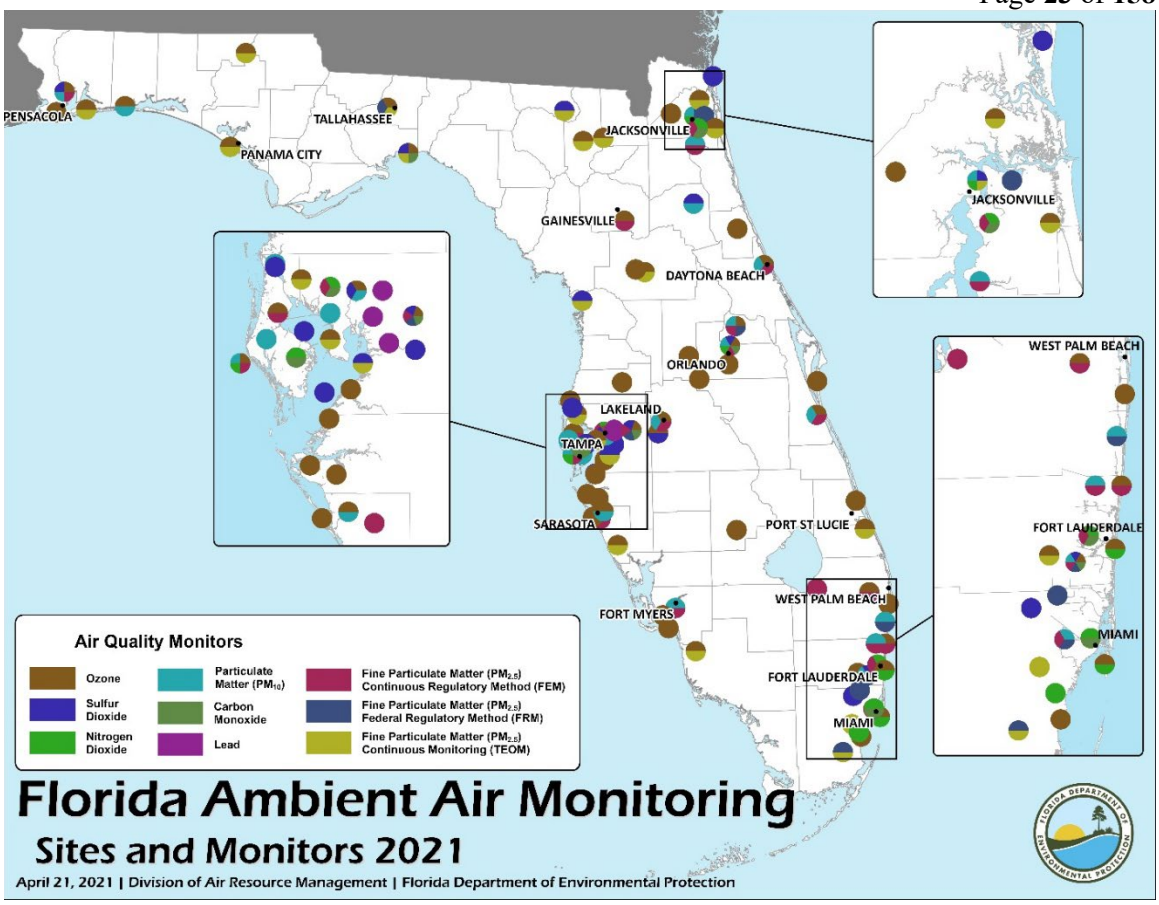
Table 4-2: Critical Documents and Records

Categories	Record/Document Type
Site Information	▪ Network Descriptions ▪ Site Files ▪ Site Maps ▪ Site Pictures
Environmental Data Operations	▪ Quality Assurance Project Plans ▪ Standard Operating Procedures ▪ Field and Laboratory Notebooks ▪ Inspection/Maintenance Records
Raw Data	▪ Any Original Data (routine and quality control) including Data Entry Forms and control charts.
Data Reporting	▪ Air Quality Index Reports ▪ Data/Summary Reports
Data Management	▪ Data Algorithms ▪ Data Management Plans/Flowcharts ▪ Data Management Systems ▪ Pollutant Data ▪ Meteorological Data
Quality Assurance	▪ Network Reviews ▪ NIST-traceable Certification Records ▪ Data Quality Assessments ▪ Quality Assurance Reports ▪ Technical / Quality Assurance Systems Audits ▪ Response/Corrective Action Reports ▪ Performance Evaluations

4.6 Site Locations

Florida's air monitoring network description is provided on Florida DEP's website: https://floridadep.gov/air/air-monitoring. Figure 4-1, below, shows the 2021 site locations for Florida's Ambient Air Monitoring Network.

Figure 4-1 2021 Site Locations for Florida's Ambient Air Monitoring Network


PENSACOLA
TALLAHASSEE
PANAMA CITY
JACKSONVILLE
GAINESVILLE
DAYTONA BEACH
ORLANDO
LAKELAND
TAMPA
SARASOTA
PORT ST LUCIE
FORT MYERS
WEST PALM BEACH
FORT LAUDERDALE
MIAMI
Air Quality Monitors
Ozone
Particulate Matter (PM10)
Fine Particulate Matter (PM2.5) Continuous Regulatory Method (FEM)
Sulfur Dioxide
Carbon Monoxide
Fine Particulate Matter (PM2.5) Federal Regulatory Method (FRM)
Nitrogen Dioxide
Lead
Fine Particulate Matter (PM2.5) Continuous Monitoring (TEOM)
Florida Ambient Air Monitoring
Sites and Monitors 2021
April 21, 2021 | Division of Air Resource Management | Florida Department of Environmental Protection

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, sensitivity, completeness, comparability, and representativeness are collected within its Ambient Air Quality Monitoring Program.

Defined in Section 5.5, precision, bias, sensitivity, completeness, comparability, and representativeness are the principal 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. Of the six 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 six 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 ensure quality data for purposes of Florida's air quality designations regarding attainment of the NAAQS. EPA-approved Federal Reference Methods (FRMs) or Federal Equivalent Methods (FEMs) are the designated methodologies and basis for operating gaseous pollutant monitoring equipment within the network.

5.1. Data Quality Objectives

This section provides a description of the data quality objectives (DQO) for the ambient air quality monitoring program for the State of Florida PQAO. 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 making a decision error due to uncertainty in the data.

5.2. Intended Use of Data

Data collected in Florida's 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 throughout the region, 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 in accordance with 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. The gaseous monitoring data compiled by the PQAO in**c**lude**s**: sulfur dioxide [SO_2], carbon monoxide [CO], nitrogen dioxide [NO_2] and ozone [O_3]. 40 CFR 58.16 specifies the data reporting requirements that the Florida PQAO will follow, and the appendices to 40 CFR Part 50 explain the data handling conventions and computations necessary for determining whether the NAAQS are met for each pollutant.

Criteria pollutant data will be collected for comparison to the NAAQS using hourly concentration data (with each hour considered valid if 45, 1-minute readings have been obtained) and 5-minute concentration data (SO_2 only). For CO, SO_2 and NO_2 quarterly data capture must achieve ≥75% completeness and ≥90% quarterly for O_3. The collection of precision and bias data is also required. In addition to these requirements, the data needed will meet the following principal quality objectives:

- All data should be traceable to a National Institute of Standards 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 in a similar and scientific manner. The use of the standard methodologies for sampling, calibration, auditing, etc. found in the QAPP and SOPs should achieve this goal.

- All data shall be representative of the parameters being measured with respect to 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 subsections provide more detail regarding the specifications on the types of data needed to compare Florida's design values to the NAAQS.

5.3.1. Ozone

- Keep each hourly data point (need at least 45 minutes of the hour to be used) to the nearest whole number in units of ppb, with additional digits to the right being truncated.
- Calculate average values for every rolling 8-hour period in the day.
- An 8-hour average shall be considered valid if at least 6 of the hourly concentrations for the rolling 8-hour period are available.
- Determine the highest 8-hour average from each day.
- Daily maximum 8-hour average O_3 concentrations are determined for each day with ambient O_3 monitoring data. The daily maximum 8-hour average O_3 concentration for a given day is the highest of the 17 consecutive 8-hour averages beginning with the 8-hour period from 7:00 a.m. to 3:00 p.m. and ending with the 8-hour period from 11:00 p.m. to 7:00 a.m. the following day (i.e., the 8-hour averages for 7:00 a.m. to 11:00 p.m.).
- A daily maximum 8-hour average O_3 concentration shall be considered valid, if valid 8-hour averages are available for at least 13 of the 17 consecutive 8-hour periods starting from 7:00 a.m. to 11:00 p.m.
- The highest 8-hour averages in each year are ranked, and the fourth highest value is used in each year.
- The 4th-highest values in 3 consecutive years are averaged.
- The resulting design value is compared with the NAAQS.

Specific information on the O_3 NAAQS calculation, as well as incomplete hours and days, is found in 40 CFR 50 Appendices I, P, and U.

5.3.2. Nitrogen Dioxide

- Keep each hourly data point (need at least 45 minutes of the hour to be used) with at least one decimal place in units of ppb, with additional digits to the right being truncated with no further rounding.

  - Trace-level hourly data points (need at least 45 minutes of the hour to be used) will be at least three decimal places in units of ppb, with additional digits to the right being truncated with no further rounding.
- Calculate 24 hourly average values for a day and determine the maximum. Daily maximum 1-hour values are not rounded.
- The 1-hour design value is the mean of the three 98th percentile values, rounded to the nearest whole number.
- The annual design value is simply the arithmetic average of all the reported 1-hour values rounded to the nearest whole number.

Specific information on NO_2 NAAQS calculations is found in 40 CFR 50 Appendix S.

5.3.3. Sulfur Dioxide

- Keep each hourly data point (need at least 45 minutes of the hour to be used) with at least one decimal place in units of ppb, with additional digits to the right being truncated with no further rounding.
  - Trace-level hourly data points (need at least 45 minutes of the hour to be used) will be at least three decimal places in units of ppb, with additional digits to the right being truncated with no further rounding.
- Calculate 24, hourly average values for each day and determine the maximum. Daily maximum 1-hour values (and therefore the 99th percentile of those daily values) are not rounded.
- The 99th percentile of the daily maximum hourly values averaged over 3 years, rounded to the nearest whole number, is used to compare to the primary NAAQS.
- The level of the 3-hour secondary standard is 0.5 parts per million (ppm), not to be exceeded more than once per calendar year. The 3-hour averages shall be determined from successive non-overlapping 3-hour blocks starting at midnight each calendar day and shall be rounded to 1 decimal place (fractional parts equal to or greater than 0.05 ppm shall be rounded up).

Specific information on SO_2 NAAQS calculations is found in 40 CFR 50 Appendix T and 40 CFR 50.5.

5.3.4. Carbon Monoxide

- Keep each hourly data point (need at least 45 minutes of the hour to be used) with at least one decimal place in units of ppm, with additional digits to the right being truncated with no further rounding.

  - Trace-level hourly data points (need at least 45 minutes of the hour to be used) will be at least three decimal places in units of ppm, with additional digits to the right being truncated with no further rounding.
- An 8-hour average will be considered valid if at least 75% of the hourly averages for the 8-hour period are available.
- The 1-hour and 8-hour values are not to exceed 35ppm and 9ppm, respectively, more than once per year.

Specific information on CO NAAQS calculations is found in 40 CFR 50.8.

5.4. Tolerable Error Limits

The Data Quality Objective (DQO) process defines tolerable limits on the probability of making a decision error due to uncertainty in the data, that is, limits on the probability of measuring a false positive or false negative error. Regarding air quality data, a false positive error occurs when data indicates that the 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 no NAAQS have 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 in order to reduce the probability of decision errors. 40 CFR 58, Appendix A Section 2.3.1, defines the acceptable measurement uncertainty for O_3, NO_2, and SO_2. EPA has not developed a formal 7-step DQO process for CO at this time, however, EPA has provided DQOs for CO in the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II. Florida formally adopts EPA's DQOs for the gaseous pollutant network and these are summarized in Table 5-1 below.

Table 5-1: Acceptable Precision and Bias as Measured by Coefficient of Variation (CV) for O_3, SO_2, CO and NO_2.

Pollutant	Acceptable Precision	Acceptable Bias
O_3	Upper 90 % confidence limit for the CV of ≤7 %	Upper 95 percent confidence limit for the absolute bias of ≤7 %
SO_2	Upper 90 % confidence limit for the CV of ≤10 %	Upper 95 percent confidence limit for the absolute bias of ≤10 %
CO	Upper 90 % confidence limit for the CV of ≤10 %	Upper 95 percent confidence limit for the absolute bias of ≤10 %
NO_2	Upper 90 % confidence limit for the CV of ≤15 %	Upper 95 percent confidence limit for the absolute bias of ≤15 %

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 Air Monitoring Network are defined in terms of the following data quality indicators (DQI):

- ***Precision*** **-** Precision is a measure of agreement between two replicate measurements of the same property, under prescribed similar conditions. This agreement is calculated as the percent difference and the standard deviation. This calculation represents the random component of error (Ex. 1-Point QC check).
- ***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 (Ex. Performance Evaluations).
- ***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 with respect 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.
- ***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 appendices of 40 CFR Part 50.
- ***Sensitivity*** - Sensitivity allows for the assessment and estimation of true pollutant concentrations above background noise. It is determined by method detection limits (MDLs) for each measurement method for each pollutant (40 CFR 53.20, Appendix B, Table B-1).

Acceptance criteria have been developed for these DQIs using various parts of 40 CFR Parts 50, 53, and 58 and EPA guidance documents. Specifically, the MQOs for the criteria pollutants have been compiled into "validation templates" found in the EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II (i.e., QA Handbook). The validation templates have been reproduced here and are included as Tables 5-4 to 5-7. Florida has adopted these tables and established them as the MQOs for the Statewide Ambient Air Monitoring Program.

As described in the QA Handbook and implemented here, for each criteria pollutant listed in the tables that follow, three validation criteria are listed: critical, operational, and systematic. The tables discriminate 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 making a determination 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 also adopted and implemented EPA Region 4's Laboratory Services & Applied Science Division (LSASD)

recommended warning limits. Warning limits are defined as the level of allowable imprecision before an analyzer calibration or other 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. Action/Investigation should be investigated after two consecutive exceedances but must be addressed after three consecutive occurrences.

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 5-2, below.

Table 5-2: Data Quality Action Levels

Parameter	Warning Limit	Control Limit (MQO)
	Precision Checks (% Difference)	
Ozone (O_3)	≥ ± 5%	< ± 7.1%
Carbon Monoxide (CO)	≥ ± 7%	< ± 10.1%
Sulfur Dioxide (SO_2)	≥ ± 7%	< ± 10.1%
Nitrogen Dioxide (NO_2)	≥ ± 12%	< ± 15.1%

By the same token, action limits were adopted and implemented for performance audits. These limits require investigations and corrective actions be performed by Field Technicians if the MQO for the specific pollutant is exceeded during the audit of the instrument. These levels are described in Table 5-3 below.

Table 5-3: Annual Performance Evaluation Audit Action Levels

Parameter	Audit Action Levels	Action Required
Ozone (O_3)	<±1.5ppb (levels 1&2) or <±5%	N/A
	≥±5% - <±7.1%	Investigation and documentation in logbooks required.
	>±7.1%	Corrective action required.
Carbon Monoxide (CO)	<±0.031ppm (levels 1&2) or <±7%	N/A
	≥±7% - <±10.1%	Investigation and documentation in logbooks required.
	>±10.1%	Corrective action required.
Sulfur Dioxide (SO_2)	<±1.5ppb (levels 1&2) or <±7%	N/A
	≥±7% - <±10.1%	Investigation and documentation in logbooks required.
	>±10.1%	Corrective action required.
Nitrogen Dioxide (NO_2)	<±1.5ppb (levels 1&2) or <±12%	N/A

	≥±12% - <±15.1%	Investigation and documentation in logbooks required.
	>±15.1%	Corrective action required.

