DEP 18-27
Revision No. 2
February 2022

STANDARD OPERATING PROCEDURE

FOR

AIR MONITORING
DATA HANDLING AND DATA VALIDATION

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF AIR MONITORING

Prepared by: Florida PQAO Date: February 23, 2022

Approved by: Kyrsteen Webster Digitally signed by Kyrsteen Webster Date: 2022.02.24 10:07:03 -05'00' Date: February 24,2022

Quality Assurance Manager

REVISION HISTORY

Revision Number	Date	Author	Updates
0	October 2015	Cadedra Hodge	Initial Release
0	May 2016	Cadedra Hodge	• Addressed EPA comments received February 10, 2016 • Incorporated detailed instructions to run AQS reports • Attached AirVision Guide as an appendix
0	June 2016	Cadedra Hodge	• Corrected some inconsistencies in Section 12.6 • Updated Miami-Dade County local program agency name
0	May 2017	Cadedra Hodge	• Addressed EPA comments received October 13, 2016 • Updates resulting from release of QA Handbook for Air Pollution Measurement Systems (January 2017) • Updates resulting from EPA TSA (February 2017)
0	December 2017	Cadedra Hodge	• Addressed EPA comments received October 2017
0	March 2018	Cadedra Hodge	• Addressed EPA comments received March 2018 • Added section on EPA lead audits • Updated data validation templates based on EPA March 2018 updates
1	December 2019	Cadedra Hodge	• Updated current Revision Number. Only one version (March 2018) prior to this one has been approved by EPA. The March 2018 version should have been version 0. • Updated/removed language regarding manual (filter-based) PM_{10} operations throughout the SOP. • References - Updated QAPP references. • Section 3.3 – Updated language

Revision Number	Date	Author	Updates
			to incorporate Level 0 thru Level 3 review language (consistent with QAPPs). • Section 7.0 – Updated language to be consistent with the QAPPs. • Section 12.0 - Updated Data Validation Templates to ensure consistency with QAPPs. • Section 12.6.2 – Newly added section on AIRMVP Control Chart utility. • Section 12.6.7 - Removed manual (filter-based) PM_{10} operations as part of this section • Section 12.9 - Updated commonly used QA qualifier and null code tables. • Section 12.9 - Updated AQS QA qualifier and null code tables. • Section 12.10 – Organized and added updates based on previous guidance (i.e. FAMAC Notes, Data Quality Teleconference Notes, Technical/QA Notes, etc.) • Appendix C – Added additional clarification on which checks and audits to exclude. • Appendices – Updated screenshots and links to revised Monitor ID Form and Site ID Form.
2	February 2022		• Removed references to FAMAS and updated to AirMVP, where appropriate. • Incorporated applicable FAMAC Notes, Data Quality Teleconference Notes, Technical/QA Notes. • Updated FAMAS screenshots to AirMVP screenshots. • Updated PMTS screenshots and website link. • References – Updated.

Revision Number	Date	Author	Updates
			• Appendix – Updated. Removed FAMAS QA Transaction directions.

REFERENCES

AirMVP User Manual, August 2020, Florida Department of Environmental Protection, Tallahassee, FL.

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Quality Assurance Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring Program, January 2017, U.S. Environmental Protection Agency, RTP, North Carolina.

Quality Assurance Project Plan for the State of Florida Gaseous Ambient Air Quality Monitoring Program, Revision 1, November 2019, Florida Department of Environmental Protection, Tallahassee, FL.

Quality Assurance Project Plan for the State of Florida Lead Ambient Air Quality Monitoring Program, Revision 1, November 2019, Florida Department of Environmental Protection, Tallahassee, FL.

Quality Assurance Project Plan for the State of Florida National Air Toxics Trends Stations and Air Toxics Monitoring Program, Revision 2, November 2021, Florida Department of Environmental Protection, Tallahassee, FL.

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Quality Assurance Project Plan for the State of Florida Particulate Matter ($PM_{2.5}$ and PM_{10}) Ambient Air Quality Monitoring Program, Revision 1, October 2020, Florida Department of Environmental Protection, Tallahassee, FL.

Standard Operating Procedure for Ambient Air Monitoring Data Handling Procedures, DEP 02-2, Revision No. 3, January 2012, Florida Department of Environmental Protection Bureau of Air Monitoring, Tallahassee, FL.

Standard Operating Procedure for Data Handling, SCAP-07-03, Revisions No. 2, May 2014, Sarasota County Air & Water Quality Environmental Protection Division, Sarasota, FL.

Standard Operating Procedure for Data Management, Revision #0, November 2006, Miami-Dade County Department of Environmental Resources Management, Air Monitoring Section, Miami, FL.

Standard Operating Procedures for Data Quality Control of Lead and PM_{10} Monitoring Data, Revision 1.0, April 1, 2015, Environmental Protection Commission of Hillsborough County, Tampa, FL.

Standard Operating Procedure for Electronic Data Collection and Storage, Revision No. 1, March 2014, The City of Jacksonville Regulatory Compliance Department, Environmental Quality Division, Jacksonville, FL.

Standard Operating Procedure for Internal Data Handling and Verification, SOP #41, Revision #1, April 2015, Manatee County Parks and Natural Resources Department Air and Watershed Protection, Bradenton, FL.

Standard Operating Procedures for PM FRM Data Quality Assurance and Data Reporting, AM SOP 2.2, Revision No. 0.0, June 1, 2014, Environmental Protection Commission of Hillsborough County, Tampa, FL.

Standard Operating Procedures for Validation of Continuous Monitoring Data, AM SOP 2.1.1, Revision No. 1.0, April 16, 2015, Environmental Protection Commission of Hillsborough County, Tampa, FL

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1.0 PURPOSE

The State of Florida's Department of Environmental Protection (DEP) Division of Air Resource Management (DARM) Office of Air Monitoring (OAM), along with its nine (9) local program agencies, operates a robust statewide ambient air monitoring network. The nine local agencies include the following:

- City of Jacksonville Environmental Quality Division, Jacksonville, Florida
- Orange County Environmental Protection Department, Orlando, Florida
- Environmental Protection Commission of Hillsborough County, Tampa, Florida
- Pinellas County Air Quality Division, South Clearwater, Florida
- Palm Beach County Health Department Division of Environmental Public Health, West Palm Beach, Florida
- Sarasota County Air & Water Quality, Sarasota, Florida
- Broward County Pollution Prevention, Remediation and Air Quality Division, Davie, Florida
- Miami-Dade County Department of Regulatory and Economic Resources, Air Quality Management Division, Miami, Florida
- Manatee County Natural Resources Department, Air & Watershed Management, Bradenton, Florida

Florida operates as a single primary quality assurance organization (PQAO) comprised of multi-agencies. Henceforth, the word "Florida" in this document will be used to reference all air monitoring agencies (both state and local) within the network. The network consists of continuous ambient air monitors that collect hourly concentration data for the criteria pollutants including ozone (O_3), sulfur dioxide (SO_2), oxides of nitrogen (including nitric oxide (NO), oxides of nitrogen (NO_x) and nitrogen dioxide (NO_2)), and particulate matter (PM_{10} and $PM_{2.5}$). In addition, continuous data are collected for total reactive nitrogen compounds (NOy), trace level sulfur dioxide (SO_2TL), and trace level carbon monoxide (COTL). Florida also operates intermittent samplers that collect data for particulate matter 2.5 ($PM_{2.5)}$ and lead (Pb). All particulate matter 10 intermittent samplers in Florida's network were replaced with continuous samplers no later than February 2019.

The standard operating procedure (SOP) defined in this document is for the data handling and data validation of monitoring data collected by Florida's network. This SOP document describes Florida's ambient air quality data handling process from collection, review, and annotation of data from its sites to the verification and validation of these observations in AirVision, if applicable, to DEP's Air Monitoring Validation Program (AirMVP) database and ultimately, to the Environmental Protection Agency's (EPA) Air Quality System (AQS). Procedures are cross-referenced to relevant guidance or documentation: (a) in other areas of this SOP; (b) the

instrument manual; (c) the software manual; (d) EPA regulatory language; (e) Florida's QAPP; (f) EPA guidance; and/or (g) other Florida SOPs. As a single PQAO, it is imperative that Florida utilizes consistent quality assurance practices across its network. This SOP works in conjunction with the other SOPs that are maintained and used by air monitoring agencies across Florida.

2.0 SCOPE AND APPLICABILITY

The data generated by the criteria pollutant network are used for many purposes, such as: determining compliance with and/or progress made toward meeting the National Ambient Air Quality Standards (NAAQS); identifying pollution trends; assisting in evaluating public health impacts; and notifying the public about current air quality conditions. Since the success of the ambient air quality program's objectives rely heavily on the data and their interpretation, it is critical that the data available to users be reliable, of known and discernible quality, and aggregated in a manner that is acceptable for its primary use. To accomplish this activity, data must be collected and handled in a consistent manner that protects and ensures its integrity. Individual standard operating procedures (SOPs) are available for each monitor type and activity utilized within the Florida network. These documents are significantly detailed, and cover all topics from monitor installation, calibration procedures, preventative maintenance, auditing procedures, and documentation requirements, to name a few. SOPs can be found in AirMVP, alongside their respective equipment, and/or on the shared electronic drives located on each agency's network drive.

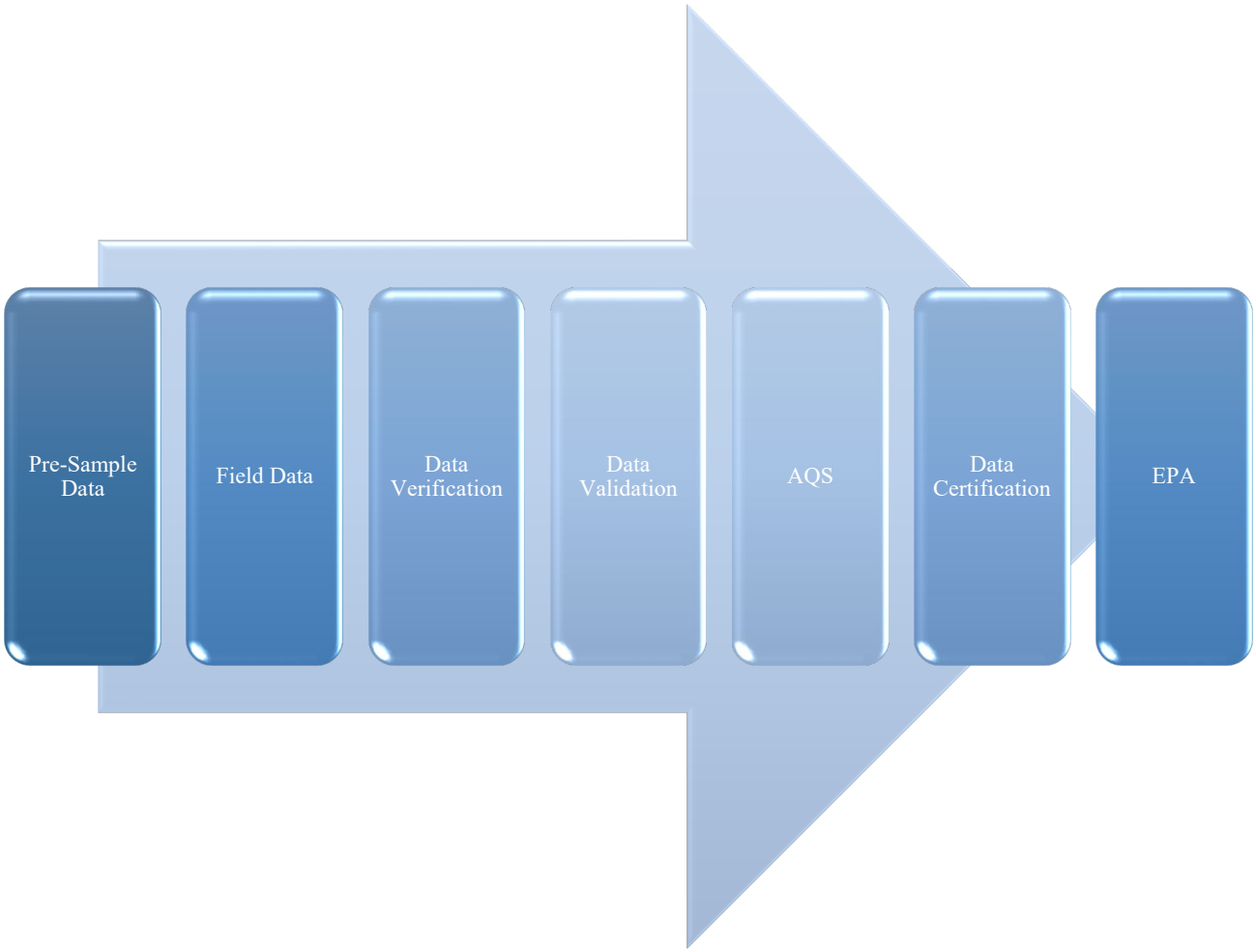
The purpose of this Air Monitoring Data Handling and Data Validation SOP is to provide a description of the data handling and validation procedures utilized by Florida for the criteria pollutant monitors, and of the air quality reports generated at the culmination of these activities.

3.0 SUMMARY OF THE METHOD

3.1 Data Flow

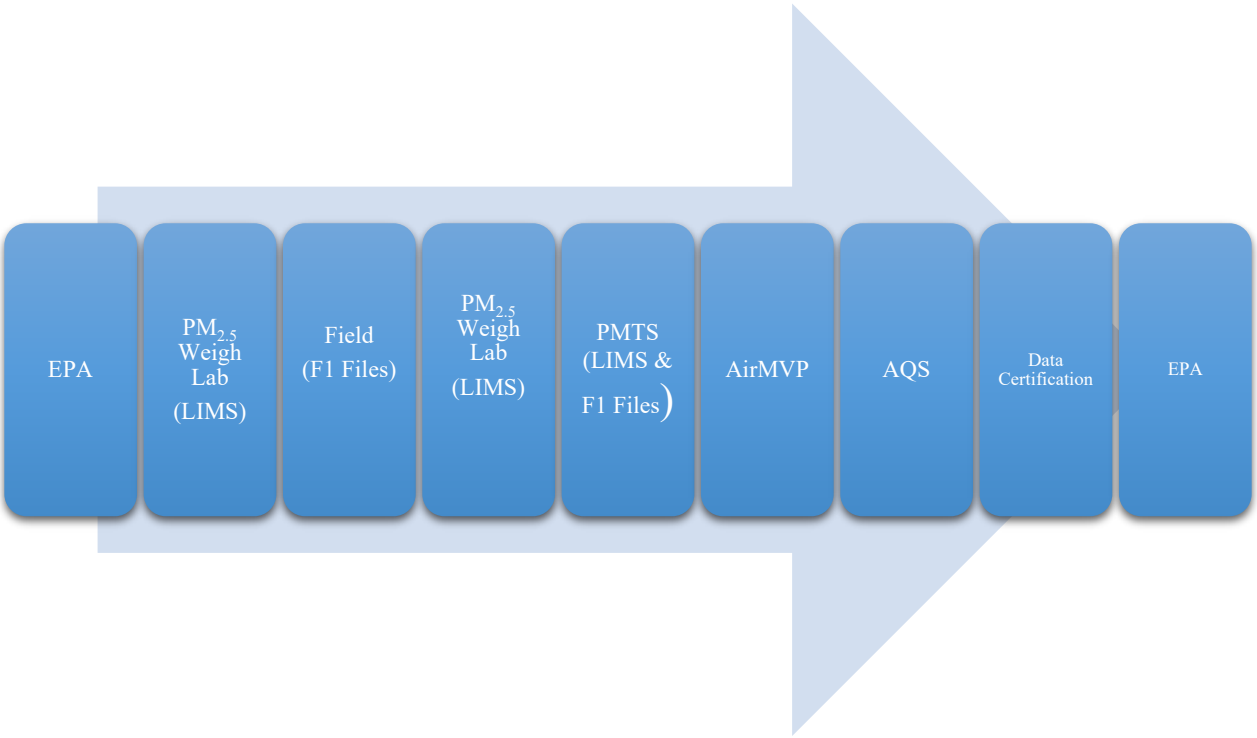
The statewide data flow for continuous air monitoring data (i.e. ozone, carbon monoxide, particulate matter, sulfur dioxide, and oxides of nitrogen, nitrogen dioxide, etc.) for Florida is represented in Figure 3-1. See Section 13.0 of this document for details on data acquisition and records management associated with continuous air monitoring data.

Figure 3-1. Florida Statewide Data Flow (Continuous Air Monitoring)



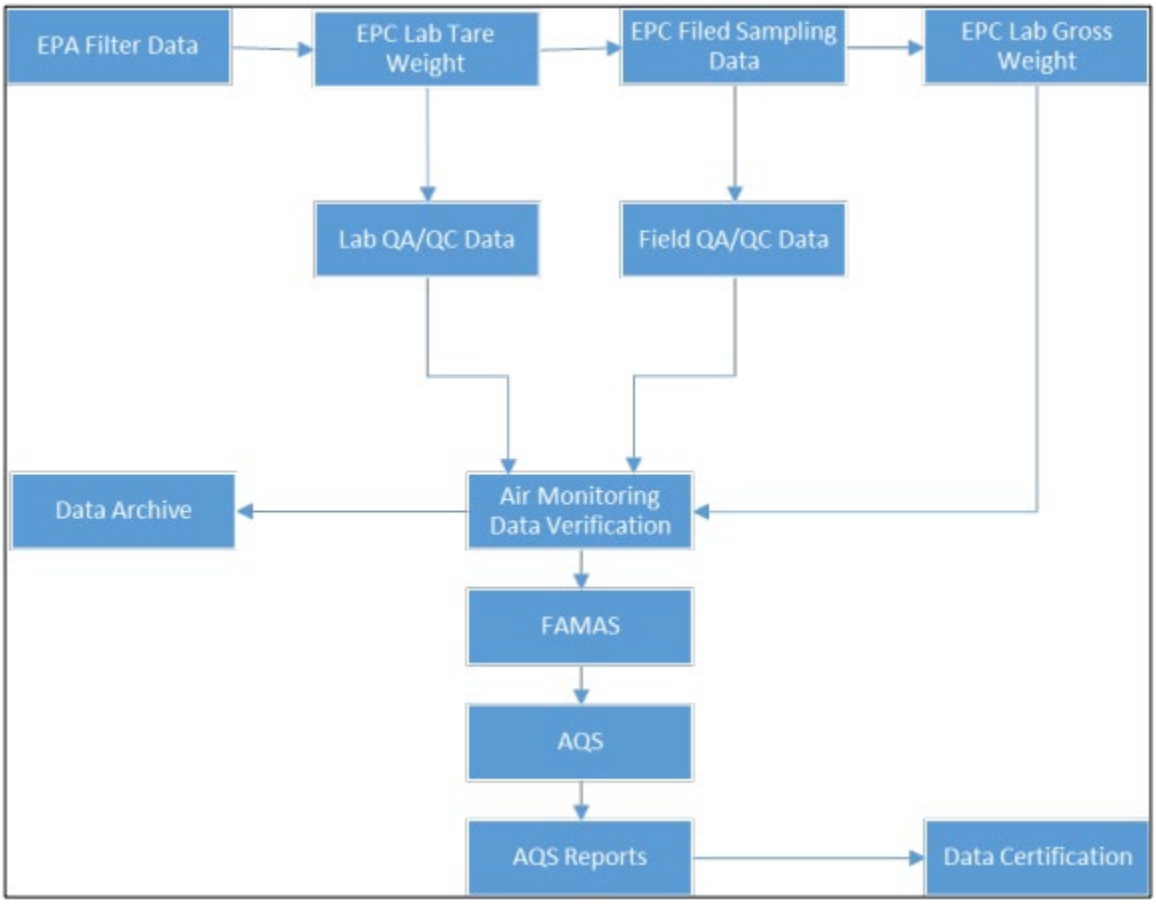
Florida has a single $PM_{2.5}$ Gravimetric Laboratory located in Tallahassee, Florida. The data flow for manual $PM_{2.5}$ is depicted in Figure 3-2. See Section 13.0 of this document for details on data acquisition and records management associated with manually retrieved air monitoring data.

Figure 3-2. Florida Statewide Manual $PM_{2.5}$ Data Flow



Florida also has a single lead laboratory that is located in Hillsborough County. Currently, the Environmental Protection Commission of Hillsborough County is the only agency within Florida that monitors for lead. The data flow for lead (Pb) is depicted in Figure 3-3.

Figure 3-3. Florida Statewide Lead (Pb) Data Flow



All data has a "chain-of-custody" and is influenced by numerous personnel and processes. In general, ambient air monitoring data collection activities begin in the field. Once data are collected, the field staff first reviews them. The field staff is the individual most intimate with the site/equipment and is most aware of any localized activities or events that could impact data integrity. Data is collected from the site, with supporting information from the field staff, and is then processed by the quality assurance staff. The QA managers/supervisors/coordinators have the ultimate review, validation, and certification of the data. The routine end-product of these activities is the generation and upload of quality-assured data files, transmitted into the DEP's AirMVP database. DEP transmits Florida's data into the EPA's AQS database. The local programs, additionally, utilize an intermediate (between the field and AirMVP) database, AirVision. They QA their data in AirVision and then it is transmitted into AirMVP. This process is detailed more in Section 12 and Section 13 of this document.

Pollutant data collected through manual monitors (i.e. $PM_{2.5}$ and lead) are reviewed for accuracy and validation as well. The samples undergo lab analysis. The data validation of manual $PM_{2.5}$ data is covered in detail in Sections 12.6.4 and 12.6.6 of this document. Section 12.6.7 of this

document addresses lead data validation in detail.

40 CFR Part 58 defines the data submittal requirements utilized by Florida. The regulation requires all agencies to report all monitoring and quality assurance data for the criteria pollutants on a quarterly basis. Reporting periods are based on calendar quarters. Data submitted must be in AQS-format, pursuant to the procedures defined in the AQS Coding Manual. All agencies perform the same reporting requirements set forth in the regulation above monthly.

3.2 Deadlines

To meet the federal regulatory deadlines established in 40 CFR Part 58, as detailed above, DEP has established deadlines for which all monitoring staff must adhere. As will be detailed in the subsequent sections of this SOP, the data collection, verification, and validation processes are intricate and time consuming. Therefore, to ensure that Florida can meet the 90-day requirement for routine data entry into AQS, Florida has deadlines for routine data entry (or the transfer of local program agencies' data from their primary data repositories) into AirMVP. The deadline for regular data certification and the deadlines for other related tasks has been established:

- Routine, preferably no later than the following business day, review of pollutant concentrations, meteorological and instrument diagnostic parameters by the field staff. The field staff are reviewing these data for outliers and anomalies and performing the additional investigation/action, as needed. The graphical display of the minute data is a tool to assist the operator in determining the stability of each concentration level when conducting QA/QC procedures. The QA staff reviews these data to ensure that the data were reviewed by field staff and are handled correctly. Minute data review is to be documented appropriately (i.e. initials/name, date, and comment that the entire day was reviewed) on the first hour or minute of the previous day. All agencies must review their minute data. Florida DEP will utilize AirMVP to generate these electronic strip charts, a time series graphical presentation of the data, and will make the annotation via the Matrix Editor in AirMVP; however, the local program agencies will utilize AirVision, where their one-minute data are stored, to generate the electronic strip charts. Florida DEP staff, please refer to the AirMVP User Guide for instructions on how to generate these strip charts. Local program agencies, please refer to Appendix E of this document for the AirVision User Guide.
- Bi-weekly review and upload of calibration results. "Upload" in this sense refers to the electronic records being saved to a shared drive or a document management database. These records should be reviewed, verified, and signed by the appropriate QA staff.
- Quality control (QC) check results and maintenance activities should be submitted timely, reviewed, and verified monthly by the appropriate QA staff.
- The data validation, comments, flags and precision data entry in AirMVP needs to be completed monthly, no later than 20 days after the end of each month.
- The complete and final submittal to AirMVP and data verification should be completed no later than 40 days after the end of the quarter (see Section 12.6 and Section 12.7 of this document for details).

- A quarterly report of agency's data completeness should be generated after each quarter (see Section 12.7 of this document for details).
- Quarterly review of agency's data in AQS (see Section 12.7 of this document for details).
- Annual data certification procedures are completed by Florida DEP's OAM by May 1 of each year. The local agencies will work with DEP, as needed, to address any data concerns or issues (see Section 12.8 of this document for details).

3.3 Flow of Data Review

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. Level 2 Review is performed monthly and quarterly by the designated independent reviewer (QA). In addition to Level 2 Review includes:

- Verification of the Level 1 review of the data.
- Ensure data meets QA//QC requirements and objectives of its intended use.
- Review field technician's logbooks and data forms for completeness and accuracy and ensure the data results meet the MQOs found in Tables 12-1 to 12-9. 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

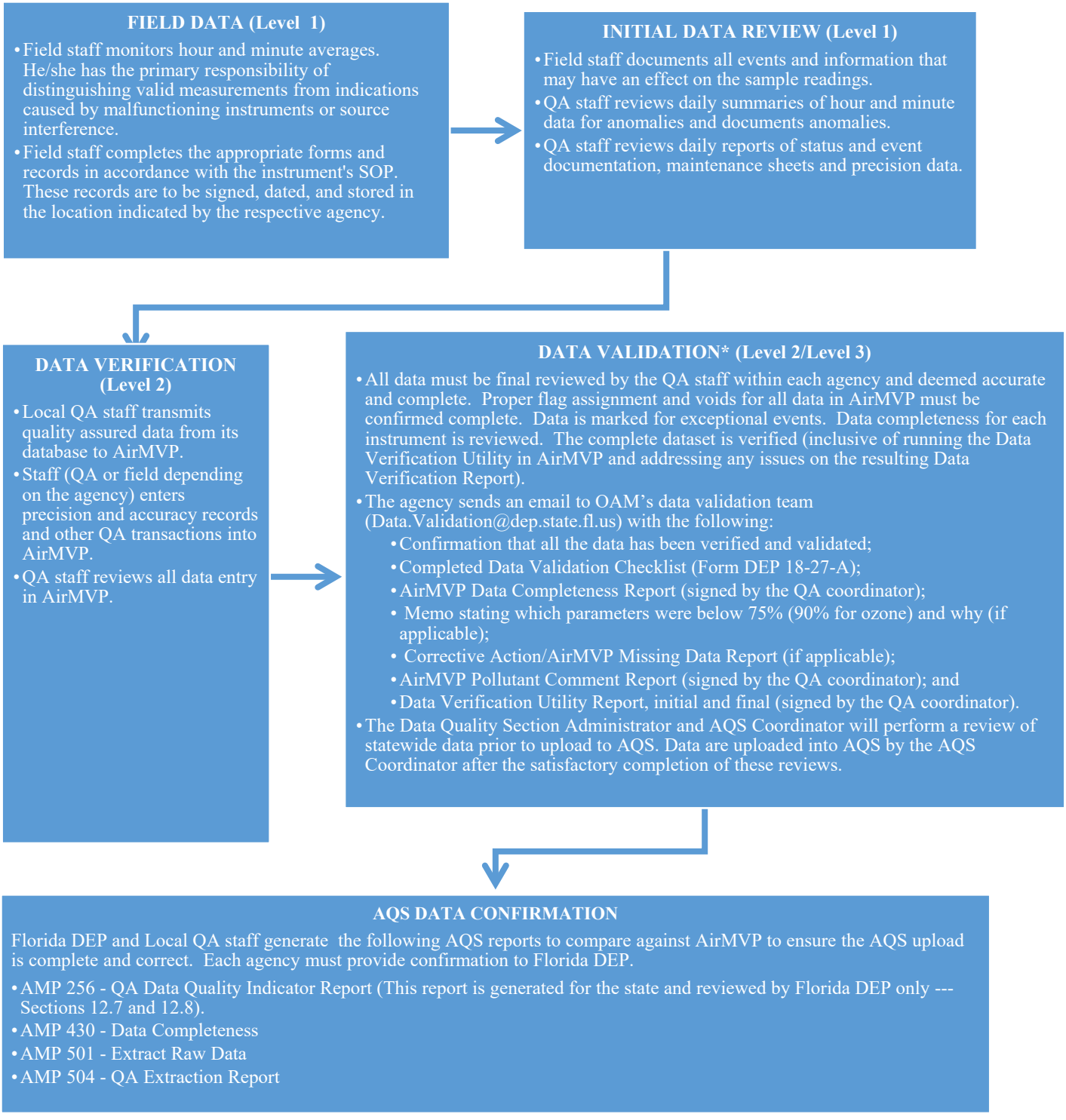
operational or systematic criteria. If multiple operational criteria flags are applied to the data, the Data Validation Team and QA Coordinators/Staff, in collaboration with the Data Quality Section Administrator and Quality Assurance Manager, may deem that the data should be invalidated instead of qualified.

AQS READY– Level 3 (Data Quality Section Administrator and AQS Coordinator): Data is prepared and approved suitable for release to AQS. The Data Quality Section Administrator and AQS Coordinator will perform a 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. AQS submission and text files are created and submitted by the AQS Coordinator (see Section 13.0 of this document). 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.

The general flow of Florida's data review is depicted in Figure 3-4 and Figure 3-5 shown below. The local program agencies perform their initial data review and QA of data in AirVision. Subsequently, the data are transferred to AirMVP which is the repository for Florida's air monitoring data. See Section 13.0.

The following figure, Figure 3-4, details the flow of the data review for continuous air monitoring data

Figure 3-4. Data Review – Continuous Pollutant Monitors



* - The QA coordinators from the local program agencies are responsible for setting the verified flags, both monthly and quarterly, on the Data Verification Report prior to emailing OAM's data validation team. This signifies that the agency has

employed the appropriate QA/QC procedures when reviewing its data. Additionally, the agency is responsible for submitting the required email and completed documents as identified. For the OAM, the data validation team is responsible for completing and ensuring that that these same tasks have been completed (i.e. Florida DEP field operators generate the AirMVP Completeness Report). Any pertinent emails regarding decision-making during the data validation and data verification process should be saved and/or appended to the Data Validation Checklist (Form DEP 18-27-A).

The following figure, Figure 3-5, depicts the data review flow for manual $PM_{2.5}$ air monitoring data. This data flow begins once the filter leaves the $PM_{2.5}$ Gravimetric Laboratory and is going to the field. $PM_{2.5}$ Gravimetric Laboratory procedures are discussed in the DEP 16-23 $PM_{2.5}$ Laboratory SOP.

Figure 3-5. Data Review – Manual $PM_{2.5}$

FIELD (Level 1)

- Field staff ensures the filter chain of custody is maintained between the $PM_{2.5}$ Gravimetric Laboratory and the field.
- Field staff completes the field sheets.
- Field staff maintains the sampler according to its respective SOP.
- Field staff retrieves F1 files and ensure that they are complete.
- Field staff notes any disruption in sample handling that may have compromised the validity of the samples.

INITIAL DATA REVIEW (Level 1)

- Staff (field or QA depending on the agency) uploads the F1 files into the PMTS database.
- Staff (field or QA depending on the agency) utilizes the F1 files and the PM Field Sheet to review and to ensure that data are accurate and complete and makes annotations as needed.
- Staff reviews the $PM_{2.5}$ Analysis Reports to determine the appropriate holding time for filters and to handle any other filter data appropriately (depending on code, if any, entered by the $PM_{2.5}$ Gravimetric Laboratory staff).

DATA VERIFICATION† (Level 2)

- QA staff compares data in PMTS to the field sheets (i.e. serial numbers, dates, concentrations, etc.)
- QA staff reviews field sheets to ensure that the appropriate and timely maintenance was performed on the sampler within specifications.
- Comparisons of the F1 files to PMTS and field records are performed to ensure accuracy and correct data transfer.
- QA staff validates filters in PMTS with the appropriate flags and/or null codes.
- QA staff transfers data from PMTS to AirMVP ensuring that all null codes and flags are transferred over to AirMVP, also.

DATA VALIDATION* (Level 2/Level 3)

- All data must be final reviewed by the QA staff within each agency and deemed accurate and complete. Proper flag assignment and voids for all data in AirMVP must be confirmed complete. Data is marked for exceptional events. Data completeness for each instrument is reviewed. The complete dataset is verified (inclusive of running the Data Verification Utility in AirMVP and addressing any issues on the resulting Data Verification Report).
- The agency sends an email to OAM's data validation team (Data.Validation@dep.state.fl.us) with the following:
  - Confirmation that all the data has been verified and validated;
  - Completed Data Validation Checklist (Form DEP 18-27-A);
  - AirMVP Data Completeness Report (signed by the QA coordinator);
  - Memo stating which parameters were below 75% (90% for ozone) and why (if applicable);
  - Corrective Action/AirMVP Missing Data Report (if applicable);
  - AirMVP Pollutant Comment Report (signed by the QA coordinator); and
  - Data Verification Utility Report, initial and final (signed by the QA coordinator).
- The Data Quality Section Administrator and AQS Coordinator will perform a review of statewide data prior to upload to AQS. Data are uploaded into AQS by the AQS Coordinator after the satisfactory completion of these reviews.

AQS DATA CONFIRMATION

Florida DEP and Local QA staff generate the following AQS reports to compare against AirMVP to ensure the AQS upload is complete and correct. Each agency must provide confirmation to Florida DEP.

- AMP 256 - QA Data Quality Indicator Report (This report is generated for the state and reviewed by Florida DEP only --- Sections 12.7 and 12.8).
- AMP 430 - Data Completeness
- AMP 501 - Extract Raw Data
- AMP 504 - QA Extraction Report

† - The OAM interacts with the $PM_{2.5}$ Gravimetric Laboratory regularly to ensure that the laboratory's environmental conditions as well as other specifications outlined in EPA's Quality Assurance Guidance Document 2.12 – Monitoring $PM_{2.5}$ in Ambient Air Using Designated Reference or Class I Equivalent Methods and 40 CFR Part 50 Appendix L are being met. Agencies are alerted of any issues or concerns by the OAM and/or the $PM_{2.5}$ Gravimetric Laboratory directly. Additionally, each agency must review its $PM_{2.5}$ Analysis Report which is provided regularly by the $PM_{2.5}$ Gravimetric Laboratory and make decisions accordingly regarding the data validity.

* - The QA coordinators from the local program agencies are responsible for setting the verified flags, both monthly and quarterly, on the Data Verification Report prior to emailing OAM's data validation team. This signifies that the agency has employed the appropriate QA/QC procedures when reviewing its data. Additionally, the agency is responsible for submitting the required email and completed documents as identified. For the OAM, the data validation team is responsible for completing and ensuring that that these same tasks have been completed (i.e. Florida DEP field operators generate the AirMVP Completeness Report). Any pertinent emails regarding decision-making during the data validation and data verification process should be saved and/or appended to the Data Validation Checklist (Form DEP 18-27-A).

The OAM provides the PQAO with monthly environmental condition reports of the $PM_{2.5}$ gravimetric laboratory in Tallahassee. The OAM works directly with the laboratory and impacted agency to address any issues or concerns.

Subsequent review of both continuous data and manual pollutant data is performed after the AQS upload (see Section 12.7 of this document) by the local program agencies and Florida DEP.

4.0 DEFINITIONS

1. AirNow – Publicly available EPA website which provides past, current, and forecasted ambient air monitoring data and related information.
2. AirVision™ - Air quality monitoring system software developed by Agilaire LLC that collects data from a variety of different data sources, including direct polling of samplers.
3. As-Found – A term used to describe data recorded prior to an instrument adjustment being made or, if an adjustment has not been made, the conditions of an instrument upon receipt.
4. As-Left – A term used to describe data recorded after an instrument adjustment has been made or, if an adjustment has not been made, the conditions of an instrument when all services have been completed.
5. Automated Reference Method – An automated method of sampling and analyzing the ambient air for an air pollutant that is specified as a reference method in Title 40 CFR Part 50 Appendixes A-1 (SO_2), C (CO), D (O_3), and F (NO_2) using the specified measurement principle and calibration procedure.
6. Best practice – A procedure that is accepted as being the most correct based on widely accepted scientific practices and/or experience throughout the ambient air monitoring community.
7. Chain-of-custody (COC) – An unbroken trail of accountability that ensures the physical security of samples, data, and records. It is a legal term that refers to activities guaranteeing that no tampering has occurred for measurements or data, at any point in the process of measuring, recording, transferring, and reporting the results. It is vital that measurements, especially when comparing to standards, have records necessary for completely verifying the integrity of the data.
8. Compelling evidence (reason) – Data that concretely establishes instrument performance or validity of a QA/QC check. It includes, but is not limited to, data generated from independent audit point(s), multi-point verifications, and/or a prior zero/span check. This data establishes whether the analyzer was operating within its acceptance limits. It also indicates whether a QC check itself is considered valid or invalid.
9. Continuous Data – Data collected from all pollutants sampled by an automated method.
10. Control Limits – The level of allowable imprecision before data invalidation is required.
11. Data review – The examination of data; a multi-step, multi-layered process to ensure data has been recorded, transmitted, and processed correctly and ultimately meets the needs of data users. Data review incorporates various verification and validation techniques which are used to accept, reject, or qualify data in an objective and consistent manner.