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 5-4: O_3 Validation Template

1) Requirement (O_3)	2) Frequency	3) Acceptance Criteria	Information /Action
CRITICAL CRITERIA-OZONE			
Monitor	NA	***Meets requirements listed in FRM/FEM designation***	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
One Point QC Check Single analyzer	***Every 14 days***	< ±7.1% (percent difference) or < ±1.5 ppb difference whichever is greater	1 and 2) 40 CFR Part 58 App A Sec. 3.1 3) Recommendation based on DQO in 40 CFR Part 58 App A Sec. 2.3.1.2. QC Check Conc range 0.005 - 0.08 ppm and 05/05/2016 Technical Note on AMTIC
Zero/span check	Every 14 days	Zero drift < ± 3.1 ppb (24 hr) < ± 5.1 ppb (>24hr-14 day) Span drift < ± 7.1 %	1 and 2) QA Handbook Volume 2 Sec. 12.3 3) Recommendation and related to DQO
OPERATIONAL CRITERIA -OZONE			
Shelter Temperature Range	Daily (hourly values)	20.0 to 30.0° C. (Hourly avg) or per manufacturers specifications if designated to a wider temperature range	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2 Generally, the 20-30.0° C range will apply but the most restrictive operable range of the instruments in the shelter may also be used as guidance. FRM/FEM list found on AMTIC provides temp. range for given instrument. FRM/FEM monitor testing is required at 20-30° C range per 40 CFR Part 53.32
Shelter Temperature Control	Daily (hourly values)	< 2.1° C SD over 24 hours	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Shelter Temperature Device Check	Every 182 days and 2/ calendar year	≤± 2.1° C of standard	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Annual Performance Evaluation Single analyzer	***Every site every 365 days and 1/ calendar year within period of monitor operation,***	Percent difference of audit levels 3-10 < ±15.1% Audit levels 1&2 < ± 1.5 ppb difference or ≤± 15.1%	1 and 2) 40 CFR Part 58 App A Sec. 3.1.2 3) Recommendation- 3-audit concentrations not including zero. AMTIC guidance 2/17/2011 AMTIC Technical Memo
Federal Audits (NPAP)	***20% of sites audited in calendar year***	Audit levels 1&2 < ± 1.5 ppb difference all other levels percent difference < ± 10.1%	1 and 2) 40 CFR Part 58 App A Sec. 3.1.3 3) NPAP QAPP/SOP
Verification/Calibration	Upon receipt/adjustment/repair/ installation/moving and repair and recalibration of standard of higher level Every 182 day and 2/ calendar year if manual zero/span performed biweekly Every 365 day and 1/ calendar year if continuous zero/span performed daily	All points < ± 2.1 % or ≤ ±1.5 ppb difference of best-fit straight line whichever is greater and Slope 1 ± .05	1) 40 CFR Part 50 App D 2) Recommendation 3) 40 CFR Part 50 App D Sec 4.5.5.6 Multi-point calibration (0 and 4 upscale points) Slope criteria is a recommendation
Zero Air/Zero Air Check	Every 365 days and 1/calendar year	Concentrations below LDL	1) 40 CFR Part 50 App D Sec. 4.1 2 and 3) Recommendation
Ozone Level 2 Standard			

1) Requirement (O_3)	2) Frequency	3) Acceptance Criteria	Information /Action
Certification/recertification to Standard Reference Photometer (Level 1)	Every 365 days and 1/calendar year	single point difference < ± 3.1%	1) 40 CFR Part 50 App D Sec. 5.4 2 and 3) Transfer Standard Guidance EPA-454/B-10-001 Level 2 standard (formerly called primary standard) usually transported to EPA Regions SRP for comparison
Level 2 and Greater Transfer Standard Precision	Every 365 days and 1/calendar year	***Standard Deviation less than 0.005 ppm or 3.0% whichever is greater***	1) 40 CFR Part 50 Appendix D Sec. 3.1 2) Recommendation, part of reverification 3) 40 CFR Part 50 Appendix D Sec. 3.1
(if recertified via a transfer standard)	Every 365 days and 1/calendar year	Regression slopes = 1.00 ± 0.03 and two intercepts are 0 ± 3 ppb	1, 2 and 3) Transfer Standard Guidance EPA-545/B-10-001
Ozone Transfer standard (Level 3 and greater)			
Qualification	Upon receipt of transfer standard	< ±4.1% or < ±4 ppb (whichever greater)	1, 2 and 3) Transfer Standard Guidance EPA-545/B-10-001
Certification	After qualification and upon receipt/adjustment/repair	RSD of six slopes ≤ 3.7% Std. Dev. of 6 intercepts ≤ 1.5	1, 2 and 3) Transfer Standard Guidance EPA-545/B-10-001 1
Recertification to higher level standard [1]	Beginning and end of O3 season or every 182 days and 2/calendar year whichever less	New slope = ± 0.05 of previous and RSD of six slopes ≤3.7% Std. Dev. of 6 intercepts ≤ 1.5	1, 2 and 3) Transfer Standard Guidance EPA-545/B-10-001 recertification test that then gets added to most recent 5 tests. If does not meet acceptability certification fails
Detection (FEM/FRMs) Noise and Lower Detectable Limits (LDL) are part of the FEM/FRM requirements. It is recommended that monitoring organizations perform the LDL test to minimally confirm and establish the LDL of their monitor. Performing the LDL test will provide the noise information.			
Noise	Every 365 days and 1/ calendar year	***< 0.0025 ppm (standard range)*** ***≤ 0.001 ppm (lower range)***	1) 40 CFR Part 53.23 (b) (definition & procedure) 2) Recommendation- info can be obtained from LDL 3) 40 CFR Part 53.20 Table B-1
Lower detectable limit	Every 365 days and 1/calendar year	***≤ 0.005 ppm (standard range)*** ***≤ 0.002 ppm (lower range)***	1) 40 CFR Part 53.23 (b) (definition & procedure) 2) Recommendation 3) 40 CFR Part 53.20 Table B-1
SYSTEMATIC CRITERIA-OZONE			
Standard Reporting Units	***All data***	***ppm (final units in AQS)***	1, 2 and 3) 40 CFR Part 50 App U Sec. 3(a)
Rounding convention for design value calculation	***All routine concentration data***	***3 places after decimal with digits to right truncated***	1, 2 and 3) 40 CFR Part 50 App U Sec. 3(a) The rounding convention is for averaging values for comparison to NAAQS not for reporting individual hourly values.
Completeness (seasonal) [2]	***3-Year Comparison***	***≥ 90% (avg) daily max available in ozone season with min of 75% in any one year.***	1,2,3) 40 CFR Part 50 App U Sec 4(b)
	8- hour average	***≥ if at least 6 of the hourly concentrations for the 8-hour period are available***	1) 40 CFR Part 50 App U 2 and 3) 40 CFR Part 50 App U Sec. 3(b)
	Valid Daily Max	***≥ if valid 8-hour averages are available for at least 13 of the 17 consecutive 8-hour periods starting from 7:00 a.m. to 11:00 p.m***	1) 40 CFR Part 50 App U 2,3) 40 CFR Part 50 App U Sec. 3(d)
Sample Residence Time Verification	Every 365 days and 1/calendar year	***≤ 20 Seconds***	1) 40 CFR Part 58 App E, Sec. 9 (c) 2) Recommendation

[1]Florida performs recertifications of level 4 ozone transfer standards annually, at a minimum.

[2]Florida uses a more stringent completeness goal of 90% per quarter for ozone.

1) Requirement (O_3)	2) Frequency	3) Acceptance Criteria	Information /Action
			3) 40 CFR Part 58 App E, Sec. 9 (c)
Sample Probe, Inlet, Sampling train	***All sites***	***Borosilicate glass (e.g., Pyrex®) or Teflon®***	1) 40 CFR Part 58 App E, Sec. Sec. 9 (a) 2) Recommendation 3) 40 CFR Part 58 App E, Sec. Sec. 9 (a) FEP and PFA have been accepted as an equivalent material to Teflon. Replacement or cleaning is suggested as 1/year and more frequent if pollutant load or contamination dictate
Siting	Every 365 days and 1/calendar year	***Meets siting criteria or waiver documented***	1) 40 CFR Part 58 App E, Sec. 2-6 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-6
EPA Standard Ozone Reference Photometer (SRP) Recertification (Level 1)	Every 365 days and 1/calendar year	Regression slope = 1.00 ± 0.01 and intercept < 3 ppb	1, 2 and 3) Transfer Standard Guidance EPA-454/B-10-001 This is usually at a Regional Office and is compared against the traveling SRP
Precision (using 1-point QC checks)	***Calculated annually and as appropriate for design value estimates***	**90% CL CV < 7.1%**	1) 40 CFR Part 58 App A 2.3.1.2 & 3.1.1 2) 40 CFR Part 58 App A Sec. 4 (b) 3) 40 CFR Part 58 App A Sec. 4.1.2
Bias (using 1-point QC checks)	***Calculated annually and as appropriate for design value estimates***	**95% CL < ± 7.1%**	1) 40 CFR Part 58 App A 2.3.1.2 & 3.1.1 2) 40 CFR Part 58 App A Sec. 4 (b) 3) 40 CFR Part 58 App A Sec. 4.1.3

Table 5-5: CO Validation Template

1) Requirement (CO)	2) Frequency	3) Acceptance Criteria	Information /Action
CRITICAL CRITERIA-CO			
Sampler/Monitor	NA	***Meets requirements listed in FRM/FEM designation***	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
One Point QC Check Single analyzer	***Every 14 days***	< ±10.1% (percent difference)	1 and 2) 40 CFR Part 58 App A Sec. 3.1.1 3) Recommendation based on DQO in 40 CFR Part 58 App A Sec. 2.3.1. QC Check Conc range 0.5 – 5 ppm
Zero/span check	Every 14 days	Zero drift < ± 0.41 ppm (24 hr) < ± 0.61 ppm (>24hr-14 day) Span drift < ± 10.1 %	1 and 2) QA Handbook Volume 2 Sec. 12.3 3) Recommendation
OPERATIONAL CRITERIA-CO			
Shelter Temperature range	Daily (hourly values)	20.0 to 30.0° C. (Hourly avg) or per manufacturers specifications if designated to a wider temperature range	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2 Generally, the 20-30.0 ° C range will apply but the most restrictive operable range of the instruments in the shelter may also be used as guidance. FRM/FEM list found on AMTIC provides temp. range for given instrument. FRM/FEM monitor testing is required at 20-30 ° C range per 40 CFR Part 53.32
Shelter Temperature Control	Daily (hourly values)	< 2.1° C SD over 24 hours	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Shelter Temperature Device Check	Every 182 days and 2/ calendar year	< ± 2.1° C of standard	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Annual Performance Evaluation Single Analyzer	***Every site every 365 days and 1/ calendar year***	Percent difference of audit levels 3-10 < ±15.1% Audit levels 1&2 < ± 0.031 ppm difference or < ±15.1%	1 and 2) 40 CFR Part 58 App A Sec. 3.1.2 3) Recommendation- 3 audit concentrations not including zero. AMTIC Technical Memo
Federal Audits (NPAP)	***20% of sites audited in a calendar year***	Audit levels 1&2 < ± 0.031 ppm difference all other levels percent difference < ± 15.1%	1 and 2) 40 CFR Part 58 App A Sec. 3.1.3 3) NPAP QAPP/SOP
Verification/Calibration	Upon receipt/adjustment/repair/ installation/moving Every 182 day and 2/ calendar year if manual zero/span performed biweekly Every 365 days and 1/ calendar year if continuous zero/span performed daily	All points < ± 2.1 % or ≤ ± 0.03 ppm difference of best-fit straight line. whichever is greater and Slope 1 ± .05	1) 40 CFR Part 50 Appendix C Sec. 4 2 and 3) Recommendation See details about CO2 sensitive instruments Multi-point calibration (0 and 4 upscale points) Slope criteria is a recommendation

1) Requirement (CO)	2) Frequency	3) Acceptance Criteria	Information /Action
Gaseous Standards	All gas cylinders	NIST Traceable (e.g., EPA Protocol Gas)	1) 40 CFR Part 50 Appendix C Sec. 4.3.1 2) NA Green Book 3) 40 CFR Part 50 Appendix C Sec. 4.3.1 See details about CO2 sensitive instruments Gas producer used must participate in EPA Ambient Air Protocol Gas Verification Program 40 CFR Part 58 App A Sec. 2.6.1
Zero Air/Zero Air Check	Every 365 days and 1/ calendar year	***< 0.1 ppm CO***	1) 40 CFR Part 50 App C Sec. 4.3.2 2) Recommendation 3) 40 CFR Part 50 App C Sec. 4.3.2
Gas Dilution Systems	Every 365 days and 1/ calendar year or after failure of 1 point QC check or performance evaluation	Accuracy < ± 2.1 %	1, 2 and 3) Recommendation based on SO2 requirement in 40 CFR Part 50 App A-1 Sec. 4.1.2
Detection (FEM/FRMs) Noise and Lower Detectable Limits (LDL) are part of the FEM/FRM requirements. It is recommended that monitoring organizations perform the LDL test to minimally confirm and establish the LDL of their monitor. Performing the LDL test will provide the noise information.			
Noise	Every 365 days and 1/ calendar year	***< 0.2 ppm (standard range)*** ***≤ 0.1 ppm (lower range)***	1) 40 CFR Part 53.23 (b) (definition & procedure) 2) Recommendation- info can be obtained from LDL 3) 40 CFR Part 53.20 Table B-1
Lower detectable level	Every 365 days and 1/ calendar year	***≤ 0.4 ppm (standard range)*** ***≤ 0.2 ppm (lower range)***	1) 40 CFR Part 53.23 (c) (definition & procedure) 2) Recommendation 3) 40 CFR Part 53.20 Table B-1
SYSTEMATIC CRITERIA-CO			
Standard Reporting Units	***All data***	***ppm (final units in AQS)***	1, 2 and 3) 40 CFR Part 50.8 (a)
Rounding convention for design value calculation	***All routine concentration data***	***1 decimal place***	1, 2 and 3) 40 CFR Part 50.8 (d) The rounding convention is for averaging values for comparison to NAAQS not for reporting individual hourly values.
Completeness	***8-hour standard***	***75% of hourly averages for the 8-hour period***	1) 40 CFR Part 50.8(c) 2) 40 CFR Part 50.8(a-2) 3) 40 CFR Part 50.8(c)
Sample Residence Time Verification	Every 365 days and 1/ calendar year	≤ 20 Seconds	1, 2, and 3) Recommendation. CO not a reactive gas but suggest following same methods other gaseous criteria pollutants.
Sample Probe, Inlet, Sampling train	All Sites	Borosilicate glass (e.g., Pyrex®) or Teflon®	1, 2, and 3) Recommendation. CO not a reactive gas but suggest following same methods other gaseous criteria pollutants. FEP and PFA have been accepted as a equivalent material to Teflon. Replacement/cleaning is suggested as 1/year and more frequent if pollutant load dictate.
Siting	Every 365 days and 1/ calendar year	***Meets siting criteria or waiver documented***	1) 40 CFR Part 58 App E, Sec. 2-6 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-6
Precision (using 1-point QC	***Calculated annually and as***	***90% CL CV < 10.1%***	1) 40 CFR part 58 App A Sec. 3.1.1

1) Requirement (CO)	2) Frequency	3) Acceptance Criteria	Information /Action
checks)	*appropriate for design value estimates*		2) 40 CFR Part 58 App A Sec. 4 (b) 3) 40 CFR Part 58 App A Sec. 4.1.2
Bias (using 1-point QC checks)	*Calculated annually and as appropriate for design value estimates*	*95% CL < ± 10.1%*	1) 40 CFR Part 58 App A Sec. 3.1.1 2) 40 CFR Part 58 App A Sec. 4 (b) 3) 40 CFR Part 58 App A Sec. 4.1.3

Table 5-6: NO_2, NO, NO_x Validation Template

1) Requirement (NO_2)	2) Frequency	3) Acceptance Criteria	Information /Action
CRITICAL CRITERIA- NO_2			
Sampler/Monitor	***NA***	***Meets requirements listed in FRM/FEM designation***	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
One Point QC Check Single analyzer	***Every 14 days***	< ±15.1% (percent difference) or < ± 1.5 ppb difference whichever is greater	1 and 2) 40 CFR Part 58 App A Sec. 3.1.1 3) Recommendation based on DQO in 40 CFR Part 58 App A Sec. 2.3.1.5 QC Check Conc range 0.005 - 0.08 ppm and 05/05/2016 Technical Note on AMTIC
Zero/span check	Every 14 days	Zero drift < ± 3.1 ppb (24 hr) < ± 5.1 ppb (>24hr-14 day) Span drift < ± 10.1 %	1 and 2) QA Handbook Volume 2 Sec. 12.3 3) Recommendation and related to DQO
Converter Efficiency	During multi-point calibrations, span and audit Every 14 days	***(≥96%)*** 96% – 104.1%	1) 40 CFR Part 50 App F Sec. 1.5.10 and 2.4.10 2) Recommendation 3) 40 CFR Part 50 App F Sec. 1.5.10 and 2.4.10 Regulation states ≥ 96%, 96 – 104.1% is a recommendation.
OPERATIONAL CRITERIA- NO_2			
Shelter Temperature Range	Daily (hourly values)	20.0 to 30.0° C. (Hourly avg) or per manufacturers specifications if designated to a wider temperature range	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2 Generally, the 20-30.0 ° C range will apply but the most restrictive operable range of the instruments in the shelter may also be used as guidance. FRM/FEM list found on AMTIC provides temp. range for given instrument. FRM/FEM monitor testing is required at 20-30 ° C range per 40 CFR Part 53.32
Shelter Temperature Control	Daily (hourly values)	< 2.1° C SD over 24 hours	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Shelter Temperature Device Check	every 182 days and 2/calendar year	< ± 2.1° C of standard	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Annual Performance Evaluation Single Analyzer	***Every site every 365 days and 1/ calendar year***	Percent difference of audit levels 3-10 < ±15.1% Audit levels 1&2 < ± 1.5 ppb difference or < ±15.1%	1) 40 CFR Part 58 App A Sec. 3.1.2 2) 40 CFR Part 58 App A Sec. 3.1.2 3) Recommendation - 3-audit concentrations not including zero. AMTIC Technical Memo
Federal Audits (NPAP)	20% of sites audited in calendar year	Audit levels 1&2 < ± 1.5 ppb difference all other levels percent difference < ± 15.1%	1 & 2) 40 CFR Part 58 App A Sec. 3.1.3 3) NPAP QAPP/SOP