12. Data Validation - A routine process designed to ensure that reported values meet the quality goals of the environmental data operations. It is an examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled.
13. Data Verification – The process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements.
14. F1 Files – The electronic records that are generated from the TEI2025/2025i air sampler and recovered for transfer into agency's databases and ultimately DEP's PMTS and AirMVP databases.
15. Form – A blank controlled document, either paper or electronic, that has not been completed or filled-in.
16. Informational codes – Types of AQS-qualifiers used to alert users to data that may have been impacted by exceptional events (or other unique situations). Like QA qualifier codes, these codes do not invalidate data, but rather provide a means to tell a more complete story about the events which may have impacted the data. Examples of how and when to apply specific informational codes are described in this SOP.
17. Integrity – As defined in the EPA Information Quality Guidelines (IQG), integrity refers to security, such as the protection of information (data) from unauthorized access or revision, to ensure that the information is not compromised through corruption or falsification. Therefore, an important element of data review is to evaluate the integrity of the collected data.
18. Locals/Local Programs – Includes the City of Jacksonville; Orange County Environmental Protection Department; Environmental Protection Commission of Hillsborough County; Pinellas County Air Quality Division; Palm Beach County Health Department Division of Environmental Health & Engineering; Sarasota County Air & Water Quality; Broward County Pollution Prevention Division; Miami-Dade County Regulatory & Economic Resources, Air Quality Management Division; and Manatee County Natural Resources Department.
19. Manual Data – Data collected from analysis of a PM ($PM_{2.5}$ or PM_{10}) filter or a Pb-TSP filter
20. NIST-traceability (see Traceability, below) – National Institute of Standards and Technology (NIST)-traceability of field instruments is verified with documentation (i.e., calibration certificates) that demonstrates comparison against a NIST standard, directly or indirectly. NIST is the United States authority on metric quantities, for commerce and research. All ambient monitoring measurements should be traceable to NIST.
21. Null codes – Also referred to as null qualifiers, are alphanumeric codes used within the AQS database to invalidate data. They are also required when submitting a null (i.e., nothing was collected) sample measurement. Based on the descriptions in AQS, null codes should be used

to inform data users as to why valid data are not available, to the extent possible. Examples of how and when to apply specific null codes are described in this SOP.

22. OCULUS™ - Document management software used to catalog, index and archive electronic files to enable efficient search and retrieval operations.

23. Primary Quality Assurance Organization (PQAO) – Established in 40 CFR Part 58, Appendix A, Section 1.2, a PQAO is defined as a monitoring organization or a group of monitoring organizations that is responsible for a set of stations that monitors the same pollutant and for which DQAs will be pooled. PQAOs are defined such that measurement uncertainty among all stations in the organization can be expected to be reasonably homogeneous as a result of common factors, which are explained within the regulation. Since DQAs are made and data certified at the PQAO level, the monitoring organization identified as the PQAO will be responsible for the oversight of the quality of data of all monitoring organizations within the PQAO.

24. Quality Assurance (QA) – A series of management activities, including planning, implementation, and assessment, necessary to ensure the quality and defensibility of the final product (e.g., data). Examples of QA activities include developing QAPPs and SOPs.

25. QA Qualifier Codes – Used when data are valid, but additional commentary is needed in the AQS database to support and explain the validity decision. As its name suggests, QA qualifier codes qualify data, alerting users that specific QA/QC issues were identified with the flagged data. QA qualifier codes are alphanumeric codes in the AQS database. Examples of how and when to apply specific QA qualifier codes are described n this SOP.

26. Quality Control (QC) – The system of technical activities conducted to measure the attributes and performance of a process against defined standards. QC provides a reasonable level of checking (verification) at various stages of the data collection process to ensure quality is maintained. Examples of QC activities include calibrations and precision checks. Although sometimes used synonymously with QA, QA and QC are significantly different concepts.

27. Record – Includes all documents that are utilized in the data collection and review. For example, a completed zero/span/precision form, an annotated graphed minute data, or scribbled notes regarding a site visit on scrap paper. *(Note: Scribbled notes and scrap paper for recordkeeping should be avoided).*

28. Traceability – The property of a measurement result whereby the result can be related to a stated reference through a documented unbroken chain of calibrations/comparisons, each contributing to measurement uncertainty. Traceability also refers to the ability to verify the history, location, or application of an item (or air monitoring calibration standard, for example), by means of documented recorded identification.

29. Warning Limits – The level of allowable imprecision before corrective action or investigation is warranted.

5.0 HEALTH AND SAFETY PRECAUTIONS

There are no health precautions associated with this SOP. However, the safety precautions associated with this SOP are in regard to securing data and records and ensuring that these data are backed-up and/or scanned on a regular basis.

- Records should be in one central location within the agency.
- Official files should be write-protected so they cannot be modified after upload without permission.
- Files should be backed-up frequently and confirmed as such.

Additionally, specific health and safety precautions are also addressed in the individual SOPs for the equipment used throughout Florida's network.

6.0 INTERFERENCES

Interferences are not applicable to this SOP. Interferences associated with specific equipment will be addressed in its respective individual SOP.

7.0 PERSONNEL QUALIFICATIONS

Several levels of quality assurance (QA) are involved in the data handling process. The titles associated with each level vary by agency. Section 2.0 Project and Task Organization of the Florida Quality Assurance Project Plans (QAPPs) details titles and roles associated with the Florida PQAO. However, regardless of title, each agency has field staff, QA staff, and various level of management.

All personnel (i.e. quality assurance, data review and validation, etc.) should be trained in accordance with training requirements specified in Section 6 Training Requirements of the Florida QAPPs.

8.0 EQUIPMENT AND SUPPLIES

Equipment and supplies generally necessary for data validation are office-related equipment and supplies (i.e. computer, scanner, highlighters, pens, etc.).

Additionally, the computer should have:

- Internet access past firewalls
- Network access to the agency's shared network drives and/or desktop applications
- Google Chrome, Microsoft Edge, Mozilla Firefox
- Microsoft Office
- Adobe Acrobat (full version)
- Any other software that is required to utilize Oculus, AirMVP, PMTS, AQS, and AirVision.

9.0 INSTALLATION, START-UP, AND REMOVAL

See specific instrument SOPs to address installation, start-up, and removal of equipment. However, in the event of changes to the monitors or sites, OAM's data validation team, Florida AQS coordinator, and OAM audit staff must be notified timely to maintain accurate data codes in AirMVP and AQS. Additionally, the OAM audit staff schedule on-site ozone primary certifications and performance audits to meet PQAO QA requirements, so it is imperative that they are informed for scheduling purposes. Inefficient communication can result in the inability to meet CFR collocation requirements, failure to meet audits timely, and incomplete data records that can affect attainment decisions.

Monitor ID Forms must be completed when a new parameter is added so that AirMVP and AQS remain updated. Site ID Forms must be completed when a new site is added so that AirMVP and AQS remain updated. See Appendix A of this SOP for forms and instructions. Changes to equipment require changes in method codes. An email to OAM's data validation team (data.validation@dep.state.fl.us) and the OAM Quality Assurance Manager is required to maintain accurate records in AirMVP and AQS. Ozone primary changes affect the certification schedule and an email must be sent to OAM's data validation team and the OAM audit staff to allow the auditors time to schedule the changes. Ozone transfer standards which are intended to be used or kept at dedicated locations, but which are then moved for use at another location must be recertified no later than six months (182 days) from the date of the move or at its normal recertification date, whichever is earlier. Alternative arrangements must be made which may require the ozone primary to be shipped to the quality assurance standards laboratory in Tallahassee if the audit team is not able to schedule a timely on-site visit. Additional sites or changes to existing sites require a Site Information Form to be completed. Since this change would impact the Annual Air Monitoring Network Plan, the OAM should be consulted.

> *Note: If a monitor gets swapped out for any reason, AQS can accept different method codes from one day to the next as opposed to being changed in monthly increments.*

The following require formal approval from Florida DEP and/or EPA Region 4:

- Starting a new monitor.
- Shutdown of a site/monitor.
- Relocation of a site/monitor (depending on the distance of the move, a site relocation may require a new AQS ID).
- Moving a monitor within a site configuration.
- Changes in instrumentation (however, this does require working with the OAM Data Validation team, to amend the method code and to verify any collocation requirements).

Here is the notification process summarized:

1. Informally notify Florida DEP (i.e. OAM Program Administrator, OAM Quality Assurance Manager, OAM Data Quality Section Environmental Administrator) of anticipated changes.

2. For changes requiring approval, submit a formal request for site modification.
3. Receive approval in writing from Florida DEP and/or EPA Region 4.
4. Implement change (in coordination with Florida DEP).

10.0 INSTRUMENT CALIBRATION

This section does not apply to this SOP. Individual instrument calibrations are addressed in the individual SOPs for each instrument. The review of calibration records and their role in the data validation process are addressed in Section 12.0 and Section 13.0 of this document.

11.0 INSTRUMENT PREVENTATIVE MAINTENANCE, CORRECTIVE ACTION, MAJOR MAINTENANCE AND CONSEQUENCES

Instrument preventative maintenance and major maintenance do not apply in this SOP. The corrective action procedures are documented in each instrument's SOP. However, it is imperative that these completed corrective action records are reviewed in the QA process to ensure a proper and accurate documentation trail as well as to ensure that data, if need be, has been appropriately flagged or null coded.

The Florida Statewide Corrective Action SOP and associated forms can be found within AirMVP: https://prodenv.dep.state.fl.us/DarmAirMVP/SOP. (See Appendix A for the corrective action forms). Approved corrective action documentation are saved in the appropriate agency location, a shared network drive or Oculus. Agency staff are advised to involve the agency's Quality Assurance Manager early when presented with complex corrective actions to ensure the correct records are created.

12.0 QUALITY ASSURANCE AND QUALITY CONTROL

12.1 Data Verification

Data verification is the confirmation, through the provision of objective evidence, that specified requirements have been fulfilled. The specified requirements for which data are to be verified against are found in the Florida DEP Quality Assurance Project Plans (QAPP), as well as in the individual SOPs for each pollutant monitored.

Data collection commences in the field at the ambient air monitoring station. The field staff is responsible for the accuracy and reliability of the data collected. Ultimately, accurate data collection is dependent on correctly calibrated monitors. The field staff performs most calibration procedures. In cases where data collection is accomplished through analog connections, the datalogger must be calibrated, as well as the monitor. Calibration procedures for each pollutant are detailed in the individual pollutant SOPs.

After monitors are calibrated, it is the responsibility of the field staff to maintain the monitors, reviewing data daily to ensure it is accurate and complete. Should the monitor begin to drift from its calibration curve, it is the field staff's responsibility to perform corrective actions. The field staff is also responsible for conducting precision checks on site, as well as required maintenance procedures. The field staff must document all activities. These requirements are specifically detailed in the individual pollutant SOPs. Should circumstances arise on site where minute or hour data collection fails, initially it is the responsibility of the field staff to attempt to restart data collection and/or reinitiate automated data transfers.

The QA staff serves as the second reviewer in the data verification process. The QA staff can process data daily, as it is received from the field sites by automated polling and data transmission. The QA staff can also manually poll sites to retrieve data, when data sets are incomplete, and/or visit sites in the field if communications have failed and the field staff is unable to resolve the problem. Data will always be confirmed as correct by a second level of review. Data verification procedures by the field staff and the QA staff should occur on a regular basis.

Aside from the routine duties of the field staff and QA staff, staff within the Office of Air Monitoring (OAM) performs routine statewide data verification as well:

- OAM's Data Quality Section Environmental Administrator performs a quarterly evaluation and a statistical summary of Florida's criteria pollutant network. This evaluation/summary includes the data completeness for each site and parameter as well as improvements, issues/concerns, resolutions, and recommendations. This evaluation/summary is provided to the OAM Program Administrator after the conclusion of each quarter and once the data are completely verified and validated and submitted to AQS. The OAM's Data Quality Section Environmental Administrator also submits quarterly data completeness reports to EPA for

those parameters that fell below 75% data completeness for the quarter. These reports detail what caused the completeness to fall below 75% and what corrective action has been taken to resolve the issue.

- OAM's QA Manager performs quarterly "hand" calculations of the manual $PM_{2.5}$ concentration data to ensure that the automated calculations performed by the data systems and the transfer of these data, LIMS, PMTS, and AirMVP, are accurate. The OAM QA Manager will manually verify one filter concentration each quarter per agency/territory statewide. Additionally, the OAM QA Manager will alert staff, air monitoring and laboratory staff, of any concerns or issues, if any. The Florida DEP information technology (IT) staff will be involved, as needed, to resolve any issues or concerns.

12.2 Measurement Quality Objectives

Measurement quality objectives (MQOs) are designed to evaluate and control various phases (sampling, preparation, analysis) of the measurement process to ensure that the total measurement uncertainty is within the range prescribed by the data quality objectives (DQOs). Consistent with the QAPPs, the MQOs for the State of Florida's ambient air quality monitoring program will be defined in terms of the following data quality indicators (DQIs):

- **Precision -** Precision is a measure of agreement between two replicate measurements of the same property, under prescribed similar conditions. This agreement is calculated as either the range or as the standard deviation. This calculation represents the random component of error.

- **Bias -** Bias is the systematic or persistent distortion of a measurement process that causes errors in one direction. Bias is determined by estimating the positive and negative deviation from the true value as a percentage of the true value.

- **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 regarding 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 reference methods (40 CFR Part 50).

- **Sensitivity -** Sensitivity is a measure of the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest. Methodology to establish sensitivity for a given analytical method or instrument includes examination of standardized blanks, instrument detection limit studies, and calibration of the QL (quantitation limit). Method sensitivity is typically evaluated in terms of the method detection limit (MDL). The instrument detection limit (IDL) is the lowest concentration that can be detected for a given analyte on a specific instrument independent of matrix and sample preparation. Appendices of 40 CFR Part 50 describe sensitivity requirements for particulates. Additionally, EPA Quality Assurance Guidance Document 2.12 describes sensitivity requirements for $PM_{2.5}$.

For each of these attributes, acceptance criteria have been developed using various parts of 40 CFR and EPA supplied guidance documents. The MQOs for the State of Florida's ambient air quality monitoring program are listed in Tables 12-1 thru 12-9. More detailed descriptions of these MQOs and how they will be used to control and assess measurement uncertainty are described in the SOPs and QAPPs.

As outlined in Florida's DEP QAPPs, the following tables identify the measurement quality objectives (MQOs) for the criteria pollutants (including continuous $PM_{2.5}$). Section 5.0 Data and Measurement Quality Objectives and Criteria found within each respective QAPP details how to read and interpret the data validation templates.

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.

Florida has adopted the consensus-built data validation templates in the EPA QA Handbook. The templates 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.

See Section 21 of the Florida QAPPs for additional information.

Table 12-1. Ozone 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 [1] standard	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 recertification 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 12-2. 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 12-3. NO_2, NO_x, NO 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 12-4. 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

Table 12-5. Filter-Based $PM_{2.5}$ Local Conditions Validation Template

1) Criteria (PM2.5 LC)	2) Frequency	3) Acceptable Range	Information /Action
CRITICAL CRITERIA- $PM_{2.5}$ Filter Based Local Conditions			
Field Activities			
Sampler/Monitor	NA	*Meets requirements listed in FRM/FEM/ARM designation*	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
Filter Holding Times			
Pre-sampling	*all filters*	*≤ 30 days before sampling*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.3.5
Sample Recovery	*all filters*	*≤ 7 days 9 hours from sample end date*	1, 2 and 3) 40 CFR Part 50, App. L 10.10
Sampling Period (including multiple power failures)	*all filters*	*1380-1500 minutes, or if value < 1380 and exceedance of NAAQS* [1/] *midnight to midnight local standard time*	1, 2 and 3) 40 CFR Part 50 App L Sec. 3.3 and 40 CFR Part 50 App N Sec. 1 for the midnight to midnight local standard time requirement See details if less than 1380 min sampled
Sampling Instrument			
Average Flow Rate	*every 24 hours of op*	*average within 5% of 16.67 liters/minute*	1, 2 and 3) Part 50 App L Sec. 7.4.3.1
Variability in Flow Rate	*every 24 hours of op*	*CV ≤ 2%*	1, 2 and 3) 40 CFR Part 50, App L Sec. 7.4.3.2
One-point Flow Rate Verification	*every 30 days each seperated by 14 days*	*< ± 4.1% of transfer standard* < ± 5.1% of flow rate design value	1, 2 and 3) 40 CFR Part 50, App L, Sec. 9.2.5 and 7.4.3.1 and 40 CFR Part 58, Appendix A Sec. 3.2.1
Design Flow Rate Adjustment	*After multi-point calibration or verification*	*< ± 2.1% of design flow rate*	1, 2 and 3) 40 CFR Part 50, App. L, Sec. 9.2.6
Individual Flow Rates	*every 24 hours of op*	*no flow rate excursions > ±5% for > 5 min.* [1/]	1, 2 and 3) 40 CFR Part 50, App. L Sec. 7.4.3.1
Filter Temp Sensor	*every 24 hours of op*	*no excursions of > 5° C lasting longer than 30 min* [1/]	1, 2 and 3) 40 CFR Part 50, App. L Sec. 7.4.11.4
External Leak Check	*Before each flow rate verification/calibration* and before and after $PM_{2.5}$ separator maintenance	*< 80.1 mL/min* (see comment #1)	1) 40 CFR Part 50 App L, Sec. 7.4.6.1 2) 40 CFR Part 50 App L Sec. 9.2.3 and Method 2-12 Sec. 7.4.3 3) 40 CFR Part 50, App. L, Sec. 7.4.6.1
Internal Leak Check	If failure of external leak check	*< 80.1 mL/min*	1) 40 CFR Part 50, App. L, Sec. 7.4.6.2 2) Method 2-12, Sec. 7.4.4 3) 40 CFR Part 50, App. L, Sec. 7.4.6.2
Laboratory Activities			

1) Criteria (PM2.5 LC)	2) Frequency	3) Acceptable Range	Information /Action
Post-sampling Weighing	*all filters*	*Protected from exposure to temperatures above 25C from sample retrieval to conditioning* *≤10 days from sample end date if shipped at ambient temp, or* *< 30 days if shipped below avg ambient (or 4° C or below for avg sampling temps < 4° C) from sample end date*	1, 2 and 3) 40 CFR Part 50 App L Sec. 8.3.6 and L Sec. 10.13. See technical note on holding time requirements at : https://www3.epa.gov/ttn/amtic/pmpolgud.html
Filter Visual Defect Check (unexposed)	*all filters*	*Correct type & size and for pinholes, particles or imperfections*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 10.2
Filter Conditioning Environment			
Equilibration	*all filters*	*24 hours minimum*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.5
Temp. Range	*all filters*	*24-hr mean 20.0-23.0° C*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.1
Temp. Control	*all filters*	*< 2.1° C SD* over 24 hr.*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.2 SD use is a recommendation
Humidity Range	*all filters*	*24-hr mean 30.0% - 40.0% RH or Within ±5.0 % sampling RH but ≥ 20.0%RH*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.3
Humidity Control	*all filters*	*< 5.1 % SD* over 24 hr.*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.4 SD use is recommendation
Pre/post Sampling RH	*all filters*	*difference in 24-hr means < ± 5.1% RH*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.3.3
Balance	*all filters*	*located in filter conditioning environment*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.3.2
Microbalance Auto-Calibration	*Prior to each weighing session*	Manufacturer's specification	1) 40 CFR Part 50, App. L, Sec. 8.1 2) 40 CFR Part 50, App. L, Sec. 8.1 and Method 2.12 Sec. 10.6 3) NA
OPERATIONAL EVALUATIONS TABLE $PM_{2.5}$ Filter Based Local Conditions			
Field Activities			
One-point Temp Verification	every 30 days	< ± 2.1°C	1) 40 CFR Part 50, App. L, Sec. 9.3 2) Method 2.12 Sec. 7.4.5 and Table 6-1 3) Recommendation
Pressure Verification	every 30 days	< ± 10.1 mm Hg	1) 40 CFR Part 50, App. L, Sec. 9.3 2) Method 2.12 Sec. 7.4.6 and Table 6-1 3) Recommendation
Annual Multi-point Verifications/Calibrations			
Temperature multi-point Verification/Calibration	on installation, then every 365 days and once a calendar year	< ± 2.1°C	1) 40 CFR Part 50, App. L, Sec. 9.3 2 and 3) Method 2.12 Sec. 6.4.4 Table 6-1

1) Criteria (PM2.5 LC)	2) Frequency	3) Acceptable Range	Information /Action
Pressure Verification/Calibration	on installation, and on one-point verification failure	< ± 10.1 mm Hg	1) 40 CFR Part 50, App. L, Sec. 9.3 2 and 3) Method 2.12 Sec. 6.5 Sampler BP verified against independent standard verified against a lab primary standard that is certified as NIST traceable 1/year
Flow Rate Multi-point Verification/ Calibration	*Electromechanical maintenance or transport* or every 365 days and once a calendar year	< ± 2.1% of transfer standard	1) 40 CFR Part 50, App. L, Sec. 9.2. 2) 40 CFR Part 50, App. L, Sec. 9.1.3, Method 2.12 Sec. 6.3 & Table 6-1 3) Recommendation
Other Monitor Calibrations	per manufacturers' op manual	per manufacturers' operating manual	1, 2 and 3) Recommendation
Precision			
Collocated Samples	*every 12 days for 15% of sites by method designation*	CV < 10.1% of samples ≥ 3.0 µg/m^3	1) and 2) Part 58 App A Sec. 3.2.3 3 Recommendation based on DQO in 40 CFR Part 58 App A Sec. 2.3.1.1
Accuracy			
Temperature Audit	every 180 days and at time of flow rate audit	< ± 2.1°C	1, 2 and 3) Method 2.12 Sec. 11.2.2
Pressure Audit	every 180 days and at time of flow rate audit	< ±10.1 mm Hg	1, 2 and 3) Method 2.12 Sec. 11.2.3
Semi Annual Flow Rate Audit	*Twice a calendar year and between 5-7 months apart*	< ± 4.1% of audit standard < ± 5.1% of design flow rate	1 and 2) Part 58, App A, Sec. 3.2.2 3) Method 2.12 Sec. 11.2.1
Monitor Maintenance			
$PM_{2.5}$ Separator (WINs)	every 5 sampling events	cleaned/changed	1, 2, and 3) Method 2.12 Sec. 8.2.2
$PM_{2.5}$ Separator (VSCC)	every 30 days	cleaned/changed	1, 2 and 3) Method 2.12 Sec. 8.3.3
Inlet Cleaning	every 30 days	cleaned	1, 2 and 3) Method 2.12 Sec. 8.3
Downtube Cleaning	every 90 days	cleaned	1, 2 and 3) Method 2.12 Sec. 8.4
Filter Housing Assembly Cleaning	every 30 days	cleaned	1, 2 and 3) Method 2.12 Sec. 8.3
Circulating Fan Filter Cleaning	every 30 days	cleaned/changed	1, 2 and 3) Method 2.12 Sec. 8.3
Manufacturer-Recommended Maintenance	per manufacturers' SOP	per manufacturers' SOP	
Laboratory Activities			
Filter Checks			
Lot Blanks	9 filters per lot	< ±15.1 µg change between weighings	1, 2, 3) Recommendation and used to determine filter stability of the lot of filters received from EPA or vendor. Method 2.12 Sec. 10.5
Exposure Lot Blanks	3 filters per lot	< ±15.1 µg change between weighings	1, 2 and 3) Method 2.12 Sec. 10.5 Used for preparing a subset of filters for equilibration
Filter Integrity (exposed)	each filter	no visual defects	1, 2 and 3) Method 2.12 Sec. 10.7 and 10.3
Lab QC Checks			

1) Criteria (PM2.5 LC)	2) Frequency	3) Acceptable Range	Information /Action
Field Filter Blank	10% or 1 per weighing session	<± 30.1 µg change between weighings	1) 40 CFR Part 50, App. L Sec. 8.3.7.1 2 and 3) Method 2.12 Table 7-1 & Sec.10.5
Lab Filter Blank	10% or 1 per weighing session	<± 15.1 µg change between weighings	1) 40 CFR Part 50, App. L Sec. 8.3.7.2 2 and 3) Method 2.12 Sec. 10.5
Balance Check (working standards)	beginning, 10th sample, end	<±3.1 µg from certified value	1, 2 and 3) Method 2.12 Sec. 10.6 Standards used should meet specifications in Method 2.12, Sec. 4.3.7
Routine Filter re-weighing	1 per weighing session	<± 15.1 µg change between weighings	1, 2 and 3) Method 2.12 Sec. 10.8
Microbalance Audit	every 365 days and once a calendar year	<± 0.003 mg or manufacturers specs, whichever is tighter	1, 2 and 3) Method 2.12 Sec. 11.2.7
Lab Temp Check	Every 90 days	<± 2.1°C	1, 2 and 3) Method 2.12 Sec. 10.10
Lab Humidity Check	Every 90 days	<± 2.1%	1, 2 and 3) Method 2.12 Sec. 10.10
Verification/Calibration			
Microbalance Calibration	*At installation* every 365 days and once a calendar year	Manufacturer's specification	1) 40 CFR Part 50, App. L, Sec. 8.1 2) 40 CFR Part 50, App. L, Sec. 8.1 and Method 2.12 Sec. 10.11 3) NA
Lab Temperature Certification	every 365 days and once a year	<± 2.1°C	1, 2 and 3) Method 2.12 Sec. 4.3.8 and 9.4
Lab Humidity Certification	every 365 days and once a year	<± 2.1%	1, 2 and 3) Method 2.12 Sec. 4.3.8 and 9.4
Calibration & Check Standards -			
Working Mass Stds. Verification Compared to primary standards	Every 90 days	<± 2.1 ug	1, 2 and 3) Method 2.12 Sec. 9.7
Primary standards certification	every 365 days and once a calendar year	0.025 mg tolerance (Class 2)	1, 2 and 3) Method 2.12 Sec. 4.3.7
SYSTEMATIC CRITERIA -$PM_{2.5}$ Filter Based Local Conditions			
Siting	every 365 days and once a calendar year	*Meets siting criteria or waiver documented*	1) 40 CFR Part 58 App E, Sec. 2-5 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-5
Data Completeness	*Annual Standard*	*≥ 75% scheduled sampling days in each quarter*	1, 2 and 3) 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
	24- Hour Standard	*≥ 75% scheduled sampling days in each quarter*	1, 2 and 3) 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
Reporting Units	*all filters*	*µg/m³ at ambient temp/pressure ($PM_{2.5}$)*	1, 2 and 3) 40 CFR Part 50 App N Sec. 3.0 (b)
Rounding convention for design value calculation	*all filters*	*to one decimal place, with additional digits to the right being truncated*	1, 2 and 3) 40 CFR Part 50 App N Sec. 3.0 (b) The rounding convention is for averaging values for comparison to NAAQS not for reporting individual values.

1) Criteria (PM2.5 LC)	2) Frequency	3) Acceptable Range	Information /Action
Annual 3-yr average	*all concentrations*	*nearest 0.1 µg/m³* (≥ 0.05 round up)	1, 2 and 3) 40 CFR Part 50, App. N Sec. 3 and 4 Rounding convention for data reported to AQS is a recommendation
24-hour, 3-year average	*all concentrations*	*nearest 1 µg/m³* (≥ 0.5 round up)	1, 2 and 3) 40 CFR Part 50, App. N Sec. 3 and 4 Rounding convention for data reported to AQS is a recommendation
Detection Limit			
Lower DL	*all filters*	*≤ 2 µg/m³*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 3.1
Upper Conc. Limit	*all filters*	*≥ 200 µg/m³*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 3.2
Precision			
Single analyzer (collocated monitors)	every 90 days	Coefficient of variation (CV) < 10.1% for values ≥ 3.0 µg/m³	1, 2 and 3) Recommendation in order to provide early (quarterly) evaluation of achievement of DQOs.
Primary Quality Assurance Org.	*Annual and 3 year estimates*	*90% CL of CV < 10.1 % for values ≥ 3.0 µg/m³*	1, 2 and 3) 40 CFR Part 58, App A, Sec. 4.2.1 and 2.3.1.1
Bias			
Performance Evaluation Program (PEP)	*5 audits for PQAOs with ≤ 5 sites* *8 audits for PQAOs with > 5 sites*	*< ± 10.1% for values ≥ 3.0 µg/m³*	1, 2 and 3) 40 CFR Part 58, App A, Sec. 3.2.4, 4.2.5 and 2.3.1.1
Field Activities			
Verification/Calibration Standards Recertifications – All standards should have multi-point certifications against NIST Traceable standards			
Flow Rate Transfer Std.	every 365 days and once a calendar year	*< ± 2.1% of NIST Traceable Std.*	1) 40 CFR Part 50, App. L Sec. 9.1 & 9.2 2) Method 2-12 Sec. 4.2.2 & 6.4.3 3) 40 CFR Part 50, App. L Sec. 9.1 & 9.2
Field Thermometer	every 365 days and once a calendar year	± 0.1° C resolution, ± 0.5° C accuracy	1, 2 and 3) Method 2.12 Sec. 4.2.2
Field Barometer	every 365 days and once a calendar year	± 1 mm Hg resolution, ± 5 mm Hg accuracy	1, 2 and 3) Method 2.12 Sec. 4.2.2
Clock/timer Verification	Every 30 days	*1 min/mo*	1 and 2) Method 2.12 Sec. 4.2.1 3) 40 CFR Part 50, App. L Sec. 7.4.12
Laboratory Activities			
Microbalance Readability	*At purchase*	*1 µg*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.1
Microbalance Repeatability	At purchase	1 µg	1) Method 2.12 Sec. 4.3.6 2) Recommendation 3) Method 2.12 Sec. 4.3.6
Primary Mass/Working mass Verification/Calibration Standards	At purchase	0.025 mg tolerance (Class 2)	1, 2 and 3) Method 2.12 Sec. 4.3.7

1) Criteria (PM2.5 LC)	2) Frequency	3) Acceptable Range	Information /Action
Comment #1 The associated leak test procedure shall require that for successful passage of this test, the difference between the two pressure measurements shall not be greater than the number of mm of Hg specified for the sampler by the manufacturer, based on the actual internal volume of the sampler, that indicates a leak of less than 80 mL/min.			

1/ value must be flagged SD * = standard deviation CV= coefficient of variation

Table 12-6. $PM_{2.5}$ Continuous Local Conditions Validation Template

Note: This validation template is used to validate the $PM_{2.5}$ TEOM data, also, however all $PM_{2.5}$ TEOMs within Florida's PQAO are not configured as FEMs and thus are only used for AQI purposes. Additionally, this template applies to the BAM1020, which has an EPA approved NAAQS comparison waiver, hence the data is only used for AQI reporting.

1) Criteria (PM2.5 Cont)	2) Frequency	3) Acceptable Range	Information /Action
CRITICAL CRITERIA- $PM_{2.5}$ Continuous, Local Conditions			
Sampler/Monitor Designation	NA	*Meets requirements listed in FRM/FEM/ARM designation* Confirm method designation on front panel or just inside instrument.	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
Firmware of monitor	At setup	1. Must be the firmware (or later version) as identified in the published method designation summary. *2. Firmware settings must be set for flowrate to operate and report at "local conditions" (i.e., not STP).*	40 CFR Part 50 App N. sec. 1 (c)
Data Reporting Period	Report every hour	1. The calculation of an hour of data is dependent on the design of the method. *2. A 24-hour period is calculated in AQS if 18 or more valid hours are reported for a day [1/].*	See operator's manual. Hourly data are always reported as the start of the hour on local standard time 40 CFR Part 50 App N. Sec 3 (c)

1) Criteria (PM2.5 Cont)	2) Frequency	3) Acceptable Range	Information /Action
Sampling Instrument			
PM10 Inlet (if applicable to method designated)	At Setup	Must be a Louvered PM10 size selective inlet as specified in 40 CFR 50 appendix L, Figures L-2 through L-19	
PM2.5 second stage separator (if applicable to method designated)	At Setup	Must be a BGI Inc. Very Sharp Cut Cyclone (VSCC™) or equivalent second stage separator approved for the method.	The other approved second stage separator option for select FEMs is the Dichot. Only the GRIMM 180 and Teledyne T640 and T640X are known to not have a second stage seperator as part of the method.
Average Flow Rate	*every 24 hours of operation; alternatively, each hour can be checked*	*average within 5% of 16.67 liters/minute at local conditions*	1, 2 and 3) Part 50 App L Sec. 7.4.3.1
Variability in Flow Rate	*every 24 hours of op*	*CV ≤ 2%*	1, 2 and 3) 40 CFR Part 50, App L Sec. 7.4.3.2
One-point Flow Rate Verification	*every 30 days each seperated by 14 days*	*< ± 4.1% of transfer standard* < ± 5.1% of flow rate design value	1, 2 and 3) 40 CFR Part 50, App.L, Sec. 9.2.5, 40 CFR Part 58, Appendix A Sec. 3.2.3 & 3.3.2
Design Flow Rate Adjustment	*After multi-point calibration or verification*	*< ± 2.1% of design flow rate*	1,2 and 3) 40 CFR Part 50, App. L, Sec. 9.2.6
External Leak Check	*Before each flow rate verification/calibration* and before and after $PM_{2.5}$ separator maintenance	Method specific. See operator's manual.	1) 40 CFR Part 50 App L, Sec. 7.4.6.1 2) 40 CFR Part 50 App L Sec.t 9.2.3 and Method 2-12 Sec. 7.4.3 3) 40 CFR Part 50, App. L, Sec. 7.4.6.1
Internal Leak Check	If failure of external leak check	Method specific. See operators manual.	1) 40 CFR Part 50, App. L, Sec. 7.4.6.2 2) Method 2-12 7.4.4 3) 40 CFR Part 50, App. L, Sec. 7.4.6.2
Annual Multi-point Verifications/Calibrations			
Leak Check	every 30 days	< 1.0 lpm BAM (Not Thermo BAMS) ± 0.15 lpm TEOM	1) 40 CFR Part 50 App L, Sec. 7.4.6.1 2) Recommendation 3) BAM SOP Sec. 10.1.2 TEOM SOP Sec. 10.1.6 Thermo BAM leak check should not be attempted. Foils could be ruptured.
Temperature multi-point Verification/Calibration	on installation, then Every 365 days and 1/ calendar year	< ± 2.1°C	1) 40 CFR Part 50, App.L, Sec. 9.3 2 and 3) Method 2.12 Sec. 6.4.4
One-point Temp Verification	every 30 days	< ± 2.1°C	1) 40 CFR Part 50, App.L, Sec. 9.3 2) Method 2.12 Sec. 7.4.5 and Table 6-1 3) Recommendation
Pressure Verification/Calibration	on installation, then Every 365 days and 1/ calendar year	< ± 10.1 mm Hg	1) 40 CFR Part 50, App.L, Sec. 9.3 2 and 3) Method 2.12 Sec. 6.5 BP verified against independent standard verified against a lab primary standard that is certified NIST traceable 1/year

1) Criteria (PM2.5 Cont)	2) Frequency	3) Acceptable Range	Information /Action
Flow Rate Multi-point Verification/ Calibration	*Electromechanical maintenance or transport or* Every 365 days and 1/ calendar year	< ± 2.1% of transfer standard	1) 40 CFR Part 50, App.L, Sec. 9.2. 2) 40 CFR Part 50, App.L, Sec. 9.1.3, Method 2.12 Sec. 6.3 & Table 6-1 3) Recommendation
Other Monitor Calibrations/checks	per manufacturers' op manual	Annual zero test on Met One BAM 1020 and BAM 1022	per manufacturers' operating manual. Note: more frequent zero tests may be appropriate in areas with seasonal changes in dew-points.
Precision			
Collocated Samples	*every 12 days for 15% of sites by method designation*	CV < 10.1% of samples ≥ 3 µg/m^3	1) and 2) Part 58 App A Sec. 3.2.3 3 Recommendation based on DQO in 40 CFR Part 58 App A Sec. 2.3.1.1
Accuracy			
Temperature Audit	every 180 days and at time of flow rate audit	< ± 2.1ºC	1, 2 and 3) Method 2.12 Sec. 11.2.2
Pressure Audit	every 180 days and at time of flow rate audit	< ±10.1 mm Hg	1, 2 and 3) Method 2.12 Sec. 11.2.3
Semi Annual Flow Rate Audit	*Twice a calendar year and 5-7 months apart*	< ± 4.1% of audit standard < ± 5.1% of design flow rate	1 and 2) Part 58, App A, Sec. 3.3.3 3) Method 2.12 Sec. 11.2.1
Shelter Temperature			
Temperature range	At setup	per operator manual	
Temperature Control	Daily (hourly values)	< 2.1º C SD over 24 hours	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Temperature Device Check	every 180 days and twice a calendar year	< ± 2.1º C	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Monitor Maintenance			
$PM_{2.5}$ Separator (WINS)	every 5 sampling events	cleaned/changed	1, 2,and 3) Method 2.12 Sec. 8.2.2
$PM_{2.5}$ Separator (VSCC)	every 30 days	cleaned/changed	1,2 and 3) Method 2.12 Sec. 8.3.3
Inlet Cleaning	every 30 days	cleaned	1,2 and 3) Method 2.12 Sec. 8.3
Downtube Cleaning	every 90 days	cleaned	1,2 and 3) Method 2.12 Sec. 8.4
Filter Housing Assembly Cleaning	every 30 days	cleaned	1, 2 and 3) Method 2.12 Sec. 8.3
Circulating Fan Filter Cleaning	every 30 days	cleaned/changed	1, 2 and 3) Method 2.12 Sec. 8.3
Manufacturer-Recommended Maintenance	per manufacturers' SOP	per manufacturers' SOP	
TEOM-FDMS Specific Operational Criteria			
Total Flow Verification	every 30 days	Sum of flow rates from 3 paths equal design flow rate < ± 5.1%	1,2 and 3) TEOM SOP Sec. 10.1.2
Bypass leak check (TEOM)	every 30 days	± 0.60 lpm	1,2 and 3) TEOM SOP Sec. 10.1.6 or TEOM Operating Manual Sec. 5-4
Replace TEOM filters	as needed	Change TEOM filter as filter loading approaches 90%, but must be changed before reaching 100%.	1,2 and 3) TEOM SOP Sec. 10.1.8
Replace the 47-mm FDMS (Purge) filters	every 30 days or any time TEOM filters are replaced	replaced	1,2 and 3) TEOM SOP Sec. 10.1.10

1) Criteria (PM2.5 Cont)	2) Frequency	3) Acceptable Range	Information /Action
Internal/External Data Logger Data	Every 30 days 10 randomly selected values	agree exactly (digital) and $\pm$ 1 µg/m^3 (analog). Note: digital is expected and should be used unless there is no capacity to utilize digital in the monitoring agencies' data system.	1, 2 and 3) TEOM SOP Sec. 10.1.24
Replace In-line filters	every 180 days and twice a calendar year	replaced	1, 2 and 3) TEOM SOP Sec. 10.2
Clean cooler assembly	every 365 days and once a calendar year	cleaned	1, 2 and 3) TEOM SOP Sec. 10.3.1
Clean/Maintain switching valve	every 365 days and once a calendar year	cleaned	1, 2 and 3) TEOM SOP Sec. 10.3.2
Clean air inlet system of mass transducer enclosure	every 365 days and once a calendar year	cleaned	1, 2 and 3) TEOM SOP Sec. 10.3.3
Replace the dryers	1/yr or due to poor performance	Review dryer dew point data to determine acceptable performance of dryer	1, 2 and 3) TEOM SOP Sec. 10.3.4
Calibration (KO) constant verification	every 365 days and once a calendar year	Pass or Fail ($\leq$ 2.5%)	1, 2 TEOM SOP Sec. 10.3.6 3) 1405-DF operating guide. Verification software either passes or fails the verification. Acceptance criteria is $\leq$ 2.5 %
Rebuild sampling pump	18 months	< 66% of local pressure	1, 2 and 3) TEOM SOP Sec. 10.4
GRIMM Specific Operational Criteria			
Internal rinsing air filter	After a few years	Changed	1, 2 and 3) GRIMM SOP Sec. 12.4 May require a trained service staff to change. May only require changing if a message reads "check nozzle and air inlet"
Change Dust Filter	Every 365 days and 1/ calendar year	Changed	1, 2 and 3) GRIMM SOP Sec. 12.3
Relative Humidity Setting	At Setup	Per Operators manual (55%) unless otherwise directed and approved to use at a different value	
Calibration of spectrometer	Yearly	+/- 5% for mass	Operators' Manual section 5.2
Cleaning or changing of the Nafion in inlet	As needed	We are seeking clarification from GRIMM on this	Operators' Manual section 11.4.2
Thermo BAM Specific Operational Criteria			
Cleaning Nozzle and Vane (BAM)	Minimally every 30 days	cleaned	1, 2 and 3) BAM SOP Sec. 10.1.3
Leak Check	every 30 days	$\leq$ 0.42 L/min	1) BAM 5014i Instruction Manual 2) 3) BAM 5014i Instruction Manual
Replace or clean pump muffler	every 180 days and twice a calendar year	Cleaned or changed	

1) Criteria (PM2.5 Cont)	2) Frequency	3) Acceptable Range	Information /Action
Internal/External Data Logger Data (BAM) Clean/replace internal debris filter	Every 30 days 10 randomly selected values Every 365 days and 1/ calendar year	agree exactly (digital) and $\pm$ 1 $\mu g/m^3$ (analog). Note: digital is expected and should be used unless there is no capacity to utilize digital in the monitoring agencies' data system.	1, 2 and 3) BAM SOP Sec. 10.1.9
MetOne BAM Specific Operational Criteria			
BAM check of membrane span foil	Daily	Avg. $<\pm$ 5.1% of ABS	1, 2 and 3) BAM SOP Sec. 10.4.3. Applies on the BAM 1020
BAM electrical grounding	At setup	1. Is the chassis of the BAM grounded? Is the downtube grounded to the chassis at the collar (i.e., with setscrews)	Per operator manual
Nozzle cleaning	Every 30 days, or more often as needed	cleaned	Per operator manual
Zero test	Yearly	Standard deviation of the data from a 72-hour zero test < 2.4 $\mu g/m^3$	Per operator manual
SYSTEMATIC CRITERIA- $PM_{2.5}$ Continuous, Local Conditions			
Siting	every 365 days and once a calendar year	*Meets siting criteria or waiver documented*	1) 40 CFR Part 58 App E, Sec. 2-5 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-5
Data Completeness	*Annual Standard*	*$\geq$ 75% scheduled sampling days in each quarter*	1, 2 and 3) 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
	24- Hour Standard	*$\geq$ 75% scheduled sampling days in each quarter*	1, 2 and 3) 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
Reporting Units	*all filters*	*$\mu g/m^3$ at ambient temp/pressure ($PM_{2.5}$)*	1. 2 and 3) 40 CFR Part 50 App N Sec. 3.0 (b)
Rounding convention for data reported to AQS	*all filters*	*to one decimal place or as reported by instrument*	1. 2 and 3) 40 CFR Part 50 App N Sec. 3.0 (b)
Annual 3-yr average	*all concentrations*	*nearest 0.1 $\mu g/m^3$* ($\geq$ 0.05 round up)	1,2 and 3) 40 CFR Part 50, App. N Sec. 3 and 4 Rounding convention for data reported to AQS is a recommendation
24-hour, 3-year average	*all concentrations*	*nearest 1 $\mu g/m^3$* ($\geq$ 0.5 round up)	1,2 and 3) 40 CFR Part 50, App. N Sec. 3 and 4 Rounding convention for data reported to AQS is a recommendation
Verification/Calibration Standards Recertifications - All standards should have multi-point certifications against NIST Traceable standards			
Flow Rate Transfer Std.	every 365 days and once a calendar year	*$<\pm$ 2.1% of NIST Traceable Std.*	1) 40 CFR Part 50, App.L Sec. 9.1 & 9.2 2) Method 2-12 Sec. 4.2.2 & 6.4.3 3) 40 CFR Part 50, App.L Sec. 9.1 & 9.2
Field Thermometer	every 365 days and once a calendar year	$\pm$ 0.1° C resolution, $\pm$ 0.5° C accuracy	1, 2 and 3) Method 2.12 Sec. 4.2.2

1) Criteria (PM2.5 Cont)	2) Frequency	3) Acceptable Range	Information /Action
Field Barometer	every 365 days and once a calendar year	± 1 mm Hg resolution, ± 5 mm Hg accuracy	1, 2 and 3) Method 2.12 Sec. 4.2.2
Clock/timer Verification **Precision**	Every 30 days	*1 min/mo***	1 and 2) Method 2.12 Sec. 4.2.1 3) 40 CFR Part 50, App.L Sec. 7.4.12
Single analyzer (collocated monitors)	every 90 days	Coefficient of variation (CV) < 10.1% for values ≥ 3.0 µg/m^3	1,2 and 3) Recommendation in order to provide early (quarterly) evaluation of achievement of DQOs.
Primary Quality Assurance Org.	*Annual and 3 year estimates*	*90% CL of CV < 10.1 % for values ≥ 3.0 µg/m^3*	1,2 and 3) 40 CFR Part 58, App A, Sec. 4.2.1 and 2.3.1.1
Bias			
Performance Evaluation Program (PEP)	*5 audits for PQAOs with ≤ 5 sites* *8 audits for PQAOs with > 5 sites*	*< ±10.1% for value > 3 µg/m^3*	1,2 and 3) 40 CFR Part 58, App A, Sec. 3.2.7, 4.3.2 and 2.3.1.1

1/ 24 hour average value must be flagged if not meeting criteria
SD= standard deviation , CV= coefficient of variation
**** = need to ensure data system stamps appropriate time period with reported sample value**

Table 12-7. Continuous PM_{10} STP Conditions Validation Template

1) Criteria (PM_{10} Cont)	2) Frequency	3) Acceptable Range	Information /Action
CRITICAL CRITERIA- PM_{10} Continuous			
Sampler/Monitor	NA	*Meets requirements listed in FRM/FEM/ARM designation*	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
Sampling Period	**all filters**	**1440 minutes ± 60 minutes midnight to midnight local standard time**	1, 2 and 3) 40 CFR Part 50 App J Sec. 7.1.5
Average Flow Rate	every 24 hours of op	Average within < ± 5.1% of design	recommendation
Verification/Calibration			
One-point Flow Rate Verification	*every 30 days each seperated by 14 days*	< ± 7.1% of transfer standard	1 and 2) 40 CFR Part 58, App A, Sec. 3.3 3) Method 2.10 Table 3-1
OPERATIONAL EVALUATIONS TABLE PM_{10} Continuous			
Verification/Calibration			
System Leak Check	During precalibration check	Auditory inspection with faceplate blocked	1, 2 and 3) Method 2.11 Sec. 2.3.2
FR Multi-point Verification/Calibration	every 365 days and once a calendar year	3 of 4 cal points within < ± 10.1% of design	1) 40 CFR Part 50 App J Sec. 8.0 2 and 3) Method 2.10 Sec. 2.2.4
Audits			
Semi Annual Flow Rate Audit	*Twice a calendar year and 5-7 months apart*	< ± 10.1% of audit standard	1, 2) Part 58, App A, Sec. 3.3.3 3) Method 2.10 Sec. 7.1.5
Monitor Maintenance Inlet/downtube Cleaning	every 90 days and 4 times a calendar year	cleaned	1, 2 and 3) Method 2.10 Sec. 6.1.2
Manufacturer-Recommended Maintenance	per manufacturers' SOP	per manufacturers' SOP	
SYSTEMATIC CRITERIA - PM_{10} Continuous			
Siting	Every 365 days and 1/ calendar year	*Meets siting criteria or waiver documented*	1) 40 CFR Part 58 App E, Sections 2-5 2) Recommendation 3) 40 CFR Part 58 App E, Sections 2-5
Data Completeness	24-hour quarterly	≥ 75%	1, 2 and 3) 40 CFR Part 50 App. K, Sec. 2.3b & c

1) Criteria (PM_{10} Cont)	2) Frequency	3) Acceptable Range	Information /Action
Reporting Units	all filters	$\mu g/m^3$ at standard temperature and pressure (STP)	40 CFR Part 50 App K
Rounding convention for design value calculation			
24-hour, 3-year average	*quarterly*	*nearest 10 $\mu g/m^3$ (≥ 5 round up)*	1, 2 and 3) 40 CFR Part 50 App K Sec. 1 The rounding convention is for averaging values for comparison to NAAQS not for reporting individual values.
Verification/Calibration Standards and Recertifications - All standards should have multi-point certifications against NIST Traceable standards			
Flow Rate Transfer Std.	every 365 days and once a calendar year	*< ± 2.1% of NIST-traceable Std.*	1) 40 CFR Part 50, App.J Sec. 7.3 2) Method 2.11 Sec. 1.1.3 3) 40 CFR Part 50, App.J Sec. 7.3
Field Thermometer	every 365 days and once a calendar year	± 0.1° C resolution, ± 0.1° C accuracy	1, 2 and 3) Method 2.10 Sec. 1.1.2
Field Barometer	every 365 days and once a calendar year	± 1 mm Hg resolution, ± 5 mm Hg accuracy	1, 2 and 3) Method 2.10 Sec. 1.1.2
Clock/timer Verification	every 180 days and twice a calendar year	*15 min/day*	1) 40 CFR Part 50, App.J Sec. 7.1.5 2) Recommendation 3) 40 CFR Part 50, App.J Sec. 7.1.5

Table 12-8. PM10c for $PM_{10-2.5}$ Low-Volume Filter-Based Local Conditions Validation Template

1) Criteria (PM10c)	2) Frequency	3) Acceptable Range	Information /Action
CRITICAL CRITERIA- PM10c Filter Based Local Conditions			
Field Activities			
Sampler/Monitor	NA	*Meets requirements listed in FRM/FEM/ARM designation*	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
Filter Holding Times			
Pre-sampling	*all filters*	*≤ 30 days before sampling*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.3.5
Sample Recovery	*all filters*	*≤7 days 9 hours from sample end date*	1, 2 and 3) 40 CFR Part 50 App L Sec. 10.10
Sampling Period (including multiple power failures)	*all filters*	*1380-1500 minutes, or value if < 1380 and exceedance of NAAQS* 1/ *midnight to midnight local standard time*	1, 2 and 3) 40 CFR Part 50 App L Sec. 3.3 See details if less than 1380 min sampled
Sampling Instrument			
Average Flow Rate	*every 24 hours of op*	*average within 5% of 16.67 liters/minute*	1, 2 and 3) Part 50 App L Sec. 7.4.3.1
Variability in Flow Rate	*every 24 hours of op*	*CV ≤ 2%*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 7.4.3.2
One-point Flow Rate Verification	*every 30 days each seperated by 14 days*	*± 4% of transfer standard* ± 5% of flow rate design value	1, 2 and 3) 40 CFR Part 50, App. L, Sec. 9.2.5, 40 CFR Part 58 App A Sec. 3.3.1
Design Flow Rate Adjustment	*After multi-point calibration or verification*	*< ± 2.1% of design flow rate*	1, 2 and 3) 40 CFR Part 50, App. L, Sec. 9.2.6
Individual Flow Rates	*every 24 hours of op*	*no flow rate excursions > ±5% for > 5 min.* 1/	1, 2 and 3) 40 CFR Part 50, App. L Sec. 7.4.3.1
Filter Temp Sensor	*every 24 hours of op*	*no excursions of > 5° C lasting longer than 30 min* 1/	1, 2 and 3) 40 CFR Part 50, App. L Sec. 7.4.11.4
External Leak Check	*Before each flow rate verification/calibration* and before and after $PM_{2.5}$ separator maintenance	*< 80.1 mL/min* (see comment #1)	1) 40 CFR Part 50 App L, Sec. 7.4.6.1 2) 40 CFR Part 50 App L Sec.t 9.2.3 and Method 2-12 Sec. 7.4.3 3) 40 CFR Part 50, App. L, Sec. 7.4.6.1

1) Criteria (PM10c)	2) Frequency	3) Acceptable Range	Information /Action
Internal Leak Check	If failure of external leak check	*< 80.1 mL/min*	1) 40 CFR Part 50, App. L, Sec. 7.4.6.2 2) Method 2-12, Sec. 7.4.4 3) 40 CFR Part 50, App. L, Sec. 7.4.6.2
Laboratory Activities			
Post-sampling Weighing	*all filters*	*Protected from exposure to temperatures above 25C from sample retrieval to conditioning* *≤10 days from sample end date if shipped at ambient temp, or* *≤30 days if shipped below avg ambient (or 4° C or below for avg sampling temps < 4° C) from sample end date*	1, 2 and 3) 40 CFR Part 50 App L Sec. 8.3.6
Filter Visual Defect Check (unexposed)	*all filters*	*Correct type & size and for pinholes, particles or imperfections*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 10.2
Filter Conditioning Environment			
Equilibration	*all filters*	*24 hours minimum*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.5
Temp. Range	*all filters*	*24-hr mean 20.0-23.0° C*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.1
Temp.Control	*all filters*	*< 2.1° C SD* over 24 hr*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.2 SD use is a recommendation
Humidity Range	*all filters*	*24-hr mean 30.0% - 40.0% RH or within ±5.0% sampling RH but > 20.0%RH*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.3
Humidity Control	*all filters*	*< 5.1% SD* over 24 hr.*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.4 SD use is recommendation
Pre/post Sampling RH	*all filters*	*difference in 24-hr means ≤ ± 5.1% RH*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.3.3
Balance	*all filters*	*located in filter conditioning environment*	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.3.2
OPERATIONAL EVALUATIONS TABLE- PM10c Filter Based Local Conditions			
Field Activities			
Sampling Instrument			
Routine Verifications			
One-point Temp Verification	every 30 days	≤± 2.1°C	1) 40 CFR Part 50, App. L, Sec. 9.3 2) Method 2.12 Sec. 7.4.5 and Table 6-1 3) Recommendation
Pressure Verification	every 30 days	≤ ± 10.1 mm Hg	1) 40 CFR Part 50, App. L, Sec. 9.3 2) Method 2.12 Sec. 7.4.6 and Table 6-1 3) Recommendation
Annual Multi-point Verifications/Calibrations			
Temperature multi-point Verification/Calibration	on installation, then every 365 days and once a calendar year	≤± 2.1°C	1) 40 CFR Part 50, App. L, Sec. 9.3 2 and 3) Method 2.12 Sec. 6.4.4 Table 6-1

1) Criteria (PM10c)	2) Frequency	3) Acceptable Range	Information /Action
Pressure Verification/Calibration	on installation, then every 365 days and once a calendar year	<± 10.1 mm Hg	1) 40 CFR Part 50, App. L, Sec. 9.3 2 and 3) Method 2.12 Sec. 6.5 Sampler BP verified against independent standard verified against a lab primary standard that is certified as NIST traceable 1/year
Flow Rate Multi-point Verification/ Calibration	*Electromechanical maintenance or transport or* every 365 days and once a calendar year	<± 2.1% of transfer standard	1) 40 CFR Part 50, App. L, Sec. 9.2. 2) 40 CFR Part 50, App. L, Sec. 9.1.3, Method 2.12 Sec. 6.3 & Table 6-1 3) Recommendation
Other Monitor Calibrations	per manufacturers' op manual	per manufacturers' operating manual	1, 2 and 3) Recommendation
Precision			
Collocated Samples	*every 12 days for 15% of sites by method designation*	CV < 10.1% of samples ≥ 3.0 µg/m^3	1) and 2) Part 58 App A Sec. 3.2.3 3 Recommendation based on DQO in 40 CFR Part 58 App A Sec. 2.3.1.1
Accuracy Temperature Audit	every 180 days and at time of flow rate audit	<± 2.1°C	1, 2 and 3) Method 2.12 Sec. 11.2.2
Pressure Audit	every 180 days and at time of flow rate audit	<±10.1 mm Hg	1, 2 and 3) Method 2.12 Sec. 11.2.3
Semi Annual Flow Rate Audit	*Twice a calendar year and 5-7 months apart*	<± 4.1% of audit standard <± 5.1% of design flow rate	1 and 2) Part 58, App A, Sec. 3.2.2 3) Method 2.12 Sec. 11.2.1
Monitor Maintenance $PM_{2.5}$ Separator (WINs)	every 5 sampling events	cleaned/changed	1, 2 and 3) Method 2.12 Sec. 8.2.2
$PM_{2.5}$ Separator (VSCC)	every 30 days	cleaned/changed	1, 2 and 3) Method 2.12 Sec. 8.3.3
Inlet Cleaning Downtube Cleaning	every 30 days every 90 days	cleaned cleaned	1, 2 and 3) Method 2.12 Sec. 8.3 1, 2 and 3) Method 2.12 Sec. 8.4
Filter Housing Assembly Cleaning	every 30 days	cleaned	1, 2 and 3) Method 2.12 Sec. 8.3
Circulating Fan Filter Cleaning Manufacturer-Recommended Maintenance	every 30 days per manufacturers' SOP	cleaned/changed per manufacturers' SOP	1, 2 and 3) Method 2.12 Sec. 8.3
Laboratory Activities			
Filter Checks			
Lot Blanks	9 filters per lot	< ±15.1 µg change between weighings	1, 2, 3) Recommendation and used to determine filter stability of the lot of filters received from EPA or vendor. Method 2.12 Sec. 10.5
Exposure Lot Blanks	3 filters per lot	< ±15.1 µg change between weighings	1, 2 and 3) Method 2.12 Sec. 10.5 Used for preparing a subset of filters for equilibration
Filter Integrity (exposed)	each filter	no visual defects	1, 2 and 3) Method 2.12 Sec. 10.7 and 10.3
Lab QC Checks			

1) Criteria (PM10c)	2) Frequency	3) Acceptable Range	Information /Action
Field Filter Blank	10% or 1 per weighing session	$\leq \pm$ 30.1 µg change between weighings	1) 40 CFR Part 50, App. L Sec. 8.3.7.1 2 and 3) Method 2.12 Table 7-1 & Sec.10.5
Lab Filter Blank	10% or 1 per weighing session	$\leq \pm$ 15.1 µg change between weighings	1) 40 CFR Part 50, App. L Sec. 8.3.7.2 2 and 3) Method 2.12 Sec. 10.5
Balance Check (working standards)	beginning, 10th sample, end	$< \pm$3.1 µg from certified value	1, 2 and 3) Method 2.12 Sec. 10.6 Standards used should meet specifications in Method 2.12, Sec. 4.3.7
Routine Filter re-weighing	1 per weighing session	$\leq \pm$ 15.1 µg change between weighings	1, 2 and 3) Method 2.12 Sec. 10.8
Microbalance Audit	every 365 days and once a calendar year	$\leq \pm$ 0.003 mg or manufacturers specs, whichever is tighter	1, 2 and 3) Method 2.12 Sec. 11.2.7
Lab Temp Check	Every 90 days	$< \pm$ 2.1ºC	1, 2 and 3) Method 2.12 Sec. 10.10
Lab Humidity Check	Every 90 days	$< \pm$ 2.1%	1, 2 and 3) Method 2.12 Sec. 10.10
Verification/Calibration			
Microbalance Calibration	*At installation* every 365 days and once a calendar year	Manufacturer's specification	1) 40 CFR Part 50, App. L, Sec. 8.1 2) 40 CFR Part 50, App. L, Sec. 8.1 and Method 2.12 Sec. 10.11 3) NA
Lab Temperature Certification	every 365 days and once a year	$< \pm$ 2.1ºC	1, 2 and 3) Method 2.12 Sec. 4.3.8 and 9.4
Lab Humidity Certification	every 365 days and once a year	$< \pm$ 2.1%	1, 2 and 3) Method 2.12 Sec. 4.3.8 and 9.4
Calibration & Check Standards - Working Mass Stds. Verification Compared to primary standards	Every 90 days	$< \pm$ 2.1 ug	1, 2 and 3) Method 2.12 Sec. 9.7
Primary standards certification	every 365 days and once a calendar year	0.025 mg tolerance (Class 2)	1, 2 and 3) Method 2.12 Sec. 4.3.7
SYSTEMATIC CRITERIA - PM10c Filter Based Local Conditions			
Siting	Every 365 days and 1/ calendar year	*Meets siting criteria or waiver documented*	1) 40 CFR Part 58 App E, Sec. 2-5 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-5
Data Completeness	NA	$\geq$ 75% scheduled sampling days in each quarter	1, 2 and 3) Recommendation based on PM2.5 requirements in 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
Reporting Units	*all filters*	*µg/m^3 at ambient temp/pressure ($PM_{2.5}$)*	1, 2 and 3) 40 CFR Part 50 App N
Rounding convention for design value calculation	*all filters*	*to one decimal place, with additional digits to the right being truncated*	1, 2 and 3) 40 CFR Part 50 App N Sec. 3.0 (b) The rounding convention is for averaging values for comparison to NAAQS not for reporting individual values.
Lower DL	*all filters*	*$\leq$ 3 µg/m^3*	1, 2 and 3) 40 CFR Part 50, App O Sec. 3.1
Upper Conc. Limit	*all filters*	*$\geq$200 µg/m^3*	1, 2 and 3) 40 CFR Part 50, App O Sec. 3.2

1) Criteria (PM10c)	2) Frequency	3) Acceptable Range	Information /Action
Precision Single analyzer (collocated monitors)	every 90 days and 4 times a calendar year.	Coefficient of variation (CV) < 10.1% for values ≥ 3 µg/m^3	1, 2 and 3) Recommendation in order to provide early evaluation of achievement of DQOs.
Primary Quality Assurance Org.	*Annual and 3 year estimates*	*90% CL of CV < 10.1% for values ≥ 3 µg/m^3*	1, 2 and 3) Recommendation in order to provide early evaluation of achievement of DQOs.
Bias Performance Evaluation Program (PEP)	Once every 6-7 years	*< ±10.1% for values ≥ 3 µg/m^3*	1, 2 and 3) Recommendation based on pending guidance.
Field Activities			
Verification/Calibration Standards Recertifications – All standards should have multi-point certifications against NIST Traceable standards			
Flow Rate Transfer Std.	every 365 days and once a calendar year	*< ± 2.1% of NIST-traceable Std.*	1) 40 CFR Part 50, App. L Sec. 9.1 & 9.2 2) Method 2-12 Sec. 6.3.3 and Table 3-1 3) 40 CFR Part 50, App. L Sec. 9.1 & 9.2
Field Thermometer	every 365 days and once a calendar year	± 0.1° C resolution, ± 0.5° C accuracy	1, 2 and 3) Method 2.12 Sec. 4.2.2
Field Barometer	every 365 days and once a calendar year	± 1 mm Hg resolution, ± 5 mm Hg accuracy	1, 2 and 3) Method 2.12 Sec. 4.2.2
Verification/Calibration Clock/timer Verification	every 30 days	*1 min/mo*	1 and 2) Method 2.12 Sec 4.2.1 3) 40 CFR Part 50, App. L, Sec. 7.4.12
Laboratory Activities			
Microbalance Readability	*at purchase*	*1 µg*	1, 2 and 3) 40 CFR Part 50, App. L, Sec. 8.1
Microbalance Repeatability	at purchase	1 µg	1) Method 2.12 Sec. 4.3.6 2) Recommendation 3) Method 2.12 Sec. 4.3.6
Primary Mass. Verification/Calibration Standards	at purchase	0.025 mg tolerance (class 2)	1, 2 and 3) Method 2.12 Sec. 4.3.7
Comment #1 The associated leak test procedure shall require that for successful passage of this test, the difference between the two pressure measurements shall not be greater than the number of mm of Hg specified for the sampler by the manufacturer, based on the actual internal volume of the sampler, that indicates a leak of less than 80 mL/min.			

1/ value must be flagged, SD= standard deviation, CV= coefficient of variation

Table 12-9. Pb High-Volume (TSP) Local Conditions Validation Table

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

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

1) Criteria	2) Frequency	3) Acceptable Range	4) Information/Action
Reporting Units	*all filters*	*µg/m³ at local temperature and pressure.*	1, 2 and 3) 40 CFR Part 50 App R Sec. 3 (b)
Rounding convention for design value calculation (3-month arithmetic mean)	*quarterly*	*Report data to 3 decimal places (data after 3 are truncated.*	1, 2 and 3) 40 CFR Part 50 App R Sec. 3 (b) The rounding convention is for averaging values for comparison to NAAQS not for reporting individual values.
Lower Detectable Limit (AA)	*all samples*	*0.07 µg Pb/m³*	1, 2 and 3) 40 CFR Part 50 App G Sec. 2.3
Precision			
Single analyzer	every 90 days and 4 times a calendar year.	Coefficient of variation (CV) < 20.1% ≥0.02 µg/m³	1 and 2) 40 CFR Part 58 App A Sec. 3.4.4 3) Recommendation related to DQO
Primary Quality Assurance Org.	*Annual and 3 year estimates*	*90% CL of CV < 20.1% ≥ 0.02 µg/m³*	1, 2 and 3) 40 CFR Part 58 App A Sec. 3.4.4 and Sec. 2.3.1.3
Bias			
Performance Evaluation Program (PEP)	*5 audits for PQAOs with ≤ 5 sites* *8 audits for PQAOs with > 5 sites*	*95% CL Absolute bias < ±15.1% ≥ 0.02 µg/m³*	1, 2 and 3) 40 CFR Part 58 App A Sec. 3.4.7 and Sec. 2.3.1.3 The PEP include 1 or independent collocated audits and 4 or 6 samples from the monitoring organizations collocated monitor sent to the independent National PEP Laboratory.
Field Activities			
Verification/Calibration Standards and Recertifications - All standards should have multi-point certifications against NIST Traceable standards			
Flow Rate Transfer Std.	every 365 days and once a calendar year	*Resolution 0.02 m³/min* *± 2% reproducibility*	1) 40 CFR Part 50, App. B Sec. 7.8 2) Method 2.2 Sec. 2.5 3) 40 CFR Part 50, App. B Sec. 7.8
Field Thermometer	every 365 days and once a calendar year	*2° C resolution*	1) 40 CFR Part 50, App. B Sec. 7.5 2) Recommendation 3) 40 CFR Part 50, App. B Sec. 7.5
Field Barometer	every 365 days and once a calendar year	*± 5 mm Hg resolution*	1) 40 CFR Part 50, App. B Sec. 7.6 2) Recommendation 3) 40 CFR Part 50, App. B Sec. 7.6
Clock/timer Verification	every 90 days and 4 times a calendar year.	± 2 min/24-hour	R1, 2 and 3) Method 2.2. Sec. 2.3
Lab Activities			
Analytical Standards			
Reagents (HNO_3 and HCL)	*all*	*ACS reagent grade*	1, 2 and 3) 40 CFR Part 50 App G Sec.6.2.1
Pb nitrate Pb $(NO_3)_2$	*all*	*ACS reagent grade (99.0% purity)*	1, 2 and 3) 40 CFR Part 50 App G Sec.6.2.8

SD= standard deviation
CV= coefficient of variation

Additionally, below, Table 12-10, are gaseous pollutant action levels established by EPA's Region 4 (November 2016) that have subsequently been adopted by Florida's PQAO. These action levels are for comprised of both control limits and warning limits. Beginning January 2021, the Florida PQAO adopted a warning limit policy requiring the review and/or investigation of QC checks exceeding the warning limit for two or more consecutive checks. At a minimum, the exceedances will be noted and documented on the field records and/or in AirMVP. After the third consecutive exceedance of the warning limit, documented action and investigation by the operator must be performed. This applies to both manual and automatic nightly checks for the gaseous monitors.

Table 12-10. Gaseous Pollutant Action Levels

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

The monitor exhibits excessive zero or span drift, so the daily zero and span values must not exceed the maximum amount for a 24-hour period and the maximum for a period greater than 24 hours up to 14 days. See Table 12-11 below. For the zero drift, if the monitor exceeds these control limits, the data must first be investigated, and if deemed appropriate (based on a weight-of-evidence approach), invalidated back to the last passing check. See Florida's Gaseous QAPP for additional information. The control limit is the level of allowable imprecision before data invalidation is required.

Table 12-11. Zero and Span Drift Limits

Pollutant	24 hours	>24 hours to 14 days
	Zero Drift	Zero Drift
	Span Drift	Span Drift
Sulfur Dioxide (SO_2)	≤ +3.1 ppb	≤ +5.1 ppb
	Span drift ≤ ± 10.1%	Span drift ≤ ± 10.1%
Ozone (O_3)	≤ +3.1 ppb	≤ +5.1 ppb
	Span drift ≤ ± 7.1 %	Span drift ≤ ± 7.1 %
Carbon Monoxide (CO)	≤ +0.41 ppm	≤ +0.61 ppm
	Span drift ≤ ± 10.1%	Span drift ≤ ± 10.1%
Nitrogen Dioxide (NO_2)	≤ +3.1 ppb	≤ +5.1 ppb
	Span drift ≤ ± 10.1%	Span drift ≤ ± 10.1%

The action limits for precision checks used by the Florida PQAO for particulate pollutants are defined below in Table 12-12.

Table 12-12. Particulate Pollutant Action Levels

Parameter	Control Limit	Warning Limit
Precision Checks (% Difference)		
*$PM_{2.5}$	< ± 4.1%	≥ 3%
PM_{10}	< ± 7.1%	≥ 5%

*These limits are also used for filter based low-volume PM_{10} which is used to calculate PMcoarse (i.e., PM_{10} minus $PM_{2.5}$).

12.2.1 General Data Quality Objectives

- All criteria data should be traceable to a National Institute of Science and Technology (NIST) primary standard.
- All data shall be of a known and documented quality. Two major measurements used to define quality are precision and bias. Refer to Section 12.2 of this document for definitions of the metrics precision and bias.
- All data shall be comparable. All data shall be produced in a similar and scientific manner. The use of the standard methodologies for sampling, calibration, audition, etc. found in the QAPPs for the State of Florida 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 QAPPs should ensure that the data generated are representative.

- A 90% confidence of precision and 95% confidence of bias should be maintained, within each pollutant's allotted percent difference, between the actual amount of an introduced parameter (to a measurement system) and the indicated response of the measurement system.

12.2.2 Specific Data Quality Objectives (National Ambient Air Quality Standards)

The purpose of ambient pollutant monitoring in Florida are to determine whether the criteria data meet the standards described in Table 12-13.

Table 12-13. 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, 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 $\mu g/m^3$	Primary and Secondary	Not to be exceeded
Particulate Matter (PM_{10}) [d]	24-hour	150 $\mu g/m^3$	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 $\mu g/m^3$	Primary	Annual mean, averaged over 3 years
	Annual	15.0 $\mu g/m^3$	Secondary	Annual mean, averaged over 3 years
	24-hour	35 $\mu g/m^3$	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] Parenthetical value is an approximately equivalent concentration.
[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

12.3 Performance Audits/Site Reviews

In accordance with 40 CFR Part 58, Appendix A, Florida DEP performs quality assurance performance audits for all approved operating SLAMS, SPM, and specified PSD monitors which are used to measure the pollutants of ozone, sulfur dioxide, carbon monoxide, and nitrogen oxides within the Florida PQAO. However, due to the pandemic (COVID-19) and related restrictions (i.e. travel, face-to-face interactions, etc.), beginning the second quarter of calendar year 2020, the field technicians, both local program agencies and Florida DEP, within the Florida PQAO began conducting performance evaluations (semi-annual flow rate audits) for the particulate matter and lead monitors utilizing independent certified equipment, not normally used to calibrate and operate the sampler. The field SOP forms are used in lieu of the audit SOP forms to record these performance evaluations. However, a newly created, PQAO-approved form may be used in the future to document these semi-annual flow rate audits. Florida DEP OAM QA staff conduct quality assurance reviews of these documented performance evaluations, both Florida DEP and local program agencies, before they are finalized and entered into AirMVP. The final, QA'd performance evaluation is provided to the agency or Florida DEP territory and saved on Florida DEP's network drive. These audits are conducted using the methodology specified in audit and field SOPs for the parameter being measured.

Florida DEP also performs air monitoring site reviews to ensure that the siting criteria as identified in 40 CFR Part 58, Appendix E are being met. Florida DEP will email a summary of the results of the audit(s) and site review(s) to the respective agency along with guidance to the agency regarding follow-up, if any.

12.3.1 Performance Audits

If a performance audit for a monitor indicates a problem, certain actions are required. For gaseous audits, these actions are specified in Table 12-14 and must be performed to ensure the overall quality of the data. For particulate audits, these actions are specified in Table 12-15. Corrective actions must be completed in accordance with the Corrective Action SOP (DEP 01-4). Invalidation of data will be based on actual causes, not on the audit results.

Table 12-14. Gaseous 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.

Parameter	Audit Action Levels	Action 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.

- For gaseous audits, an audit is considered as a failed audit when the audit results for levels 3-10 are outside of the control limits for that specific pollutant (see Table 12-1 thru 12-4). Failures at levels 1 and 2 only, are not considered failed audits, however, an evaluation of the instrument should be conducted to ensure that the data quality is maintained. These evaluation procedures are described in the Corrective Action SOP (DEP 01-4).
- For gaseous audits, if a failed audit does occur (failures at levels 3-10), an independent standard should be used to confirm the audit results, i.e. the instrument standard located at that site should not be used to verify these results. All audits (passing and failing) must be entered into AirMVP. All valid audits (passing and failing) will be submitted to AQS. Furthermore, corrective actions must be completed in accordance with the Corrective Action SOP (DEP 01-4).

Note: Enter <u>all</u> audits, both passing and failing, at <u>all</u> levels (1 thru 10) into AirMVP. Exclude only invalid or voided audits from being uploaded into AQS.

Table 12-15. Particulate Audit Action Levels

Pollutant Type	Precision & Accuracy or Design Percent Difference Limits	Acceptable Limit: No Action Required	Action Required	Out of Tolerance: Corrective Action
Filter Based $PM_{2.5}$ (Local)	P&A	< ±4.1%	≥ ±4.1%	≥± 4.1%
Filter Based $PM_{2.5}$ (Local)	Design	<± 5.1%	≥± 5.1%	≥ ±5.1%
Filter Based $PM_{10-2.5}$ (Local)	P&A	<± 4.1%	≥ ±4.1%	≥± 4.1%
Filter Based $PM_{10-2.5}$ (Local)	Design	< ±5.1%	≥ ±5.1%	≥ ±5.1%
Filter Based Low Vol STP PM_{10} (Local)	P&A	< ±4.1%	≥±4.1%	≥±4.1%

Pollutant Type	Precision & Accuracy or Design Percent Difference Limits	Acceptable Limit: No Action Required	Action Required	Out of Tolerance: Corrective Action
Filter Based Low Vol STP PM_{10} (Local)	Design	<±5.1%	≥±5.1%	≥±5.1%
Filter Based Low Vol PM_{10}/Pb (Local)	P&A	<±4.1%	≥±4.1%	≥±4.1%
Filter Based Low Vol PM_{10}/Pb (Local)	Design	<±5.1%	≥±5.1%	≥±5.1%
Continuous $PM_{2.5}$ (Local)	P&A	<±4.1%	≥±4.1%	≥±4.1%
Continuous $PM_{2.5}$ (Local)	Design	<±5.1%	≥±5.1%	≥±5.1%
Continuous PM_{10} (STP)	P&A	<±4.1%	≥±4.1%	≥±4.1%
Continuous PM_{10} (STP)	Design	<±5.1%	≥±5.1%	≥±5.1%
High Volume PM_{10} (STP)	P&A	<±4.1%	≥±4.1 %	≥±7.1 %
High Volume PM_{10} (STP)	Design	<±5.1%	≥±5.1 %	≥±10.1%
High Volume Pb (TSP)	P&A	<±4.1%	≥±4.1 %	≥±7.1%
High Volume Pb (TSP)	Design	<±5.1%	≥±5.1 %	≥±10.1%

Note: Consistent with the Office of Air Quality Planning and Standards' March 3, 2016 technical memorandum, the low-volume PM_{10} field and laboratory requirements stated here are consistent with those stated in 40 CFR Part 50. See Appendix G.