1) Requirement (NO_2)	2) Frequency	3) Acceptance Criteria	Information /Action
Verification/Calibration	Upon receipt/adjustment/repair/ installation/moving Every 182 day and 2/ calendar year if manual zero/span performed biweekly Every 365 day and 1/ calendar year if continuous zero/span performed daily	Instrument residence time ≤ 2 min Dynamic parameter ≥ 2.75 ppm-min All points <± 2.1 % or ≤ ± 1.5 ppb difference of best-fit straight line whichever is greater and Slope 1 ± .05	1) 40 CFR Part 50 App F 2 and 3) Recommendation Multi-point calibration (0 and 4 upscale points) Slope criteria is a recommendation
Gaseous Standards	All gas cylinders	NIST Traceable (e.g., EPA Protocol Gas) 50-100 ppm of NO in Nitrogen with < 1 ppm NO_2	1) 40 CFR Part 50 App F Sec. 1.3.1 2) NA Green Book 3) 40 CFR Part 50 App F Sec. 1.3.1. A technical memo may change the concentration requirment. Gas producer used must participate in EPAAmbient Air Protocol Gas Verification Program 40 CFR Part 58 App A Sec. 2.6.1
Zero Air/ Zero Air Check	Every 365 days and 1/ calendar year	Concentrations below LDL	1) 40 CFR Part 50 App F Sec. 1.3.2 2 and 3) Recommendation
Gas Dilution Systems	Every 365 days and 1/ calendar year or after failure of 1 point QC check or performance evaluation	Accuracy < ± 2.1 %	1, 2 and 3) Recommendation based on SO2 requirement in 40 CFR Part 50 App A-1 Sec. 4.1.2
Detection (FEM/FRMs) Noise and Lower Detectable Limits (LDL) are part of the FEM/FRM requirements. It is recommended that monitoring organizations perform the LDL test to minimally confirm and establish the LDL of their monitor. Performing the LDL test will provide the noise information.			
Noise	Every 365 days and 1/ calendar year	***≤ 0.005 ppm***	1) 40 CFR Part 53.23 (b) (definition & procedure) 2) Recommendation- info can be obtained from LDL 3) 40 CFR Part 53.20 Table B-1
Lower detectable level	Every 365 days and 1/ calendar year	***≤ 0.01 ppm***	1) 40 CFR Part 53.23 (c) (definition & procedure) 2) Recommendation 3) 40 CFR Part 53.20 Table B-1
SYSTEMATIC CRITERIA- NO_2			
Standard Reporting Units	***All data***	***ppb (final units in AQS)***	1, 2 and 3) 40 CFR Part 50 App S Sec. 2 (c)
Rounding convention for data reported to AQ S	***All routine concentration data***	***1 place after decimal with digits to right truncated***	1, 2 and 3) 40 CFR Part 50 App S Sec. 4.2 (a) The rounding convention is for averaging values for comparison to NAAQS not for reporting individual hourly values.
Completeness	***Annual Standard***	***≥ 75% hours in year***	1) 40 CFR Part 50 App S Sec. 3.1(b) 2) 40 CFR Part 50 App S Sec. 3.1(a) 3) 40 CFR Part 50 App S Sec. 3.1(b)
	1-hour standard	***1) 3consecutive calendars years of complete data*** ***2) 4 quarters complete in each year*** ***3) ≥75% sampling days in quarter*** ***4) ≥ 75% of hours in a day***	1) 40 CFR Part 50 App S Sec. 3.2(b) 2) 40 CFR Part 50 App S Sec. 3.2(a) 3) 40 CFR Part 50 App S Sec. 3.2(b) More details in 40 CFR Part 50 App S

1) Requirement (NO_2)	2) Frequency	3) Acceptance Criteria	Information /Action
Sample Residence Time Verification	Every 365 days and 1/ calendar year	***≤ 20 Seconds***	1) 40 CFR Part 58 App E, Sec. 9 (c) 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 9 (c)
Sample Probe, Inlet, Sampling train	***All sites***	***Borosilicate glass (e.g., Pyrex®) or Teflon®***	1, 2 and 3) 40 CFR Part 58 App E Sec. 9 (a) FEP and PFA have been accepted as equivalent material to Teflon. Replacement or cleaning is suggested as 1/year and more frequent if pollutant load or contamination dictate
Siting	Every 365 days and 1/ calendar year	***Meets siting criteria or waiver documented***	1) 40 CFR Part 58 App E, Secs 2-6 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-6
Precision (using 1-point QC checks)	***Calculated annually and as appropriate for design value estimates***	***90% CL CV < 15.1%***	1) 40 CFR Part 58 App A Sec. 2.3.1.5 & 3.1.1 2) 40 CFR Part 58 App A Sec. 4 (b) 3) 40 CFR Part 58 App A Sec. 4.1.2
Bias (using 1-point QC checks)	***Calculated annually and as appropriate for design value estimates***	***95% CL < ± 15.1%***	1) 40 CFR Part 58 App A Sec. 2.3.1.5 & 3.1.1 2) 40 CFR Part 58 App A Sec. 4 (b) 3) 40 CFR Part 58 App A Sec. 4.1.3

Table 5-7: SO_2 Validation Template

1) Requirement (SO_2)	2) Frequency	3) Acceptance Criteria	Information /Action
CRITICAL CRITERIA- SO_2			
Sampler/Monitor	NA	***Meets requirements listed in FRM/FEM designation***	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
One Point QC Check Single analyzer	***Every 14 days***	< ±10.1% (percent difference) or < ± 1.5 ppb difference whichever is greater	1 and 2) 40 CFR Part 58 App A Sec. 3.1.1 3) Recommendation based on DQO in 40 CFR Part 58 App A Sec. 2.3.1.2 QC Check Conc range 0.005 - 0.08 ppm and 05/05/2016 Technical Note on AMTIC
Zero/span check	Every 14 days	Zero drift < ± 3.1 ppb (24 hr) < ± 5.1 ppb (>24hr-14 day) Span drift < ± 10.1 %	1 and 2) QA Handbook Volume 2 Sec. 12.3 3) Recommendation and related to DQO
OPERATIONAL CRITERIA- SO_2			
Shelter Temperature Range	Daily (hourly values)	20.0 to 30.0° C. (Hourly avg) or per manufacturers specifications if designated to a wider temperature range	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2 Generally, the 20-30.0 ° C range will apply but the most restrictive operable range of the instruments in the shelter may also be used as guidance. FRM/FEM list found on AMTIC provides temp. range for given instrument. FRM/FEM monitor testing is required at 20-30 ° C range per 40 CFR Part 53.32
Shelter Temperature Control	Daily (hourly values)	< 2.1° C SD over 24 hours	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Shelter Temperature Device Check	every 180 days and 2/calendar year	< ± 2.1° C of standard	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Annual Performance Evaluation Single Analyzer	***Every site every 365 days and 1/ calendar year***	Percent difference of audit levels 3-10 < ±15.1% Audit levels 1&2 < ± 1.5 ppb difference or < ±15.1%	1 and 2) 40 CFR Part 58 App A Sec. 3.1.2 3) Recommendation - 3-audit concentrations not including zero. AMTIC Technical Memo
Federal Audits (NPAP)	20% of sites audited in calendar year	Audit levels 1&2 < ± 1.5 ppb difference all other levels percent difference < ± 15.1%	1&2) 40 CFR Part 58 App A Sec. 3.1.3 3) NPAP QAPP/SOP
Verification/Calibration	Upon receipt/adjustment/repair/ installation/moving Every 182 day and 2/ calendar year if manual zero/span performed biweekly Every 365 day and 1/ calendar year if continuous zero/span performed daily	All points < ± 2.1 % or < ± 1.5 ppb difference of best-fit straight line whichever is greater and Slope 1 ± .05	1) 40 CFR Part 50 App A-1 Sec. 4 2 and 3) Recommendation Multi-point calibration (0 and 4 upscale points) Slope criteria is a recommendation
Gaseous Standards	***All gas cylinders***	***NIST Traceable (e.g., EPA Protocol Gas)***	1) 40 CFR Part 50 App A-1 Sec. 4.1.6.1 2) NA Green Book 3) 40 CFR Part 50 App F Sec. 1.3.1 Producers must participate in Ambient Air Protocol Gas

1) Requirement (SO_2)	2) Frequency	3) Acceptance Criteria	Information /Action
			Verification Program 40 CFR Part 58 App A Sec. 2.6.1
Zero Air/ Zero Air Check	Every 365 days and 1/ calendar year	Concentrations below LDL < 0.1 ppm aromatic hydrocarbons	1) 40 CFR Part 50 App A-1 Sec. 4.1.6.2 2) Recommendation 3) Recommendation and 40 CFR Part 50 App A-1 Sec. 4.1.6.2
Gas Dilution Systems	Every 365 days and 1/ calendar year or after failure of 1point QC check or performance evaluation	*Accuracy < ± 2.1 %*	1) 40 CFR Part 50 App A-1Sec. 4.1.2 2) Recommendation 3) 40 CFR Part 50 App A-1 Sec. 4.1.2
Detection (FEM/FRMs) Noise and Lower Detectable Limits (LDL) are part of the FEM/FRM requirements. It is recommended that monitoring organizations perform the LDL test to minimally confirm and establish the LDL of their monitor. Performing the LDL test will provide the noise information.			
Noise	Every 365 days and 1/ calendar year	*≤ 0.001 ppm (standard range)* *≤ 0.0005 ppm (lower range)*	1) 40 CFR Part 53.23 (b) (definition & procedure) 2) Recommendation- info can be obtained from LDL 3) 40 CFR Part 53.20 Table B-1
Lower detectable level	Every 365 days and 1/ calendar year	*≤ 0.002 ppm (standard range)* *≤ 0.001 ppm (lower range)*	1) 40 CFR Part 53.23 (c) (definition & procedure) 2) Recommendation 3) 40 CFR Part 53.20 Table B-1
SYSTEMATIC CRITERIA- SO_2			
Standard Reporting Units	*All data*	*ppb (final units in AQS)*	1, 2 and 3) 40 CFR Part 50 App T Sec. 2 (c)
Rounding convention for design value calculation	*All routine concentration data*	*1 place after decimal with digits to right truncated*	1, 2 and 3) 40 CFR Part 50 App T Sec. 2 (c) The rounding convention is for averaging values for comparison to NAAQS not for reporting individual hourly values.
Completeness	*1 hour standard*	Hour – 75% of hour *Day- 75% hourly Conc* *Quarter- 75% complete days* *Years- 4 complete quarters* *5-min value reported only for valid hours*	1, 2 and 3) 40 CFR Part 50 App T Sec. 3 (b), (c) More details in CFR on acceptable completeness. 5-min values or 5-min max value (40 CFR part 58.16(g)) only reported for the valid portion of the hour reported. If the hour is incomplete no 5-min or 5-min max reported.
Sample Residence Time Verification	Every 365 days and 1/ calendar year	*≤ 20 Seconds*	1) 40 CFR Part 58 App E, Sec. 9 (c) 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 9 (c)
Sample Probe, Inlet, Sampling train	*All sites*	*Borosilicate glass (e.g., Pyrex®) or Teflon®*	1, 2 and 3) 40 CFR Part 58 App E Sec. 9 (a) FEP and PFA have been accepted as equivalent material to Teflon. Replacement or cleaning is suggested as 1/year and more frequent if pollutant load or contamination dictate
Siting	Every 365 days and 1/ calendar year	*Meets siting criteria or waiver documented*	1) 40 CFR Part 58 App E, Sec. 2-6 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-6
Precision (using 1-point QC checks)	*Calculated annually and as appropriate for design value estimates*	*90% CL CV < 10.1%*	1) 40 CFR Part 58 App A Sec. 2.3.1.6 & 3.1.1 2) 40 CFR Part 58 App A Sec. 4 (b) 3) 40 CFR Part 58 App A Sec. 4.1.2

1) Requirement (SO_2)	2) Frequency	3) Acceptance Criteria	Information /Action
Bias (using 1-point QC checks)	*Calculated annually and as appropriate for design value estimates*	*95% CL <± 10.1%*	1) 40 CFR Part 58 App A Sec. 2.3.1.6 & 3.1.1 2) 40 CFR Part 58 App A Sec. 4 (b) 3) 40 CFR Part 58 App A Sec. 4.1.3

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 Criteria for Ambient Air Quality Monitoring); 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. See the State of Florida Ambient Air Monitoring Annual Network Plan located on Florida DEP's website: https://floridadep.gov/air/air-monitoring.

- ***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.

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 are required to take specific, mandatory governmental training courses, such as safety training, operation of government vehicles, and Equal Employment Opportunity (EEO) courses, among others. Records on personnel qualifications and training may be maintained in several locations, dependent upon the applicability of the information. For example, staff may maintain copies of certificates received from classes or workshops, whereas the Florida DEP and Local Program Administrators/Managers will keep records of personnel qualifications and in-house training. Other personnel training and qualification records are maintained by each programs' human resources departments.

Ambient air monitoring training is aimed at increasing the effectiveness of employees as well as the effectiveness of the PQAO as a whole. In general, training for the ambient air monitoring program consists of a combination of required reading, monthly air monitoring meetings, 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 PQAO staff. Completion of additional training – such as self-instructional air monitoring courses (e.g., online Air Pollution Training Institute courses) and EPA-provided webinars (e.g., AQS) – is encouraged by all 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 back-up 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. Back-up roles are also assigned to monitoring personnel in order to ensure redundancy in staff and to prevent downtime or significant data loss associated with absence or turnover.

The following describes the base-training that is required for Florida's air monitoring staff.

Quality Assurance - 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 monitoring-specific SOPs associated with the equipment for which the trainee is responsible for validating ambient data. Staff will sign and date their training plans, upon completion.
- Reading and understanding the PQAO QAPPs for Ambient Air Quality Monitoring of Criteria Air Pollutants.
- All staff are required to read this QAPP and sign and date their training plans upon revision/completion.

- Reading and understanding the EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II (QA Handbook).
- All staff are required to read the sections of the QA Handbook that clearly address duties they perform for the PQAO. These sections will be identified by the Florida DEP and Local Program Managers. Additionally, staff will sign and date their training plans, upon completion.
- Participation in monthly air monitoring meetings to stay current with PQAO policies, procedures, and guidance.
- Trainees and QA staff will also be required to complete a Quality Assurance Proficiency Evaluation, which assess their knowledge of PQAO data validation and quality assurance policies and procedures.
- 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; to modifications within the PQAO; and to provide clarification/explanation of an existing policy or procedure. The Data Quality Section Administrator hosts these meetings, creates the agenda and records the meeting minutes, which are then distributed to all air monitoring staff within the PQAO. 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.

Equipment / Monitor-Specific Procedural Training - The vast majority of work in the ambient air quality monitoring program involves operation, maintenance, and troubleshooting of equipment. Staff need to be trained on the procedures involved for proper installation of equipment, daily operation, required QA/QC check procedures, preventative maintenance, and troubleshooting. Proper understanding and implementation of this QAPP requires the following specific training regimen for 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.
- Reading and understanding the manufacturer's operating manuals and guides and attending 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 analyzer to PQAO data management system. If any abnormalities occur, the trainees are always to notify the Field Operations Administrator/Local Program Manager.

- It is recommended that the trainee attends Florida DEP's annual Field Technician Hands-On training. The agenda and sign-in sheets for each DEP-hosted training are retained at Florida DEP's Central Office.
- The trainee will also be required to complete a Field Proficiency Evaluation, which covers "big picture" air monitoring items as well as instrument specific questions related to equipment.

- Applicable health and safety training conducted within the Florida DEP and Local Programs for operating new equipment.

Data Review and Validation - Data can be considered the true work product of the ambient air quality monitoring program. Accordingly, thorough attention must be given to review, verification, and validation to ensure data is accurate and reliable. Staff must completely understand the importance of following defensible procedures by reading and understanding this QAPP and the PQAO Data Handling and Data Validation SOP. Like with equipment training, on-the-job training is the primary means by which staff members learn to review and validate data in accordance with PQAO procedures. The QA training and required reading described above also assists in ensuring staff understand the fundamentals of data review. Supplemental training such as the Florida DEP's Quality Assurance Hands-On training (which focuses primarily on data review), is offered annually or on an as needed basis; for example, the QAM provides hands-on QA/data review training to staff upon request from a Program Administrator or Manager. Additionally, results from field and quality assurance proficiency evaluations, quality assurance systems audits and/or data quality audits (as discussed in Section 18 of this QAPP, performed by Florida DEP) may highlight a need for additional field or QA training, which would be provided for a designated period of time.

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 prior to 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 air monitoring program consist of data and information gathered to support the data collection activities. Documentation and records include:

- Quality Assurance Project Plans (i.e., this QAPP and others supporting the PQAO's ambient monitoring program)
- Standard Operating Procedures (SOPs)
- Logbooks and data collection records in electronic and written format
- Instrument and equipment calibration information
- Quality assurance documentation in electronic and written format
- 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 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 clearly 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
- Quality Assurance and Technical Notes, which provide air monitoring policy interpretations or best practices.

All of 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

The gaseous analyzers, along with the data acquisition systems, provide an automated means for collecting information that would otherwise be recorded on data entry forms. Additional information on data collection is detailed in Section 17 of this QAPP. To reduce the potential for data entry errors, automated systems will be used where appropriate and will record the same information that would be recorded on data entry forms. Electronic backup copies of automated data collection information will be stored on the servers, within the local program offices and in Florida DEP's central office.

Each field and laboratory technician will be responsible for obtaining, maintaining and documenting the appropriate field and lab logbooks and associated QA/QC data forms. Logbooks will be used to record information about the site and laboratory operations, as well as document routine operations. QA/QC forms will be used to document the QA/QC activities described in Section 7.3 below. The field logbooks will be made for each sampling site or specific pollutant. 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 air quality network data integrity activities.