12.3.2 Site Reviews

For siting issues, apply the QA qualifier flag SX (Does not meet siting criteria) to those sites/parameters with siting issues. Apply this code from the date the siting issues were identified by DEP's audit staff until the date the issues are resolved (or EPA grants a siting waiver). Due to the limitations that may be imposed by the City agencies, County agencies, or other property owners, tree trimming may not be an option or may be limited. In these cases, site relocation or an EPA siting waiver may need to be considered. However, these actions must also be coordinated with the OAM Quality Assurance Manager.

Additionally, the agency will need to determine whether data needs to be invalidated. The agency is also responsible for developing a plan of action in addressing siting issues. Investigations will not be closed until a cause has been determined and corrective actions taken. The agency must email the results of its investigation to:

- DEP audit staff,
- OAM's data validation team (Data.Validation@dep.state.fl.us), and
- OAM's Data Quality Section Environmental Administrator.

Florida DEP will decide whether the resulting findings/actions taken by the agency, for both performance audits and site reviews, are sufficient. If data needs to be invalidated or flagged, the

onus is on the agency to do so in AirMVP. However, OAM's data validation team ensures that these data are handled appropriately in AirMVP and subsequently in AQS.

12.3.3 EPA NPAP, PEP, and Pb-PEP Audit Reporting

The National Performance Audit Program (NPAP) is a performance evaluation which is a type of audit where quantitative data are collected independently in order to evaluate the proficiency of an analyst, monitoring instrument or laboratory. Due to the implementation approach used in the program, NPAP provides a national independent assessment of performance while maintaining a consistent level of data quality. Performing audits of the primary monitors at 20 percent of monitoring sites per year, and 100 percent of the sites every 6 years. High-priority sites may be audited more frequently. Since not all gaseous criteria pollutants are monitored at every site within a PQAO, it is not required that 20 percent of the primary monitors for each pollutant receive an NPAP audit each year only that 20 percent of the PQAOs monitoring sites receive an NPAP audit. It is expected that over the 6-year period all primary monitors for all gaseous pollutants will receive an NPAP audit. The details of the program are described in 40 CFR Part 58 Appendix A.

The $PM_{2.5}$ Performance Evaluation Program (PEP) is an independent assessment used to estimate total measurement system bias. These evaluations will be performed under the NPEP as described in section 2.4 of this appendix or a comparable program. Performance evaluations will be performed annually within each PQAO. For PQAOs with less than or equal to five monitoring sites, five valid performance evaluation audits must be collected and reported each year. For PQAOs with greater than five monitoring sites, eight valid performance evaluation audits must be collected and reported each year. The details of the program are described in 40 CFR Part 58 Appendix A.

The Florida lead network participates in the national Pb-PEP conducted by EPA, according to Appendix A of 40 CFR Part 58, §3.4.7. Each calendar quarter, a collocated sample is shipped to the designated EPA laboratory for analysis. The EPA OAQPS submits the results of the collocated sample analyzed by the EPA laboratory to AQS and compares the laboratory result to the result of the primary sample analyzed by the EPC laboratory assessing the accuracy of the analytical method. Additionally, the EPA sets up a performance evaluation monitor which is collocated with an ambient lead sampler, to assess the total measurement system bias between the primary monitor and the performance evaluation monitor on an annual basis. The Pb-PEP results are retrieved from AQS by running the AMP504 Report, and then the EPC Air Monitoring QA staff will manually enter the QA data into AirMVP. Each calendar quarter, the EPC Air Monitoring QA staff will review the Pb-PEP results for the collocated sample pairs and the collocated audit monitor. In the first calendar quarter, the EPC will review all Pb-PEP results for the previous calendar year.

Effective calendar year 2021, all EPA NPAP and PEP audits must be entered into AirMVP. The option is available under the "QA/QC Checks Menu" in AirMVP. The

review and comparison of this data entry to AQS will be a part of the annual data certification process going forward. EPA is responsible for entering these audits in AQS. This process will allow us to confirm that this data entry has been complete in AQS and that it is accurate.

In the case of an NPAP or PEP audit failure, Florida DEP should be immediately emailed to be alerted of the performance evaluation failure. Attach the NPAP and PEP audit report to the email. Email the OAM Program Administrator, the OAM Quality Assurance Manager, and the OAM Data Quality Section Administrator.

See below for additional measures to be taken for an out of tolerance NPAP audit.

- An out of tolerance NPAP audit at EPA Audit Levels 1 and 2 require an evaluation. The evaluation process must include, but is not limited to, the following:
  - Evaluate the level of zero drift on the instrument.
  - Perform a sample line integrity check (SLIC).
  - Assess the frequency of zero adjustments on the instrument.
  - Any corrective actions taken based on the evaluation of the instrument must be documented in the site records and clearly state all applicable results.
  - Email Florida DEP to let us know of your completed evaluation and provide associated documentation and records. You do not need to contact EPA regarding an evaluation.
- An out of tolerance NPAP audit at EPA Audit Levels 3 and higher require corrective action.
  - SO_2, NO_2, and CO have an acceptance limit of a mean absolute % difference greater than 15% (per the January 8, 2015 QAPP for Federal NPAP for NAAQS Gases).
  - Ozone has an acceptance limit of a mean absolute % difference greater than 10% (per the January 8, 2015 QAPP for Federal NPAP for NAAQS Gases)
- Corrective action includes, but is not limited to, the following:
  - Review of QC checks.
  - Review of maintenance records.
  - Review of control charts.
  - Review of recent Florida DEP audit results.
  - Performance of a manual Z/S/P following NPAP audit.
  - Performance of a multipoint verification/calibration NPAP audit.
  - A corrective action performance audit can be conducted by Florida DEP upon request.
- Corrective action is expected within 30 days after the audits are conducted. The corrective action response should include:
  - The suspected cause(s) of the failure and steps taken to correct the cause(s).
  - Steps taken to prevent future occurrences.

- If/how ambient monitoring data was affected, including date and times affected, flags applied, and/or null data codes applied.

- Corrective action should be sent to Keith Harris (Harris.Keith@EPA.gov), Floyd Wellborn (Wellborn.Floyd@EPA.gov), and Daniel Garver (Garver.Daniel@EPA.gov). Copy the OAM Program Administrator, the OAM Quality Assurance Manager, and the OAM Data Quality Section Administrator.

12.4 Quality Assurance (QA) Systems Audits and Data Reviews

The requirements for the QA systems audits are delineated in 40 CFR Part 58 Appendix A and the Florida QAPPs. During a systems audit, all aspects of the monitoring program are examined, including laboratories which support ambient monitoring. Florida DEP performs systems audits of all its nine local program agencies and Florida's air monitoring laboratories (i.e. $PM_{2.5}$ and lead). Florida DEP also conducts internal audits of their quality system. If the outcome of a systems audit, whether performed by Florida DEP or EPA, impacts the data, Florida DEP will work with the agency to ensure that the data are handled appropriately in AirMVP and AQS.

Florida DEP also performs routine "spot-checks" or data reviews of Florida's data. A schedule is determined prior to the start of each calendar year. OAM staff will review agency records and data reported in AirMVP for agencies within the PQAO to ensure that the air monitoring data are being handled correctly and consistently across the state. If the outcome of the data review warrant corrections, whether in procedure or data, the agency is immediately notified. Again, Florida DEP will work with the agency to ensure that the data are handled appropriately.

12.5 PB (Lead) Analysis Audit

The Florida lead network participates in a Pb analysis audit conducted by EPA, pursuant to Appendix A of 40 CFR Part 58, §3.4.6. Annually, the US EPA provides audit strips to the Hillsborough County laboratory, the only agency in the Florida PQAO performing lead analysis, for monthly lead analysis. A set of Pb audit strips are prepared with a concentration which is 30-100% of the NAAQS for Pb (Level 1), and a concentration which is 200-300% of the NAAQS for Pb (Level 2). The set is analyzed monthly, reported in units of µg/strip (AQS code 077) and then, each calendar quarter the Environmental Protection Commission of Hillsborough County (EPCHC) enters this data into AirMVP. The AQS Coordinator submits the results to AQS for assessment by EPA.

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

12.6 Routine Tasks (Data Verification and Data Validation)

The QA staff from each agency are responsible for the tasks identified in this section. The data validation, comments, flags and precision data entry in AirMVP must be completed monthly, no later than 20 days after the end of each month. However, the data validation for the entire quarter must be completed no later than 40 days after the end of the quarter.

Each agency is required to provide the following, in an email to OAM's data validation team (data.validation@dep.state.fl.us), within 40 days after the end of each quarter:

- Confirmation that all the data has been verified and validated;
- Completed Data Validation Checklist (Form DEP 18-27-A);
- AirMVP Data Completeness Report (signed by the QA coordinator);
- Memo stating which parameters were below 75% (90% for ozone) and why (if applicable);
- Corrective Action/AirMVP Missing Data Report (if applicable);
- AirMVP Pollutant Comment Report (signed by the QA coordinator); and,
- Data Verification Utility Report, initial and final (signed by the QA coordinator).

The QA Coordinator from each local program agency is responsible for these tasks while OAM's data validation team is also responsible for completing or ensuring that these tasks are completed for each of its eight territories. The Data Quality Section Administrator and AQS Coordinator will perform a review of statewide data prior to upload to AQS. Data are uploaded into AQS by the AQS Coordinator after the satisfactory completion of these reviews.

12.6.1 Data Review/Validation Criteria – General Overview

The data should be evaluated for non-representative (irregular) data points that may be the result of monitoring system malfunctions. Small random errors are difficult to ascertain as they may be close to the "true value" and do not seem out of line from what is expected. The best approach in dealing with small random errors is through prevention (e.g., designing the sampling and data analysis procedures to minimize the potential for errors), checking the sampling system to decrease opportunities for systematic errors (equipment maintenance, calibrations), and relying on the knowledge that a few random errors of small magnitude will generally "average out."

The primary concerns in data reviews are the systemic errors, errors that introduce a bias to the data (e.g., data different from data collected by near-by monitors or from what is expected) and should warrant further investigation as to the validity of the data.

Typical indications of systematic errors due to malfunctions of the sampling equipment include:

1. Persistent values (other than minimum detectable) for several hours
2. Data spikes or jumps
3. Data below the zero baseline
4. Excessive drifting of the zero or span

The data for any time interval in which a malfunction of the sampling system is suspected should be investigated, documented and invalidated, if necessary.

12.6.2 Control Charts

On October 2, 2019, Florida DEP released its new Control Chart Utility in FAMAS (now AirMVP). This utility allows staff to review raw ambient data and QC data from trends, biases, or exceedances. Effective the 3rd quarter of 2019, all agencies within the Florida PQAO are to utilize this Control Chart Utility in their quarterly data validation process and document accordingly.

What is a Control Chart?

A Control Chart is a:

- Visual analysis of trend(s), bias(es), or exceedance(s) in the dataset of interest,
- Method by which a large amount of information regarding the dataset may be shared quickly, and
- Valuable tool at multiple levels in the quality system for data verification and validation to enhance quality data capture.

A Control Chart is **not**:

- A paper or electronic strip chart of minute data **or** the only tool to be used when validating data

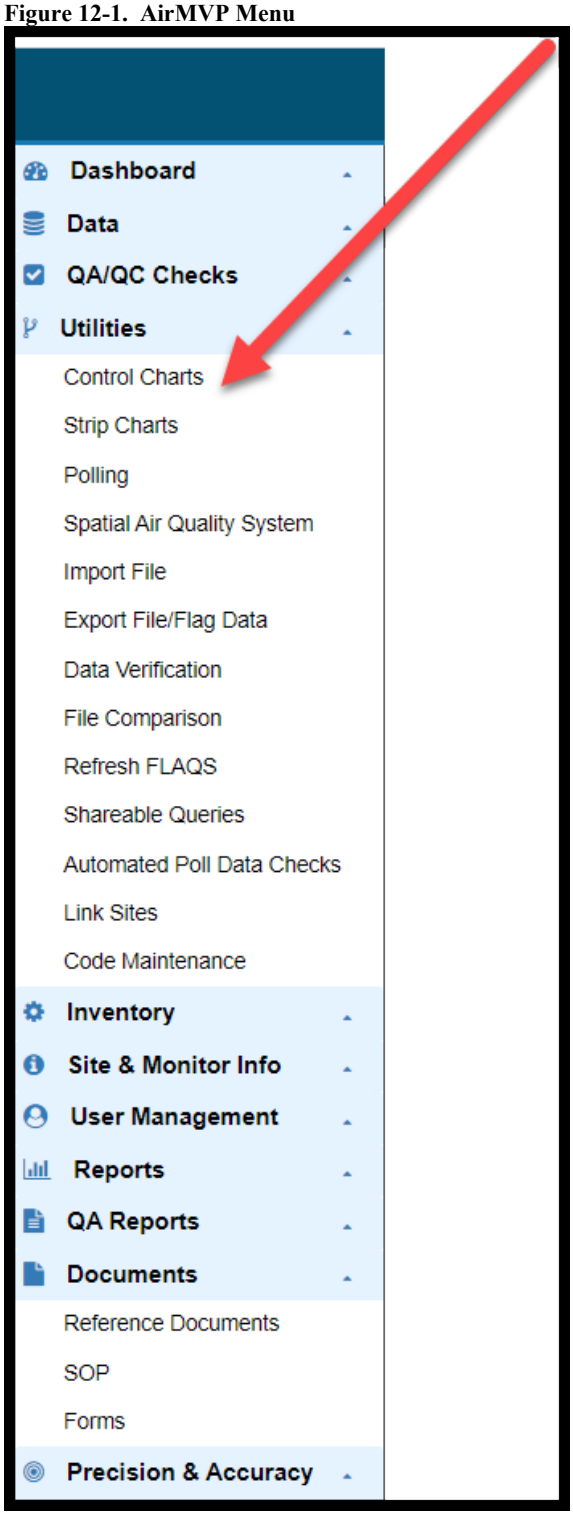
Why should Control Charts be used?

- They can improve the quality of the data captured.
- They provide a graphical representation of trends, biases, or exceedances in the dataset.
    - Outliers, spikes, etc.
    - Positive/negative bias They allow for the analyses of large datasets over various timescales to ensure specific goals are being met.
    - Daily/monthly/quarterly data comparisons.
    - Track progress toward achieving DQOs (i.e., the measurement uncertainty of your quality system).
    - Efficiently calculate different data statistics - % difference, standard deviation, etc.
- They are useful tools for assessing quality control checks and ambient data during the data verification and validation process.

How do I access the Control Chart Utility in AIRMVP?

1. Select the Control Charts option from the Utilities menu in AirMVP (see Figure 12-1).

Figure 12-1. AirMVP Menu

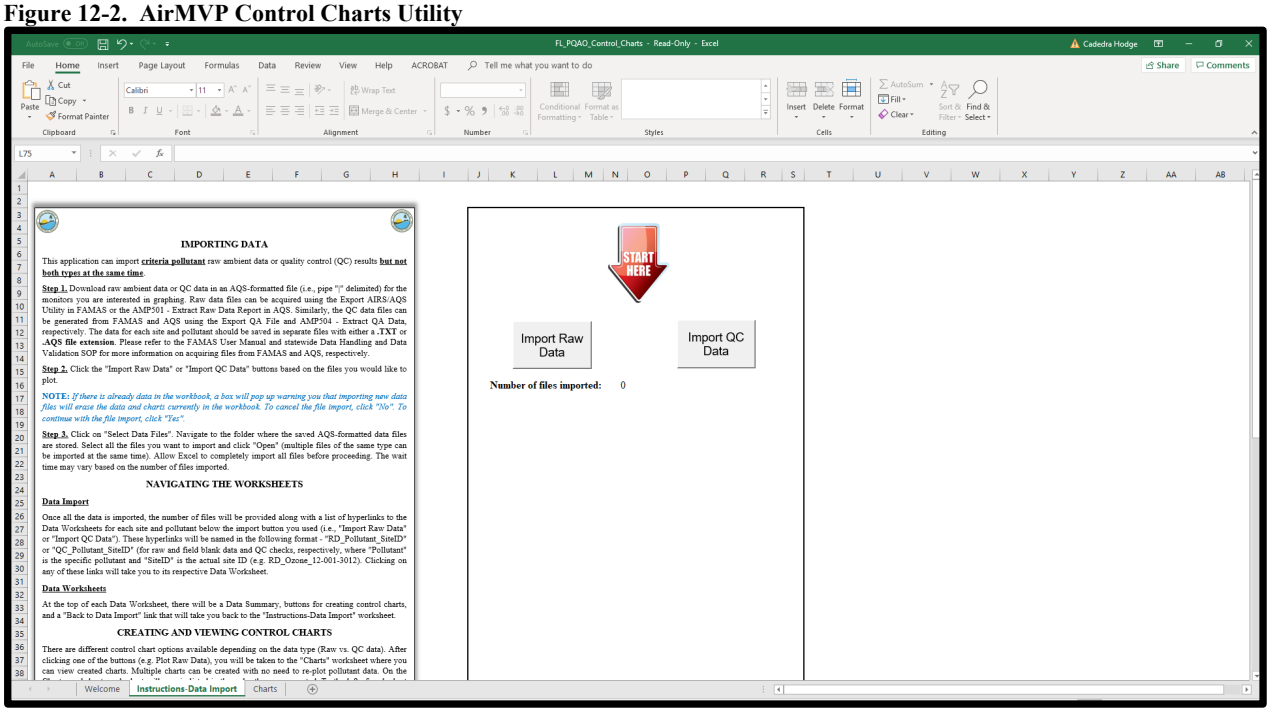


2. AirMVP will automatically download the chart after you have selected the Control Chart option.

3. The tool will open in an Excel file. Detailed instructions covering Importing Data,

Navigating the Worksheets, and Creating and Reviewing Control Charts are provided within the file. See Figure 12-2.

Figure 12-2. AirMVP Control Charts Utility



Graphical Examples from the AirMVP Control Chart Utility

See Figure 12-3 thru 12-8 for examples of visual trends, biases, or exceedances in the raw ambient data and QC data that can be observed utilizing the AirMVP Control Chart Utility.

Figure 12-3. AirMVP Control Chart Utility – Examples of Outliers or Exceedances

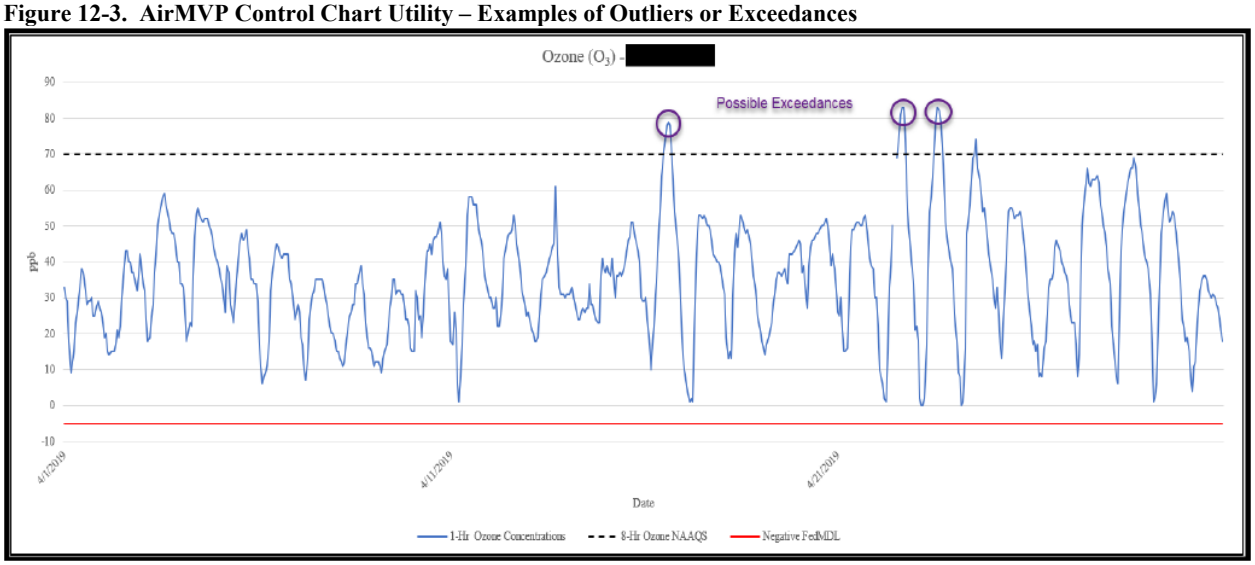


Figure 12-4. AirMVP Control Chart Utility – Example of Negative Shift in the Baseline Concentrations (Negative Bias)

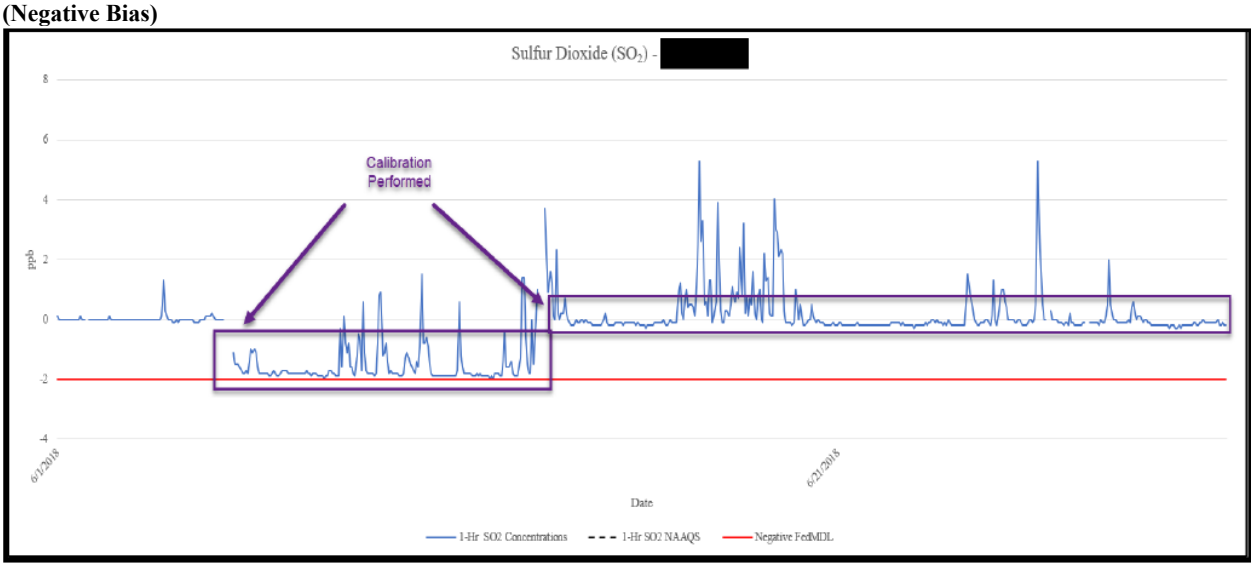


Figure 12-5. AirMVP Control Chart Utility – Example of Data Spikes or Drop-Outs

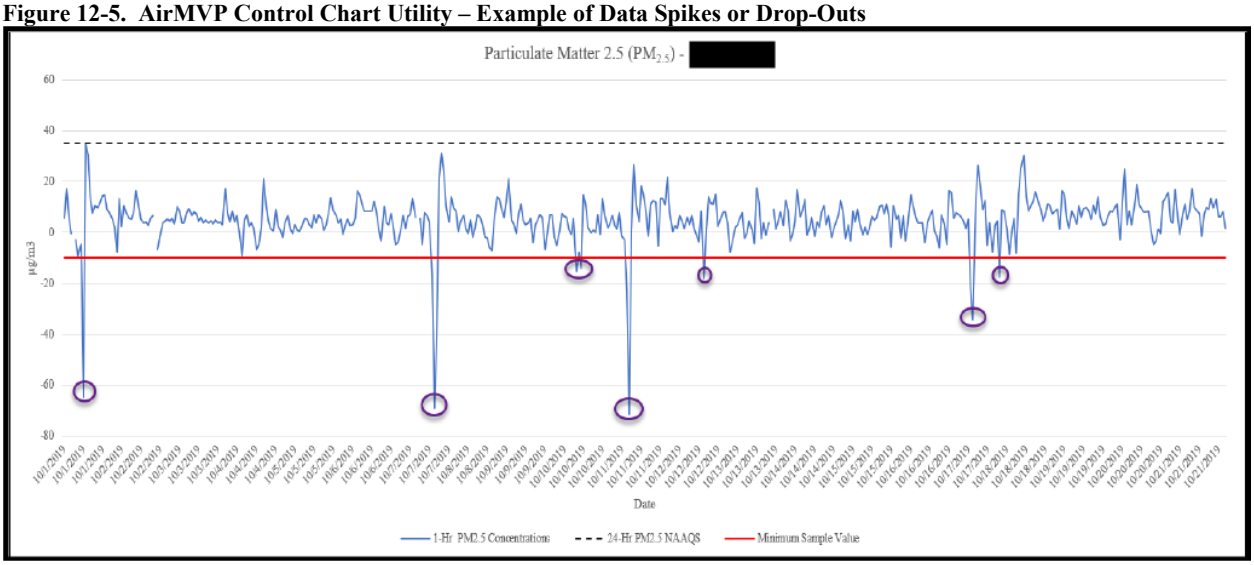


Figure 12-6. AirMVP Control Chart Utility – Example of Positive Shift in the Baseline Concentrations (Positive Bias)

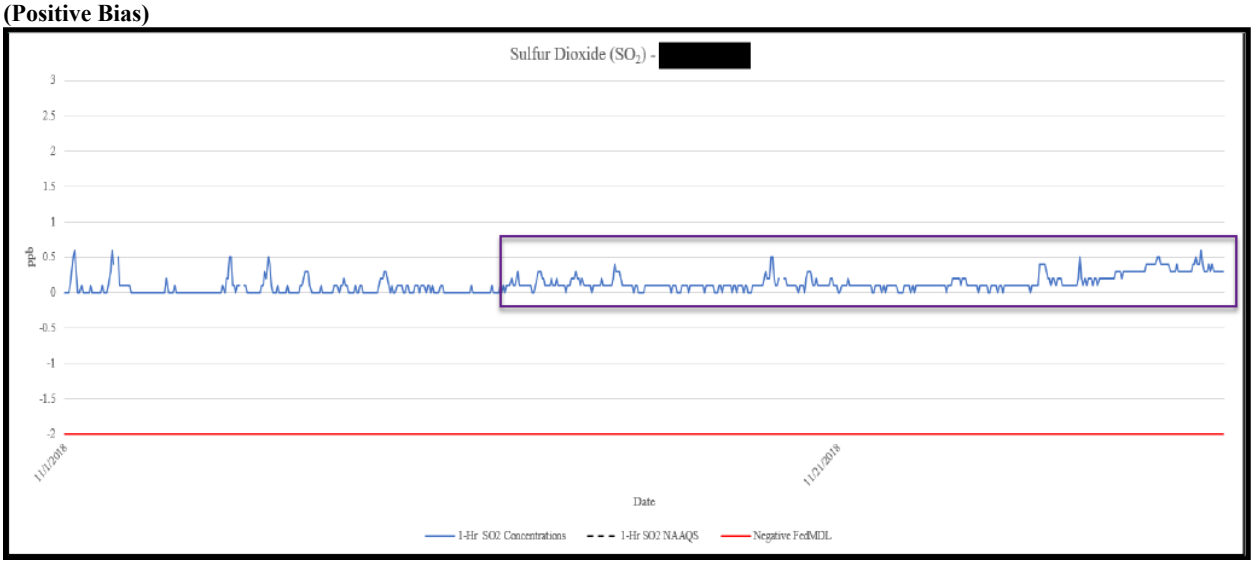


Figure 12-7. AirMVP Control Chart Utility – Example of Drift in 1-Point QC Checks

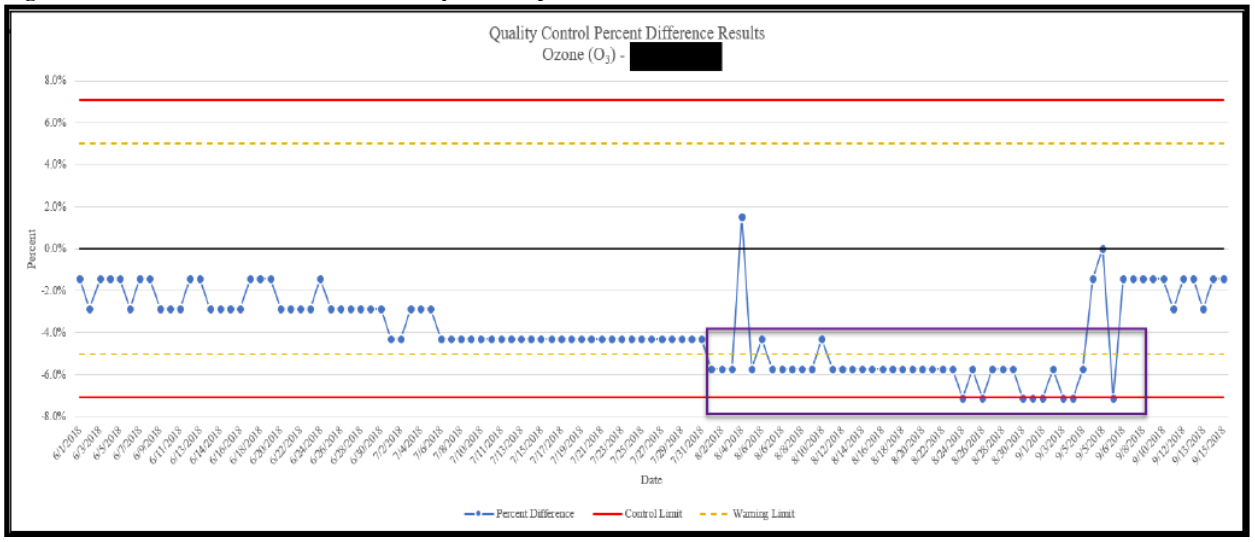
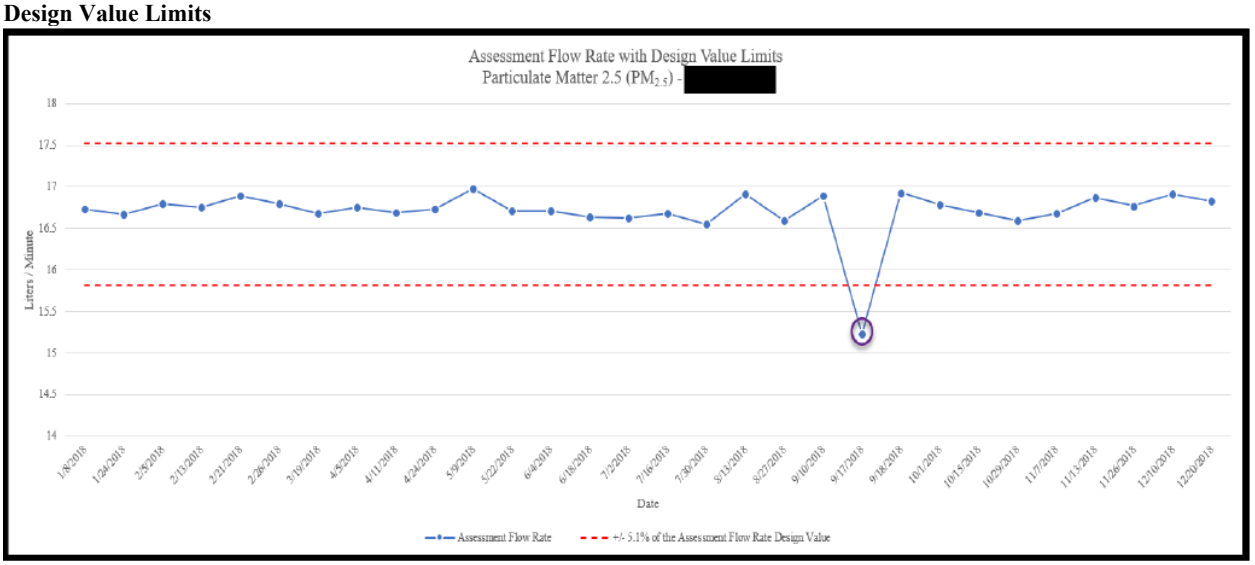


Figure 12-8. AirMVP Control Chart Utility – Example of Assessment Flow Rate Outside of Flow Rate Design Value Limits



12.6.3 Continuous Monitoring Data Review/Validation Criteria

All continuous monitoring data shall be validated by the ambient monitoring staff and reviewed by the QA staff of the originating agency before submittal to AQS.

Ozone (O3)

Ozone formation typically follows a diurnal pattern; increasing in the morning, highest in the afternoon, and decreasing in the evening or night. (*Note: The diurnal cycle can vary greatly depending on the site location, emission sources, weather conditions, or ozone transport.*)

1. The maximum ambient ozone hourly concentration should be in the range of 170 to 250 ppb. While concentrations greater than that are possible, it is more likely a span or calibration that has not been correctly flagged and needs to be investigated.
2. The minimum ozone concentration should be greater than -5 ppb.
3. A rate of change in ozone greater than 50 to 60 ppb/hour needs to be evaluated.
4. At any point in time, the ozone concentration should be within 50 ppb of the ozone concentration of near-by sites; the large value is due to ozone transport being observed at one site and then appearing later at the near-by site.
5. Constant ozone concentrations (especially concentrations greater than 40 ppb) that remain unchanged for 4 to 5 consecutive hours may indicate analyzer malfunction.
6. Shifts in the baseline concentration should be investigated as it may indicate an analyzer instability problem.
7. Co-pollutant check: nitric oxide (NO); NO decreases as ozone increases and typically increases as ozone decreases.

Oxides of Nitrogen (NO, NO_2, NO_X)

Nitrogen dioxide (NO_2) is one of a group of highly reactive gases known as "oxides of nitrogen," or "nitrogen oxides (NOx)." NO_2 forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment.

1. The NO or NO_2 concentration should not exceed the NO_X concentration.
2. The maximum ambient NO_X concentration should be less than 700 ppb in urban areas and no greater than 300 ppb in rural areas.
3. The minimum concentration should be greater than -5 ppb.
4. A rate of change in NO, NO_X, NO_2 greater than 30 ppb/hour needs to be evaluated.
5. Constant NO, NO_X, or NO_2 concentrations (concentrations greater than 0 ppb) that remain unchanged for 9 to 10 consecutive hours may indicate an analyzer malfunction.
6. Shifts in the baseline concentration should be investigated as it may indicate an analyzer instability problem.
7. Co-pollutant check: Ozone. Nitric oxide decreases as ozone increases and typically increases as ozone decreases.

Carbon Monoxide (CO)

Highest levels of CO typically occur during the colder months of the year when inversion conditions are more frequent.

1. The maximum ambient CO concentration expected to be observed may be greater than 8 ppm but should less than the CO NAAQS of 35 ppm.
2. The minimum CO concentration should be greater than or equal to 0 ppm.
3. A rate of change in CO greater than 5 ppm/hour needs to be investigated.
4. Constant CO concentrations (concentrations greater than 0 ppm) that remain unchanged for 9 to 10 consecutive hours may indicate an analyzer malfunction.
5. Shifts in the baseline concentration should be investigated as it is a common occurrence with CO analyzers.
6. Co-pollutant: nitric oxide; higher levels of CO are generally associated with areas of high traffic congestion and increased NO concentrations.

Sulfur Dioxide (SO_2)

Sulfur dioxide is formed in the burning of sulfur containing fuels (e.g., high sulfur coal and oils), when gasoline is refined from oil, and the extraction of metals from ores.

1. The maximum ambient SO_2 concentration should be less than 75 ppb.
2. The minimum SO_2 concentration should be greater than -2 ppb.
3. A rate of change in SO_2 concentration greater than 40 ppb/hour needs to be

investigated.

4. Constant SO_2 concentrations greater than or less than 0 ppb that remain unchanged for 9 to 10 consecutive hours may indicate an analyzer malfunction.
5. Shifts in the baseline concentration should be investigated.

Particulates (Continuous)

Particulate matter (PM) is a mixture of solid particles (different shapes, sizes, and compositions) and liquid droplets found in air.

1. Maximum ambient $PM_{2.5}$ hourly concentrations should normally be less than 200 $\mu g/m^3$.
2. Minimum $PM_{10}/PM_{2.5}$ concentrations should be greater than the negative Federal MDL.
3. Rates of change in $PM_{10}/PM_{2.5}$ concentrations greater than 50 $\mu g/m^3$ per hour should be investigated.
4. Particulate concentrations (concentrations greater than 50 $\mu g/m^3$) that remain unchanged for 5 hours may indicate a monitor malfunction.
5. Collocated monitors should have similar concentrations.
6. At sites with both PM_{10} and $PM_{2.5}$ monitors, $PM_{2.5}$ concentrations should be less than PM_{10} concentrations.

12.6.4 Manual Sampling Data Review/Validation Criteria

Particulates (Manual)

Manual particulate sampling data reviews are primarily concerned with the mass values of randomly selected particulate filters.

1. Maximum ambient $PM_{2.5}$ hourly concentrations should normally be less than 200 $\mu g/m^3$ but greater than 2 $\mu g/m^3$.
2. The flow rates and sampling times must be reviewed to ensure the sample is valid and that the information is associated with the correct particulate filter.
3. The calculated particulate concentrations ($PM_{2.5}$, PM_{10}) must be reviewed to ensure the values do not exceed the National Ambient Air Quality Standards (NAAQS) and that those values that exceed the NAAQS are properly investigated. If there was an exceedance of the NAAQS concentration, the manual particulate data should be compared to the data from the on-site continuous particulate sampler, if available.
4. Collocated monitors should have similar concentrations.
5. At sites with both PM_{10} and $PM_{2.5}$ monitors, $PM_{2.5}$ concentrations should be less than PM_{10} concentrations.
6. $PM_{2.5}$ filter blanks should not exceed ± 30 $\mu g/m^3$. If exceeded, the instrument should

be checked, and more frequent maintenance/cleaning may be required.

Collocated Percent Difference for Manual Samplers

The data validation templates state that the coefficient of variation should not exceed 10.1% for samples of 3 $\mu g/m^3$ or greater on a quarterly basis. This means that it accounts for a quarterly average of the percent differences between the collocated samples. The data verification utility will flag any samples that have a 10% difference or greater as failing and thus will require further investigation.

Example: If the sample is $\geq 3\mu g/m^3$ and the collocated percent difference exceeds 10% the following should be used to assess the validity of the samples:

1. Check to see if the arithmetic difference between samples is within 4 $\mu g/m^3$.
2. Check the run documentation (F, P, and I files, sampler run data sheet) to ensure the instrument was operating correctly.
3. Check site documentation to ensure maintenance was completed timely.
4. Check to see if more than one sample was affected (i.e., 2 or 3 consecutive samples failed).

   Actions: 1, 2 and 3 above are ok and 4 showed only one sample was affected – proceed without any further action.

   Actions: 1, 2 and 3 above are ok but 4 showed two or more consecutive samples were affected – cleaning and more frequent maintenance may be required for the instrument (documented on site forms) but no further action will be required.

   Actions: 1, 2, 3 and 4 were an issue – further investigation is required and may result in the flagging or invalidation of data.

   If no sampler issues are found, it may be necessary to ask the lab to confirm the filter weights

12.6.5 Overall Data Review (Continuous and Manual Sampling)

The following procedures cover the review of continuous monitor data and the overall data review. Utilize the Data Validation Checklist (Form DEP 18-27-A) as your guide as you complete these reviews and tasks. Decision-making emails should be saved on the agency's network drive and preferably appended to the checklist for future reference.

1. Verify that there is sufficient valid minute data for each hour (45 minutes = 1 valid hour). If an hour is found to have less than 45 minutes of valid data, the entire hour is invalidated. There are some exceptions with continuous particulate federal equivalent methods (FEMS). See Florida Particulate QAPP.

   Remember: For continuous monitors, except for ozone, data completeness refers

to the number of days with valid data (i.e., days with ≥ 18 hours of valid concentration averages are considered complete) for the month.

2. Ensure that review of daily minute data is documented accordingly (see Section 3.2 of this document for specifics and the documentation of minute data). The field staff must perform the daily comparison of the minute data concentrations. The field staff are utilizing electronic strip charts, generated by AirMVP or AirVision, to review the data for outliers and anomalies among the concentrations. The QA staff reviews the data similarly as well as to ensure that the field staff are documenting review of these data and that the data are handled correctly.
3. Ensure that diagnostic information associated with the instruments, including diagnostic information provided on the completed performance audit record, is reviewed to ensure that instrumentation was operating within specification.
4. Verify the latest approved version/effective dates of each form (as of the date(s) indicated on the form(s)) was/were used for the operation(s) documented.
5. Check that the makes, models, and serial numbers of equipment on the form match the equipment operating in the field at the time of maintenance.
6. Check that due dates for all preventative maintenance are being met. See Tables 12-19 and 12-20 in this SOP for appropriate null code or QA qualifier to use in the case of late or failed checks.
7. Make sure the dates on all forms generated by a single station visit (preventative maintenance schedule, Z/S/P, calibrations, site visit, etc.) are correct.
8. Ensure that the certification dates for certified equipment are correct and up-to-date.
    a. Confirm NIST-traceability.
    b. Confirm that "as found" out of tolerance verifications (multi-gas calibrators) have been handled correctly. Florida DEP OAM Management should be contacted to determine what, if any, impacts there are to the data. See OAM TN 18-2 posted in AirMVP.
9. Check that the shelter temperature was within specification for the time of the data being reviewed and null codes are appropriately applied where it was not. Data associated with the out of spec temperatures should be invalidated. The temperature (INT) data should remain if it's confirmed that the temperature data are correct.
    a. See Table 12-15 (issued June 2019 by the OAM) for reference.
    b. See also Appendix H, "Clarifications and Guidance on Shelter Temperature Guidance for Ambient Air Pollutant Methods", a technical memorandum issued by the United States EPA's Office of Air Quality Planning and Standards dated March 8, 2018.

Table 12-16. Operating Temperature Ranges for Air Monitoring Instruments

Gaseous Monitors		
Pollutant	**Model**	**Operating Range**
SO_2	Teledyne T100	5-40°C
	Teledyne T100U	5-40°C
	Thermo Environmental Instruments 43i	20-30°C
	Thermo Environmental Instruments 43iQ	0-45°C
NO_2	Teledyne T200	5-40°C
	Teledyne T200U	20-30°C
	Teledyne T500U	5-40°C
	Thermo Environmental Instruments 42i	15-35°C
	Thermo Environmental Instruments 42iQ	0-40°C
CO	Teledyne T300	15-35°C
	Teledyne T300U	15-35°C
	Thermo Environmental Instruments 48i	20-30°C
	Thermo Environmental Instruments 48iQ	5-45°C
O_3	Thermo Environmental Instruments 49i	5-40°C
	Thermo Environmental Instruments 49iQ	0-45°C
	Teledyne T400	5-40°C
	2B Technologies 202 & 205	10-40°C
Particulate Monitors		
Pollutant	**Model**	**Operating Range**
$PM_{2.5}$	Teledyne T640	0-50°C
$PM_{2.5}$ & PM_{10}	Teledyne T640X	0-50°C
$PM_{2.5}$ & PM_{10}	Thermo Scientific TEOM® 1405	2-40°C
$PM_{2.5}$ & PM_{10}	Thermo Scientific TEOM® 1400AB	2-40°C

10. Check that all required fields on a form are either filled in with the proper entry or that a strikethrough and/or an N/A has been added.
11. Any corrections to the original document must use a strikethrough, initial, and date to make a change (or some alternative transparent audit trail in the case of electronic documentation). The corrections must be traceable and secure.
12. Ensure that the values are reasonable that are reported on the forms. For those that seem unreasonable, ensure that they have been addressed appropriately (i.e. transparently corrected, data flagged or null coded in AirMVP, etc.).
    a. For example, a bench temperature of 345^{O}C reported on an ozone Routine Operations Log should be addressed (perhaps the operator left off the decimal point between the "4" and the "5").
    b. For example, for a precision check, a Data Logger PS has a reading of "69 ppb" and an Analyzer has a reading of "70 ppb", and the percent difference between the two is reported as "7%" on the form. There is obviously something wrong with the formula on the form (if there's a built-in formula) or the operator performed the calculation incorrectly.

13. Make sure exceedances of warning limits, if any, have been properly addressed and investigated. See Section 12.2 of this SOP for additional guidance.
14. Make sure all control limits of the maintenance checks were met. Maintenance checks are scheduled and documented routine testing, inspection, and upkeep of the instruments. Routine testing has control limits (see Section 4.0 of this document for the definition of control limits; see Section 12 of this document for the validation templates for each parameter's control limits and also Tables 12-10 and 12-12 for the summary of control and warning limits). If these control limits are not met, check that the appropriate actions were taken to correct the issue, and, if necessary, that data were invalidated or flagged with a qualifier and corrective action was documented appropriately. Refer to Tables 12-19 and 12-20 and Section 20 of this SOP for guidance on the appropriate null codes/QA qualifiers to utilize in the case of late checks, failed checks, or passing checks.
    Note: Effective January 1, 2017, the Florida PQAO implemented the use of the EPA Rounding Policy. Ensure the rounding policy is utilized appropriately (see Appendix E in this document).
15. Check that the dates and times of maintenance periods on forms match the dates and times in the minute data.
    a. Ensure that appropriate null codes describing maintenance performed are applied to the hour(s) the equipment was down.
    b. Ensure that all hours affected by maintenance activities were null coded for all associated parameters.
    c. Ensure that the beginning and ending null codes for a maintenance period represent any outgoing QC check or returning QC check or calibration performed before/after the instrument was removed/returned to service. (*Note: An instrument failure will not have an outgoing QC check*).
16. Review comments on forms documenting all work done on the equipment or at the site and obtain clarifications from the originator, if needed. Add comments as needed to clarify.
17. Make sure all signatures and dates needed from field technicians, as well as any other level of reviewer, have been legibly recorded and are correct.
18. Ensure any exceedances of ambient data are documented, and, if applicable, an exceedance report is completed and that concise comments describing the cause were entered in AirMVP. (*Note: Exceedance reports are not required for ozone*).
19. Make sure there are no blank hours of data. Every expected hour or daily sample of data should either have a concentration or a null code. Data that are collected from the site data loggers via polling may be utilized to backfill blank hours of data in AirMVP, if possible. Such procedures must have been approved (or have been documented in an SOP). Otherwise, backfill the data manually.

a. For example, in an instance where there is a collection error or a machine malfunction, the 1-hour data will automatically be null coded by the datalogger; however, the blank or missing 5-minute data must be null coded manually.

20. Upload all automatically generated data into the AirMVP database.
21. Manually enter other required data into the AirMVP database. These are data such as 1-point QC records, flow rate verifications, and audits (i.e. semi-annual flow rate audits, annual PEs, etc.), for example.
22. Ensure that the $PM_{2.5}$ Analysis Reports have been reviewed and the data has been handled appropriately (i.e. holding times, filters that have been flagged by the laboratory, etc.). See Table 12-17.
23. Ensure that the QA comparisons of the F1 files have been performed.
24. Transfer quality-assured $PM_{2.5}$ data from PMTS to AirMVP. Ensure that data are transferred accurately.
    a. Compare all null codes and qualifiers in PMTS against what's transferred to AirMVP.
    b. Compare all method codes in PMTS against what's transferred to AirMVP.
    c. Compare all concentration values in PMTS against what's transferred to AirMVP.

    Note: If data do not match between PMTS and AirMVP, notify OAM's QA Manager and correct data accordingly in AirMVP.
25. Compare the AirMVP database with the local program agency database to ensure accurate data transmission.
26. Inspect the AirMVP database for long strings of repeated data values and verify these are reasonable and correct.
27. Generate an AirMVP Pollutant Comment Report. Review comments entered in AirMVP, and the QA Coordinator should sign the report.
28. Verify the data in AirMVP (i.e. run the Data Verification Utility in AirMVP and ensure that all data issues have been addressed on the resulting report).
29. Set the verified flags on the Data Verification Report in AirMVP signifying that all appropriate QA/QC procedures have been employed when reviewing the data set. Be sure the initial and final reports are signed by the QA Coordinator.
30. Complete, sign, and date the Data Validation Checklist (Form DEP 18-27-A). Add comments on the checklist to clarify any discrepancies. Save decision-making emails on the agency's network drive and preferably, append these emails to the completed checklist for future reference.

12.6.6 Manual $PM_{2.5}$

The F1 files from the manual $PM_{2.5}$ must be uploaded into the Particulate Matter$_{2.5}$ Tracking System (PMTS) for validation and transmittal to DEP's AirMVP database (see Section 13.3 of this document). The Run Data Sheets are used to validate the information that is displayed in the PMTS after the F1 file upload and during the verification process. The operational data are verified per the performance criteria specified in Table 12-5 of this document. Corrections to the field sheets are annotated accordingly. The F1 files are uploaded to PMTS, at a minimum, monthly.

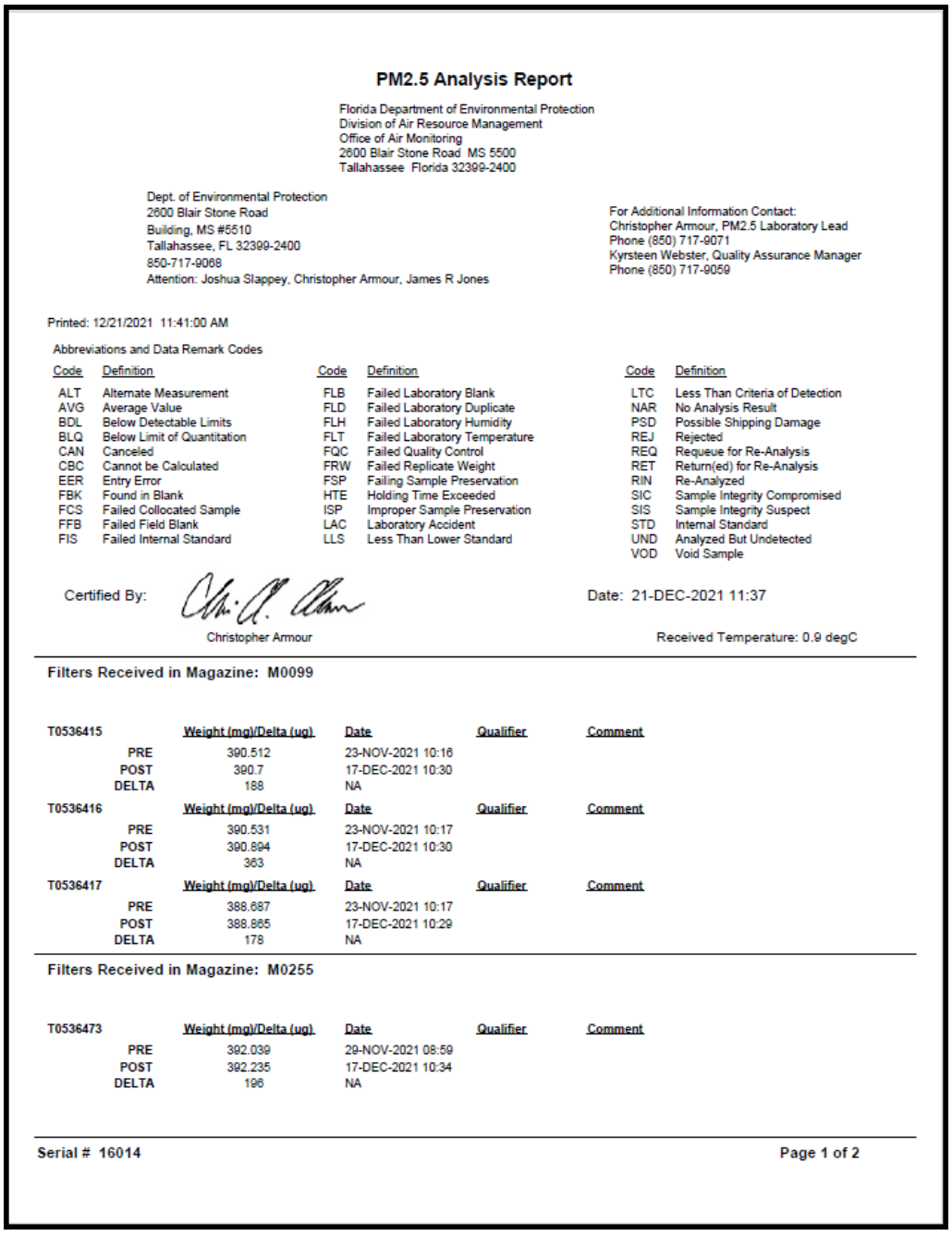
The QA staff performs the following procedures:

- Review the $PM_{2.5}$ Analysis Report provided by the $PM_{2.5}$ Gravimetric Laboratory in Tallahassee, Florida. See Figure 12-10 below. The $PM_{2.5}$ Gravimetric Laboratory Analysis Report includes filter weight information as well as laboratory qualifiers and comments that were applied to a filter, when applicable; however, the QA staff from each agency is required to review this report in its entirety and make decisions as to how to handle the data in PMTS and AirMVP (i.e. flag, null code, etc.). (Refer to Table 12-17).
- Review the $PM_{2.5}$ Analysis Reports for filter magazines received above 4ºC. These filters are qualified with an "ISP" (Improper Sample Preservation) code and a comment that includes the actual laboratory received temperature. This qualifier is only added to filters that are beyond the 10-day expiration limit (holding time), but not past the 30-day expiration limit (holding time). The onus is on the air monitoring agency (i.e. local program agency and the OAM), not the $PM_{2.5}$ gravimetric laboratory, to determine the filter holding time. By comparing the actual laboratory received temperature to the ambient average sampling temperature will help to determine whether the post-sampling conditioning and weighing must occur within 10 days or 30 days. The ambient average sampling temperature can be reviewed from the Run Data Sheet, F1 file and in PMTS (after F1 upload).
- Compare the $PM_{2.5}$ Gravimetric Laboratory's received temperature to the ambient average sampling temperature.
    - If the ambient average sampling temperature is above the temperature recorded in the comments on the $PM_{2.5}$ Analysis Report, the holding time is 30 days.
    - If the ambient average sampling temperature is below the temperature recorded in the comments on the $PM_{2.5}$ Analysis Report, the holding time is 10 days.
    - Document your review of the "ISP" code or any other laboratory code in AirMVP. (See Table 12-17 for detailed instructions).
    - Review the date that the samples were physically taken (i.e. sample run date). Compare the date the samples were post-weighed (the actual analysis) to the sample run date.

- Based on the temperature and date comparisons, flag or null code data, accordingly. See Section 12.6.6 and Table 12-17 of this document for additional details.

- Confirm that all filters and magazines been accounted for in these reports ($PM_{2.5}$ Analysis Report) for each month. For the quarter.

Figure 12-9. $PM_{2.5}$ Analysis Report



PM2.5 Analysis Report

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Air Monitoring
2600 Blair Stone Road MS 5500
Tallahassee Florida 32399-2400

Dept. of Environmental Protection
2600 Blair Stone Road
Building, MS #5510
Tallahassee, FL 32399-2400
850-717-9068
Attention: Joshua Slappey, Christopher Armour, James R Jones

For Additional Information Contact:
Christopher Armour, PM2.5 Laboratory Lead
Phone (850) 717-9071
Kyrsteen Webster, Quality Assurance Manager
Phone (850) 717-9059

Printed: 12/21/2021 11:41:00 AM

Abbreviations and Data Remark Codes

Code	Definition	Code	Definition	Code	Definition
ALT	Alternate Measurement	FLB	Failed Laboratory Blank	LTC	Less Than Criteria of Detection
AVG	Average Value	FLD	Failed Laboratory Duplicate	NAR	No Analysis Result
BDL	Below Detectable Limits	FLH	Failed Laboratory Humidity	PSD	Possible Shipping Damage
BLQ	Below Limit of Quantitation	FLT	Failed Laboratory Temperature	REJ	Rejected
CAN	Canceled	FQC	Failed Quality Control	REQ	Requeue for Re-Analysis
CBC	Cannot be Calculated	FRW	Failed Replicate Weight	RET	Return(ed) for Re-Analysis
EER	Entry Error	FSP	Failing Sample Preservation	RIN	Re-Analyzed
FBK	Found in Blank	HTE	Holding Time Exceeded	SIC	Sample Integrity Compromised
FCS	Failed Collocated Sample	ISP	Improper Sample Preservation	SIS	Sample Integrity Suspect
FFB	Failed Field Blank	LAC	Laboratory Accident	STD	Internal Standard
FIS	Failed Internal Standard	LLS	Less Than Lower Standard	UND	Analyzed But Undetected
				VOD	Void Sample

Certified By: Christopher Armour

Date: 21-DEC-2021 11:37

Received Temperature: 0.9 degC

Filters Received in Magazine: M0099

		Weight (mg)/Delta (ug)	Date	Qualifier	Comment
T0536415	PRE	390.512	23-NOV-2021 10:16		
	POST	390.7	17-DEC-2021 10:30		
	DELTA	188	NA		
T0536416	PRE	390.531	23-NOV-2021 10:17		
	POST	390.894	17-DEC-2021 10:30		
	DELTA	363	NA		
T0536417	PRE	388.687	23-NOV-2021 10:17		
	POST	388.865	17-DEC-2021 10:29		
	DELTA	178	NA		

Filters Received in Magazine: M0255

		Weight (mg)/Delta (ug)	Date	Qualifier	Comment
T0536473	PRE	392.039	29-NOV-2021 08:59		
	POST	392.235	17-DEC-2021 10:34		
	DELTA	196	NA		

Serial # 16014

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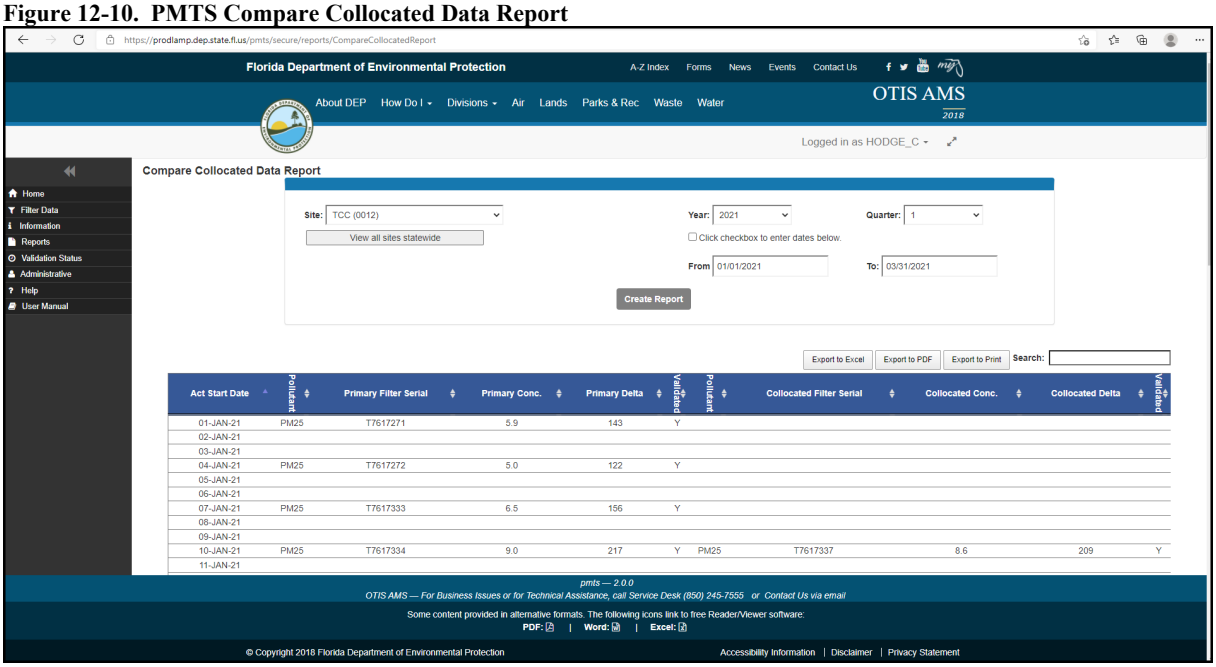
- Confirm that all laboratory qualifiers have been addressed in AirMVP (i.e. comments, qualifiers, null codes, etc.) See Table 12-17.
- Check the site field sheets for completeness and verify that all entries are correct.
- Check that the Run Data Sheets are complete and correlate to the PMTS "Compare Collocated Data" report. See Figure 12-10 below.

Figure 12-10. PMTS Compare Collocated Data Report



- Review the Run Data Sheets, paying close attention to the valid elapsed time, WINS/VSCC impactor number (where applicable), filter ID, and start/stop dates.

  Note: If there are any discrepancies between the Run Data Sheets and the data in PMTS, verify with the field staff for completeness. Notate corrections or comments on the data in PMTS. The F1 file may need to be opened and reviewed to determine the issue.

- Ensure that routine maintenance (i.e. flow rate verifications, temperature checks, pressure checks, leak checks) has been performed in accordance with the sampler's SOP and within specifications (please refer to the validation templates in Section 12).
  - If a flow rate verification is performed outside of the minimum frequency, a QA qualifier flag 6 (QAPP issue) must be applied in AirMVP to those days exceeding the frequency if the next check passes. However, if the subsequent check fails, a null code back to the last passing check must be applied in AirMVP.
- Compare the data in PMTS against field records.
  - Do the filter serial numbers in PMTS match the field sheets?
  - Do the dates in PMTS match the field sheets?
  - Are there any missed runs? If so, you must enter a null code. See Table 12-17.

    - Are there make-up runs?
        - Creditable samples (those that will count towards data completeness) for the primary sampler must be made up before the next scheduled run or exactly one week from the day they were scheduled to run.
        - Ensure that these make-up sample run concentrations are populated in PMTS.

          Note: If these make-up runs are not ran within the required timeframes, AQS will not count them towards data completeness.
        - Are the concentrations of the primary and collocated comparable in PMTS?
- Review the PM Filter Custody Logs.
    - Cross-check the filter IDs and weigh dates to the field sheets.
    - Ensure that the PM Filter Custody Logs have been appropriately signed and dated by staff (i.e. field staff, laboratory staff, etc.).
- Validate data in PMTS and transfer it to AirMVP.
- Once all information is validated, sign your name and date on the Run Data Sheets and the Filter Log.
- Additional steps that are taken by the local program agencies and Florida DEP's field technicians are outlined in Florida's Statewide $PM_{2.5}$ Model 2025/2025i Sequential Sampler SOPs and include the following:
    - Validate the PM Filter Custody Log for completeness and that all entries are correct and complete. Also, validate that the magazines were refrigerated during storage.
    - Notify the appropriate staff within the agency that the PM Filter Custody Log is ready to be sent to the Gravimetric $PM_{2.5}$ Laboratory located in Tallahassee, Florida.

Table 12-17 identifies commonly used null codes and flags used by the $PM_{2.5}$ Gravimetric Laboratory and the corresponding action and null code or qualifier flag that the agency (Florida DEP OAM and the local programs) must use.

The OAM's QA Manager also performs routine "hand" calculations of the $PM_{2.5}$ concentration data to ensure that the automated calculations performed by the data systems, both LIMS and PMTS, are accurate (see Section 12.1). The OAM QA Manager will alert staff, air monitoring and laboratory staff, of any concerns or issues, if any. The Florida DEP information technology (IT) staff will be involved, as needed, to resolve any issues or concerns.

Table 12-17. Commonly Used $PM_{2.5}$ Gravimetric Laboratory Flags and Null Codes and Required Agency Action

Laboratory Data Qualifier	Laboratory Null Code/ Flag	Recommended Comments from the Laboratory	Required Action by the Agency
Sample Integrity Suspect	**SIS**	Filter damage observed (ex: spots, scuffs, pinhole, light spots or particles)	Investigate flows in P and I files; Compare sample concentration to surrounding samples and/or collocated sample (if applicable) ▪ If sample is deemed valid qualify data with V "Validated Value" and comments in FAMAS ▪ If sample is invalid null code data with AJ "Filter Damage" and comments in FAMAS
Sample Integrity Compromised	**SIC**	Destructive filter damage observed (ex: hole, tear, scratch, heavy spots or particles)	Null Code – AJ "Filter Damage" with comments in FAMAS.
Lab Accident	**LAC**	Laboratory accident or damage.	Null Code – AR "Lab Error" and comments in FAMAS
Holding Time Exceedance	**HTE**	Post-weighed more than 30 days after sampling.	Null Code – TS "Holding Time or Transport Temp Is Out of Spec" and comments in FAMAS
		Holding time in field exceeded 177 hours.	
		Sampled more than 30 days after pre-weight.	
Voided Filter	**VOD**	Filter voided by customer.	Null Code – AL "Voided by Operator" and comments in FAMAS
Voided Filter	**VOD**	Filter voided by laboratory.	Null Code – AM "Miscellaneous Void" and comments in FAMAS stating that the filter was voided by the lab
Lab Temperature criteria exceeded	**FLT**	Lab Temperature criteria exceeded.	Null Code – AR "Lab Error" and comments in FAMAS
Lab Humidity criteria exceeded	**FLH**	Lab Humidity criteria exceeded.	Null Code – AR "Lab Error" and comments in FAMAS

Laboratory Data Qualifier	Laboratory Null Code/ Flag	Recommended Comments from the Laboratory	Required Action by the Agency
Sample Preservation Criteria Exceeded	**FSP**	Filter Magazine received above 25 °C.	Null Code – TS "Holding Time or Transport Temp Is Out of Spec" and comments in FAMAS
Improper Sample Preservation	**ISP**	Filter Magazine received above 4 °C.	Investigate – Compare received temperature to average ambient temperature on Run Data Sheet. ▪ If average ambient is above received temperature qualify the data with V "Validated Value" and comments in FAMAS ▪ If average ambient is below received temperature check hold time and confirm whether sample was weighed within 10 days of sampling: • If sample was weighed within 10 days: Add V "Validated Value" and comments in FAMAS. • If sample was not weighed within 10 days: Null code data with TS "Holding Time or Transport Temp Is Out of Spec" and comments in FAMAS

12.6.7 Lead

Currently, only Hillsborough County performs lead analysis. This section addresses the transferring and verifying of the lead (Pb) data produced by Hillsborough County. The final data are verified and submitted to AirMVP, then uploaded by Florida DEP into AQS.

The primary responsibilities associated with this verification are summarized below:

- The responsible QA staff utilizes records from the sampler's digital timer, if applicable, or records from a certified transfer standard to validate the field run sheets. The average ambient temperature, barometric pressure, average flow rate, and elapsed time recorded on the field logbook is compared to the run sheet. Refer to Table 12-18 this document for specific control limits and acceptance criteria.

- The responsible QA staff also verifies the completed filter analysis performed by the laboratory on the lead filters.
- The responsible QA staff also inserts the concentrations from the lab datasheets, once confirmed, into AirVision (or permanent record retention system).

The following summarizes the steps associated with the validation of the data. The responsible QA staff ensures that the samples collected in the field and analyzed in the laboratory were done so in accordance with federal requirements and procedures outlined in the SOPs. See Table 12-9 requirements utilized as part of the data validation process.

- Review the field run sheets for completeness.
- Utilizing the field sheets and records from the sampler's digital timer, if applicable, or records from a certified transfer standard, validate the following:
    - Temperature and pressure
    - Average flow
    - Elapsed time "total"
- Validate balance weight checks, weight log, and other quality control checks associated with the filter analysis.
- The laboratory provides electronic copies of the analytical results of the lead and PM_{10} filter analysis. Values such the total minutes and corrected flows may be validated on these reports.
- Ensure QA/QC checks have been met. Below is a summary of the QA/QC checks and acceptance criteria associated with the lead samplers:

Table 12-18. Pb TSP High-Volume QA/QC Schedule – Field Operations

Parameter	Frequency	Acceptance Criteria
Average Flow Rate	Every sample run	1.1 – 1.7 m^3/min
Sample Elapsed Time	Every sample run	1440 ± 60 minutes
Hi-VOL Sampler Timer	Every sample run	±30 mins of the pre-set on/off time (midnight to midnight)
Hi-VOL Sampler Timer	Every 90-days (Quarterly)	± 30 minutes of the NIST-traceable transfer standard
1-pt. Flow Rate Verification	Every 90-days (Quarterly)	± 7% of the NIST-traceable standard
Operational Flow Rate Check	Every 90-days (Quarterly)	1.1 – 1.7 m^3/min
Multi-point Flow Rate Verification	Every 365-days (Annual); Following motor maintenance or replacement	± 5% of the best fit linear regression line
Elapsed Timer Verification	Every 365-days (Annual)	1440 ± 60 minutes; ± 2 mins per 24-hour verification

If discrepancies are noted on the field records, the appropriate lab personnel are notified, and the field sheet is rejected back to the field staff for correction and re-submittal. Corrections should be transparent and traceable whether electronic or pen and ink. If there are no discrepancies noted, the QA staff signs off as validated.

If discrepancies are noted on the laboratory analytical results, the laboratory is notified that corrections are required. Updated records are provided by the laboratory and forwarded to the QA staff. The laboratory also maintains the original record. The appropriate staff maintains field and lab documents.

See the Florida AirVision Guide located in the Appendix of this document for the steps on how to perform the data entry. Once the data are entered in AirVision, the data are saved and reviewed by another staff member within the section.

12.7 Quarterly Tasks

The data validation, comments, flags and precision data entry in AirMVP must be completed monthly, no later than 20 days after the end of each month. However, the data validation for the entire quarter must be completed no later than 40 days after the end of the quarter.

Once all issues have been addressed and due diligence has been documented, the QA coordinators from each of the local program agencies are responsible for setting the verified flags on the Data Verification Report. This signifies that the agency has employed the appropriate QA/QC procedures when reviewing its data.

The agency sends an email to OAM's data validation team (Data.Validation@dep.state.fl.us) with the following:

- Confirmation that all the data has been verified and validated;
- Completed Data Validation Checklist (Form DEP 18-27-A);
- AirMVP Data Completeness Report (signed by the QA coordinator);
- Memo stating which parameters were below 75% (90% for ozone) and why (if applicable);
- Corrective Action/AirMVP Missing Data Report (if applicable);
- AirMVP Pollutant Comment Report (signed by the QA coordinator); and
- Data Verification Utility Report, initial and final (signed by the QA coordinator).

The QA Coordinator from each local program agency is responsible for these tasks while OAM's data validation team is also responsible for completing or ensuring that these tasks are completed for each of its eight territories. This email and completed forms and documents will serve as the official documentation of the agency's review of their data for the specified period. It will also give DEP the indication that the agency's data is ready for submission into the AQS system.

The Data Quality Section Administrator and AQS Coordinator will perform a review of statewide data prior to upload to AQS. Data are uploaded into AQS by the AQS Coordinator after the satisfactory completion of these reviews.

After each quarterly upload to AQS, the OAM performs a statewide file comparison between AirMVP and AQS to ensure that the data set are complete. However, all agencies will also generate the following AQS AMP Reports, QA the reports, and submit the signed and dated reports to DEP's OAM. Once an agency's data has been uploaded to AQS for the quarter, OAM will notify the agency. The agency has 20 days thereafter to generate and submit these reports to the OAM. The purpose of this QA is for each agency to review the data that were sent to EPA's AQS by Florida's AQS Coordinator.

- AMP430 – Data Completeness Report - Review this report to ensure that all parameters made it up to AQS (1st page only and signed by the QA coordinator).
- AMP501 – Extract Raw Data Report - Use this report for file comparison to ensure that the data matches AIRMVP.
- AMP504 – Extract QA Data Report - Use this report for file comparison to ensure that the

data matches AIRMVP.

If there are discrepancies between what's in AQS and what the agency intended to be submitted to AQS, please notify the AQS coordinator immediately. See Appendix B for directions on how to execute these reports and perform these comparisons between AQS and AirMVP.

Additionally, the AQS Coordinator will run the AMP256 – QA Data Quality Indicator Report on a quarterly basis. The AQS Coordinator will address issues, if any, on the report and document them accordingly for preparation for the annual data certification (see Section 12.8 Annual Tasks in this document).

Here is a summary of the report schedules and due dates:

AQS Report Schedules

Ambient Air Data:

The AQS Reports for all ambient air data are due within 20 days after the upload of an agency's data into AQS. An email should be sent to OAM's data validation team (data.validation@dep.state.fl.us) with:

- Confirmation that there were no discrepancies between the data in AirMVP and the data in the AMP501 and AMP504 AQS reports.
- AMP430 Completeness Report (1st page only and signed by the QA coordinator).

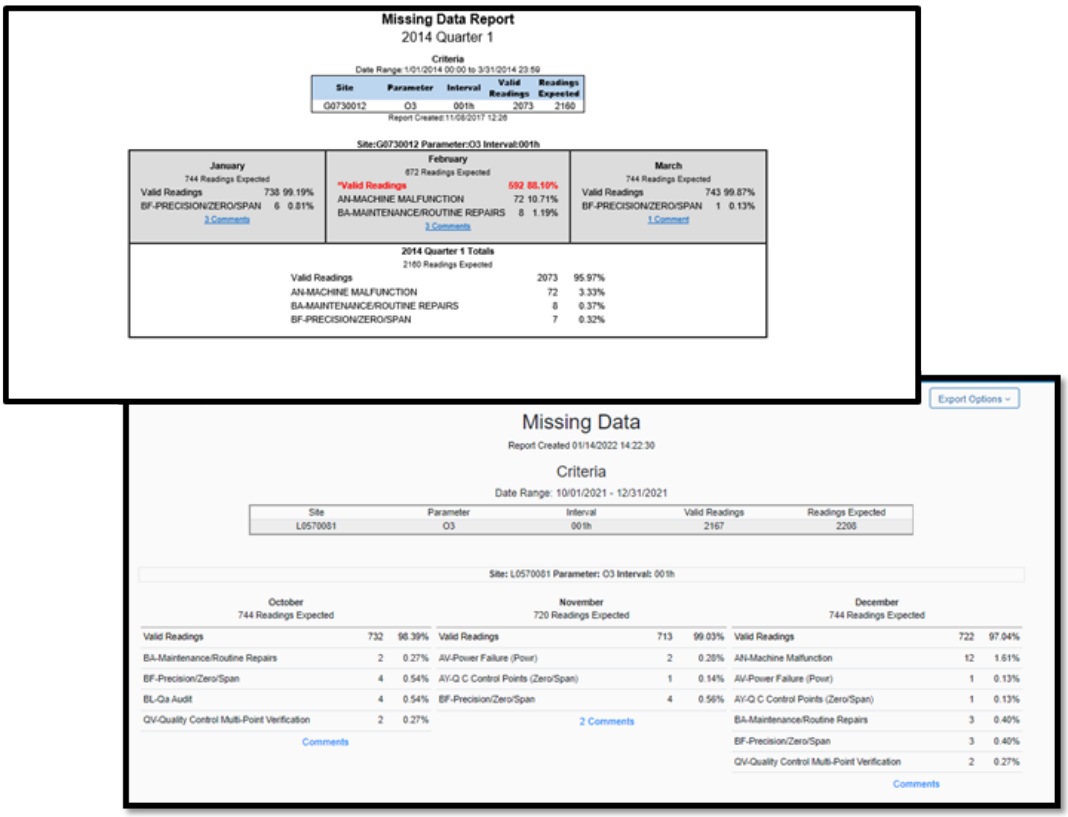
Data Validation Due Dates

Ambient Air Data:

Each agency is required to provide the following, in an email to OAM's data validation team (data.validation@dep.state.fl.us), within 40 days after the end of each quarter:

- Confirmation that all the data has been verified and validated;
- Completed Data Validation Checklist (Form DEP 18-27-A);
- AirMVP Data Completeness Report (signed by the QA coordinator);
- Memo stating which parameters were below 75% (90% for ozone) and why (if applicable);
- Corrective Action/AirMVP Missing Data Report (if applicable);
- AirMVP Pollutant Comment Report (signed by the QA coordinator); and
- Data Verification Utility Report, initial and final (signed by the QA coordinator).