Logbooks and QA/QC forms can be either electronic or hardcopy records. Electronic logbooks/forms must contain locked cells so that formulas cannot be overwritten; be filled out clearly and completely; and dated and signed. Hardcopy logbooks must be legible; filled out completely in ink with blank spaces marked through to prevent back-filling; dated and signed. Corrections to these records shall be made either electronically or manually. For electronic logbooks or QA/QC forms, corrections will be made through PDF editor by inserting a single line through the incorrect entry, initialing and dating with the date the correction was made. The correct information should then be added, via a text box, nearby with the corrected information. For hardcopy logbooks, 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 annually, at a minimum, and stored on the network drive.

The electronic and scanned hardcopy field records are compiled into data packets for each site within the PQAO, which are stored annually on the department's local area network servers, in accordance with the Data Handling and Data Validation SOP. The electronic laboratory records are stored on the department's local area network servers as well, however, bound logbooks are stored in cabinets within the laboratory. Please refer to Appendix J of the 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 QC Checks
- Zero/span/precision checks
- Verification/calibration procedures
- Maintenance activities
- Annual performance evaluations
- EPA performance audits (i.e. NPAP)
- Traceability certifications/calibrations
- Corrective actions

With the exception of 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., the strip chart annotations and electronic logbooks which are included with these software). Use of these methods to create the air monitoring QA/QC records is described in the associated PQAO SOPs. 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.

However, for some of the QA/QC activities described above – such as the traceability certifications – many of those records are retained in the Florida DEP Tallahassee office on the network server and by the local programs. For example, the Certificates

of Analyses that accompany gas cylinders are typically provided in paper format but are scanned and maintained on the network server, along with the other electronic air monitoring records.

7.4. Reference Materials

Because of the technical nature of ambient air monitoring, numerous reference materials are required to effectively administer the program. Publications such as instrument operation manuals, troubleshooting guides, technical assistance documents (TADs), 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 Local Program and Florida DEP office's and/or on the department's network drive.

7.5. Archiving and Retrieval

Documentation is classified according to its intended use, future applicability, and regulatory requirement for retention. Information listed in Table 7-1 below will be retained for a minimum of ten (10) complete calendar years from the date of collection in accordance with 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.

Electronic records are stored within the data management systems of each local agency within the PQAO, and on the FL DEP network server for the FDEP-portion of the network. 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 the 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 Information

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 & Local Program Offices
Site Information	▪ Network Descriptions ▪ Site Files ▪ Site Maps ▪ Site Pictures	Tallahassee, FL – Florida DEP's Central Office
Environmental Data Operations	▪ Quality Assurance Project Plans ▪ Standard Operating Procedures ▪ Field and Laboratory Notebooks ▪ Sample Handling/Custody Records ▪ Inspection/Maintenance Records ▪ Technical and Quality Assurance Notes	Tallahassee, FL – Florida DEP's Central Office & Local Program Offices
Raw Data	▪ Any Original Data (routine and quality control)	Tallahassee, FL – Florida DEP's Central Office & Local Program Offices
Data Management	▪ Data Algorithms ▪ Data Management Plans/Flowcharts ▪ Data Management Systems ▪ Pollutant Data ▪ Meteorological Data	Tallahassee, FL – Florida DEP's Central Office & Local Program Offices
Data Reporting	▪ Air Quality Index Reports ▪ Data/Summary Reports ▪ Data Certification Reports	Tallahassee, FL – Florida DEP's Central Office
Quality Assurance	▪ Network Reviews ▪ NIST-traceable Certification Records ▪ Control Charts ▪ Data Quality Assessments ▪ Quality Assurance Documents and Reports ▪ Technical System Audits ▪ Response/Corrective Action Reports ▪ Performance Evaluations/ Siting Evaluations Audits	Tallahassee, FL – Florida DEP's Central Office & Local Program Offices

8.0 NETWORK DESCRIPTION

The primary function of the air monitoring program is to verify compliance with the NAAQS. Other purposes include determining trends over time, determining effects on air quality from adjustments to source emissions, developing algorithms based on historical air quality and other conditions which will allow the verifying of air quality modeling programs, providing real-time pollutant data to the public, and correlating health effects to air quality levels.

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 Criteria 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

To fulfill the three basic monitoring objectives listed in Section 4.1 of this QAPP, the ambient air quality monitoring network is designed to meet the following additional monitoring objectives:

- Determine the highest concentrations expected to occur in the area covered by the network,
- Determine representative concentrations in areas of high population density,
- Determine the impact of significant sources or source categories on ambient pollution levels,
- Determine general background concentration levels,
- Determine the extent of regional pollutant transport among populated areas and in support of secondary standards,
- Determine the welfare-related impacts in rural and remote areas (such as visibility impairment and effects on vegetation), and
- Produce ambient monitoring data that are legally defensible.

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 and FEM sites for specific pollutants based on the Core-Based Statistical Areas (CBSAs) and Metropolitan Statistical Areas (MSAs). As mentioned in Section 4.6, Florida's ambient air

monitoring network description is provided in the annual Network Plan located on Florida DEP's website. The Network Plan includes monitoring objective (see Section 8.1.1 of this QAPP), operating schedule (40 CFR 58.12), and site type (e.g., SLAMS or SPM) information for each PQAO gaseous criteria pollutant monitor.

8.1.1. Monitoring Objectives and Spatial Scales

Each monitor within Florida's ambient air quality monitoring network is assigned the appropriate monitoring objective designation(s) from the list below:

- ***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,
- ***Regional Transport –*** the monitor is located to measure pollutants transported from other areas,
- ***Highest concentration –*** the monitor is located where a high concentration of the pollutant is expected,
- ***Max Ozone Concentration –*** the monitor is located where ozone is routinely found to be a maximum (coastal regions of Florida),
- ***Upwind Background –*** the monitor is located to determine the concentrations of a pollutant coming into an area,
- ***Max Precursor Emissions Impact –*** this monitor type is used to determine the precursor emission maximum concentrations,
- ***Extreme Downwind –*** the monitor would be very far downwind, but not commonly used in Florida due to the mesoscale nature of wind systems,
- ***Welfare Related Impacts –*** the monitor is located with emphasis on impacts other than human health,
- ***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.

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. 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 pollutant 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 quantity 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 of 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*** **–** The monitoring site location for a specific pollutant may or may not be appropriate for another pollutant. Evaluation of the changes that pollutants undergo temporally and spatially must be considered to determine the applicability of each site for a specific pollutant. An example would be the temporal delay in peak concentrations of NO_x and volatile organic compounds (VOCs), compared to the peak concentration of resulting O_3. A micro scale site used to monitor CO may be appropriate for measuring O_3 precursors, such as VOCs and NO_x, but entirely inappropriate for measuring O_3 itself. Due to the time delay in the creation of the secondary pollutant, O_3, a monitoring site located following the plume for some time may be appropriate for monitoring O_3.

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 site location may be necessary. Staff familiar with the operation of air quality measurement systems; estimates of air quality concentrations, and air modeling; and considerations of atmospheric chemistry and air pollution effects work collaboratively to select the optimum sampling site in order 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 collection of optimally representative data. 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 buildings 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 criteria pollutants shall adhere to the requirements listed in 40 CFR Part 58, Appendix E, and outlined below in Table 8-1. Florida's Site Review Protocol provides further details on how these criteria are interpreted and implemented.

Table 8-1: Probe and Monitoring Path Siting Criteria

Pollutant	Scale[1]	Height from ground to probe or inlet	Horizontal and vertical distance from supporting structures[2] to probe or inlet	Distance from trees to probe or inlet	Distance from roadways to probe or inlet
SO_2[3 4 5 6]	Middle (300 m)	2-15 meters	>1 meter	>10 meters	N/A
	Neighborhood Urban				
	Regional (1 km)				
CO[4 5 7]	Micro [downtown or street canyon sites]	2.5-3.5meters	>1 meter	>10 meters	2-10 meters for downtown areas or street canyon microscale
	Near-road sites (microscale)	2-7meters			≤50 meters for near-road microscale
	Middle (300 m)	2-15meters			See 40 CFR Part 58, Appendix E, Table E-2.
	Neighborhood (1 km)				
O_3[3 4 5]	Middle (300 m)	2-15 meters	>1 meter	>10 meters	See 40 CFR Part 58, Appendix E, Table E-1 for all scales.
	Neighborhood, Urban, and Regional (1 km)				

NO_2[3 4 5]	Near-road (Microscale: 50-300 m)	2-7 meters	>1 meter	>10 meters	≤50 meters for near-road micro-scale.
	Middle (300 m)	2-15 meters			See 40 CFR Part 58, Appendix E, Table E-1 for all scales.
	Neighborhood, Urban, and Regional (1 km)				
Pollutant	**Scale[1]**	**Height from ground to probe or inlet**	**Horizontal and vertical distance from supporting structures[2] to probe or inlet**	**Distance from trees to probe or inlet**	**Distance from roadways to probe or inlet**
Ozone precursors (for PAMS)[3 4 5]	Neighborhood and Urban (1 km)	2-15 meters	>1 meter	>10 meters	See 40 CFR Part 58, Appendix E, Table E-4.

[1] Maximum monitoring path length, meters

[2]When probe is located on a rooftop, this separation distance is in reference to walls, parapets, or penthouses located on roof.

[3]Should be greater than 20 meters from the dripline of tree(s) and must be 10 meters from the dripline when the tree(s) act as an obstruction.

[4]Distance from sampler, probe, or 90 percent of monitoring path to obstacle, such as a building, must be at least twice the height the obstacle protrudes above the sampler, probe, or monitoring path. Sites not meeting this criterion may be classified as middle scale (see text).

[5]Must have unrestricted airflow 270 degrees around the probe or sampler; 180 degrees if the probe is on the side of a building or a wall.

[6]The probe, sampler, or monitoring path should be away from minor sources, such as furnace or incineration flues. The separation distance is dependent on the height of the minor source's emission point (such as a flue), the type of fuel or waste burned, and the quality of the fuel (sulfur, ash, or lead content). This criterion is designed to avoid undue influences from minor sources.

[7]For micro-scale CO monitoring sites, the probe must be >10 meters from a street intersection and preferably at a midblock location.

8.4. Rationale for Florida's Ambient Air Quality Monitoring Network

The emphasis of Florida's Ambient Air Quality Monitoring Network has been in areas where elevated pollutant concentrations are known or suspected and where population and emission levels meet the EPA-established criteria. 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. Most of the monitoring done in Florida is attributable to the population requirements in the federal requirements.

9.0 SAMPLING METHODS REQUIREMENTS

In accordance with 40 CFR 58, Appendix C, Section 2.1, a criteria pollutant monitoring method used for making NAAQS decisions at a SLAMS site must be a reference or equivalent method (i.e., FRM or FEM, respectively). Towards that end, the Florida PQAO uses only EPA-approved FRM or FEM instrumentation at SLAMS sites within the gaseous monitoring network. Gaseous analyzer methods that have received FRM or FEM status have been rigorously tested, in accordance with 40 CFR Part 53 requirements, and found to meet (or be comparable to) the EPA reference methods (codified in 40 CFR Part 50 – see Section 11 of this QAPP). For the detailed specifications upon which a specific monitoring method (i.e., analyzer type) has received its FRM/FEM status, see the List of Designated Reference and Equivalent Methods, issued by the EPA Office of Research and Development, which can be found on the AMTIC website (https://www.epa.gov/amtic/air-monitoring-methods-criteria-pollutants as of the date of this QAPP). The Florida PQAO will operate each analyzer in accordance with these designation specifications. Field personnel must gain approval from their respective air monitoring manager and the Quality Assurance Manager prior to replacing or deploying new instrument methods at air monitoring sites. Table 9-1 (below) contains the EPA method designation reference or equivalence number for each analyzer-type operated within the PQAO.

9.1. Monitoring Technology/Methodology

9.1.1. Carbon Monoxide (Nondispersive Infrared Photometry)

The detection and measurement of CO utilizes this chemical's propensity to absorb infrared (IR) radiation. Broadband IR radiation is generated using a high energy heated element. The IR radiation is modulated using gas filter correlation technology. Gas filter correlation utilizes a rotating wheel containing two gas filled cells that selectively modulate the IR radiation. One cell contains nitrogen (the measure cell), while the other contains CO (the reference cell). This configuration modulates the IR radiation into reference and measure pulses.

During the reference pulse, the CO in the gas filter wheel effectively strips the beam of all IR energy at wavelengths susceptible to CO absorption. The result of this action is a beam that is unaffected by any CO in the sample cell being evaluated.

During the measure pulse, the nitrogen in the filter wheel does not affect the IR radiation beam. The CO subsequently absorbs the IR radiation in the sample cell. The attenuation of the IR radiation is directly proportional to the quantity of CO present in the sample being evaluated.

The IR beam enters the multi-pass sample cell after the gas filter wheel. This sample cell uses folding optics to extend the absorption path through the sample, by making the reference and measure beams pass multiple times through the sample in the cell.

The length of the absorption path is directly related to the sensitivity of the instrument in measuring CO concentrations.

Upon exiting the sample cell, the beam passes through a band-pass interference filter to limit the light to the wavelength of interest. Finally, the beam strikes a thermoelectrically cooled, solid-state photo-conductor. This solid-state device, coupled with its support circuitry, amplifies the signal generated by the modulated IR radiation beam, and outputs a modulated voltage. This voltage is de-modulated resulting in two voltage signals associated with the reference and measurement pulses. The ratio of the de-modulated voltage signals is indirectly proportional to the concentration of CO in the sample being evaluated.

9.1.2. Sulfur Dioxide (Fluorescence Analyzer)

The physical principle used in SO_2 molecule measurement relies on exciting an electron shell in the presence of a specific wavelength (214 nanometers [nm]) of ultraviolet (UV) radiation, and the subsequent relaxation which produces a photon of light. A photomultiplier tube allows the light emissions to be measured as the SO_2 molecule returns to the ground state. The intensity of this light is proportional to the quantity of SO_2 present in the sample. A reference detector continuously monitors the intensity of the UV lamp, used to excite the SO_2, and allows use of a ratiometric measurement technique that compensates for lamp degradation. A hydrocarbon scrubbing system, containing no consumable material, removes interfering hydrocarbons prior to the ambient sample entering the measurement chamber.

9.1.3. Nitrogen Oxides

9.1.3.1 Chemiluminescence

The principle of measurement is based upon the reaction of a nitric oxide (NO) molecule with an internal source of O_3 in an evacuated reaction cell that results in the emission of light. Single channel instruments divide the sample into two streams. The first stream passes the sample directly to the evacuated reaction cell. A reaction between the NO present in the sample and the analyzer supplied O_3 occurs. The resulting light emitted by the reaction is monitored and correlated to the concentration of NO in the sample.

The second stream of sample gas is passed through a catalytic converter which reduces the NO_2 to NO. This second stream, now containing NO from both the reduction of NO_2 and the original NO, is cycled through the evacuated reaction cell where the new augmented concentration of NO is measured.

The measurement of the untreated sample provides a NO concentration, while the measurement of the converted sample provides a measurement of the NO_x concentration. Subtracting the NO concentration from the NO_x concentration yields the NO_2 concentration. Periodically, a background measurement is taken to correct the zero offset of the instrument to maintain zero stability.

9.1.3.2 Photolytic Conversion

In the photolytic process, light at wavelengths greater than 600 nm is produced by the chemiluminescent reaction of NO with O_3. First, the sample gas passes through a photolytic conversion cell where it is exposed to light at a specific wavelength from an LED array. This causes the NO_2 to be selectively converted to NO. Ambient NO, which commonly exists in association with NO_2, passes through the converter unchanged, resulting in a measured total nitrogen oxides (NO_x) concentration of NO plus NO_2. A portion of the sampled ambient air is also reacted with O3 without having passed through the converter, and the ambient NO concentration is measured. This value is subtracted from the NO_x concentration yielding the concentration of NO_2. This method has negligible interference from other gases, with a lower detectable limit of 0.1 ppb or better, well-suited for NCore research sites and the low-level direct NO_2 measurements required for roadside monitoring.

9.1.3.3 Nitrogen Dioxide (Cavity Attenuated Phase Shift Spectroscopy)

Cavity attenuated phase shift spectroscopy (CAPS) technology results in a direct measurement of nitrogen dioxide using an optical absorption spectrometer. The absorbance is directly proportional to the path length of the optical cell and the concentration of the absorbing gas. The measurement principle employs the Beer-Lambert Law where: Absorbance (A) = Molar absorptivity (e) * mean path length (l) * Concentration (c).

The basic components of the analytical system include an optical cell, a pair of highly reflective mirrors centered to 450 nm (a strong NO_2 absorbance band), a light emitting diode (LED), and a vacuum photodiode detector. The LED is located behind one of the mirrors and the detector is positioned at the end of the cell behind the other mirror. The LED produces ultraviolet (UV) light into the cell which is reflected back and forth between the mirrors. During the time the sample flows through the cell, precisely timed data acquisition in combination with an algorithm translates the absorbance into a phase shift. The phase shift in turn is used to calculate the NO_2 concentration. There is an inverse relationship between the phase shift and the NO_2 concentration – as the phase shift decreases the NO_2 signal increases.

9.1.4. Ozone (Ultraviolet Photometry)

The physical principle used to measure O_3 relies on the absorption of UV radiation by the O_3 molecule. The O_3 molecule absorbs energy in the UV range at 254 nm. The Beer-Lambert relationship relates the quantity of O_3 present in a sample to the quantity of UV radiation absorbed along a specified path length.

The sample is split into two streams. The first stream is directed into a measurement cell, while the second stream is passed through a catalytic converter to remove all

traces of O_3. The measurement cell has a specified length, a UV source at one end, and a photometer at the other end. The analyzer allows a specified time to pass, determined by the cell volume and the sample flow rate, to ensure that a clean, uniform sample is present in the cell. A measurement is taken of this sample over the subsequent, equal time span. Next, the instrument cycles the catalyzed sample into the cell, utilizing the same time spans to insure a clean, O_3-free sample exists in the cell, prior to measuring the O_3-free UV attenuation level. The cycle is then repeated with a new O_3 containing sample.

9.2. Electronic Data Collection

Electronic data collection is possible through the network's data loggers and modems. This equipment is located within the shelters where the data loggers record the data history and the modems provide a path to download the data for analysis. FDEP's Data Acquisition System (DAS) is configured to automatically poll sites or download data from specific folders on Florida's FTP/SFTP server periodically. Monitoring personnel can remotely access the sites to retrieve data or determine the status of the systems. Collected continuous gaseous pollutant data is also reported for the Air Quality Index (AQI) via AirNow Tech. Additional information is discussed in Section 17 of this QAPP.

9.3. Support Facilities

9.3.1. Monitoring Station Design

The monitoring station design must encompass the operational needs of the equipment, provide an environment that supports sample integrity, and allow the operator to safely and easily service and maintain the equipment. Within the PQAO modular shelters such as construction trailers or modified shipping containers are often used (e.g., Wells Cargo trailers); however, for some sites, equipment may be located in small outdoor/rooftop single-monitor enclosures or inside existing buildings.

9.3.2. Shelter Criteria

Air pollution analyzers and support equipment must be housed in a shelter capable of fulfilling the following requirements:

- The shelter temperature must be maintained between 20° and 30°C (unless otherwise specified by the EPA equipment designation).
- The power supply should not vary more than ±10% from 120 Alternating Current Voltage (VAC). It is best to provide some type of voltage regulation to accomplish this.
- The shelter must protect the instrumentation from precipitation and excessive dust and dirt, provide third wire grounding as required in modern electrical codes, meet federal Occupational Safety and Health

Administration regulations, and be cleaned regularly to prevent a buildup of dust.

- The shelter must protect the instrumentation from any environmental stress such as vibration, corrosive chemicals, intense light, or radiation.
- The shelter may also provide structure and connectivity for communications equipment, lightning suppression systems, or other support equipment.

Criteria pollutant analyzers require that the probe and inlet line material must be borosilicate glass, FEP Teflon® or their equivalent. This requirement applies to the entire sampling system, including the external funnel. Florida operates as a unique PQAO where monitoring sites may employ different sample inlet designs. These possible designs are discussed within each individual instrument SOP, and generally include single sample line and through-the-probe (TTP) sampling systems.

Impacted particles may provide surfaces to which criteria pollutants may adsorb, or, if the impacted particle is metallic, catalyze to a non-criteria species. The inlet system must also prevent rainwater from entering the analyzers. No condensate of liquid phase of any kind can be present in the system since it will absorb pollutants, impacting the criteria pollutant concentration by removing pollutants from the sample, and consequently, yielding inaccurate environmental data.

The flow rate through the inlet system must be sufficient to keep the residence time of gases in the system below 20 seconds.

Florida's PQAO has opted for the flexibility of either cleaning or replacing the sample line. Accordingly, the sample line should be cleaned or replaced at least annually, or as needed as indicated by a failed Sample Line Integrity Check (SLIC). Dirt buildup on the inside of the inlet system will absorb pollutants from the air stream during high concentration periods and release pollutants during low concentration periods, skewing the data collected when the inlet system is dirty. The residence time of gas in the inlet system should be verified at least once every year. The residence time should be less than 10 seconds and must be less than 20 seconds. Results should be documented in the Residence Time Verification Workbook and included with the annual records. Residence time verification applies to all gaseous monitors except for Carbon Monoxide.

9.4. State of Florida's Ambient Air Monitoring Network Analyzers

The gaseous analyzers used in the statewide ambient air monitoring network are listed in Table 9-1 below. See Appendix C of this QAPP for the list of instrument SOPs as they relate to the table below.

Table 9-1: Florida's Ambient Air Monitoring Network Analyzers

Pollutant	Analyzer	EPA Reference/Equivalence
Ozone	Thermo 49i, 49iQ series 2B Technologies 202 2B Technologies 211 Teledyne T400 or 400E	EQOA-0880-047 EQOA-0410-190 EQOA-0410-215 EQOA-0992-087
Carbon Monoxide	Thermo 48, 48iQ series Teledyne 300E	RFCA-0981-054 RFCA-1093-093
Nitrogen Dioxide	Thermo 42, 42iQ series Teledyne T200 Teledyne T200UP Teledyne T500U CAPS	RFNA-1289-074 RFNA-1194-099 EQNA-0512-200 EQNA-0514-212
Sulfur Dioxide	Thermo 43 series Teledyne T100	EQSA-0486-060 EQSA-0495-100

10.0 SAMPLE CUSTODY PROCEDURE

The gaseous air monitoring program does not require any samples to be taken that would warrant a sample custody procedure. All ambient air samples are analyzed directly through the instrumentation set at each monitoring location.

11.0 ANALYTICAL METHODS REQUIREMENTS

The gaseous ambient air monitoring network does not use any laboratory analytical methodologies to complete the analysis of any gaseous samples. Specifics on the SO_2, CO, O_3, and NO_2 reference methods can be found in 40 CFR Part 50, Appendices A-1, C, D and F, respectively. A summary of these analytics can be found in Section 9.1 of this QAPP.

12.0 QUALITY CONTROL REQUIREMENTS

Quality control is the overall system of technical activities that measure the attributes and performance of a process against established standards to verify that performance meets the stated requirements. This section contains QA/QC information regarding the specifications and performance criteria for the gaseous pollutant analyzers utilized in Florida's network. Information on QA data validation and verification can be found in Section 20.

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 second function is to control measurement error by implementing specific QC checks at established frequencies to ensure the monitoring instrumentation operates within specified criteria.

QC procedures for each pollutant type are addressed (and discussed in more detail) in the pollutant-specific SOPs (see Appendix C of this QAPP). Calculations and formulas related to the QC checks are defined in the individual SOPs. Associated forms utilized by the PQAO contain these formulas embedded in cells and generate values for the field technicians immediately. Similarly, EPA's AQS provides statistical software that evaluates the DQIs of precision, bias, and completeness, once the data is uploaded into the AQS database.

The following summarizes the QC procedures performed by Florida's air monitoring staff.

Multi-point Verification/Calibration: The Multi-point Verification/Calibration is the procedure employed to verify and rectify an instrument's measurements in order to minimize deviation from a known standard. This multi-phase process begins with certifying a calibration/transfer standard against an authoritative, NIST-traceable standard. The analyzer's measurements are then compared to that of the calibration/transfer standard. The Multi-point Verification/Calibration is conducted every 6 months (182 days), if manual zero/span checks are performed biweekly (every 14 days) and annually, if automated zero/span checks are performed nightly. This procedure must consist of 4 upscale points and a zero concentration. The span point is typically performed at 80-90% of the calibration scale of the analyzer. The multi-point verification/calibration scales are shown in Table 12-1. Verifications do not make any adjustments to the analyzer or data, but rather verify (confirm) the analyzer is in good working order, which supports the defensibility of the data collected; the calibration follows the same procedure but with an adjustment of the zero and/or span points in order to align the response of the analyzer to the calibrator/transfer standard. Per requirements in the CFR, all points in the Multi-point Verification/Calibration must be < 2.1% or < ±1.5 ppb (0.03 ppm for CO) difference of the best fit line comparing instrument response to calibration gas concentration, whichever is greater and have a slope of 1 ± 0.05 (refer to Tables 5.4 – 5.7 and individual instrument

SOPs). In general, analyzers are to be calibrated when installed, if time allows, upon receipt, and when certain repairs are made. When physically moved to another sampling site or when there is data loss (not due to a communication issue) for more than 72-hours (e.g., shut down for a hurricane) a Multi-Point Verification/Calibration is needed. Refer to the Corrective Action SOP (DEP 01-4) for further detail.

The instrument operator may opt to perform a Calibration based on instrument performance in lieu of the annual or semi-annual Multi-point Verification. Additionally, an adjustment (calibration) must be performed if the multi-point verification fails (i.e., exceeds acceptance criteria) and the analyzer itself is determined to be in good working order. Before the recalibration is performed, all typical troubleshooting techniques should be applied to verify the complete system is in good working order (which, in turns, verifies the failed verification is valid).Invalid QC checks (verifications) could occur due to several reasons that need attention; therefore, confirming the equipment/calibration system status before proceeding to recalibration can help field technicians avoid conducting unnecessary calibrations or any incorrect flagging of the data. The situations that could result in an invalid QC check may include, but are not limited to, the following:

- Faulty zero-air being supplied to the calibrator,
- Sample/calibration line connections developing leaks,
- Calibrator problems (malfunction) causing poor concentrations to be produced,
- Internal electronic problems for the calibration equipment,
- External weather conditions causing problems, such as excessive humidity, or
- Operator error, including incorrect documentation in logbooks.

Table 12-1: Florida's Gaseous Operating Ranges and Calibration Scales

Pollutant	Operating Range	Calibration Scale
Ozone (O_3)	0-300 (ppb)	0-250 (ppb)
Nitrogen Dioxide (NO_2)	0-300 (ppb)	0-240 (ppb)
Sulfur Dioxide (SO_2)	0-500 (ppb)	0-400 (ppb)
Carbon Monoxide (CO)	0-30 (ppm)	0-24 (ppm)

Precision Checks: Precision is defined as the measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. To meet the DQOs for precision, the PQAO will ensure the entire measurement process is within statistical control and various tools will be employed in evaluating and monitoring precision measurements. To evaluate precision, the following checks will be performed.

- **One-point QC checks** – Pursuant to 40 CFR Part 58, Appendix A, Section 3.1.1, a one-point QC check must be performed at least once every

2 weeks (14 days) on each continuous analyzer used to measure the gaseous criteria pollutants. The QC check is made by challenging the analyzer with a QC check gas of known concentration between the prescribed range of 5 and 80 parts per billion (ppb) for SO_2, NO_2, and O_3 and between the prescribed range of 0.5 and 5 parts per million (ppm) for CO monitors. Florida's air monitoring network performs automated and manual checks. The automated 1-point QC checks are either performed daily, every 3 days or every 6 days (site dependent), while manual checks are performed every 14 days (at all sites) if automated checks are not performed, every 30 days if automated checks are performed. One-point QC checks are performed as the precision value of a zero/span/precision (ZSP) check. Field technicians typically refer to the automated check as an "auto-nightly", which is a term used in the statewide instrument SOPs. Automated checks must include a precision measurement but may also include another upscale concentration point and a zero. For each check, a percent difference is calculated, the results of which are compared to the acceptance criteria established in Tables 5-4 to 5-7, and as specified in the SOPs.

- **Zero/Span/Precision (ZSP) Checks** – At a minimum, these precision checks are performed manually or remotely by field technicians every 14 days, or every 30 days if automated nightly checks are performed. These checks must include 2 upscale concentration points (precision and span points) and a zero. For these ZSP checks, the percent difference is calculated at each upscale point; each point must be within the specifications in Tables 5-4 to 5-7 for the check to pass. The calculation for the precision measurement (i.e., percent difference) is found in 40 CFR Part 58, Appendix A, Section 4.1.1, and is embedded in the PQAO electronic QA/QC data forms used by field technicians.

Precision checks (1-pt QC and ZSPs) verify (confirm) the analyzer is in good working order, and, therefore, support the defensibility of the data.

A calibration must be performed if the 1-point QC check or ZSP fails and the instrument is found to be in good working order. Normally if either of these checks fail, there is a problem within the monitoring system that needs addressing (i.e., results in equipment maintenance and/or repair). If the zero check or span check exceed the specifications in Tables 5-4 to 5-7, then a calibration will be done after the equipment failure is diagnosed, repaired, and the instrument is cleared for normal operation. However, if a typical slow drift causes the check to fail, no routine maintenance may be necessary – it simply indicates it is time to recalibrate the analyzer. Florida does not adjust ambient concentration data to correct for zero drift. A failure at the zero or span points will require investigation and if

deemed appropriate (based on a weight-of-evidence approach), the data will be invalidated based on the failed check.

Note: Florida's PQAO does not perform post-process procedures on the monitoring data to "correct" for a failing QC check. Based upon calibration data and validation criteria, the monitoring data is either reported as collected, appropriately qualified, or the data is invalidated.

Accuracy or 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). For the gaseous analyzers, ZSP checks can provide data capable of identifying bias. Performance Evaluations (PEs) are also an indicator of accuracy/bias and are discussed below. Trends of the instrument performance can be observed by using control charts to track the span concentrations from ZSPs, which can indicate bias occurring within the measurements.

Performance Evaluation (PE) Audits: Audits are performed by comparing analyzer measurements to independent standards (or references). The standard used for auditing must not be the same standard used to calibrate the analyzer. However, both the calibration standard and the audit standard can be referenced to the same DARM Standards Laboratory primary standard. Personnel conducting audit procedures should be designated staff who are not normally involved in the routine operational activities of the equipment under evaluation. In Florida's air monitoring network, the Quality Assurance (QA) Auditor is independent from routine field operations and conducts performance audits on network equipment using dedicated QA equipment. These audits are conducted using the methodology specified in audit SOPs for the specific pollutant being measured (see Appendix C of this QAPP).

The requirements and frequency for performance audits are specified in 40 CFR Part 58, Appendix A. In general, for the gaseous analyzer audits, the audits are required annually per Section 3.1.2 of Appendix A, to which Florida adheres. For each performance audit level, a percent difference is calculated, and the results are compared to the acceptance criteria established in Tables 5-4 to 5-7.

External Agency Audits: Florida's PQAO also participates in the EPA National Performance Audit Program (NPAP) and EPA Protocol Gas Program. Information on EPA's Performance Audit Program can be found on the Ambient Monitoring Technology Information Center (AMTIC) website at: http://www.epa.gov/ttn/amtic/npepqa.html. For each NPAP audit level, a percent difference is calculated, and the results are compared to the acceptance criteria established in Tables 5-4 to 5-7.

Corrective Actions: Corrective action measures within the PQAO are taken as necessary to ensure the MQOs are attained. Given the number of monitors, the diversity of monitoring activities, and the complexity of the instruments, there is a potential that issues may arise with the air monitoring measurement systems. 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 Corrective Action SOP (DEP 01-4) as well as instrument SOPs contain examples of corrective actions that may need to be completed under certain circumstances. Field technicians should consult the appropriate pollutant-specific SOP for technique-specific checks, required frequency of checks, acceptance criteria, and additional corrective action guidance (i.e., Corrective Action SOP). Please refer to the Corrective Action and Data Handling and Data Validation SOPs for further information on completing corrective actions and appropriate data handling procedures.

Documentation: All events, including routine site visits, calibrations, precision checks, PEs, analyzer maintenance, and calibration equipment maintenance will be documented in the appropriate field data records and logbooks, as specified in the pollutant-specific SOPs. Corrective actions will be documented in accordance with the Corrective Action SOP.

13.0 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

Preventative maintenance is a foundational element to an effective QA program. Florida DEP maintains a maintenance/repair shop at the Tallahassee, FL main office building for off-site repair, maintenance, and field readiness certification of equipment. This work is performed by the Maintenance, Repair and Acquisition Support (MRAS) team. There are also a few maintenance/repair shops amongst the local programs, however, all local programs within the PQAO do not have maintenance/repair shops due to facility and resource constraints. When possible, new monitoring equipment is inspected and certified for the field by the DARM Standards Laboratory. Alternatively, some local programs perform equipment testing "live" in the field at the monitoring site, but the data is not reported to EPA's AQS database until it is deemed acceptable for NAAQS comparisons. Furthermore, the sampling start date in AQS for these newly deployed instruments will reflect the date NAAQS comparable data collection commenced, which will be following the completion of acceptance testing activities.

Instrument/Equipment as-found and as-left status and/or conditions are documented using an equipment tracking log (for example, Equipment Status Reports or Check-in Check-out forms) to verify that all instruments and equipment are in sound operating condition and are capable of operating at acceptable performance levels before beginning or resuming ambient data collection. PQAO monitoring staff are strongly encouraged to share knowledge and equipment experience. Refer to the instrument specific SOPs (listed in Appendix C of this QAPP) for more details on the specific preventative maintenance activities.

In general, the following acceptance/testing activities are performed upon receipt of new analyzers, and/or after an analyzer has undergone significant repair. If the equipment is new and fails to meet the field readiness certification described below, the vendor will be contacted.

- Verify that instrument contains its EPA equivalent or reference method decal and meets the specifications of the purchase request.
- Verify that all expected parts arrived with the instrument and that nothing is physically broken. Contact the vendor if there are issues.
- Perform field readiness "certification" testing, summarized as follows. Although the designation of the FRM/FEM status ensures the make/model of the instrument meets EPA requirements for use in a SLAMS network, PQAO staff must still ensure that individual instruments perform as expected before deploying to the field and/or prior to the beginning of (NAAQS comparable) data collection.