Figure 12-11. AirMVP Missing Data Report



12.8 Annual Tasks

12.8.1 Data Certification

The Florida DEP's OAM is responsible for ensuring that the data certification procedures are completed by May 1 of each year, for the data from the previous calendar year (January 1 – December 31). The local program agencies send OAM quarterly emails verifying that data meets EPA criteria based on their data validation as well running the AMP251, 430, 504, and 501 reports quarterly (see Section 12.7 of this document). Prior to May 1, Florida DEP will run the following AQS reports for the previous calendar year, review for outliers or issues, and address accordingly

- AMP256 QA Data Quality Indicator Report
- AMP430 Data Completeness Report for completeness for all data submitted to AQS. This report is required for PM_Coarse only and must be submitted with the Data Certification Packet. Ensure that all parameters are about 75% completeness for each quarter and if not check to see if documentation/explanation was provided.
- AMP450NC Quicklook All Parameters Report for all non-criteria parameters. This

report is necessary if the agency wishes to certify any non-criteria parameters. Ensure that the completeness for these parameters are about 75% each quarter and that the details, such as Reporting Agency, Method Code etc. are correct for these parameters.

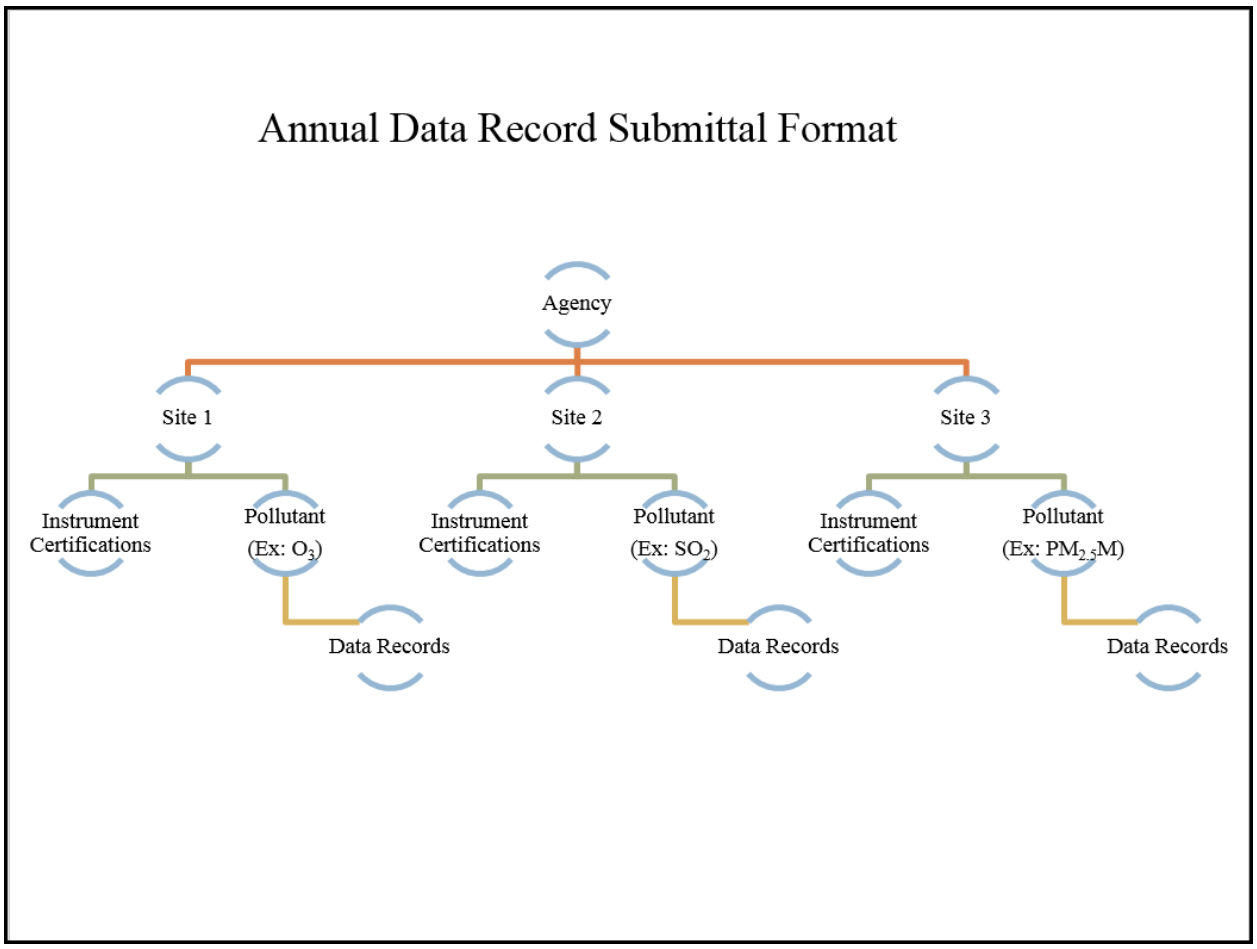
- AMP600 Certification Evaluation and Concurrence Report (criteria pollutants only) for any QA/QC incompleteness or out of specification issues. This report is required for the Data Certification Packet.
  - Each site and its respective parameters will have a recommendation flag of Yes/No based on the Completeness and QA/QC requirements being met in AQS. If there is a negative recommendation (No), an investigation on why this flag was chosen and any missing information is uploaded to change the recommended flag.
  - Comments can also be added in support of specific recommendations that may not agree with the flag recommended by AQS.

Additional reports may be generated for specific issues, usually when the configurations are in question. The local program agencies will work with DEP, as needed, to address any data concerns or issues found in these reports. Florida DEP will submit, per the 40 CFR Part 58 requirement, the AMP600 – Certification Evaluation and Concurrence showing our certification flags and the AMP430 for PM_coarse along with a signed certification letter on agency letterhead no later than May 1. If Florida DEP wishes to certify any non-criteria parameters, the AMP450NC will also be submitted to EPA.

12.8.2 Records

Each local program agency within the Florida PQAO is required to submit its records annually to Florida DEP. As the lead agency of the PQAO, it is imperative that Florida DEP has access to records associated with the data collection of air monitoring data. Each local program agency is to provide Florida DEP with a comprehensive compilation of its calendar year records, including I, P, and F files associated with manual $PM_{2.5}$ as well as E-BAM text (.txt) files used for data validation of PM_{10} data, no later than June 30 of the following calendar year. Below is the format of the records for submittal to Florida DEP (Figure 12-12).

Figure 12-12. Annual Data Record Submittal Format



Note: Instrument certification records for all sites may be compiled into a single file folder.

12.9 Qualifier Flags, Null Codes, and Comments

The quality characteristics of the data in AirMVP are indicated by qualifier flags, null codes and text comments. The first two indicator categories are transmitted to AQS and provide the principal means of communicating quality characteristics to the EPA. AirMVP retains text comments. However, the current AQS equivalent is not as straightforward in its location within its system and its correlation to AirMVP, so Florida DEP does not submit text comments recorded in the AirMVP Matrix Editor to AQS. However, Florida DEP does submit text comments in the AirMVP 1-Point QC Check screen. AirMVP comments allows events surrounding data collection to be recorded with the data and are important when recreating operational history or timelines.

Tables 12-19 and 12-20 details when to apply commonly used QA qualifiers and null codes. See Section 12.6.6 of this document for additional code use for manual $PM_{2.5}$. Use of the AM (Miscellaneous Void) null code should not be used if there is an existing code that clearly describes the situation. However, if there is no code that fits the situation appropriately, the AM null code may be used. For example, if a significant amount of water is found in a sample line

resulting in data invalidation the AM null code may be used. But, be sure that the issue is clearly documented in the comments, and associated records, if any, are saved in the agency's designated location. If you are unsure of which code to use, please contact the OAM for additional guidance.

Table 12-19. Commonly Used QA Qualifiers

QA Qualifier	Flag Description	QA Qualifier Flag Usage/Examples
6	QAPP Issue	This QA flag is used when a quality control check (i.e., 1-Pt QC or Flow Rate Verification checks) is performed outside the CFR required timeframe. **Example 1:** For an O_3 1-Pt QC check due on April 14th that was not performed until April 18th → the data from April 15th at 00:00 until the time the check was performed on April 18th must be flagged. **Example 2:** For a PM_{10} TEOM flow rate verification check due on June 1st that was not performed until the July 12th → the data from July 2nd through July 12th until the check was performed must be flagged.
2	Operational Deviation	This QA flag is used when standard operating procedures are not followed however, there is evidence to support keeping the data. **Example 1:** When a multi-point verification is not performed prior to resuming data collection after an analyzer was offline for more than 72 hours, however, when a multi-point verification is performed 5 days later the verification passes. **Example 2:** When one of the operational criteria for a specific pollutant was not met but all other activities were performed according to the instrument SOP.
SX	Does Not Meet Siting Criteria	This QA flag is used when a site does not meet siting criteria. **Example:** When a tree's dripline is within 10 meters of the shelter → all pollutants at the site will be flagged from the date the issue was identified until it was resolved.
1V	Data reviewed and validated.	This QA flag is used if there is compelling evidence (i.e., acceptable more frequent zeroes and spans, or other verifications) to accept data between a failing QC check and the prior passing QC check, the routine ambient data that was determined to be valid based on this compelling evidence is reported to AQS and qualified with the "1V" flag (data was reviewed and validated). All compelling evidence must be documented.
V	Validated Value	This QA flag is used to indicate that there was a data integrity issue, but the data was determined to still be valid. **Example:** When a $PM_{2.5}$ sample is reported with the SIS flag by DEP's $PM_{2.5}$ Laboratory but the sample is still good.

Table 12-20. Commonly Used Null Codes

Null Code	Code Description	Null Code Usage/Examples
1C	A 1-Point QC check exceeds acceptance criteria but there is compelling evidence that the analyzer data is valid.	This null code is intended to replace invalid 1-Point QC check results. This code should be applied to all **invalid (both passing and failing)**, gaseous checks on the 1-Point QC Check screen in AirMVP. An invalid 1-Pt QC Check is a check in which there were technical issues with the generation of its test concentration, including the use of expired standards. **Example:** A 1-Point QC check is performed (passing or failing) with an expired calibrator. **Example**: A 1-Point QC check exceeds the critical criteria limits but there is reason to believe the test was invalid (i.e. Pump malfunction, stabilization issues) ***NOTE:*** *This null code is only intended for the 1-Point QC screen. It is not intended for raw ambient data.*
1F	No 1 Point QC but need to count for completeness.	This null code is intended to replace **valid failed** 1-Point QC check results. A valid QC check is one that is conducted using certified, properly functioning equipment, conducted in a manner that adheres to appropriate procedures (SOPs). **Example:** A valid, 1-Pt QC Check exceeds the control limit. A 1-point QC check exceeds the established acceptance criteria. Upon investigation, the operator determines that the 1-point QC check provided a valid concentration, and that the analyzer requires adjustment/calibration. ***NOTE:*** *This null code is only intended for the 1-Point QC screen. It is not intended for raw ambient data.*
AE	Shelter Temperature Outside Limits	This code should be used on continuous air monitoring data (where applicable) when the shelter's temperature exceeds the threshold specified in the equipment's method designation (i.e., FRM or FEM). ***NOTE****: The shelter temperature (INT) data should* ***not*** *be null coded.*
AF	Scheduled but not Collected	This code should be used for manual samples scheduled to run but were not collected. **Example:** When a shuttle failure occurs in a $PM_{2.5}$ manual sampler (e.g., Thermo 2025i).
AG	Sample Time Out of Limits	This code is used when a manual sample does not meet the EPA time requirement. **Example:** The time on a manual $PM_{2.5}$ sample was less than 1380 minutes or greater than 1500 minutes.

Null Code	Code Description	Null Code Usage/Examples
AL	Voided By Operator	This code can be used for a number of situations but usually when an issue is discovered by the operator, which results in data invalidation. **Example 1:** Analyzer conditions out of range (i.e. ozone cell flow rates). **Example 2:** Excessive filter loading (>100%). **Example 3:** Noise levels >0.1 for TEOMs not associated with maintenance or a power failure. ***NOTE:*** *For noise levels >0.1 while the* ***TEOM*** *is stabilizing following routine maintenance or a power failure, use the BA null code.*
AM	Miscellaneous Void	The use of this code is limited use due to its ambiguity, so it should only be used as prescribed in the examples below or when instructed by Florida DEP. **Example 1:** Water in the sample lines. **Example 2:** After the final QC check for monitors that are being closed temporarily or permanently.
AN	Machine Malfunction	This code should be used when an instrument breaks down or malfunctions **AND** there are no other null codes that could provide more clarity on the issue. **Example 1:** Analyzer pump fails. **Example 2:** Analyzer front panel burnout. **Example 3:** Instrument tape breaks. ***NOTE:*** *A ZSP or Flow Rate Verification check, at minimum, should be performed before resuming data collection.*
AQ	Collection Error	This code is used for continuous data that was not retrieved due to communication/collection issues **NOT related to the datalogger failing/malfunctioning**. **Example 1:** Analyzer front panel freezes/locks up. **Example 2:** The hub for the calibrator and analyzer malfunctions and the data was not retrievable from the instrument. **Example 3:** An hour has less than 45 valid minutes.
AT	Calibration	This code is used **only** when a particulate matter analyzer or sampler is calibrated. **Example:** A calibration is performed on a T640 or 1405 TEOM $PM_{2.5}$ instrument.

Null Code	Code Description	Null Code Usage/Examples
AV	Power Failure	This code is typically applied automatically by the datalogger when a power failure occurs. However, it could be applied manually, if necessary. **Example:** The power is not restored for several weeks after a hurricane.
AX	Precision Check	This code is **only** used for flow rate verifications performed on particulate matter instruments.
AY	QC Control Points (Zero/Span)	This code is used when **only** a zero and span check (i.e., a precision point was not run) is performed on a gaseous analyzer. **Example 1:** After a multi-point calibration is performed to verify that the adjustment was successful prior to resuming data collection. **Example 2:** After maintenance on a gaseous analyzer or when troubleshooting an issue with the instrument.
AZ	QC Audit	This code is used when a Technical Systems Audit is conducted, and an official analysis of procedures resulted in the instrument channel being downed. **Example:** An EPA TSA site visit to assess the air monitoring equipment or operator's ability to perform standard operating procedures.
BA	Maintenance	This code is used when activities are being performed on the instrument and it is not ready to resume ambient data collection. **Example 1:** Downing instrument channel for routine/monthly maintenance or analyzer troubleshooting/replacement. **Example 2:** For instrument (TEOMs only) stabilization after a QC check, maintenance or a power failure. **Example 3:** For the 5014i, BAM1020, and eBAM+ instrument stabilizations after a Semi-Annual Flow Rate Audit, where the foil detector test was performed. ***NOTE**: This code should be associated with a bracketing quality control check (e.g., 'BF' or 'AX').*
BC	Multi-point Calibration	This code is used **only** when a gaseous analyzer is calibrated. **Example:** A calibration was performed on an ozone analyzer such as the 49i.
BF	Precision/Zero/ Span	This code is **only** used when zero/span/precision check is performed on gaseous instruments.

Null Code	Code Description	Null Code Usage/Examples
BJ	Operator Error	This code is used when data loss occurs due to an operator's negligence. **Example 1:** Instrument was accidentally left in maintenance and the data could not be recovered. **Example 2:** A bracketing check was not completed prior to performing maintenance or calibration on the instrument.
BK	Site computer/ Datalogger down	This code is used when the datalogger is not available or malfunctions. **Example 1:** Datalogger malfunctions so the data is **not** collected and could not be retrieved from the instrument. **Example 2:** Installation/Software Upgrade/Calibration of a datalogger.
BL	QA Audit	This code is used when a performance evaluation is performed on an air monitoring analyzer or sampler. **Example 1:** When a Florida DEP Annual Performance Evaluation or Semi-Annual Flow Rate Audit. **Example 2:** When an EPA NPAP or PEP audit is performed.
BR	Sample Value Below Acceptable Range	This code was specifically chosen by OAM to capture when $PM_{2.5}$ manual samples are below the minimum acceptable sample value. **Example:** A manual $PM_{2.5}$ sample is less than 2 $\mu g/m^3$.
DA	Aberrant Data (Corrupt Files, Aberrant Chromatography, Spikes, Shifts)	This code is used when data from a continuous instrument is abnormal and does not meet acceptable data quality standards. **Example 1:** $PM_{2.5}$ data spikes or drops from the 5014i equipment. **Example 2:** SO_2 data that is biased positively or negatively.
EC	Exceeds Critical Criteria	This code is applied to all invalidated data resulting from failed, valid checks, both gaseous (1-Point QC Check) and particulate (flow rate verifications) checks. ***NOTE**: Failed, valid particulate checks should be marked as "Exclude from Export/Reports" in AirMVP; however, no gaseous checks should be marked as "Exclude from Export/Reports" in AirMVP.*
QV	Quality Control Multi-point Verification	This code is used **only** when a multi-point verification (i.e., no adjustment) is performed on a gaseous analyzer. **Example:** When a new calibrator is installed at a site.

Null Code	Code Description	Null Code Usage/Examples
SA	Storm Approaching	This code is used when a hurricane or major storm is approaching. **Example:** When equipment has been taken offline in anticipation of a hurricane making landfall.
ST	Calibration Verification Standard	This code is used when a gaseous standard is verified prior to installation or removal. **Example:** Checking the concentration of a new gas bottle prior to implementation.
XX	Experimental Data	This code is used for data collected prior to a passing calibration for a new monitor at a site. **Example 1:** Data collected during the warm-up period prior to the first calibration of a new SO_2 monitor. **Example 2:** When the first attempt to calibrate a new monitor fails, and a passing calibration does not occur until a few days later.

Qualifier codes do not immediately invalidate data. Codes that are lower in the table represent less severe problems. There is a degree of interpretation with the usage of qualifier codes. Contact OAM for additional guidance on the use of a code if unsure.

Tables 12-21 and 12-22 are the full listing of QA qualifier flags and null codes.

AirMVP will accept text comments on the data in the Matrix Editor. The text comment is free-form. A block of data may be highlighted in the AirMVP Matrix Editor and the same comment will appear with every average data value in that block. Apply text comments liberally to explain events affecting data collection or station operation (be sure that your comments do not exceed the character limit in AirMVP and are truncated). Text comments may be used to help establish a timeline for corrective actions. Text comments recorded in the Matrix Editor in AirMVP are not transmitted to AQS and should not be viewed as a substitute for consistent qualifier or null code application. Comments should be final reviewed in the AirMVP Pollutant Comment Report before submission to Florida DEP OAM as part of the quarterly tasks (see Section 12.7). Florida DEP does, however, submit text comments recorded in the AirMVP 1-Point QC Check screen. AirMVP comments allows events surrounding data collection to be recorded with the data and are important when recreating operational history or timelines.

Additionally, please keep in mind the following examples/instances when addressing qualifier flags and null codes in the data set.

- Edit specific raw averaged data values in AirMVP for which the datalogger has automatically assigned flags if they are not accurate. For instance, the data logger may automatically

assign an "AM" null code (Miscellaneous Void) when you are performing routine maintenance (i.e. a calibration, Z/S/P, etc.). The "AM" null code must be updated to reflect what actually occurred.

- Edit specific raw data values in AirMVP for cases in which the datalogger is automatically triggering precision checks. The datalogger may automatically flag these hours with "C", M", and "I" (i.e. calibration, maintenance, and invalid). However, this coding may not appropriately describe what occurred.
- Overall, edit AirMVP data to clearly represent what is occurring at the site. The codes must "tell the story" in AQS because the comments are not loaded from AirMVP to AQS. However, continue to add descriptive text comments to AirMVP so it is transparent as to what occurred in case questions arise later.
- Do not apply null codes to data with a QA qualifier or vice versa. AQS will reject data that has both applied. However, multiple QA qualifiers may be applied to the data. FAMAS did not have this capability; however, AirMVP does. AQS also accepts multiple QA qualifiers.

Table 12-21. AQS QA Qualifier Codes

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.	
CF	Canister Bias: NATTS/UATMP Data for compounds that have failed certification for the canister.	
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.	

Qualifier Code	Qualifier Description	Purpose
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.	
QT	Temperature Sensor Questionable.	
QX	Does not meet QC criteria.	
SB	Sampler Bias: NATTS/UATMP Data for compounds that have failed certification for the sampler.	
SP	NATTS/UATMP data with Spike Recovery outside acceptance limits.	
SQ	Values Between SQL and MDL.	
SS	Value substituted from secondary monitor.	
SX	Does Not Meet Siting Criteria.	
TB	Trip Blank Value Above Acceptable Limit.	
TT	Transport Temperature is Out of Specs.	
V	Validated Value.	
VB	Value below normal; no reason to invalidate.	
W	Flow Rate Average out of Spec.	
X	Filter Temperature Difference or Average out of Spec.	
Y	Elapsed Sample Time out of Spec.	

Table 12-21. AQS Null Codes

Null Data Code	Description	Purpose
1C	A 1-Point QC check exceeds acceptance criteria but there is compelling evidence that the analyzer data is valid.	Code is applied to QC check results where the code replaces the QC check results.
1F	No 1 Point QC but need to count for completeness	
AA	Sample Pressure out of Limits.	Code is applied to invalid data, where the code replaces the data value.
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 or CV out of Limits.	
AI	Insufficient Data (cannot calculate).	
AJ	Filter Damage.	
AK	Filter Leak.	
AL	Voided by Operator.	

Null Data Code	Description	Purpose
AM	Miscellaneous Void.	
AN	Machine Malfunction.	
AO	Bad Weather.	
AP	Vandalism.	
AQ	Collection Error.	
AR	Lab Error.	
AS	Poor Quality Assurance Results.	
AT	Calibration.	
AU	Monitoring Waived.	
AV	Power Failure.	
AW	Wildlife Damage.	
AX	Precision Check.	
AY	Q C Control Points (zero/span).	
AZ	Q C Audit.	
BA	Maintenance/Routine Repairs.	
BB	Unable to Reach Site.	
BC	Multi-point Calibration.	
BD	Auto Calibration.	
BE	Building/Site Repair.	
BF	Precision/Zero/Span.	
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.	

Null Data Code	Description	Purpose
TC	Component Check & Retention Time Standard.	
TS	Holding Time or Transport Temperature Is Out of Specs.	
XX	Experimental Data.	

12.10 General Guidelines on Data Review

The following list describes some of the guiding principles used by Florida when reviewing and validating data. The summary is a generalized philosophy as this document cannot begin to address all the different scenarios which may occur during data review. Moreover, it is to be stressed that professional judgement is used in many instances when determining whether to void data. The reasons and justifications for voiding data are permanently documented within the annotations of the individual pollutant data in the AirVision or AirMVP database.

General

1. See Section 12.2. Specifics, including the validation tables along with the control limits and warning limits, are included in that section. Beginning January 2021, the Florida PQAO adopted a warning limit policy requiring the review and/or investigation of QC checks exceeding the warning limit for two or more consecutive checks. At a minimum, the exceedances will be noted and documented on the field records and/or in AirMVP. After the third consecutive exceedance of the warning limit, documented action and investigation by the operator must be performed. These notations may be found on, but are not limited to, field records, AirMVP (i.e. Matrix Editor screen, 1-Point QC Check screen, etc.), Data Verification Utility Report, Data Validation Checklist, etc. This applies to both manual and automatic nightly checks for the gaseous monitors.
2. Effective January 1, 2017, the Florida PQAO implemented the use of the EPA Rounding Policy. Ensure the rounding policy is utilized appropriately (see Appendix E in this document).
3. If the continuous monitor records less than 45 minutes for one hour. The hour is invalidated. However, continuous federal equivalent method (FEM) particulate monitors might behave differently. See Florida Particulate QAPP for additional details.
4. For intermittent samplers, if the total sampling time is not within the range of 1,380 minutes to 1,500 minutes (23 to 25 hours). the sample must be invalidated. However, when a sample period is less than 1,380 minutes, the measured concentration (as determined by the collected $PM_{2.5}$ mass divided by the actual sampled air volume), multiplied by the actual number of minutes in the sample period and divided by 1,440, may be used as if it were a valid concentration measurement for the specific purpose of determining a violation of the NAAQS (see 40 CFR Part 50, Appendix L, Section 3.3).
5. The following (Table 12-23) details how the level of precision of the data will be reflected in AirMVP and AirVision (effective January 2017). AirMVP will truncate the values accordingly:

Table 12-22. Florida PQAO Data Reporting Requirements

Pollutant	Units	Decimal Places	Example
$PM_{2.5}$	µg/m^3	1	10.2
PM_{10}	µg/m^3	1	26.2
Lead (Pb) TSP and PB-PM_{10}	µg/m^3	3	1.525
$PM_{10-2.5}$	µg/m^3	1	10.2
O_3	ppb	0	70
SO_2	ppb	1	35.1
CO	ppm	1	2.5
NO_2	ppb	1	53.2
SO_2_TL	ppb	3	0.351
CO_TL	ppm	3	0.025
NO_2_TL & NO_Y_TL	ppb	3	1.532

Note: Values reported in AQS will be truncated as prescribed in Table 14.1 in the EPA QA Handbook.

Checks (1-Point QC Checks and Flow Rate Verifications)

1. In general, checks (1-Point QC Checks and Flow Rate Verifications) should be handled as detailed below.

   On August 30, 2017, the US EPA Office of Air Quality Planning and Standards (OAQPS) issued a technical memorandum with new data reporting requirements for qualifying or validating data after a failed critical check. The US EPA OAQPS issued a revised memo on January 30, 2018 to address clarification on qualifier flags; and, another revision was issued on January 21, 2022 to address qualifier flags and calculations in AQS. Due to limitations on Florida DEP's existing air monitoring database system at the time (FAMAS), Florida DEP incorporated the US EPA's OAQPS technical memorandum at the start of calendar year 2021 after their new database system, Air Monitoring Validation Program (AirMVP) went live.

   - **DEFINITIONS**. See pertinent definitions below.
     - Valid QC Check (Failure of monitor): A valid QC check is one that is conducted using certified, properly functioning equipment, conducted in a manner that adheres to appropriate procedures (SOPs). The test concentration is accepted as accurate and thus represents truth. The lack of agreement between the monitor and the quality control standard is a result of the

monitor's failed performance. In this scenario, monitor calibration and/or maintenance is required to bring the monitor's measurements back to true or within the acceptance criteria. Routine ambient

measurements made by this monitor must be invalidated back to when compelling evidence is present to support retaining the monitor's measurements. Routine ambient measurements are also invalidated forward until the point in time when measurements are again known to be valid. The results of quality control checks and any associated routine ambient measurements are invalidated in AQS using appropriate null codes. OAQPS has developed a new "1F" QC null data code for AQS to qualify these null QC records.

- Invalid QC Check (Failure of QC Standard): An invalid QC check is a check in which there were technical issues with the generation of its test concentration, including the use of expired standards. The test concentration is not accepted as accurate and does not represent truth. In this scenario the monitor's valid measurements are reported to AQS. The result of the invalid quality control check result is reported as null in the AQS QA-Transaction file with the "1C" null data code.

- **DATA HANDLING**. The data handling associated with calendar year 2021 data and calendar year 2022 data forward are outlined below.
  - Calendar Year 2021 – Florida DEP issued a technical note, OAM/QA-007 – Florida PQAO QA Activities – Effective January 1, 2021 on March 8, 2021. This QA Note incorporated procedures identified in the US EPA OAQPS memorandum dated January 30, 2019. This is effective for calendar year 2020 data only.
    - The 1C (A 1-Point QC Check Exceeds Acceptance Criteria but There is Compelling Evidence That the Analyzer Data is Valid) null code should be applied to all (both passing and failing) **invalid, gaseous checks** on the 1-Point QC Check screen in AirMVP.
    - The null code EC (Exceeds Critical Criteria) should be applied to all invalidated data resulting from **failed, valid checks**.
      - This applies to gaseous parameters from the start of 2021. This EC null code replaces the former use of the AS (Poor Quality Assurance Results) null code.
      - This applies to particulate parameters at the start of 2021 Quarter 3 resulting from the July 28, 2021 FAMAC vote (refer to FAMAC meeting notes). This EC null code replaces the

former use of AH (Sample Flow Rate Out of Limits) and AS (Poor Quality Assurance Results) null codes.

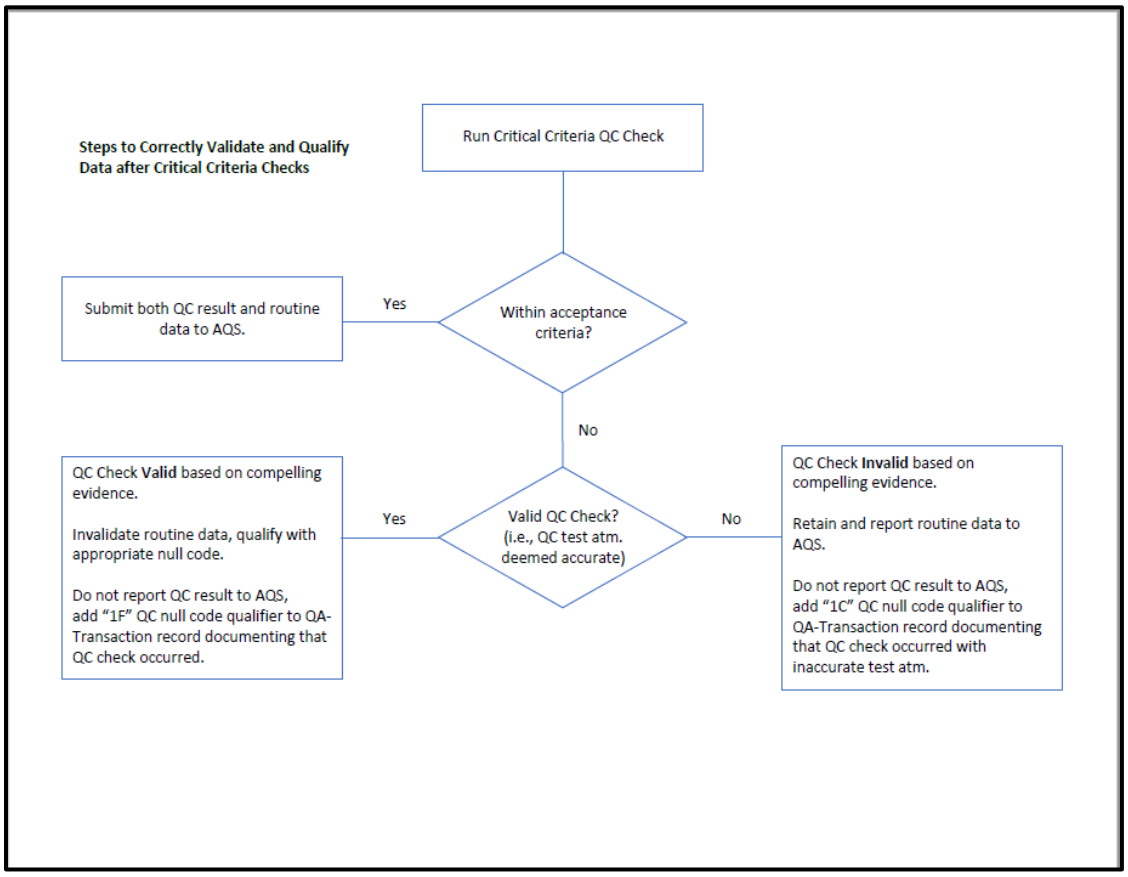
- Calendar Year 2022 Forward (Unless Otherwise Notified) – Florida DEP issues this revised technical note on February 3, 2022 to address changes in procedures identified in the revised US EPA OAQPS technical memorandum dated January 21, 2022. This change applies to calendar year 2022 data forward, unless otherwise notified by Florida DEP (i.e. usually through a QA note).
  - The 1F (No 1 Point QC but Need to County for Completeness) null code should be applied to all **valid, failed gaseous checks** on the 1-Point QC Check screen in AirMVP.
  - The 1C null code should be applied to all **invalid (pass or fail) gaseous checks** on the 1-Point QC Check screen in AirMVP.
  - The null code EC (Exceeds Critical Criteria) should be applied to all invalidated data resulting from **failed, valid checks**. This applies to gaseous and particulate parameters.
  - All checks, both gaseous (1-Point QC Checks) and particulate (Flow Rate Verifications), including passing, failing, valid, and invalid should be entered in AirMVP.
    - No gaseous checks should be marked as "Exclude from Export/Reports" in AirMVP.
    - Only invalid, particulate checks should be marked as "Exclude from Export/Reports" in AirMVP.
- The January 21, 2022 US EPA OAQPS memorandum is located in the Appendix of this document. Also, refer to flow chart (Figure 12-16) below that summarize the steps to correctly validate and qualify data after critical criteria checks.

- **AUTO-NIGHTLY CHECKS**. Following an automated nightly check that exceeds acceptance criteria, it's important for the operator to complete all necessary troubleshooting before recalibrating the monitor. It's also necessary for all troubleshooting and investigation to be documented to provide records to support the weight of evidence decision of whether the automated check in question is considered valid or invalid. Here is OAM's general policy on failed auto nightly checks:
  - If an auto-nightly check fails, the site operator must document the troubleshooting performed and investigate the probable cause for the fail. Investigations into the one minute strip chart data along with instrument diagnostic data should be sufficient in providing the best information available to discern whether a

particular automated QC check is valid or not. Diagnostic information should be recorded as documentation on the appropriate form. Troubleshooting may also include, but is not limited to, going to the site and performing a zero/span/precision (Z/S/P) **OR** running a Z/S/P check remotely documented in the appropriate forms.

- If the manually initiated check passes, the failing auto-nightly check will be reported with the null code 1C in AirMVP and the operate should document the probable cause for the invalid check based on their review and troubleshooting performed.
- If the manual check fails, standard data handling procedures apply.

Figure 12-13. Steps to Correctly Validate and Qualify Data After Critical Criteria Checks (US EPA OAQPS)



2. Action must be taken if the monitor exhibits excessive zero or span drift. If the daily zero and span values exceed the maximum allowable amount, for a 24-hour period or greater (up to 14 days), a calibration is required as well as an investigation into the probable cause. Then if deemed appropriate, the data should be invalidated back to the last passing check.
3. Look at assessment numbers for QC checks (i.e. precision and flow checks). Auto-nightly

precision checks should always be Assessment 1 regardless of the time they ran or if other checks were performed earlier in the day.

4. **Do not** adjust data values based on zero response of primary standard. All QC data should be uploaded as recorded by the datalogger during routine checks.
5. For sample line filter changes, as opposed to a verification/calibration where adjustments are made to the equipment, please document on paper (forms) and in AirMVP that a pre-and a post Z/S/P were performed. These actions show that the data were good before and after the filter change and allows you to bracket the data.
6. Bracketing checks should always be performed prior to maintenance. However, there are instances where there are malfunctions that don't permit a bracketing check to be performed prior to maintenance (i.e. instrument suddenly stops working, instrument freezes, etc.). Data may have to be invalidated back to the last good check; however, please discuss with OAM (i.e. AQS Coordinator, Quality Assurance Manager, Data Quality Section Environmental Administrator, etc.).
7. **Do not** enter the precision point from multipoint verifications/calibrations as a 1-point QC check.
8. Ensure that the total flow and sample flow are entered in AirMVP (Flow Rate Verification screen) for both $PM_{2.5}$ and PM_{10} for the Teledyne T640X.

INT (Shelter Temperature)

1. If the shelter temperature exceeds the predefined limits, the associated data must be invalidated. Some instruments may have larger ranges. Please also refer to the specific instrument manual for exceptions. See also Table 12-16 located within this SOP.
2. Internal shelter temperature (INT) values should only be invalidated when a malfunction occurs and reports incorrect data, often highly negative. DO NOT invalidate INT data just because the shelter temperature has gone outside the acceptable range for the equipment you are running. Invalidate, instead, the concentration data and associated supporting parameter data that were collected during the time the temperature was outside of the acceptable range.