- Check and document the diagnostics of the analyzer, looking for any fault lights or warnings. Ensure that parameters such as sample flow rate, lamp intensity, temperatures, and so forth are within specifications (see user manuals). Perform a leak check(s) on the analyzer.
- Perform verification check(s). Generate zero concentration, followed by 4 upscale concentrations across the calibration scale of the analyzer, as would be completed for a typical multi-point verification. For example, for O_3, this test would include 0, 40, 70, 120, and 250 ppb concentrations. If all points fall within the acceptance criteria (see SOPs), the analyzer 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 analyzer to run in its normal sampling mode in the shop (or the field) for several days before deployment (or commencing NAAQS comparable data collection). Verify that all instrument settings and data generated meet the FRM/FEM method requirements.

If an instrument has undergone significant troubleshooting or repair and fails to meet the field readiness certification (testing), the vendor will be contacted. If after working with the vendor, the instrument cannot be repaired such that it passes performance testing, then the instrument will be returned (if under warranty) or shelved (i.e., discontinued from service, if warranty has expired). Regarding the latter, the instrument is tagged as inoperable and will be used for spare parts. If the instrument that was shelved and tagged was a back-up instrument, then the Field Operations Section Administrator or Local Agency Air Program Manager will begin the process to purchase a new instrument to replace that back-up, such that a spare is once again available for use. At the time of this QAPP, Florida DEP's MRAS Shop and a few Local Programs perform annual temperature and pressure verifications/calibrations and maintain the necessary preventative maintenance on all back-up/spare analyzers and calibrators, annually. These are documented on the applicable instrument logbooks/QA/QC forms and stored electronically on each agency's network drives. The Florida PQAO plans to streamline this process so that all agencies are maintaining the necessary verifications and certifications on back-up/spare equipment. Please note that all back-up/spare equipment must undergo the required certifications, verifications and preventative maintenance before deployment in the field.

In general, the following inspection activities are used:

- Monitoring shelters, sample inlets, and other enclosures are inspected routinely to ensure conditions do not adversely affect monitor operation or data integrity.
- A zero-air system is a vital piece of support equipment maintained at all air monitoring stations within the gaseous network. Zero air is needed to blend (dilute) calibration gases to conduct routine calibrations, precision checks (1-pt QC, ZSP), and performance evaluations (audits). Zero air systems used in the Florida PQAO for conducting these QA/QC checks and audits should be able to deliver 10 liters/minute of air that is free of ozone, NO, NO_2, SO_2, CO, and non-methane hydrocarbons to below the instruments' method detection limits. Zero air supplies do not have to be NIST-traceable but will be inspected/tested annually by the field technicians or local program staff to ensure they remain free of contaminants.
- Data collection and data quality is reviewed each business day and trends are inspected for signs of problems. Data trends that signal inspection would include issues such as frozen numbers for multiple hours in a row, or erratic spikes or valleys in the concentrations obtained.
- Inspections on equipment also occur during site visits to verify the entire system is in good working order. Site visit checklists are available to the field technicians and equipment operating parameters are also documented on the ZSP, calibration, and maintenance tracking forms (within electronic logbooks), as well as on performance evaluation audit forms.
- The sites and monitors are reviewed annually to ensure continuing compliance with 40 CFR Part 58, Appendix E. These are documented by QA Auditors on the PQAO Site Review forms.

Regarding routine maintenance, the following are general protocols:

- A limited supply of critical spare parts is maintained within the PQAO by each respective program to aid in rapid response to issues. For example, pump rebuild kits, spare pumps, photometer lamps, filters, and ozone scrubbers.
- Preventive maintenance is scheduled ahead of time, so all parts/tools can be easily available to complete the tasks and data loss is kept at a minimum.
- Preventive maintenance activities are typically performed in the field, although some activities are completed in the shop, if available.

The routine preventive activities and schedules are detailed in the specific equipment SOPs and supplemented by the equipment user manuals. While replacement may not be necessary in-line particulate filters for the through-the-probe (TTP) sample trains should be inspected monthly and replaced as necessary, followed by a post-maintenance check to ensure sample train integrity. All gaseous equipment,

including analyzers, calibrators, and zero air supplies, undergoes a comprehensive annual preventive maintenance regimen (also detailed in the SOPs).

14.0 INSTRUMENT STANDARDS, CERTIFICATIONS AND FREQUENCY

40 CFR Part 58, Appendix A, §2.6 requires that gaseous standards (i.e., gas cylinders), photometers, and flow rate standards used in the ambient air monitoring network be traceable to National Institute of Standards and Technology (NIST). As such, instrument calibrations performed in Florida's network are conducted using traceable standards to ensure that the ambient air quality data meets the Florida PQAO and EPA quality objectives.

Traceable is defined in 40 CFR Parts 50 and 58 as meaning that a local standard (i.e., one maintained by a monitoring organization) has been compared and certified, either directly or via not more than one intermediate standard, to a primary standard such as a NIST Standard Reference Material (NIST SRM) or an EPA/NIST-approved Certified Reference Material (CRM). Similarly, traceability is the property of a measurement result whereby the result can be related to a stated reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty. Standard traceability, therefore, is the process of transferring the accuracy or authority of a primary standard to a field-usable standard, resulting in a documented unbroken chain of calibrations/certifications.

Calibration is defined as the comparison of a measurement standard, instrument, or item with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustment. 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 or not an instrument is operating within its acceptance range. Thus, the purpose of calibration is to minimize bias. Calibrations are discussed in more detail in Section 12 of this QAPP. Calibration procedures for each specific pollutant analyzer are described in the applicable SOP.

The term "certification" refers to the actions or processes that attest the status, operational capacity, and/or functionality of an instrument. An overview of the certification procedures will be discussed in this section; however, the specific verification, calibration, and certification procedures for the laboratory and field equipment can be found in the applicable SOPs or operation manuals. See Appendix C of this QAPP for the applicable SOPs.

14.1. Flow Rate Standards

The QA staff within the PQAO, i.e. the Data Validation Team and Local Program QA Coordinators/Staff, are responsible for ensuring that all flow rate standards used in the ambient air monitoring network are properly certified and/or calibrated. The

QA staff are responsible for maintaining calibration and certification documentation according to the Florida PQAO's record retention policy.

The DARM Standards Laboratory maintains several mass flow meters (MFMs), such as the Bios DryCal ML-800, which serve as local primary flow standards for the PQAO. The MFMs are returned to a contracted vendor for recalibration against a NIST-traceable standard annually. In return, the Standards Laboratory uses these local primary flow standards to annually certify/calibrate mass flow controllers (MFCs) within multi-gas calibrators used at each gaseous monitoring site and by the QA auditors. Mass flow devices which operate under microprocessor control (and flow controllers in electronically flow-controlled instruments) must be verified annually with a properly certified flow standard and documented, in lieu of a formal calibration.

Specific certification and calibration procedures for field equipment can be found in the applicable instrument and laboratory SOPs and/or operation manuals.

14.2. Temperature Standards

The DARM Standards Laboratory maintains Brooklyn Thermometer Company mercury-in-glass thermometers as NIST primary standards, which are used to recertify field NIST-traceable digital thermometers (e.g., max/min thermometers) used to perform annual checks (e.g., calibrator temperature sensor checks). The mercury-in-glass thermometers should be checked routinely for column separation and the field temperature devices shall be recalibrated and recertified at least annually, to within 2°C of the expected range of ambient temperatures at which the temperature standard is to be used. Additionally, all non-liquid-in-glass thermometers, including max/min, thermographs, and electronic sensors must be certified or calibrated at a minimum of three (3) points which encompass the primary area (temperature range) of interest.

Specific certification and calibration procedures for field equipment can be found in the applicable instrument and laboratory SOPs and/or operation manuals.

14.3. Pressure Standards

The DARM Standards Laboratory maintains a stationary Princo Fortin mercury barometer, which is used to certify pressure transfer standards used at the air monitoring sites to complete annual checks (e.g., calibrator pressure sensor checks). These field pressure transfer standards will be handheld aneroid (e.g., Taylor) or digital barometers (e.g., Nova Lynx) that will be recertified at least annually against the Standards Laboratory primary standard.

Note: Although maintained at some gaseous monitoring stations, the pressure transfer standards are primarily used to support the FL particulate network, which is addressed in a separate QAPP.

14.4. Time Standards

Florida's PQAO may use the WWV NIST atomic clock in Boulder, CO (telephone number: 1-303-499-7111) as a primary time standard. A local program agency can establish a time transfer standard (computer clock, watch, etc.) however the device must be reliable and certified against the WWV NIST atomic clock. A time transfer standard is considered reliable when it has proven to be consistently accurate to ±5 minutes over a six-month period (±50 seconds per month) and is not adversely affected by an electrical power failure. A newly designated time transfer standard should be checked monthly, to establish its compliance, for the first six months of operation and semi-annually thereafter. Please note that the number of time transfer standards should be kept to a minimum. Time standards are used in the gaseous network to ensure datalogging systems and analyzers report data at local standard time.

14.5. Voltage Standards

The DARM Standards Laboratory maintains a Fluke 5528 Voltage Generator as a local primary standard, which is used to certify voltmeters (e.g., Fluke digital voltmeters) used at the air monitoring sites. Fluke digital voltmeters used at the sites are certified annually against the Fluke 5528 local primary standard. The local primary voltage generator is certified annually by the vendor.

14.6. Ozone Standards

The DARM Standards Laboratory maintains two local primary standards (a main and back-up) which will be compared directly to an EPA primary ozone standard each year (365 days). All ozone monitoring sites will be equipped with a dedicated ozone transfer standard (i.e., photometer).

As part of initial performance testing, newly acquired transfer standards (i.e., photometers) will undergo a 3-day certification to the DARM Standards Laboratory local primary standard to establish NIST traceability before they are used to collect ambient air monitoring data. The certification relationship between a transfer standard and the local primary standard will be established by using the same or equivalent concentrations during the lab certification process as would be done in the field.

All field ozone transfer standards (i.e., photometers) will undergo an annual 1-day certification by DARM QA auditors or Standards Laboratory staff. One-day certifications conducted in the field will be against a DARM QA auditor's ozone transfer standard. Ozone transfer standards used by DARM QA auditors must be certified at the DARM Standards Laboratory every six months (182 days) against the local primary standard.

There are scenarios that may require the field transfer standard to undergo a 1-day recertification more frequently than once per year or undergo a 3-day recertification after deployment to the field. For example:

- If an ozone transfer standard is moved from one site to another, the 1-day certification of the photometer against a DARM QA auditor's ozone transfer standard will be due within 6 months (182 days) of relocating the instrument (i.e., the date the equipment was moved from its existing location) or at its normal recertification date, whichever is earlier.
- If an ozone transfer standard loses its certification due to the coefficient/slope requiring an adjustment (calibration), repairs or an untimely recertification, it must be returned to the DARM Standards Laboratory to undergo a 3-day certification.

Specific certification requirements for ozone standards are found in the Standards Laboratory SOPs. See Appendix C of this QAPP for a complete list of Florida's SOPs.

14.7. Gas Protocol Standards

Florida's PQAO purchases commercially prepared EPA Protocol Gas cylinders from contracted vendors for use both in the field and in, the DARM Standards Laboratory. All cylinders are directly traceable to NIST reference standards and contain a known concentration of the specified gas. The concentration of the cylinder is documented on the cylinder's label and the cylinder's certification of analysis document. All documentation should be reviewed upon receipt to ensure that blends meet purchase specifications.

Concentrations of all newly purchased gas cylinders should be verified and documented in the respective field or laboratory logbooks (electronic or hardcopy) prior to deployment in the laboratory or field. If the verification shows a discrepancy between the reported concentration of the gas cylinder and the actual value being obtained (i.e. analytical accuracy) of more than ± 4%, the cylinder is returned to the vendor. Cylinder verifications will be documented and retained in accordance with the PQAO records retention policy.

14.7.1. EPA Ambient Air Protocol Gas Verification Program

In accordance with 40 CFR 58, Appendix A, vendors advertising and distributing cylinders certified as an "EPA Protocol Gas" for ambient air monitoring purposes must participate in EPA's Ambient Air Protocol Gas Verification Program (AA-PGVP). As required, Florida will provide information to the EPA on the gas vendors used each year and send at least one new and unused gas cylinder to a designated verification laboratory at least once every five years. The procedures used by the AA-PGVP are outlined in EPA's Quality Assurance Project Plan for the Ambient Air Protocol Gas Verification Program.

14.8. Documentation

All certification, verification, and calibration records for the PQAO are compiled and stored annually in Florida's data management system, as well as the department's local area network servers, in accordance with the Data Handling and Data Validation SOP. Please note that these records are also stored within the local program servers, to ensure backup copies are available, if needed.

15.0 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Florida's PQAO 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 analyzers used within the PQAO. 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.

Supplies and consumables are tracked by the field technicians, MRAS team, and Local Program Managers and/or staff; when replacements are needed, the Florida DEP or Local Program Administrators are notified, and hence 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.

Sample lines and fittings are important supplies. If used in the sampling train of a reactive gaseous analyzer, they must be FEP Teflon or equivalent. Consumables critical to the successful operation of the gaseous monitoring network include gas cylinders used for calibrations and QC checks of SO_2, NO_2 and CO analyzers, as well as gas cylinders used for conducting internal performance evaluation audits. Gas cylinders ordered by the PQAO are EPA Protocol Cylinders. Certificates of Analyses are reviewed upon receipt of new gas cylinders to ensure the cylinder meets purchase specifications. The certificates indicate the expiration date of the gases contained within the cylinders. Florida abides by these expiration dates; dates and usage are tracked, with cylinders being replaced before they expire. Additionally, Florida's PQAO participates in the EPA Protocol Gas Verification program, such that gas cylinders can be independently assessed to ensure their integrity (and that of the supplier).

Note: In general, calibrations, QC checks, or performance audits conducted with expired gases would not be considered valid calibrations or QA/QC checks, unless compelling, empirical evidence was available to justify using the expired cylinders. Otherwise, the data from such checks would not be used for data validation purposes.

16.0 NON-DIRECT MEASUREMENTS

Some data not obtained by direct measurement from Florida's Ambient Air Quality Monitoring Program are used to support the monitoring program. This includes data from outside sources and historical monitoring data. Possible databases and types of data and information that might be used include:

- Chemical and Physical Properties Data
- Sampler Manufacturers' Operational Literature
- Geographic Location Data
- Traffic Count Data
- Census Data
- Dispersion modeling
- Historical monitoring data measured by other sources
- National Weather Service Data

Any use of outside data will be quality controlled to the extent possible following QA procedures outlined in this document and in applicable EPA guidance documents.

17.0 DATA MANAGEMENT

The primary work product of Florida's Ambient Air Quality Monitoring Program is data. Accordingly, formalized procedures are required to ensure successful data management. Data management describes an inter-related set of standardized processes used to acquire, transmit, transform, reduce, analyze, store, and retrieve data. When documented and followed, a data management system helps maintain the integrity and validity of the data throughout its entire life cycle. Florida's air monitoring data follows a documented flow path. The data life cycle starts before data collection actually begins and ends with use of the data. The major components of Florida's data management process are summarized here, and further detailed in the PQAO Data Handling and Data Validation SOP.

17.1. Data Collection and Recording

Ambient air monitoring analyzers which have been designated by EPA as reference or equivalent methods (FRMs or FEMs) will be used to collect the criteria gaseous pollutant data used for NAAQS compliance within the Florida PQAO. Upon installation and at regular intervals as specified, ambient air monitoring instrumentation is calibrated in accordance with the specified pollutant SOPs, see Appendix C of this QAPP.

The gaseous data collected in Florida's ambient monitoring network is recorded electronically. To accomplish this, monitoring sites are equipped with data loggers and/or site computers. A data logger is set up to record each monitor's output, perform specific data computations, and format the resulting data in preparation for downloading to a database.

17.2. Data Transmittal

Data transmittal is accomplished hourly using wireless access to the site's modem, which is linked to the data logger and/or the site computer. Alternate access may be used if normal communications are interrupted, including downloading directly to storage media at the site or accessing data directly from the instrument if the data logger is malfunctioning. Downloading of collected data does not delete the data from the data logger. Data are removed from the data logger continuously by overwriting data on a first-in, first-out basis, but are, if applicable, also recorded on the site computer in an on-going manner.

All transmitted raw datasets are stored electronically. The data acquisition system is designed to prevent alteration of the raw data file. As such, raw datasets are retained in unalterable form before any reduction or validation is performed. Data validation operations (e.g., AirMVP/AirVision database) use replicate versions of the raw data to avoid violating the integrity of the original raw dataset. Data stored in the "edit" database can be added, changed, flagged, or voided following the procedures described within the PQAO Data Handling and Data Validation SOP. An edit history is recorded and available to track changes made to the editable database.

17.3. Data Verification and Validation

Each of the network's analytical instruments employed to measure the ambient concentrations of the criteria gaseous pollutants undergo periodic audits, precision checks and calibrations. These procedures are outlined in the appropriate SOPs. Performance audits and precision checks ascertain the accuracy, precision, and repeatability of each instrument in performing its required function.

The instrument-generated data are stored onsite in the datalogger and downloaded to the data management system (AirMVP and/or AirVision) where they will undergo verification, analysis, and validation. The first data verification step is performed electronically by searching the data download for status flags and comparing reported values to acceptable range criteria. Additionally, field technicians verify the data collected when reviewing their minute data and electronic strip charts throughout the sample collection process.

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.

If data are flagged as questionable, the Local Program QA Coordinators/Staff and Data Validation Team evaluate the flagged data to identify underlying causes and decide whether the data are valid. If the data are invalid, they are not used in calculations. If the data are valid, but flagged due to some extenuating circumstance, then the data will be used in calculations and properly documented, per the PQAO Data Handling and Data Validation SOP (DEP 18-27). Further details on the data verification and validation processes are also provided in this SOP.