Coding (Null Codes and Qualifiers)

1. Use the AM (Miscellaneous Void) null code with strict discretion. Only use if no other code fits the situation appropriately and comments must clearly and concisely describe the situation accompanying the code. See Table 12-19 in this SOP for approved uses. Any other use must be first approved by OAM.
2. Do not apply null codes to data with a QA qualifier or vice versa. AQS will reject data that has both applied. However, apply multiple qualifiers as needed.
3. Ensure the 5-minute SO_2 data coding is consistent with the 1-hour SO_2 data coding.
4. The largest negative values that AQS will accept are also identified here: https://www.epa.gov/aqs/aqs-code-list. These are the AQS code lists, and you can select based on the parameter beneath the **"Parameters/Methods/Units/Durations**" heading in the

table (*Valid Combinations – All Parameters*, *Criteria Only*; *PM_{10} Speciation only*; *$PM_{10-2.5}$ only*; *$PM_{2.5}$ Continuous nonreference only*, etc.). The largest negative value that AQS will accept is called the "Absolute Minimum Sample Value" and is almost always the negative of the Method Detection Limit (MDL). Values beyond the negative federal MDL must be coded with the DA (Aberrant Data – Corrupt Files, Aberrant Chromatography, Spikes, Shifts) null code.

6. For TEOM data, apply a null code BA (Maintenance/Routine Repairs) to the hours after a filter change/maintenance until the machine has stabilized. If the filter goes for what seems like an extensive amount of time without stabilizing, your filter may not have been seated properly during maintenance and needs to be readjusted.
7. Apply multiple qualifier flags, if needed. For instance, if an SX (Does not meet siting criteria) flag and 6 (QAPP issue) flag have to be applied to a single dataset, both can be applied in AirMVP. AQS also accepts multiple qualifiers.
8. Use QA qualifier flag SX (Does not meet siting criteria) to those sites/parameters with siting issues. Apply this code from the date the siting issues were identified by DEP's audit staff until the date the issues are resolved, or EPA grants a siting waiver.
9. Avoid the use of random BA (Maintenance/Routine Repairs) null codes in the middle of the data set. Maintenance/routine repairs infer that a pre-maintenance and post-maintenance check should be performed.

Performance Audits

1. Enter **all** audits in AirMVP.
2. Florida DEP reports **all valid (passing and failing)** audits to EPA.
3. **Do not** enter the zero level of an audit. AQS does not accept the zero level of the audit.
4. If an audit is voided (invalid), check the **Exclude from Export/Reports** button. Voided (invalid) audits are not reported to EPA. An example of a voided audit is if the auditor's calibrator is not able to reach the required EPA levels, so the auditor will stop the audit and void it. Another example is if the shelter temperature is found to be out of range during the audit for some reason, the audit will be deemed as invalid or voided.
5. In the case of a failed performance audit, due diligence will be performed by the field staff and QA staff to determine whether data needs to be invalidated. Florida DEP will email a summary of the results of the audit(s) to the respective agency along with guidance to the agency regarding follow-up, if any.
6. In the case of a failed performance audit or if corrective action is required, due diligence will be performed by the agency's field staff and QA staff to determine whether data needs to be invalidated.
    a. The agency should investigate the possible issue immediately.
    b. Invalidation of data will be based on actual causes, not on the audit results. Investigations will not be closed until a cause has been determined and corrective actions taken.
    c. The agency should email the results of its investigation and any associated corrective

action to the audit staff, the OAM Data Quality Section Environmental Administrator, and the OAM data validation team (Data.Validation@dep.state.fl.us). Florida DEP will decide whether the resulting findings/actions taken by the agency are sufficient.

Weight of Evidence Approach

The Florida PQAO utilizes the "weight of evidence" approach afforded to us by the CFR (see section 12.1 of this document). **Please include the OAM QAM as a part of this decision-making process, especially the more complicated scenarios.** Please see language below, mostly adopted from EPA's Best Practices for Review and Validation of Ambient Air Monitoring Data (August 2021).

"Weight of evidence" or the "weight of evidence approach" are expressions used when discussing data validation that currently lack formal definitions in the CFR. However, weight of evidence is an essential part of validation, and one the CFR specifically states that PQAOs and the EPA must use. See Section 12.1 of this document. The weight of evidence approach involves using all available supporting documentation, along with professional judgment, to make decisions about data validity and determining whether data meets the needs of the end user (i.e., intended use). For monitoring organizations, the data's end-use often includes NAAQS-decision making purposes, which implies data quality should be able to withstand public and legal scrutiny. The weight of evidence approach involves evaluating data and its supporting documentation and logically determining whether the number of deviations observed, combined with the implications of those deviations, impedes one's ability to defend the quality of the data. More simply put, it's whether the evidence that suggests the data cannot be used for its intended purpose outweighs the evidence available that suggests that it can, or vice versa. Although the weight of evidence decision is subjective, it is informed by objective evidence.

In reality, there are some occasions when validity is not a simple "yes or no" decision, but rather a complicated process based on varying types of evidence, layers of supporting documentation, and, quite simply, interpretation of regulatory and methodology requirements. The allowance for a weight of evidence approach affords monitoring organizations and EPA the opportunity to evaluate and analyze all available information, arrive at a validity decision, and then determine whether it can withstand various challenges. When doing this, pursuant to CFR, consensus-built templates and/or validation criteria already approved in QAPPs should be used as the foundation of the weight of evidence approach. The consensus-built templates referenced in the CFR are the QA Handbook's data validation templates. The weight of evidence approach is, therefore, informed by the data validation templates. However, as stated in the CFR, PQAOs and the EPA must use the checks and procedures required in 40 CFR Part 58, Appendix A, in combination with other data quality information, reports, and similar documentation that demonstrate overall compliance with Part 58. This distinction is important to emphasize. It means that data validation is not simply saying data are valid because required QA/QC checks were completed and passed. Instead, validation is going a step further and ensuring that, not only are the QA/QC checks in

compliance, but also the other MQOs, summarized in the data validation templates – such as NIST-traceability, adherence to FRM/FEM specifications, and so forth – have been achieved.

The preamble to the data validation templates (Appendix D of the QA Handbook) recommends invalidation when data do not meet critical criteria, unless there is compelling evidence to justify not doing so. In the context of weight of evidence, compelling evidence informs the weight of evidence decision. It is important to note this distinction, as the terms "compelling evidence" and "weight of evidence" are sometimes used interchangeably. Weight of evidence is often employed when multiple MQO violations have occurred, and most especially in situations where operational and/or systematic criteria have not been met. As stated earlier, where the line-item in the data validation templates originates plays an important role in informing the weight of evidence decision; the data reviewer should understand the intent of all requirements in the data validation templates, which makes review of the sources listed in the Information/Action column of the templates vitally important. When significant operational and/or systematic criteria deviations have occurred, data validity is compromised; invalidation may be warranted, depending on the data's end use. Therefore, the data reviewer must examine all the available evidence in order to inform the decision-making process as to whether overall compliance with Part 58 has been achieved. The types of data and documentation available, collectively, help "build a case" for the validity decision. That decision should be scientifically sound and technically defensible.

13.0 DATA ACQUISITION AND RECORDS MANAGEMENT

13.1 AirVision

Florida's air monitoring network is comprised of State and local agencies. Much of Florida's network uses continuous monitoring instruments, so there are large amounts of minute data. Depending on the agency, the review of the minute data is either annotated on the first minute or the first hour of that day. Statewide, storing this entire volume of minute data would utilize an unwarranted amount of computer storage in AirMVP. As such, only the hourly data (aside from the 5-minute SO_2 data) are stored in AirMVP for the locals. All the minute and hourly data for Florida DEP are stored in AirMVP. The local programs utilize AirVision software as their intermediary data acquisition between the monitors in the field and the State's AirMVP database. The local program agencies store all their data, inclusive of minute data, in AirVision. Individual licenses of AirVision are independently operated and maintained by each local agency.

AirVision retrieves and processes data from continuous monitoring instrumentation. The fundamental hardware component of an AirVision system is the datalogger – an industrial-grade data acquisition controller – one of which is located at each air monitoring station and is used to gather the data from the monitors and connected auxiliary instruments at the site. The current AirVision configuration for agencies that have implemented digital communication to their sites consists of one or more dataloggers, networking equipment, monitoring instruments, auxiliary instruments, and a general-purpose site computer loaded with Windows™ software (these may be located on-site or transportable laptops/tablets). The system is supported and managed using a central computer at the agency offices that gathers the data from each individual site via the network and hosts the database of air quality data. A comprehensive description of AirVision is available in the AirVision software manuals.

In general, the AirVision system collects the data from analog and digital sensors (monitors or auxiliary instruments), digitizes and converts the analog values to pollutant concentrations expressed in engineering units, integrates these values to produce minute and hour averaged values and generates reports. The AirVision management interface allows remote access to instrument configuration and diagnostic information (where supported), automation of many routine tasks, general data management, and flexible reporting. Data from AirVision databases may be directly exported in formats suitable for transfer to the State AirMVP database.

See the AirVision User Manual for instructions on how to edit and view data and other features. See Appendix E for an AirVision Guide detailing how data are handled in the Florida PQAO.

13.2 AirMVP

The data that are to be reported to AQS for Florida's entire network are ultimately transferred to AirMVP; however, within the DEP OAM, the instruments collect data which are transferred toAirMVP without the AirVision intermediary. The following sections describe this collection

and transfer of data. There are a few methods utilized by the Florida DEP OAM to retrieve data recorded by the ambient monitoring instruments. This section describes these activities.

13.2.1 Data Transfer

All the continuous air monitoring instruments in DEP's ambient air monitoring network are connected to dataloggers. The dataloggers collect data from the instruments on a nearly continuous basis via analog and digital connections. The ambient monitoring data are then polled from each datalogger using AirMVP. Polling occurs every fifteen minutes after or before the hour depending on the site. A few sites are polled once per day. Polling connections are made using IP addresses and wireless modems.

For polling to commence, a site and its polling schedule must be configured within AirMVP. Staff with an Administrator role from FDEP are responsible for the configuration of AirMVP and many of its internal activities. Site and polling schedule configurations are verified at the time of setup through connection and data transmission testing.

AirMVP utilizes a polling server to contact and connect to the dataloggers. The server must be running for the polling to occur. The polling server's operation is verified daily during the daily data review.

13.2.2 Data Storage

There are two areas in the AirMVP database used for ambient air monitoring data storage: the foundation and ambient tables. The foundation table is populated by the data collected during the AirMVP polling process briefly described above. These data, once in the table, cannot be changed and, therefore, provide an as-is record of data polled by AirMVP.

Data stored in the ambient table, on the other hand, can be altered. However, this manipulation of data is limited based on the AirMVP user's security level (see the AirMVP User Manual for more information). Any imported data and changes to polled data are stored in the ambient table. Records of all changes made to the data are kept in AirMVP as audit trails.

13.2.3 Data Editing

Data editing in AirMVP is achieved through multiple pathways and tools. See the AirMVP User Manual for more information.

13.2.4 QA Transactions

Beginning with calendar year 2015, DEP replaced its precision and accuracy records format in its data acquisition and system record management system with new QA formats in response to EPA changing its old RP and RA files with much more specific

records to align better with 40 CFR Part 58 Appendix A requirements. The system in place at the time was FAMAS. Beginning first quarter 2015, all Florida agencies began using this new format in FAMAS (and later AirMVP). The AirMVP User Manual documents how to use QA Transactions and other tools within the software.

13.2.5 Data Verification Utility

Once all data are in AirMVP, as part of the data validation, the Data Verification Utility in AirMVP must be ran and the data checked for completeness. The AirMVP User Manual documents how to use Data Verification Utility and other tools within the software.

In the Data Verification Report (the output of the Data Verification Utility) that is generated, it is important to go through each section individually and comprehensively review all the data that is presented. AirMVP can perform automatically all the precision and bias calculations, as well as compare data to the allowable control limits that are derived from the MQOs. Any exceedances will be noted as "**FAIL**" or in the Verification Results at the bottom of the report as "**FAILED**". A full investigation into any **FAIL** issues should be fully documented using data annotations and/or comments within AirMVP and/or on the Data Verification Utility Report. For example, PM2.5 duplicates may not meet the 10% precision criteria. The equipment verification on both samplers should be checked for flow, leaks, and maintenance. Site condition or filter comments regarding construction or unusual site activity may also explain a discrepancy. Comments must be added in AirMVP and/or on the Data Verification Utility Report to document due diligence regarding FAILED Verification Results. Additionally, other instances such as 1-point QC check or flow rate verification control limit or warning limit exceedances should be notated. Effective at the start of calendar year 2020, the Data Verification Utility Report has to be PDF'd initially, and notated if changes/corrections/observations are needed, signed, and dated. A final report, showing that the "flags are set" will also have to be PDF'd, signed, and dated once all changes/corrections are addressed.

Once all issues have been addressed and due diligence has been documented, the QA coordinators from each of the local program agencies are responsible for setting the verified flags on the Data Verification Report. This signifies that the agency has employed the appropriate QA/QC procedures when reviewing its data.

The agency sends an email to OAM's data validation team (Data.Validation@dep.state.fl.us) with the following:

- Confirmation that all the data has been verified and validated;
- Completed Data Validation Checklist (Form DEP 18-27-A);
- AirMVP Data Completeness Report (signed by the QA coordinator);

- Memo stating which parameters were below 75% (90% for ozone) and why (if applicable);
- Corrective Action/AirMVP Missing Data Report (if applicable);
- AirMVP Pollutant Comment Report (signed by the QA coordinator); and
- Data Verification Utility Report, initial and final (signed by the QA coordinator).

The QA Coordinator from each local program agency is responsible for these tasks while OAM's data validation team is also responsible for completing or ensuring that these tasks are completed for each of its eight territories. This email and completed forms and documents will serve as the official documentation of the agency's review of their data for the specified period. It will also give DEP the indication that the agency's data is ready for submission into the AQS system.

The Data Quality Section Administrator and AQS Coordinator will perform a review of statewide data prior to upload to AQS. Data are uploaded into AQS by the AQS Coordinator after the satisfactory completion of these reviews. .

13.3 Manually Retrieved Data

13.3.1 $PM_{2.5}$ - PMTS

The TEI Partisol-Plus $PM_{2.5}$ Sampler (2025/2025i) is the only instrument in the Florida ambient air monitoring network which cannot be connected to a datalogger nor directly polled. This section briefly covers the collection of data from the 2025/2025i.

In the case of the 2025/2025i, a two-part system is used to collect and process data. The first part involves connecting the instrument to a computer, and using RPComm, retrieving the supporting parameter data (see the TEI Partisol-Plus Sequential Sampler (2025/2025i) operating manual and SOP for more information).

The supporting parameter data are imported into the PMTS where they are combined with filter analysis data from Tallahassee's $PM_{2.5}$ Gravimetric Weighing Lab's Laboratory Information Management System (LIMS) resulting in the PM concentrations. The supporting parameter data are verified in the PMTS by comparing the uploaded data to the field records created during the filter pickup.

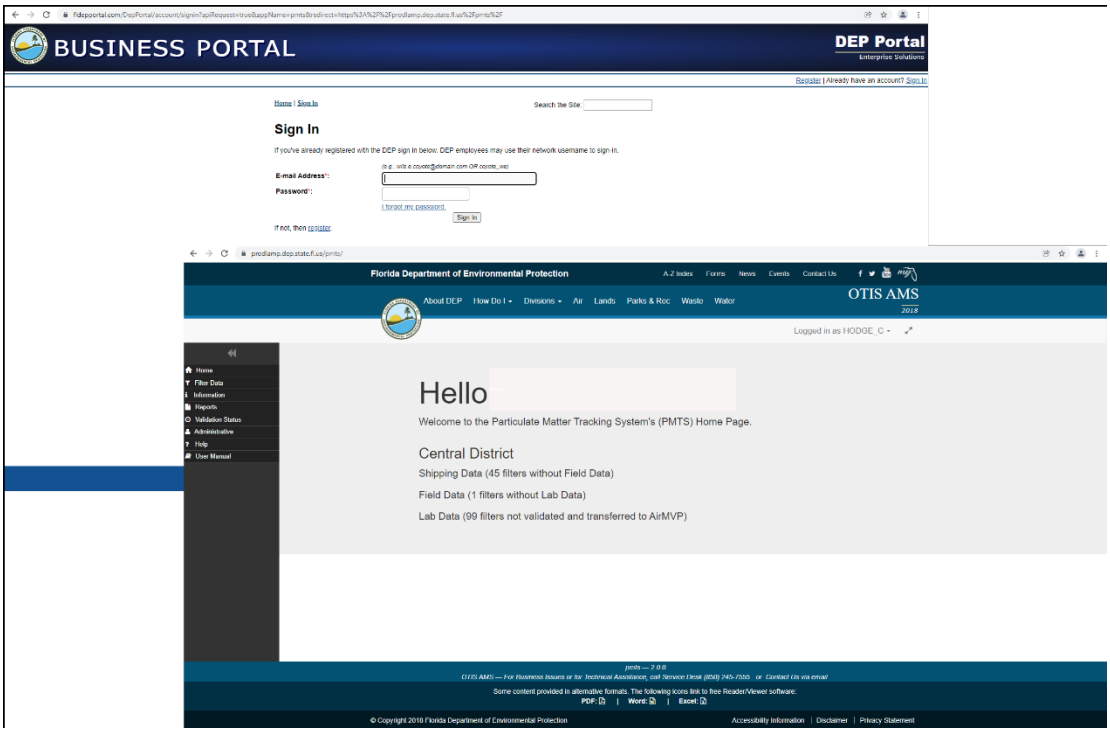
After a data review and validation in the PMTS, the supporting parameter and concentration data are electronically transferred to AirMVP. In AirMVP, these data are verified to ensure that null codes and flags are appropriately applied and any issues/concerns resulting in the Data Verification Report are addressed.

Uploading Validated PM F1 Files into PMTS

Note: Depending on the agency, the field or QA staff may upload the PM F1 files into PMTS.

1. Log on to PMTS (https://prodlamp.dep.state.fl.us/pmts/) using a network computer. *Note: A username and password is provided by DEP.*

Table 13-1. PMTS



2. Under the ***Filter Data*** tab, select ***Upload Field Data***.
3. Click **[CHOOSE FILE]** and choose the correct F1 file from the QA network drive or agency-approved transportable drive. Click **[PREVIEW]**, then click **[INSERT FIELD DATA IN $PM_{2.5}$]**. A list of the filters that were uploaded will show in green for no issues or red if there are any issues with the upload.
4. Under the ***Filter Data*** tab, select *Edit Field Data*.
5. Click on the plus **[+]** sign to the left of the filter number to display the corresponding field data (blank filters will not be listed in the **"Edit Filter Information"** screen). Validate the data to the field sheets. Investigate any differences by speaking to the field staff or checking the PM site/equipment log.

   Note: The F1 file is the primary data for the ambient temperature, ambient pressure, average flow, % cv, volume sampled, and total minutes. If any discrepancies are found with these parameters, the field sheets should be corrected to match the F1 file.

6. If any changes are to be made to the field sheets, cross out the incorrect information with a single line, initial, date and make changes in ink (or an electronic equivalent). If any changes are to be made to the electronic data, click on the filter number, make the necessary changes, document the change, and click **[SAVE CHANGES]**.

   Note: It is rare that one must change filter data; so, please be sure that changes must be made, and if so, PMTS will require you to enter a comment documenting why the change is necessary. Additionally, the change along with reasons should be documented

appropriately on the records. Once all is validated, sign off and date the field sheets.

Validating the Electronic Data in PMTS

1. Under the ***Filter Data*** tab, select ***Validate Data***. When the validation screen appears, check to see that it has defaulted to the correct quarter for the batch of filters to be validated. If not, click **[CHANGE QUARTER]** and choose the appropriate quarter and again click **[CHANGE QUARTER]** to set the timeframe.
2. Validate each filter with the appropriate flags and/or null codes. Once the filter has been validated, click **[VALIDATE FILTERS]**. When message window appears, click **[OK]**.

   Note: Be sure to have the correct batch of field sheets that correspond to the filters being validated.

3. Once all filters have been validated for the batch, click **[VIEW SUMMARY PAGE].**
4. If for any reason you need to change the data pertaining to a filter, check the **UN-VALIDATE** box next to that filter, scroll to the bottom of the page and click **[SAVE CHANGES TO 'UN-VALIDATE' OR NULL CODES FOR DATES]**.

   When message window appears, click **[OK]**.

   Note: It is rare that one must change filter data; so, please be sure that changes must be made, and if so, PMTS will require you to enter a comment documenting why the change is necessary. Additionally, the change along with reasons should be documented appropriately on the records. One example that might require filter data to be changed is if the F1 file incorrectly populated values in PMTS (see Technical Note, OAM TN 16-01 regarding the Thermo Scientific 2025i: https://fldep.dep.state.fl.us/AirMVP/). Additionally, one might need to correct the Filter ID number. This change cannot be done in PMTS. However, please document accordingly in AIRMVP what change was made and why. All other changes must be made in PMTS and the original file maintained to preserve a transparent audit trail.

5. Scroll down the page to the **Blank Filters** section. Validate the filter number and date of the blank filter to the field sheet.
6. Notify the appropriate staff in your agency by email for final review and transfer of data to DEP's AIRMVP.

   Note: Ensure that only the filters for the month being validated are being transferred to DEP.

13.3.2 Lead

Currently, only Hillsborough County performs lead analysis. See the Florida AirVision Guide located in the Appendix D as well as Section 12.6.7 of this document for the steps on how to perform the data entry and data transfer associated with these samples.

13.4 Quality Control of Calibration, Instrument Checks, and Other Related Records

Following instrument calibrations and quality control checks performed in the field, field staff are to save the electronic record in a secure location (i.e. shared network drive or OCULUS) or secure the hardcopy file in transport to the office. Specific directions are provided in the respective instrumentation's SOP.

The QA staff reviews these records ensuring completion of required fields and verification of the pollutant data as outlined in the DEP QAPP and SOP. If discrepancies are noted, additional steps are taken. These steps usually entail communication with the field staff to clarify or address concerns.

Forms that must be completed by the field staff are detailed in the individual SOPs. The QA staff reviews these forms on at least a monthly basis and ensures completion (data validation) and signs-off on these records (electronically or hardcopy) locking these records.

13.5 Record Storage

Aside from the data that are stored in the various databases (i.e. AirVision, AirMVP, PMTS, AQS, etc.). Florida's records are stored electronically. Most of the agencies within Florida's PQAO record data on electronic forms. However, all hard copy records are scanned and stored on a shared network drive or, in the case of Hillsborough County, in OCULUS.

13.6 Data Upload to AQS

After undergoing validation and verification in AirMVP, Florida's ambient air monitoring data are packaged and transmitted to the EPA's AQS database. Beginning in December 2014, at least one person from each local agency was required to register for an AQS read-only account. These AQS read-only account users will utilize AQS to verify that their agency's data was loaded correctly each quarter. See "Section 12.7 – Quarterly Tasks" for the detailed list of reports.

The following sections describe the transfer of data from AirMVP to AQS. Florida has a designated AQS Coordinator and a back-up. These persons can edit, load, and transfer data in AQS.

13.6.1 File Formatting

Files uploaded to AQS must be AQS-formatted. AQS-formatting is pipe-delimited, and each field delimited by two pipes holds a specific data element (see EPA's AQS Coding Manual for more information regarding file types and fields). AirMVP's export functions produce AQS-formatted files (see the AirMVP User Manual for more information).

13.6.2 File Editing

AQS files are edited using any text editing or word processing programs to correct any coding errors (e.g., incorrect QA qualifiers, method codes, negative values, etc.) entered

during the data submission to AirMVP. Agencies are informed of errors as necessary and requested to make corrections to current or historical data.

13.6.3 Data Transfer, Loading, and Editing

Data is transferred to AQS by one of two ways: manual entry or via EPA's Environmental Exchange Network Services Center (ENSC). Since large quantities of data are typically transferred to AQS, the simpler method of transmission is via the ENSC. The ENSC is an electronic document receiving system set up by the EPA to ease the transfer of data between states' databases and AQS.

The data is loaded to AQS in batches or batch files by the AQS Coordinator who has Florida Screening Group access rights.

14.0 Appendix

14.1 Appendix A – Forms

14.1.1 FORM DEP 18-27-A - Data Validation Checklist

(Note: To view and/or print this form, double-click on the image of the form below for it to open in Adobe Acrobat. The complete form will then be displayed).

Florida Department of Environmental Protection
DATA VALIDATION CHECK LIST

FORM DEP 18-27-A
Revision No. 2
July 2021

Required Signatures: Adobe Signature

FORM DEP 18-27-A

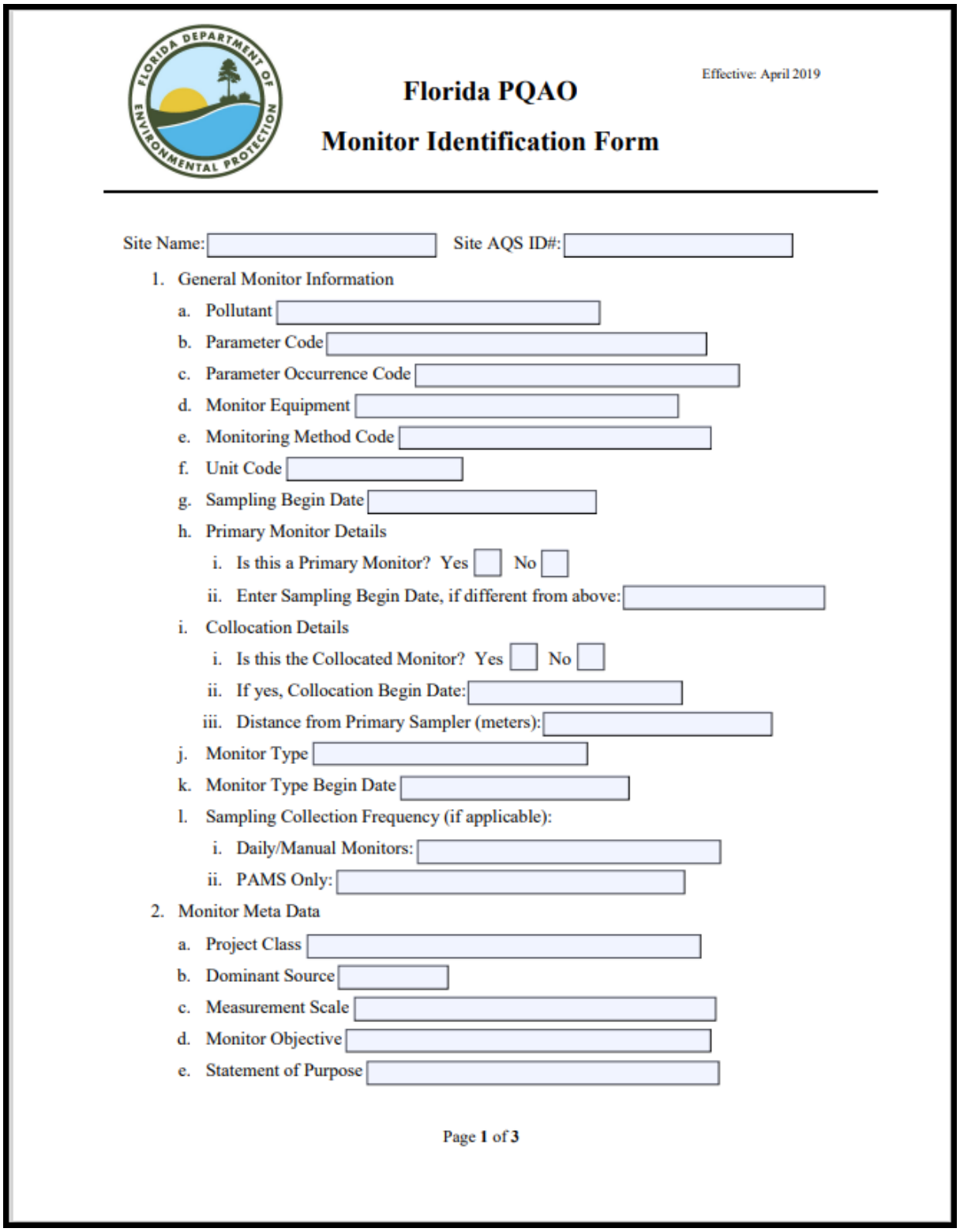
Agency Name: _____ **Reporting Period:** _____

	Yes	No	N/A
MISSING DATA			
Has all missing data ("pumpkins"), if any, been resolved in AirMVP (i.e. null codes entered, data recovered, etc.)?	☐	☐	☐
Was data recovered from the datalogger or analyzer, if applicable, and entered/imported into AirMVP?	☐	☐	☐
Was manually entered data entered by one person and reviewed by at least another different person?	☐	☐	☐
Was a null code applied to the impacted hour(s)?	☐	☐	☐
Are the reasons for missing data, including null coded data, noted in AirMVP and on field records?	☐	☐	☐
CONCENTRATION DATA (i.e. minimum values, maximum values, outliers, exceedances, etc.)			
Were there any concentration data outliers?	☐	☐	☐
Were maximum and minimum concentration values (daily and monthly) reviewed?	☐	☐	☐
Is the hour of the daily maximum concentration value typical?	☐	☐	☐
Is the hour of the daily minimum concentration value typical?	☐	☐	☐
Are the daily maximum/minimum concentration values impacted by a source or unusual condition?	☐	☐	☐
Are the sources or unusual conditions noted, if applicable?	☐	☐	☐
Does the monthly concentration data follow a seasonal, diurnal, or historical trend?	☐	☐	☐
Is the diurnal profile reasonable?	☐	☐	☐
Are these concentration values typical for the time of year?	☐	☐	☐
Are the maximum concentration values greater than or equal to the level of the NAAQS? Unusually high values should be investigated, and comments recorded in AirMVP and field records.	☐	☐	☐
Is the range between the minimum and maximum concentration values reasonable?	☐	☐	☐
If there were any concentration exceedances or outliers of ambient data, were they documented?	☐	☐	☐
If applicable, was an exceedance report completed and concise comments describing the cause entered in AirMVP? (Note: Exceedance reports are not required for ozone).	☐	☐	☐
Are concentration values below the negative Federal MDL coded appropriately?	☐	☐	☐
QA FLAGS/NULL CODES/MISSING DATA Note: Make sure 5-minute SO_2 data are handled appropriately, also.			
Have automatically flagged values in AirMVP been addressed?	☐	☐	☐
Is there at least 45 minutes of valid data for each hour?	☐	☐	☐
Are all power outages coded appropriately?	☐	☐	☐
Are all equipment failures coded appropriately?	☐	☐	☐
Are all datalogger related issues coded appropriately?	☐	☐	☐

FORM DEP 18-27-A Revision No. 1: July 2021 Page 1 of 5

14.1.2 Monitor ID Form

(Note: To view and/or print this form, double-click on the image of the form below for it to open in Adobe Acrobat. The complete form will then be displayed). This form is also available on AirMVP.



Effective: April 2019

Florida PQAO

Monitor Identification Form

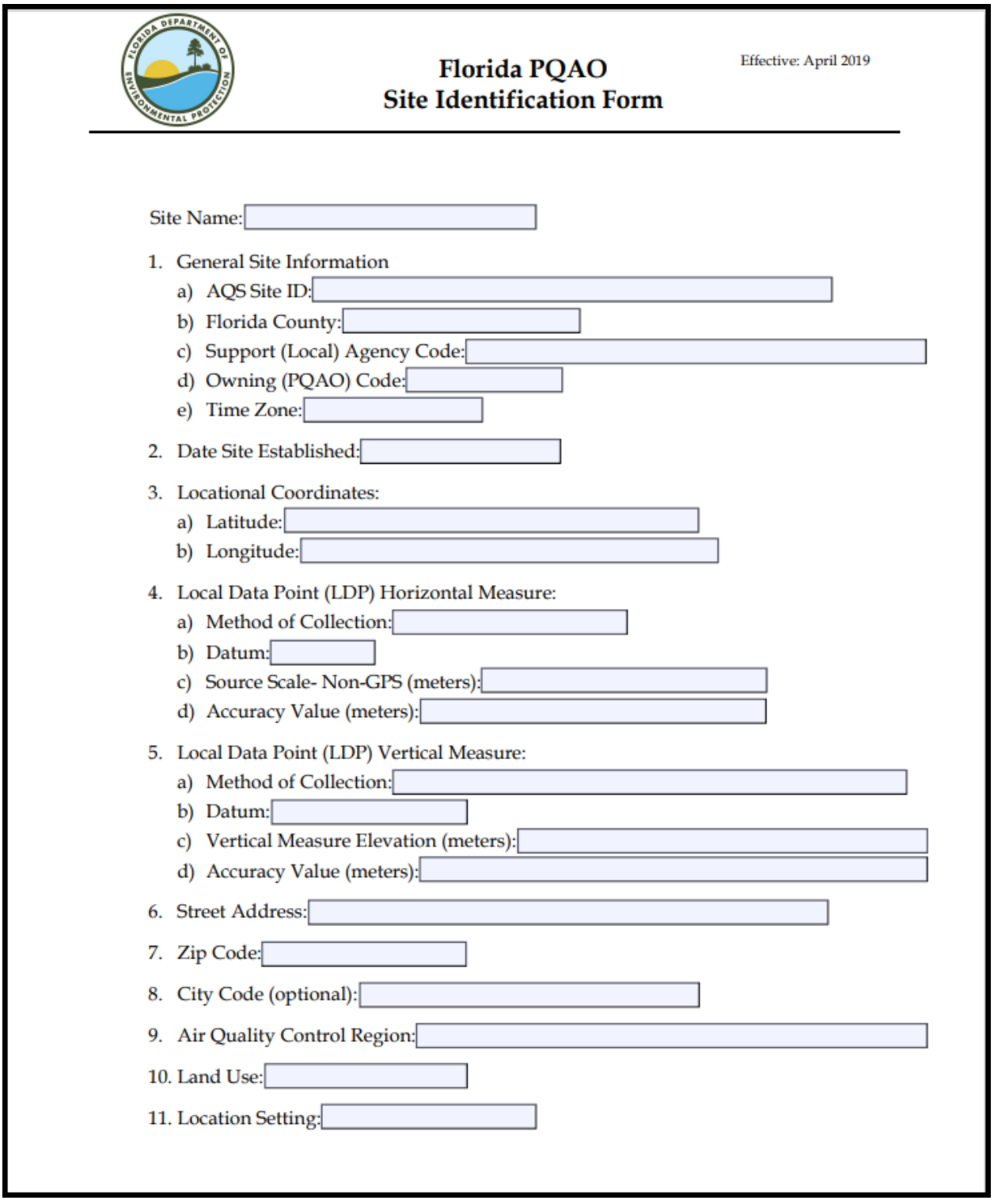
Site Name: _____ Site AQS ID#: _____

1. General Monitor Information
   a. Pollutant _____
   b. Parameter Code _____
   c. Parameter Occurrence Code _____
   d. Monitor Equipment _____
   e. Monitoring Method Code _____
   f. Unit Code _____
   g. Sampling Begin Date _____
   h. Primary Monitor Details
      i. Is this a Primary Monitor? Yes ☐ No ☐
      ii. Enter Sampling Begin Date, if different from above: _____
   i. Collocation Details
      i. Is this the Collocated Monitor? Yes ☐ No ☐
      ii. If yes, Collocation Begin Date: _____
      iii. Distance from Primary Sampler (meters): _____
   j. Monitor Type _____
   k. Monitor Type Begin Date _____
   l. Sampling Collection Frequency (if applicable):
      i. Daily/Manual Monitors: _____
      ii. PAMS Only: _____
2. Monitor Meta Data
   a. Project Class _____
   b. Dominant Source _____
   c. Measurement Scale _____
   d. Monitor Objective _____
   e. Statement of Purpose _____

Page **1** of **3**

14.1.3 Site ID Form

(Note: To view and/or print this form, double-click on the image of the form below for it to open in Adobe Acrobat. The complete form will then be displayed). This form is also available on AIRMVP.