17.4. Data Reduction and Analysis

Data reduction occurs throughout the data management process. Data is first aggregated by the datalogger from one-second data to minute data and finally into five-minute and hourly data. The datalogger reads instantaneous gaseous values from the monitor and averages each 60-second interval to create a 1-minute average. The data acquisition system stores each minute average, and this acts as the base unit for all measurements taken by monitors within the gaseous monitoring network.

These stored 1-minute averages are then averaged to form hourly values, which are the blocks of ambient gaseous measured concentrations that are submitted to the EPA. Additionally, the 1-minute averages for SO_2 are used to form 5-minute averages, which are submitted to the EPA. These values are transmitted to the data management system (i.e., AirMVP/AirVision) for retention. Ultimately, data reduction activities aggregate the raw gaseous data collected at the ambient air

monitoring station into the hourly averages that are required for comparison against the NAAQS.

Criteria for the quantity of valid data points required within a data set are defined in 40 CFR Part 50; for most pollutants, a minimum data completeness of 75% of the required interval (e.g., quarterly) must be captured for the interval to be considered valid and used in NAAQS comparisons. These criteria are adhered to when performing the data reduction and NAAQS-comparison operations. Section 5 of this QAPP contains more information regarding data reduction to produce pollutant design values for NAAQS-comparison.

Data is analyzed periodically throughout the data collection and validation process. It is ultimately the responsibility of the Quality Assurance Manager, in coordination with the Local Program QA Coordinators/Staff, to certify all hourly and five-minute averaged gaseous data collected within a calendar year as usable for NAAQS comparisons. The Quality Assurance Manager primarily relies upon AQS calculated metrics of precision, bias, and completeness, via several AQS-generated reports, to complete assessments of the data. AQS will also estimate the design values for each of the criteria pollutants, based upon the concentrations entered for each monitor in the network.

17.5. Data Storage and Retrieval

Once collected, data is stored in a variety of ways and for varying periods of time. Initially, data is stored in the instrument and/or the site-specific datalogger. Dataloggers keep an un-alterable record of instrument measurements for a period of five (5) to sixty (60) days, depending on the complexity of the data logger and the amount of information stored. Data stored in the dataloggers are accessed automatically by the data management system (DMS).

All transmitted raw datasets stored in electronic form in the DMS (e.g., AirMVP/AirVision) are retained intact by permanently archiving the data. A copy of the raw data is also maintained, upon which, data reduction operations can be performed repeatedly without violating the integrity of the original raw dataset (as described above). Retaining copies of all datasets electronically recorded provides a data audit trail. These datasets are archived on backup-systems, which are maintained by the Office of Technology and Information Services (OTIS) (e.g., PQAO local area network (LAN) servers, as well as off-site, as discussed in Section 7 of this QAPP).

The data shall be stored for a period of ten (10) years, unless any litigation, claim, negotiation, audit, or other action involving the data and its supporting records has been started before the expiration of the ten-year period. If this happens, the data and 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 air quality monitoring program is being implemented in conformance with its approved QA Project Plan. These activities are conducted to increase confidence in the information obtained, and ultimately to determine whether the information may be used for their intended purpose. Table 4-1 provides a summary of the relevant assessments performed in Florida's ambient air quality 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 Plans and Assessments
- External Performance Audits
- Internal Performance Audits
- Technical Systems Audits
- Internal Systems Audits
- 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 consists of SLAMS and SPM monitoring stations. The goal of the network plan is to determine conformance with network requirements as set forth 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 in accordance with 40 CFR §58.14. The annual monitoring network plan is made available for public inspection and comment for at least 30 days prior to submission to EPA Region 4 and the submitted plan addresses, as appropriate, any received comments. Annual network plans, in accordance with

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 is considered. The 5-year network assessment may also include information related to applicable waivers for the PQAO monitoring network stations. 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 the Florida's network please see the Annual Network Plan at this link: https://floridadep.gov/air/air-monitoring/.

18.3. External Performance Audits

The Florida PQAO participates in the EPA National Performance Audit Program (NPAP) for performance audits of monitoring equipment. Information about these audits, which are part of the EPA National Performance Evaluation Program, are detailed in 40 CFR Part 58, Appendix A, Section 2.4.

In general, the NPAP is a performance evaluation where quantitative data are collected independently to evaluate the accuracy of the monitoring equipment. In Region 4, a mobile laboratory arrives at a Florida monitoring site and generates known concentrations of pollutant-specific audit gases, used to challenge the specific on-site analyzer. Results of the comparison are immediately available to site operators and the QA staff. More information about NPAP can be found in 40 CFR Part 58, Appendix A, §3.1.3.

18.4. 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 PQAO monitoring equipment.

All continuous monitors will be audited to ensure that the minimum number of federally specified audits are completed each calendar year. 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 should not be the operator for that specific site. Specifications for performance audits are detailed in the PQAO audit SOPs. Performance evaluation audits shall be performed in accordance with the schedule established by Florida DEP.

18.4.1 Accuracy Audit Assessment

Analyzer performance audits (i.e., Performance Evaluation Audits) that have been conducted by a Florida DEP QA auditor shall be the basis upon which the monitor's accuracy is assessed.

These audits will be included in the calculations for determination of an agency's accuracy. While accuracy audits will not be used to invalidate or adjust concentration data, if a performance audit for a monitor indicates a problem, corrective actions must be performed to ensure the overall quality of the data. Corrective actions must be completed in accordance with the Corrective Action SOP (DEP 01-4). See Sections 20 and 21 of this QAPP and the Data Handling and Data Validation SOP (DEP18-27) for further details on assessing data quality when a problem is noted during an audit.

18.4.2 Performance Audit Results

The performance audit results for gases will be reported to the same number of significant digits as the ambient data for the pollutant. The audit report will contain additional decimals for information only.

18.5. 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, in accordance with 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 Administrator(s) (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.

EPA TSA auditors may segregate the TSA activities into multiple categories, which may 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 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 on a periodic basis until the corrective actions have been completed.

TSAs conducted by EPA shall be performed once during every three-year period 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, all monitoring organizations in the PQAO should be audited within 6 years (two TSA cycles of the PQAO).

18.6. Internal (Florida DEP Quality Assurance) Systems Audits

Florida DEP performs a quality assurance (QA) systems audit, which is similar to a technical systems 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.

18.6.1. Post-Audit Activities

The auditors will provide the OAM Data Quality Section Administrator with a summation of their notes and possible findings to review prior to submitting an audit draft report to the audited agency. 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 28-6: 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.

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.

18.6.2. Follow-up and Corrective Action Requirements

As part of corrective action and follow-up, an audit finding response will be generated by the audited organization for each finding in the QA systems audit report with a corrective action report where appropriate. The audit finding response is signed by the Local Program Administrators and/or Managers and sent to the Florida DEP 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 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.

18.6.3. Audit Schedule

Florida DEP shall conduct QA systems audits once during every three to five-years that the monitoring organization operates the network which collects data verifying compliance with the NAAQS.

18.7 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. Measurement uncertainty will be estimated for both automated and manual data recording methods.

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 a specific pollutant. The precision estimate (calculation) used to assess the precision checks for the gaseous analyzers is found in 40 CFR Part 58, Appendix A, §4.1.2; the bias estimate is found in the §4.1.3. Other DQA calculations are also detailed in this section of the CFR.

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 is 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 root cause and then corrective actions implemented.

Also, during these quarterly data assessments, the Data Validation Team and Local Program QA Coordinators/Staff will generate AMP 430 (Data Completeness), AMP 504 (Extract QA data), and AMP 501 (Extract Raw Data) reports. The results of these reports are compared to the MQOs in Section 5 of this QAPP, documented in Tables 5-4 through 5-7. 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, in accordance with grant commitments.

18.8 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.

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 in accordance with 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 agencies have systemic issues, and will have the same reporting/corrective action requirements as the QA systems audit (discussed in Section 18.6 above).

Florida DEP performs these Data Quality Audits within the PQAO as necessary; therefore, all agencies are not reviewed each year. However, over a 5-year period 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 resulting in difficulty or failure to meet data completeness requirements. This audit 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 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 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.

18.9. Data Certification

In accordance with 40 CFR 58.15, an annual air monitoring data certification letter is required to certify that the data collected by the FRM and FEM monitors at SLAMS (and SPM sites, if applicable) within the Florida PQAO network meet 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 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 on a quarterly basis 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:

- AMP350 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 Coordinator 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 course of the entire year and met the DQOs. If problems are identified, they are investigated in accordance with 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 data certification package is due to EPA Region 4 by May 1 of each year.

18.10. Reporting and Resolution of Issues

An important function of a quality system is a communication structure that ensures corrective actions, when needed, are implemented in a timely manner 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 QAM and/or Local Program Manager.

In most cases, the QAM will assess the need for corrective action, although occasions may arise where other Florida DEP Administrators and/or senior management personnel are delegated this responsibility. If one is deemed necessary, a suitable corrective action 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 work 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. in accordance with 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 Ground Fault Circuit Interrupter (GFCI) circuit breaker,
- Time synchronizations, and
- Thermostat adjustments.

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. Any disputed or unresolved corrective actions are elevated to DEP's Program Administrator and the applicable Local Program Administrator(s) for resolution by either the QAM, Data Quality or Field Operations Administrators.

19.0 REPORTS TO MANAGEMENT

This section describes the quality-related reports and communications to management necessary to support ambient air 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 a NAAQS within 30 days of the known exceedance event. The notification will include a summary of statistics from AQS generated reports, such as design values. A notification is not generated if there are no exceedances during the month.

Table 19-1: Report Flow for EPA Exceedance Reports

AUTHOR →	RECIPIENT(S)
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 Data Validation Team and Local Program QA staff will be responsible for reviewing and validating the concentration data and submitting all applicable reports (e.g., AirMVP Data Completeness, Data Validation Checklist, etc.). Additionally, these reports should be accompanied by a memo from the Local Program QA Coordinators/Staff or the Field Technicians (for the Florida DEP) for data captures below 75% (90% for ozone) for the quarter, 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
Local Program QA Coordinators	

Florida PQAO will report to AQS the results of all valid precision and bias checks and 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 set forth 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.

In accordance with 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 criteria pollutant monitor does not achieve at least 75% (90% for ozone) data completeness in any quarter. Notification is provided via a letter, which is written by the Data Quality Section Administrator 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 criteria pollutant monitor achieves acceptable data recovery.

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

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

19.5. Annual Performance Evaluations

Florida DEP QA auditors conduct performance evaluations (audits) of each instrument in the network once each calendar year, using specially designated audit equipment. All gaseous transfer standards used in the air monitoring network must be traceable to a primary standard such as a NIST Standard Reference Material (NIST SRM) or an EPA/NIST-approved Certified Reference Material (CRM).

The results of each performance evaluation are documented on designated 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 seen in table 19-5 below. After approval, the reports are then distributed to the Field Operations Section Administrator, QA Manager, Local Program QA Coordinators/Staff, and Field Technicians.

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

AUTHOR →	RECIPIENT(S)
QA Auditor	Data Quality Section Administrator →QA Manager→ Field Operations Section Administrator→ Local Program QA coordinator→Field Technician

19.6. Siting Criteria Evaluation Reports

Florida DEP QA auditors conduct siting criteria evaluations annually for each site in the network. 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, Local Program QA Coordinators/Staff, Field Technicians, 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)
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 gaseous 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 OAQPS and EPA Region 4.

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

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

19.8. Annual Network Plan

Florida DEP conducts a network review in accordance with 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 prior to 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)
QA Manager	Program Administrator → Division Director → Public Comment → EPA Region 4

19.9. Quality Assurance Systems and Data Quality Audit Reports

Florida DEP performs internal Quality Assurance (QA) Systems Audits and Data Quality Audits (see Sections 18.6 and 18.8, 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 -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 QA Systems and Data Quality 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

In accordance with 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)
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 recurring
- 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 to 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 analytical instruments are employed to measure ambient concentrations of specific pollutants. To be useful, the data must undergo evaluation to determine the degree to which each data point has met its quality specifications. Florida's QA staff, particularly the Data Validation Team and QA Coordinators/Staff, evaluate the data to establish that data collection is consistent with QAPP and SOP requirements. The Data Quality Section Administrator and Quality Assurance Manager, in collaboration with the Data Validation Team and QA Coordinators/Staff, estimate the potential effect any deviation from the QAPP or SOP requirements may have on the usability of the associated data item, its contribution to the quality of the reduced and analyzed data, and its effect on decisions as needed.

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 should be compared to actual events, as per guidance (Guidance on Environmental Data Verification and Data 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 prior to upload into AQS. The review of the routine data and the associated QC data will be verified and validated on a monthly basis. Gaseous data is downloaded to the data acquisition system (i.e. AirMVP and/or AirVision) daily and examined daily to ensure the data is acquired according to requirements. Continuous data is later reviewed in batches during the data validation process. 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 provision of objective evidence, that specified requirements have been fulfilled. Field Technicians/QA staff verify the gaseous data collected when reviewing and documenting their electronic strip charts throughout the data collection process, as well as by verifying or updating the flags applied to data by the site dataloggers. Any missing data (gaps) are reviewed and accounted for, and unacceptable or questionable data will be flagged by the Field Technicians/QA staff during the daily and/or monthly data review process. At that time, all flagged data will be re-verified by the Data Validation Team and QA Coordinators/Staff. 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 examination and provision of objective evidence that the particular requirements for a 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 (see Section 5 of this QAPP), which is completed by the Data Validation Team and QA Coordinators/Staff. It also includes the review of data against the QA/QC results, electronic strip charts, as well as the comparison of the data against basic statistics (such as completeness). Reviewing data long-term (over a monthly or quarterly time-frame) 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 prior to upload 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 prior to upload to AQS. The Data Quality Section Administrator and/or AQS Coordinator spot-checks these data after validation by the Data Validation Team and QA Coordinators/Staff is completed, prior to 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 Monitors used in Evaluations of National Ambient Air Quality Standards
- 40 CFR Part 58, Appendix D – Network Design Criteria for Ambient Air Quality 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., shelter location, probe placement, and/or monitor sight path requirements) shall be thoroughly documented in the Site Review report. 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). Sites that do not meet siting requirements are to be flagged with the "SX - Does Not Meet Siting Criteria" qualifier code until siting issues are resolved or EPA grants a siting criteria waiver.

20.3. Sample Collection Procedures

Sample collection procedures are outlined in Section 9. Potentially unacceptable data points are routinely identified in the database through electronic application of error flags. Each instrument-specific flag is associated with a unique error. 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 averaging periods.

The impact of any sample collection deviations shall be evaluated during data validation by the QA staff prior to upload of the data to AQS. Additionally, adherence to sample collection procedures and associated SOPs are verified during Quality Assurance Systems Audits and Data Quality Audits. Any deviation from the established sample collection plan must be documented in the appropriate logbook or data sheet. Accurate and complete documentation of any data 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 field technicians and/or QA staff. The qualifier flags and null codes are transmitted to AQS and provide the principal means of communicating data quality characteristics to the EPA. A compilation of the EPA null codes and quality assurance flags is presented in Tables 20-1 through 20-4. The PQAO Data Handling and Data Validation SOP provides a list of the commonly used null codes and quality assurance flags as well as sample scenarios for their use.

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Table 20-1: Qualifier Code Description and Type

Qualifier Code	Qualifier Description	Purpose
1	Deviation from a CFR/Critical Criteria Requirement	Flag is applied to valid data to provide additional information.
1V	Data reviewed and validated	
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	
DN	DNPH peak less than NATTS TAD requirement, reported value should be considered an estimate	
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	
ND	No Value Detected, Zero Reported	
NS	Influenced by nearby source	
QP	Pressure Sensor Questionable	
QX	Does not meet QC criteria	
QT	Temperature Sensor Questionable	
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	

Qualifier Code	Qualifier Description	Purpose
W	Flow Rate Average out of Spec.	Flag is applied to valid data to provide additional information.
X	Filter Temperature Difference or Average out of Spec.	
Y	Elapsed Sample Time out of Spec.	

Table 20-2: Null Code Description and Type

Null Data Code	Code Description	Purpose
1C [1]	A 1-Point QC check exceeds acceptance criteria but there is compelling evidence that the analyzer data is valid	Code is applied to invalid data, where the code replaces the data value.
1F[2]	No 1 Point QC but need to count for completeness	
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	

Null Data Code	Code Description	Purpose
BF	Precision/Zero/Span	Code is applied to invalid data, where the code replaces the data value.
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	
EC	Exceeds Critical Criteria	
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	
SV	Sample Volume out of limits	
TC	Component Check & Retention Time Standard	
TS	Holding Time or Transport Temperature Is Out of Specs.	
XX	Experimental Data	

[1] QC null code only used on QC data effective January 1, 2021.

[2] QC null code only used on QC data effective January 1, 2022.

Table 20-3: Informational Flag Description and Type

Informational Flag	Flag Description	Purpose
IA	African Dust	Flag is applied to provide additional information on events that may have influenced the data
IB	Asian Dust	
IC	Chem. Spills & Indust Accidents	
ID	Cleanup After a Major Disaster	
IE	Demolition	
IF	Fire - Canadian	
IG	Fire - Mexico/Central America	
IH	Fireworks	
II	High Pollen Count	
IJ	High Winds	
IK	Infrequent Large Gatherings	
IL	Other	
IM	Prescribed Fire	
IN	Seismic Activity	
IO	Stratospheric Ozone Intrusion	
IP	Structural Fire	
IQ	Terrorist Act	
IR	Unique Traffic Disruption	
IS	Volcanic Eruptions	
IT	Wildfire-U. S.	
J	Construction	

Table 20-4: Exclusion Flag Description and Type

Exclusion Flag	Flag Description	Purpose
RA	African Dust	Flags data influenced by an exceptional event that will be excluded.
RB	Asian Dust	
RC	Chem. Spills & Indust. Accidents	
RD	Cleanup After a Major Disaster	
RE	Demolition	
RF	Fire - Canadian	
RG	Fire - Mexico/Central America	
RH	Fireworks	
RI	High Pollen Count	
RJ	High Winds	
RK	Infrequent Large Gatherings	
RL	Other	
RM	Prescribed Fire	
RN	Seismic Activity	
RO	Stratospheric Ozone Intrusion	
RP	Structural Fire	
RQ	Terrorist Act	
RR	Unique Traffic Disruption	
RS	Volcanic Eruptions	
RT	Wildfire-U. S.	

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 Local Program QA Coordinators/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. during QC activities, maintenance, and power failures) will be replaced with the appropriate AQS Null Data codes.
- Each hour of gaseous concentration data is composed of at least 45 minutes of valid data. Hours of data with less than 45 minutes of valid data collection will require invalidation of the hourly averaged data. For SO_2, **both** the hourly and five-minute averaged data will require invalidation. The affected data will be replaced with AQS Null Data codes.
- The shelter temperature must be maintained within 20-30 °C, or per the manufacturers' or FRM/FEM specifications if designated to a wider

temperature range. All data collected when outside of this operational range will be invalidated and replaced with AQS Null Data codes.

- The zero and span points of all Zero and Span Checks must be within the acceptance criteria limits specified in Tables 5-4 to 5-7. Florida does not invalidate data based on the zero or span points, but an exceedance of limits will require investigation and based on a weight-of-evidence approach, the data's validity will be addressed.
- The calculated difference for the precision point conducted during precision checks (i.e., 1-point QC checks) must be within the acceptance criteria control limits (i.e. meet the MQOs) specified in Tables 5-4 to 5-7. If the 1-pt QC exceeds the percent difference limits, all hourly and five-minute (for SO_2) averaged data will be invalidated back to the last passing Precision Check or known point of analyzer malfunction Additionally, data may be invalidated forward to the point when the corrective action(s) are completed. Invalidated data will be replaced with AQS Null Data codes.
    - All valid, both passing and failing, precision checks will be uploaded to AQS in accordance with EPA's Office of Air Quality Planning and Standards (OAQPS) Memo "Steps to Qualify or Validate Data after an Exceedance of Critical Criteria Checks" dated January 21,2022.
    - Invalid 1-Point QC checks should be reported to AirMVP with the 1C null code in the QA/QC Checks screen.
    - Valid failed 1-Point QC checks should be reported to AirMVP with the 1F null code in the QA/QC Checks screen.
    - Refer to the Data Handling and Data Validation SOP (DEP 18-27) for examples of handling concentration and QA data in AirMVP and AQS.
- The calculated percent difference for Level 3 through Level 10 conducted during a QA Performance Evaluation must be within the acceptable operational criteria control limits (i.e. meet the MQOs) noted in Tables 5-4 to 5-7. All valid performance evaluations are reported to AQS. Passing performance evaluations are those that are within the criteria limits for Levels 3-10.
    - If the Performance Evaluation results for Levels 3-10 exceed these criteria limits, the validity of the failed audit must be verified by a zero/span/precision (Z/S/P) check with an independent transfer standard (i.e. the transfer standard routinely located at the site should **not** be used).

- If the failed audit results are verified, then data will be invalidated back to the point of the last acceptable precision check or a known point of analyzer malfunction. Additionally, data may be invalidated forward to the point when the corrective action(s) are completed. The affected data will be replaced with AQS Null Data codes.
- Florida does <u>not</u> invalidate data solely based on performance evaluation audit results. Please refer to the Corrective Action SOP (DEP 01-4) for further details on corrective action procedures.
- Comparison failures at Levels 1 and 2 **only**, <u>are not considered failed audits.</u> However, an investigation and assessment of the instrument must be conducted to ensure data quality is maintained. These evaluation procedures are described in Section 3.1.1 of the Corrective Action SOP (DEP 01-4).

o Performance Evaluation data uploaded to AQS as QA data must actually provide quality assurance to the applicable concentration data within AQS. Examples are below:

- If a Performance Evaluations audit was not completed according to SOP and/or concentrations do not appear stable, audit should be considered invalid and documented as such. Invalid audits must not be uploaded to AQS. If not completed at the correct concentrations, determine and document reason(s) why and possible solution(s). Determine if a follow-up audit must be scheduled so that the correct audit concentrations may be assessed to meet CFR requirements.
- If the QA auditor's equipment is malfunctioning during a Performance Evaluation, resulting in unacceptable results for Levels 3-10, no ambient concentration data will be invalidated, and the results of the Performance Evaluation will not be uploaded to AQS. The QA auditors and the Data Quality Section Administrator will make every effort to re-audit the equipment, so that each monitor will have at least one valid PE for the calendar year.

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

20.5. Calibration

Section 12 addresses the calibration of instruments and equipment and the information that should be presented to ensure that the calibrations are performed correctly, and the results are acceptable. When calibration problems are identified, any data produced between the suspect calibration event and any subsequent recalibration should be flagged or invalidated to alert data users.

20.6. Data Reduction and Processing

As mentioned in the above sections, both internal and external TSAs will be performed to ensure the data reduction and processing activities mentioned in the QAPP are being followed. Data will be reviewed on a monthly basis to ensure that associated flags or any other data qualifiers have been appropriately associated with the data and that appropriate corrective actions were taken.

20.7. Exceptional Events

40 CFR 50.14 allows the EPA Administrator to exclude certain data from being used for determinations of exceedances and violations of a NAAQS, so long as a State demonstrates to the Administrator's satisfaction that exceedance or violation was caused by an "exceptional event." 40 CFR 50.1 defines an "Exceptional Event" as an event or events, in which:

- The resulting emissions affect air quality in such a way that there exists a clear causal relationship between the specific event(s) and the monitored exceedance(s) or violation(s)
- The event(s) is not reasonably controllable or preventable
- The event(s) is caused by a human activity that is unlikely to recur at a particular location or is a natural event(s).

An Exceptional Event does not include:

- Air pollution relating to source noncompliance
- Stagnation of air masses or meteorological inversions
- Meteorological events involving high temperatures or lack of precipitation

However, conditions involving high temperatures, or a lack of precipitation may promote occurrences of particular types of exceptional events, such as wildfires or high wind events, which do directly cause emissions.

Data impacted by an Exceptional Event is not considered "representative" of air quality for NAAQS comparison purposes, or calculation of certain summary statistics. All concentration data impacted by an Exceptional Event must be flagged with an AQS Request Exclusion code and must be linked within AQS to an event description. Exceptional Event codes and descriptions are typically due by July 1 of

the following year, but alternative schedules may be established during Federal rulemaking. It is the responsibility of the Quality Assurance Manager to analyze data for potential Exceptional Events and to add the necessary flags and descriptions into AQS by July 1 of the following year (or by applicable regulatory deadlines).

A State seeking concurrence must notify and cooperate with the appropriate EPA Regional Office (i.e. EPA Region 4) to prepare a demonstration package for the Administrator. Exceptional Event data in AQS must receive concurrence from the EPA Administrator. Data that does not receive a concurrence is still eligible for NAAQS comparisons, regardless of the application of Request Exclusion flags. See Table 20-4 above for the applicable exceptional events AQS codes.

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] in 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 QA Handbook. The templates are included in this QAPP in Section 5.5 and will be used for the weight of evidence approach afforded to PQAOs within the regulation. The 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 and every criterion on the critical table should be invalidated unless there are compelling reason and justification for not doing so. Basically, 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 in nature.
- Operational Criteria - Violation of a criterion or a number of 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 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 dataloggers that acquire the data in the field. Averaging times represent the minimum intervals recorded by the datalogger. Raw data may have been reduced, but are unedited, not reviewed, and are not adjusted. Raw data has not been edited for instrument downtime, but may be flagged with pre-programmed, user-defined status flags that the logger will apply to data points when excursions occur. Raw data are consulted on a regular basis to ascertain instrument functionality and to identify potential episodes prior to the monthly data validation process.

REVIEW (Verification)– Level 1 (Field Technician/Assigned 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). Verification and associated data edits include the following:

- Removal of values when monitoring instruments fail specified validation criteria.
- Verifying computer file entries against data sheets/logbooks, where appropriate.
- Replacement of data from a backup data acquisition system in the event of failure of the primary system.
- Identification and flagging of data that are beyond reasonable bounds, significantly deviate from measurement assumptions, or that may be deemed unrepresentative.
- Identification of data collected during periods of maintenance or malfunction.

QA REVIEW (Validation)– Level 2 (Data Validation Team and QA Coordinators/Staff): QA validation is the next step in data analysis. In addition to a Level 1 review of the data, the Data Validation Team and QA Coordinators/Staff verify the field technician's logbooks and data forms for completeness and accuracy and ensure the data results meet the MQOs found in Tables 5-4 to 5-7. Data that do not meet the requirements of the critical criteria elements will be invalidated, unless compelling evidence and justification exists for not doing so. In 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 Data Validation Team and QA Coordinators/Staff, in collaboration with the Data Quality Section

Administrator and Quality Assurance Manager, may deem that the data should be invalidated instead of qualified.

AQS READY– Level 3 (Data Quality Section Administrator and AQS Coordinator): Data is prepared for AQS submission and text files are created (see Data Handling and Data Validation SOP - DEP18-27). The Data Quality Section Administrator and AQS Coordinator will perform a cursory review of statewide data prior to upload to AQS. This review entails, but is not limited to, a review of code usage; performance audit data entry; minimum/maximum daily and monthly values; data spikes, outliers, exceedances; persistent values; data patterns or shifts; precision data; comparisons of collocated data; and documented commentary in AirMVP. If there are any issues or concerns, they will alert the QA Coordinator/Staff or the Data Validation Team. 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. These reports are retained electronically in the Florida DEP's Central Office & Local Program Offices. Furthermore, the data will also be spot-checked for accuracy by the Data Quality Section Administrator.

Tables 20-1 to 20-4 list the AQS null value codes, QA qualifier flags, and informational flags that may be applied to Florida's dataset during verification/validation processes.

22.0 RECONCILIATION WITH DATA QUALITY OBJECTIVES

Florida follows procedures that verify data collected by the PQAO complies with the criteria pollutant DQOs. Actions will be taken based upon 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 criteria pollutants within the state;
- Evaluate compliance with the NAAQS;
- Observe pollution trends; and,
- Alert the public when unhealthy pollution levels are detected or predicted.

The quantitative DQOs are established in 40 CFR Part 58, Appendix A, and stated in Section 5 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. Since Florida implements EPA's critical criteria for precision checks – FDEP should not have to directly calculate confidence intervals annually because all data should, statistically, meet the DQOs.

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 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 conduct an investigation 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 or equipment). Tools for determining the cause include reviewing:

- Data from a collocated network (e.g., state, other local program, national),
- Data from performance audits (e.g., other agency or NPAP), 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 Quality Assurance Manager and 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 making a decision error due to uncertainty in the data. Decision-makers, such as EPA, need to determine if the data collected within Florida's monitoring network will be less than, equal to, or greater than the level of the NAAQS for each specific criteria pollutant. 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 air monitoring data with confidence.

23.0 REFERENCES

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/240/B-01/003). Washington, D.C.

Environmental Protection Agency. 2017. *QA Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring Program* (EPA-454/B-17-001). RTP, North Carolina. March 2017.

U.S. Environmental Protection Agency. 2008. *QA Handbook for Air Pollution Measurement Systems Volume IV Meteorological Measurements Version 2.0* (EPA/454/B-08/002). RTP, North Carolina. March 2008.

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 August 1, 2019.

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 areview 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 5. 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 Gaseous & Ancillary SOPs

Statewide				
Document Control No.	**Document Name**	**Revision No.**	**Effective Date**	**Author/Contact**
DEP 01-4	Corrective Action	2	04/2021	Florida PQAO
DEP 06-12	TAPI T400	1	02/2022	Florida PQAO
DEP 06-13	TEI 49i	1.1	10/2019	Florida PQAO
DEP 06-14	TEI 49i-PS	1	02/2022	Florida PQAO
DEP 06-16	2B Tech 202	2	06/2021	Florida PQAO
DEP 06-17	TAPI T703/703E	1	08/2016	Florida PQAO
DEP 06-18	TEI 49iQ	0	09/2020	Florida PQAO
DEP 06-19	TEI 49iQ-PS	0	12/2020	Florida PQAO
DEP 06-20	2B Tech 211	0	12/2020	Florida PQAO
DEP 07-6	TEI 43i/43iTLE	1	02/2022	Florida PQAO
DEP 07-8	TAPI T100	0	05/2017	Florida PQAO
DEP 08-5	TEI 48i/48iTLE	1	02/2022	Florida PQAO
DEP 08-14	TAPI T300	0	05/2017	Florida PQAO
DEP 08-15	TAPI T300U	0	01/2020	Florida PQAO
DEP 09-2	TEI 42i	0	03/2018	Florida PQAO
DEP 09-5	TAPI T200	0	02/2018	Florida PQAO
DEP 09-6	TAPI T500U	0	06/2019	Florida PQAO
DEP 09-7	TAPI T200UP	0	01/2018	Florida PQAO
DEP 09-08	TEI 42iY-TLE	1	05/2021	Florida PQAO
DEP 13-4	TEI 146i	0	04/2017	Florida PQAO
DEP 13-5	TAPI T700/T700E/T700	0	08/2016	Florida PQAO
DEP 13-6	Environics 6100	2	01/2022	Florida PQAO
DEP 17-10	ESC 8832 Datalogger	0	02/2012	Florida DEP
DEP 17-11	Agilaire 8872	0	07/2021	Florida PQAO

DEP 18-18	Quality Assurance Audit Ozone Primary Comparison	1	01/2018	Florida DEP
DEP 18-27	Data Handling and Data Validation	2	02/2022	Florida PQAO
DEP 18-28	Conducting a Site Review	0	02/2022	Florida DEP
DEP 22-2	Ozone Transfer Standard Comparisons Utilizing an EPA-Certified Florida Primary Standard	6	03/2017	Florida DEP
DEP 22-3	Certification/Comparison of Digital Thermometers, Internal Temperature Sensors, and Min/Max Temperature Sensors	8	03/2022	Florida DEP
DEP 22-5	Certification/Comparison of Voltage Meters And Voltage Generators	7	03/2022	Florida DEP
DEP 22-7	Certification and Adjustment of Multi-Gas Calibrators	4	03/2021	Florida DEP
DEP 22-15	Quality Assurance Standards Laboratory Standard Operating Procedure for the Certification of Digital Barometers	1	04/2021	Florida DEP

Active Local Program Gaseous & Ancillary SOPs

City of Jacksonville				
Document Control No.	**Document Name**	**Revision No.**	**Effective Date**	**Author/Contact**
NA	TE 111 Zero Air Supply	2	03/2014	Charles Farmer
Miami-Dade County				
Document Control No.	**Document Name**	**Revision No.**	**Effective Date**	**Author/Contact**
SOP 65	ESC 8816 Data Logger	1	08/2006	Georgina Loo
SOP 70	T-API Model 701 Zero Air	0	10/2010	Georgina Loo
Orange County				
Document Control No.	**Document Name**	**Revision No.**	**Effective Date**	**Author/Contact**
OCEPD-16-2	TECO 111iQ Zero Air System	0	Draft in 2021	OCEPD
Palm Beach County				
Document Control No.	**Document Name**	**Revision No.**	**Effective Date**	**Author/Contact**
DER-17-PBC-13	SOP for TECO 111 Zero Air	0	03/1986	Palm Beach County-DOH

DEP-17-PBC-36	Teledyne/API 703E Ozone Primary Standard	0	06/2011	Palm Beach County-DOH
Sarasota County				
Document Control No.	**Document Name**	**Revision No.**	**Effective Date**	**Author/Contact**
SCAP 08-03	Teledyne API Model T701 Zero Air Generator	0	03/2015	Susie Miller

APPENDIX D - GLOSSARY OF AIR MONITORING TERMS

AirMVP	Air Monitoring Validation Program
AQS	Air Quality System – EPA's repository of ambient air quality data.
CAA	Clean Air Act
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.
FEM	Federal Equivalence Method – method approved for comparison to NAAQS.
FRM	Federal Reference Method – method approved for comparison to NAAQS.
MRAS	Maintenance, Repair and Acquisition Support team
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.
NO	Nitric 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).
NO_y	Total reactive nitrogen – a collective name for oxidized forms of nitrogen in the atmosphere, such as nitric oxide (NO), nitrogen dioxide (NO_2), nitric acid (HNO_3) and organic nitrates.
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.
PAMS	Photochemical Assessment Monitoring Station
PM	Particulate Matter – also known as particle pollution.
$PM_{2.5}$	Particulate Matter 2.5 micrometers in diameter and smaller.
PM_{10}	Particulate Matter 10 micrometers in diameter and smaller.
$PM_{10-2.5}$	Particle size between 10 and 2.5.
PQAO	Primary Quality Assurance Organization
PSD	Prevention of Significant Deterioration
SLAMS	State and Local Air Monitor Stations
SO_2	Sulfur dioxide
SPM	Special Purpose Monitors
TSA	Technical Systems Audit