Florida PQAO
Site Identification Form

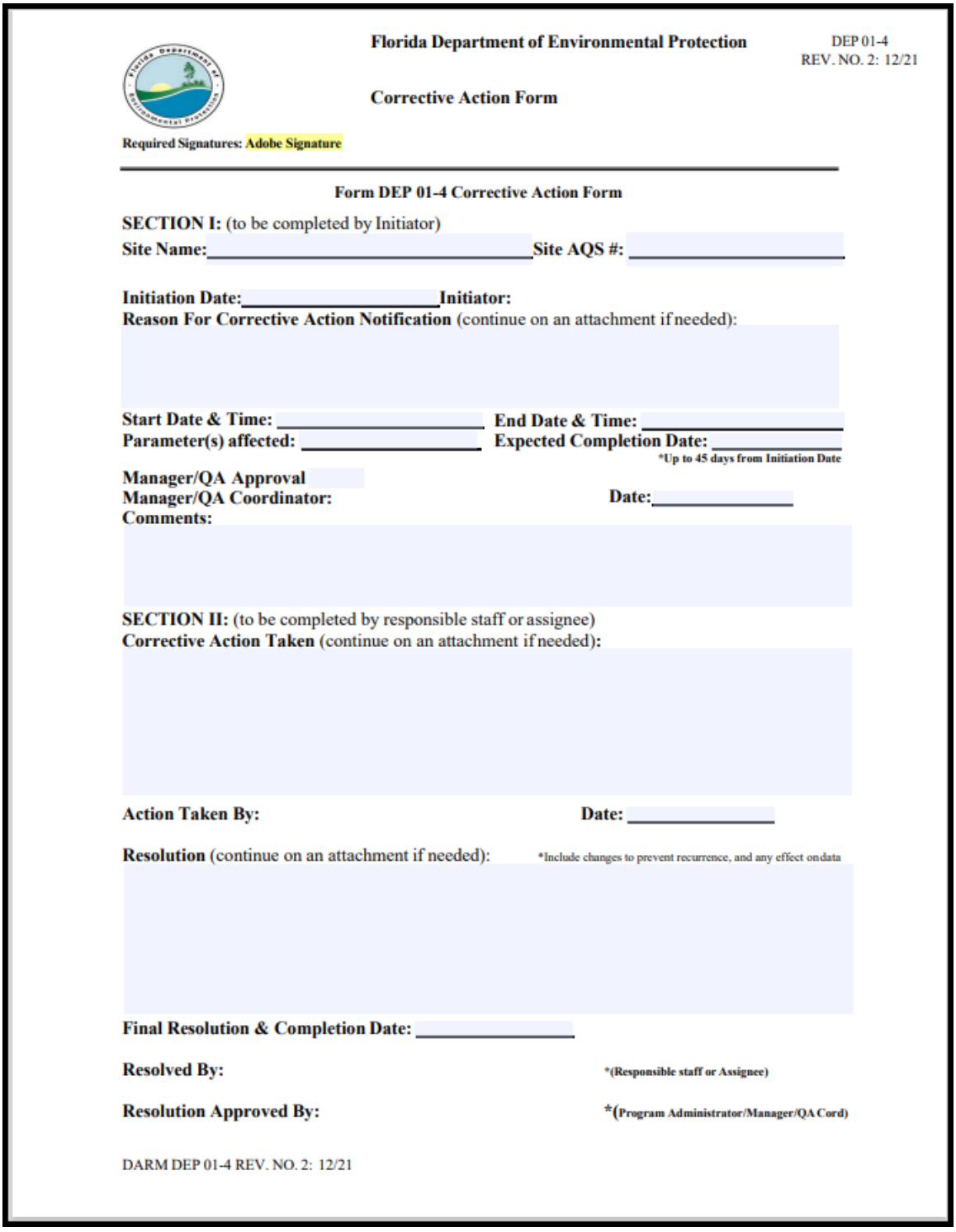
Effective: April 2019

Site Name:

1. General Site Information
   a) AQS Site ID:
   b) Florida County:
   c) Support (Local) Agency Code:
   d) Owning (PQAO) Code:
   e) Time Zone:
2. Date Site Established:
3. Locational Coordinates:
   a) Latitude:
   b) Longitude:
4. Local Data Point (LDP) Horizontal Measure:
   a) Method of Collection:
   b) Datum:
   c) Source Scale- Non-GPS (meters):
   d) Accuracy Value (meters):
5. Local Data Point (LDP) Vertical Measure:
   a) Method of Collection:
   b) Datum:
   c) Vertical Measure Elevation (meters):
   d) Accuracy Value (meters):
6. Street Address:
7. Zip Code:
8. City Code (optional):
9. Air Quality Control Region:
10. Land Use:
11. Location Setting:

14.1.4 FORM DEP 01-4 - Corrective Action Form

(Note: To view and/or print this form, double-click on the image of the form below for it to open in Adobe Acrobat. The complete form will then be displayed). This form is also available on AirMVP.



Florida Department of Environmental Protection

DEP 01-4
REV. NO. 2: 12/21

Corrective Action Form

Required Signatures: Adobe Signature

Form DEP 01-4 Corrective Action Form

SECTION I: (to be completed by Initiator)
Site Name:_____ **Site AQS #:** _____

Initiation Date:_____ **Initiator:**
Reason For Corrective Action Notification (continue on an attachment if needed):

Start Date & Time: _____ **End Date & Time:** _____
Parameter(s) affected: _____ **Expected Completion Date:** _____
*Up to 45 days from Initiation Date

Manager/QA Approval
Manager/QA Coordinator: **Date:**_____
Comments:

SECTION II: (to be completed by responsible staff or assignee)
Corrective Action Taken (continue on an attachment if needed):

Action Taken By: **Date:** _____

Resolution (continue on an attachment if needed): *Include changes to prevent recurrence, and any effect on data

Final Resolution & Completion Date: _____

Resolved By: *(Responsible staff or Assignee)

Resolution Approved By: *(Program Administrator/Manager/QA Cord)

DARM DEP 01-4 REV. NO. 2: 12/21

14.2 Appendix B – AQS Reports

The review of the AQS Reports is an additional level in the quality assurance process, which is completed when the data has been uploaded into AQS. The AQS reports are run by each local agency to ensure that all the data sent to AirMVP was uploaded into AQS. Additional AQS reports are also run by OAM management staff and the AQS Coordinator on a quarterly basis. It also ensures that there are no discrepancies between these data.

Once the data has been uploaded into AQS each agency will have 20 days from the upload date to run these reports. Each user will require a username and password issued from EPA to access AQS and generate these reports. The following reports are to be generated each quarter:

1. AMP256 (QA Data Quality Indicator Report) – This report is designed to give AQS users a summary of the status of their quality assurance activities. The DQI Report displays a summary of quality assurance activities as required by Appendix A of the monitoring rule. The report is sorted by assessment, PQAO, parameter, and year. This report contains six (6) sections related to the quality assurance assessment types: one point quality control, flow rate verifications (for particulate parameters), annual performance evaluation, semi-annual flow rate audits, collocation summary, performance evaluation program (PEP), and lead audit strip analysis. This report is generated by the OAM AQS Coordinator or OAM Quality Assurance Manager.
2. AMP430 (Data Completeness Report) – This report shows each parameter's monthly and quarterly completeness in percentages. It is designed to give AQS users a summary of the status of their data with respect to the operating information (e.g., sampling schedules) also entered in AQS.
3. AMP501 (Extract Raw Data) – This report extracts all the raw data in AQS for a specific site or agency.
4. AMP504 (Extract QA Data) –This report extracts all the QA data in AQS for a specific site or agency.

Here is a summary of the report schedules and due dates:

AQS Report Schedules

Ambient Air Data:

The AQS Reports for all ambient air data are due within 20 days after the upload of an agency's data into AQS:

- An email should be sent to OAM's data validation team (data.validation@dep.state.fl.us) with:
    - Confirmation that there were no discrepancies between the data in AirMVP and the data in the AMP501 and AMP504 reports.

- AMP430 Completeness Report (1st page only and signed by the QA coordinator).

The AQS Coordinator will also run the AMP256(QA Data Quality Indicator Report) on a quarterly basis. The AQS Coordinator will address issues, if any, on the report and document them accordingly for preparation for the annual data certification (see Section 12.8 Annual Tasks in this document).

Data Validation Due Dates

Ambient Air Data:

Each agency is required to complete the data validation, entering comments, flags and precision data entry in AirMVP on a monthly basis, no later than 20 days after the end of each month. The flags on the AirMVP Data Verification utility must also be set. However, the data validation for the entire quarter should be completed no later than 40 days after the end of the quarter.

Each agency is required to provide the following in an email to OAM's data validation team (data.validation@dep.state.fl.us) within 40 days after the end of each quarter.

- Confirmation that all the data has been verified and validated;
- Completed Data Validation Checklist (Form DEP 18-27-A);
- AirMVP Data Completeness Report (signed by the QA coordinator);
- Memo stating which parameters were below 75% (90% for ozone) and why (if applicable);
- Corrective Action/AirMVP Missing Data Report (if applicable);
- AirMVP Pollutant Comment Report (signed by the QA coordinator); and
- Data Verification Utility Report, initial and final (signed by the QA coordinator).

14.2.1 Execution of Reports

1. Each user should access the AQS application via the following link: http://www.epa.gov/aqs and select the icon labelled '***AQS Launch Web Application***' on the right-side of the page. This will launch the AQS application in another window and prompt the user to log-in.

Figure 14-1. EPA's AQS Website

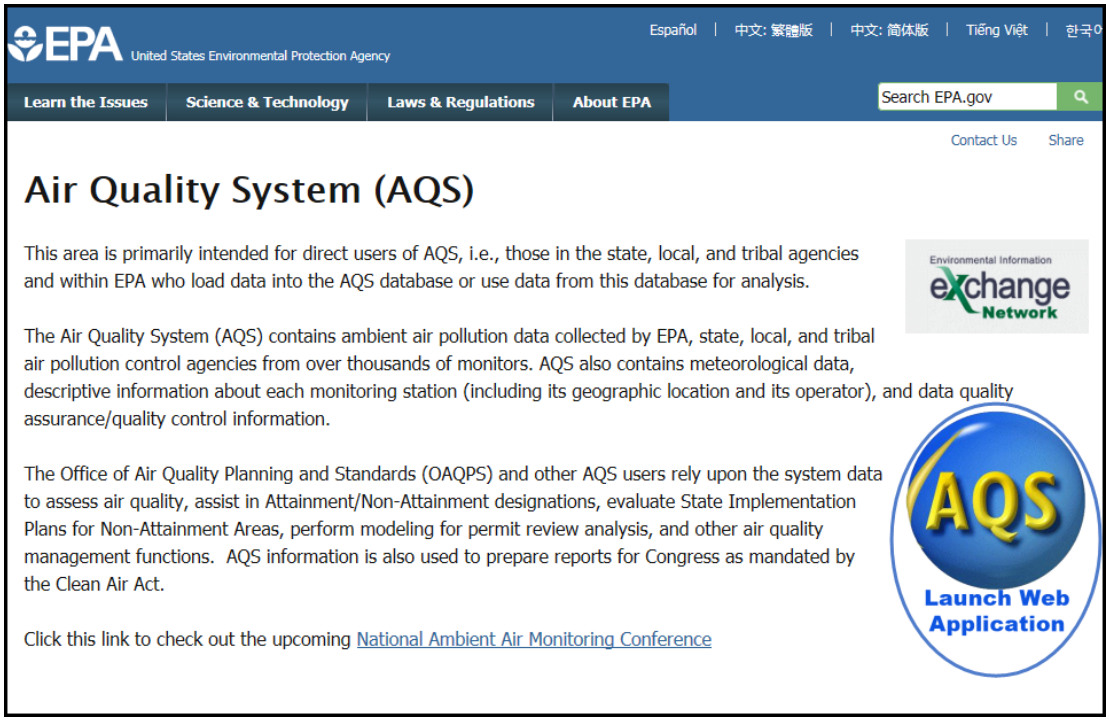
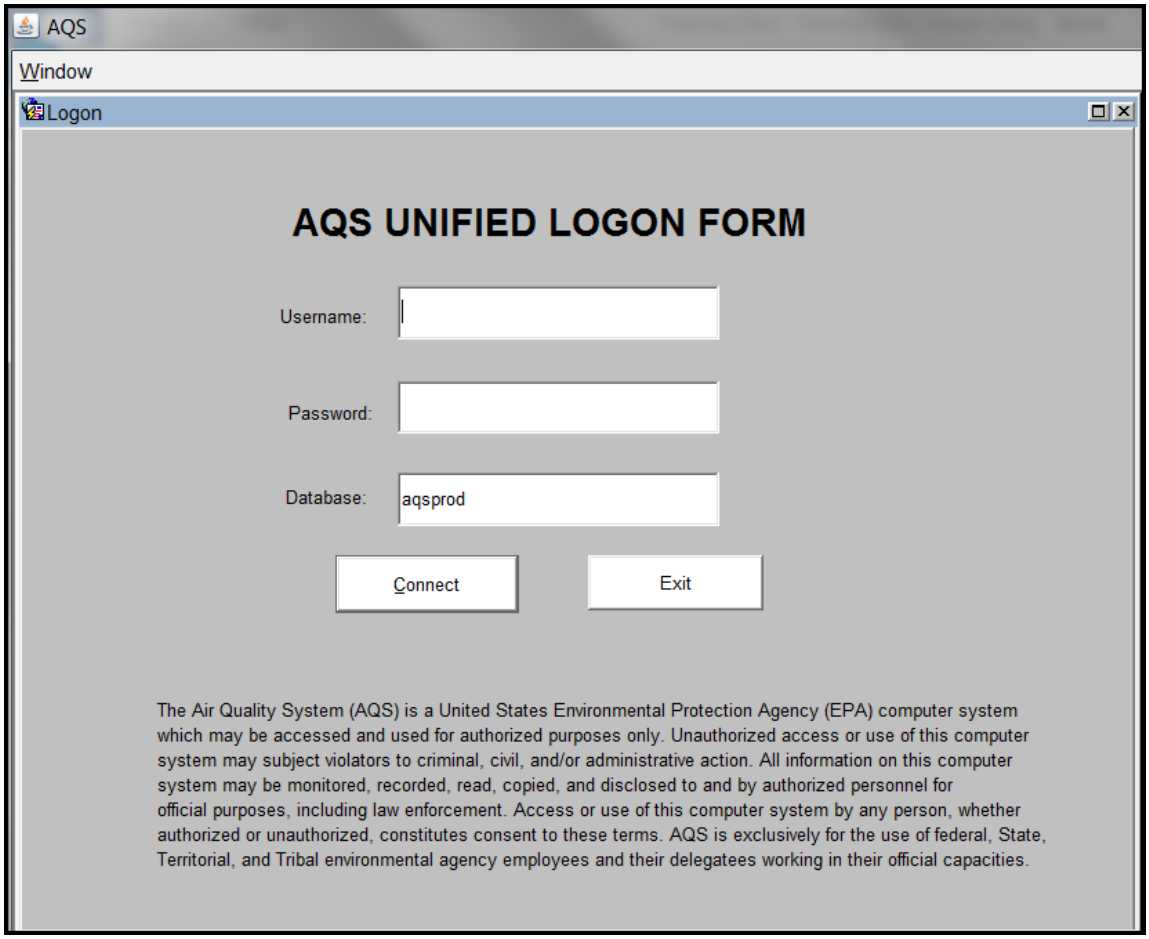
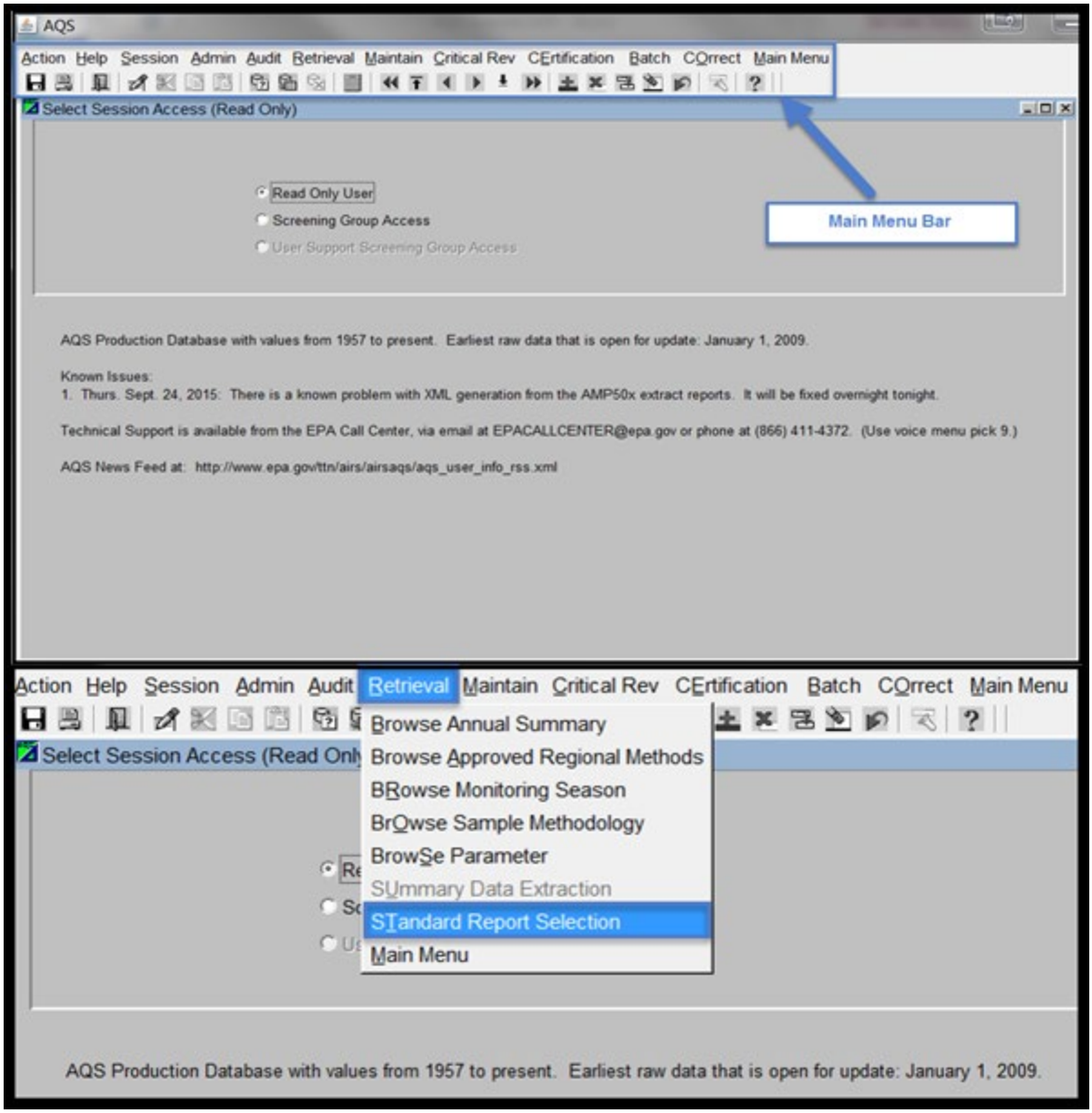


Figure 14-2. AQS Logon Screen



2. Once the user has successfully logged into AQS application, a Main Menu bar with more functions will become visible. To access the report selection utility, select the '***Retrieval***' tab on the Main Menu and then the '***Standard Report Selection***' utility from the drop-down menu.

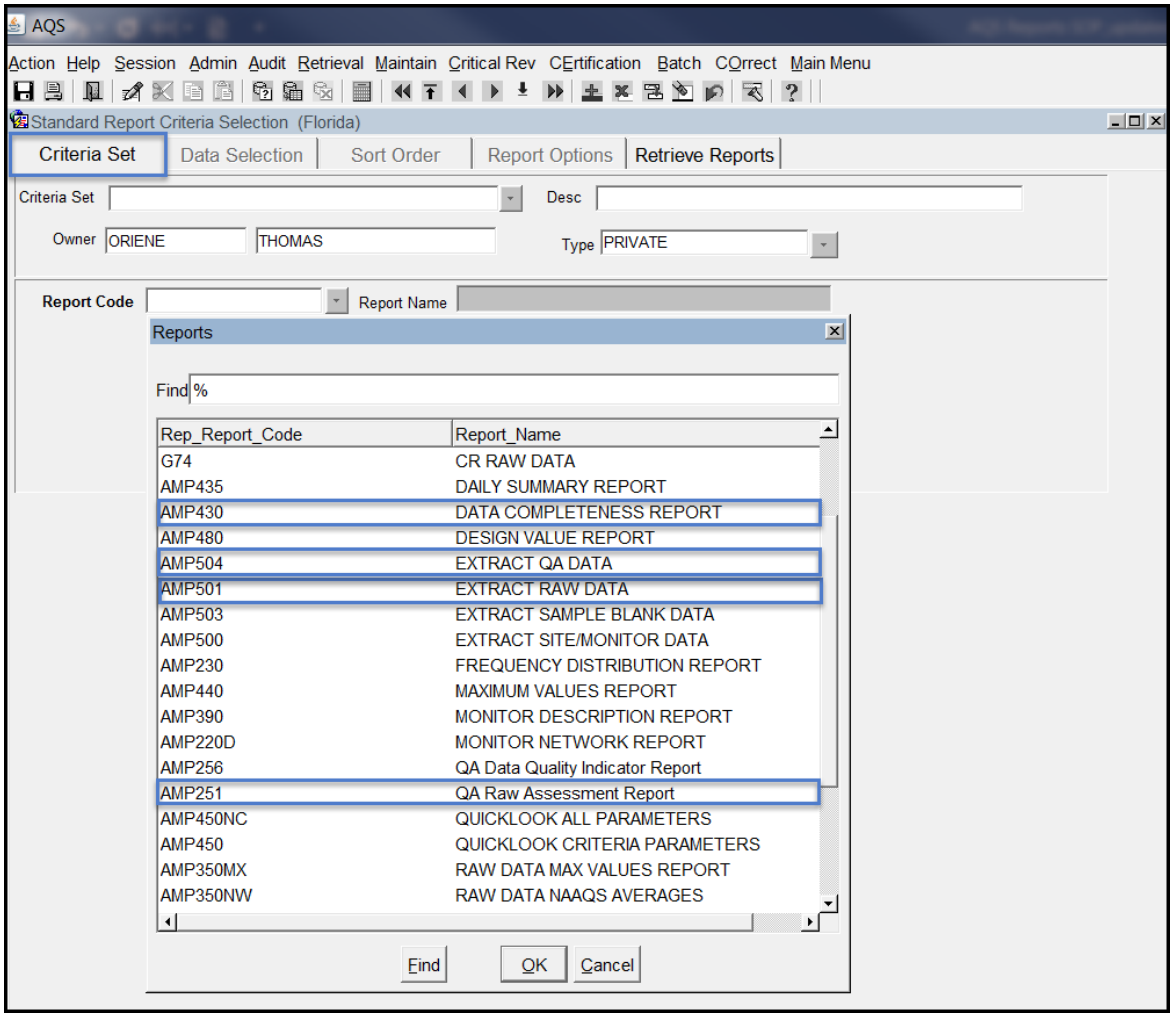
Figure 14-3. AQS Main Menu



Criteria Set:

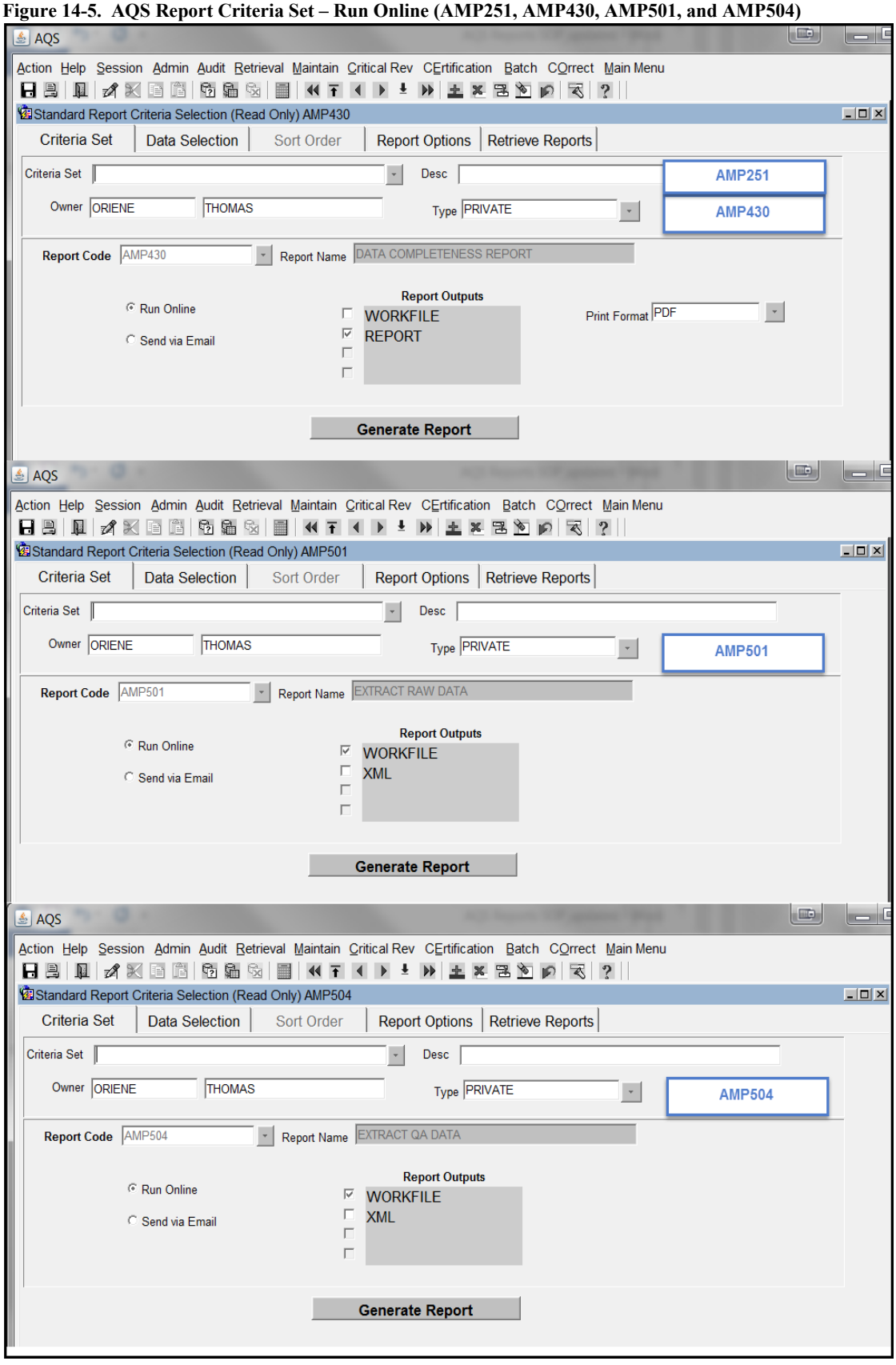
3. This utility will automatically open on the '***Criteria Set***' tab where the user will have the option to select the type of report and the delivery method. To choose the report, select the tab next to '***Report Code***' to view the drop-down menu, which lists all possible report options. The user would then choose either the AMP251, AMP430, AMP501 or AMP 504 and press '***OK***.'

Figure 14-4. AQS Criteria Set Tab



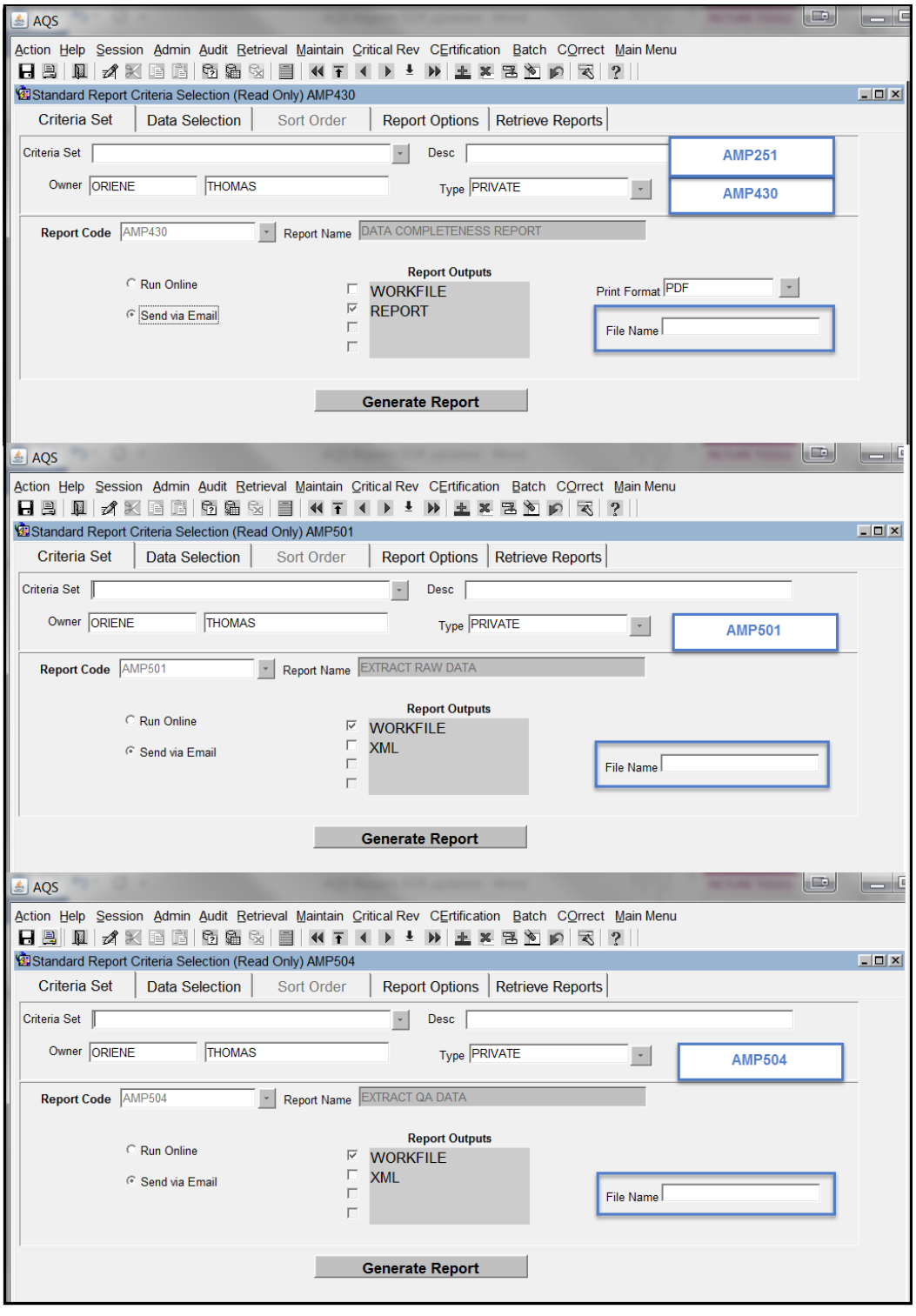
4. The AQS application will automatically populate several fields on this page. The method of receiving the reports will be set to '***Run Online***' unless the user wishes to receive the report via email and selects the '***Send via Email***' option.

Figure 14-5. AQS Report Criteria Set – Run Online (AMP251, AMP430, AMP501, and AMP504)



5. If the user would like the report sent to an email address, a file name will need to be chosen before the AQS will send the report. All other settings under this '***Criteria Set***' tab of the report should remain unchanged.

Figure 14-6. AQS Report Criteria Set – Send via Email (AMP251, AMP430, AMP501, AMP504)



Data Selection:

6. Next, the user will need to specify the data criteria for the report by selecting the '***Data Selection***' tab. Within the 'Monitor/Geographic Criteria' the user will be able to select the sites to be included in the report.
    a. The minimum requirement for this section is the state code (e.g. Florida's is 12) and the report will automatically generate **all** the data for the state. The user can as specific as desired by entering the county codes, site IDs, parameter codes and POC numbers.

Figure 14-7. AQS Report Data Selection

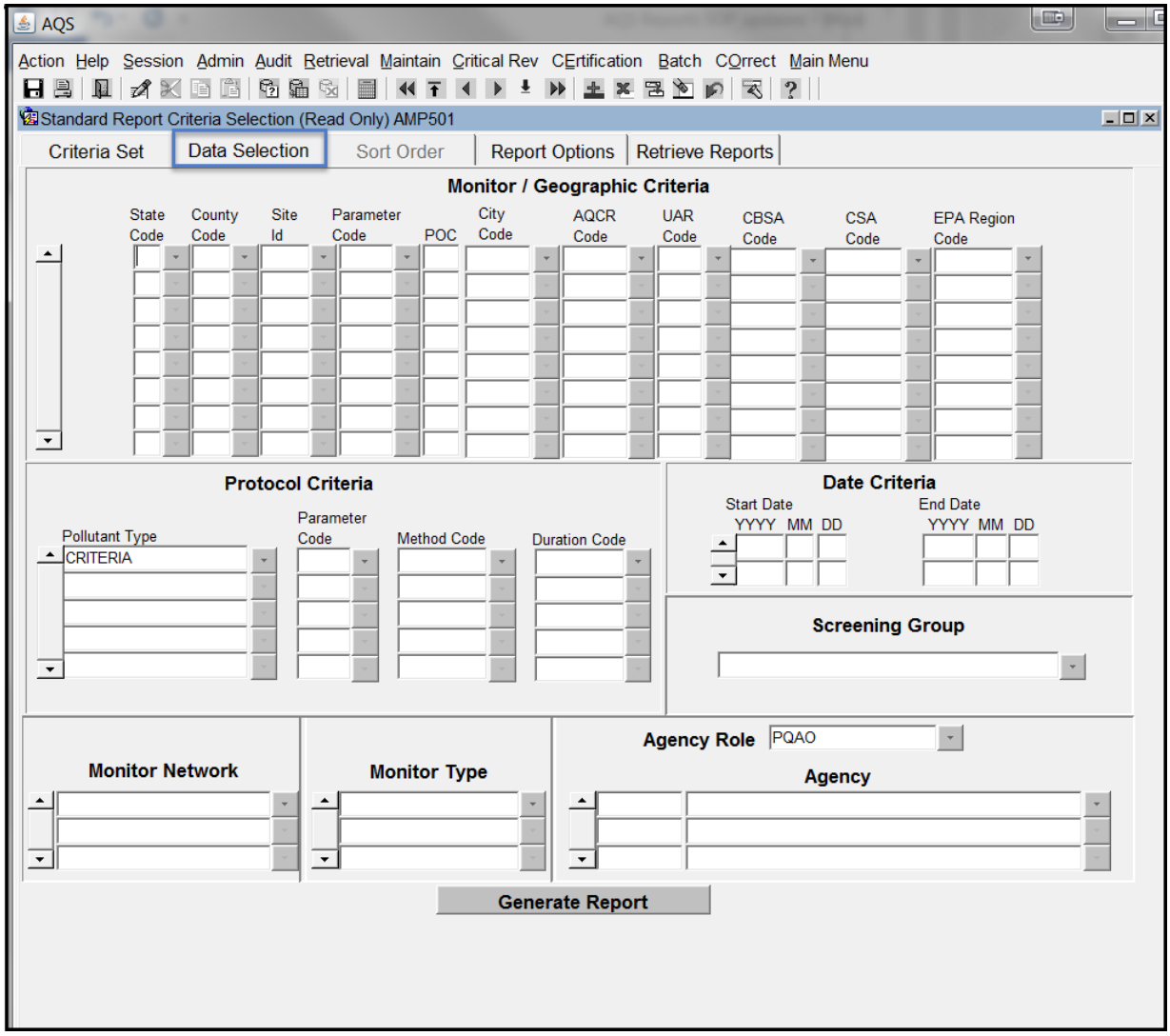
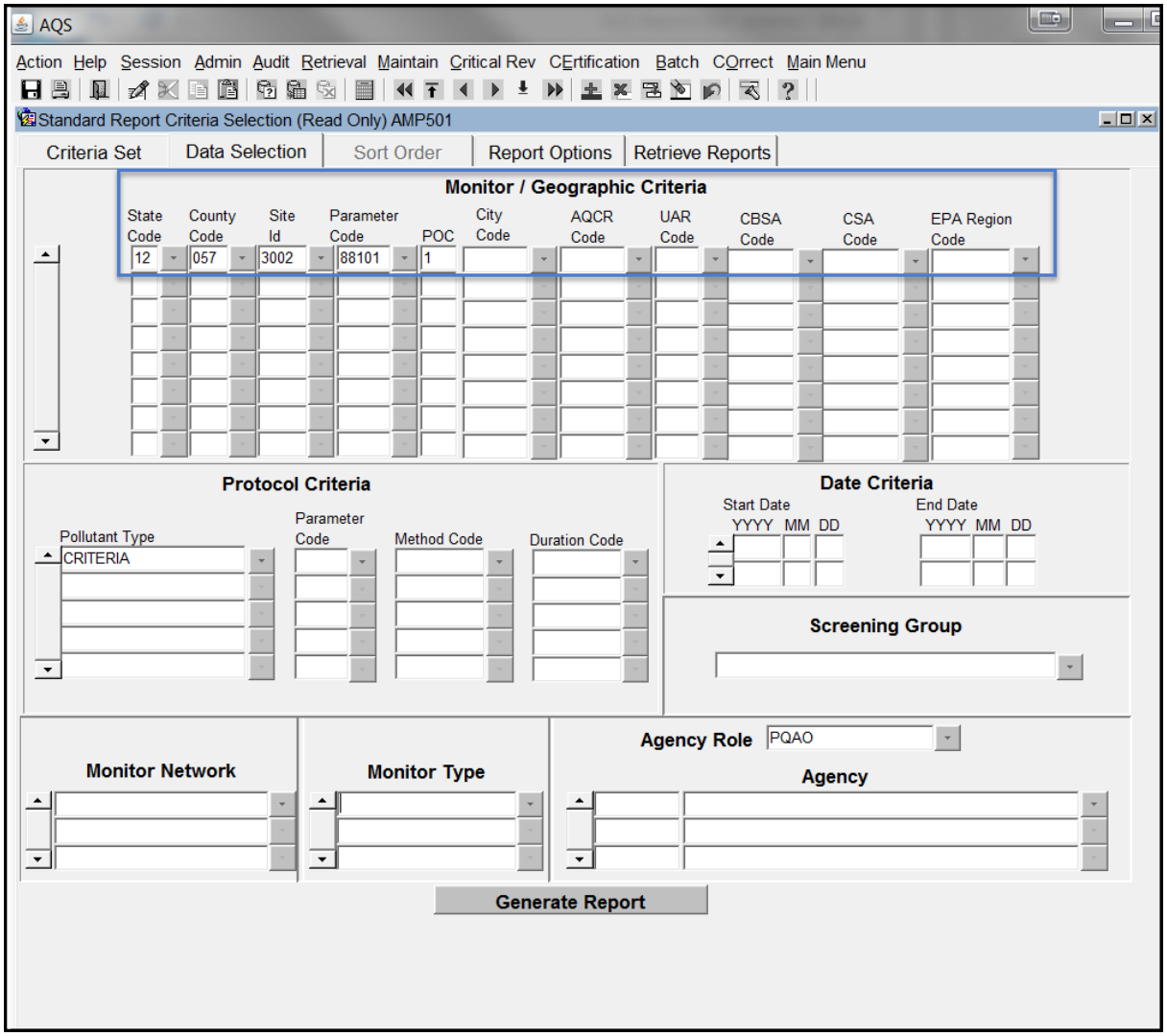
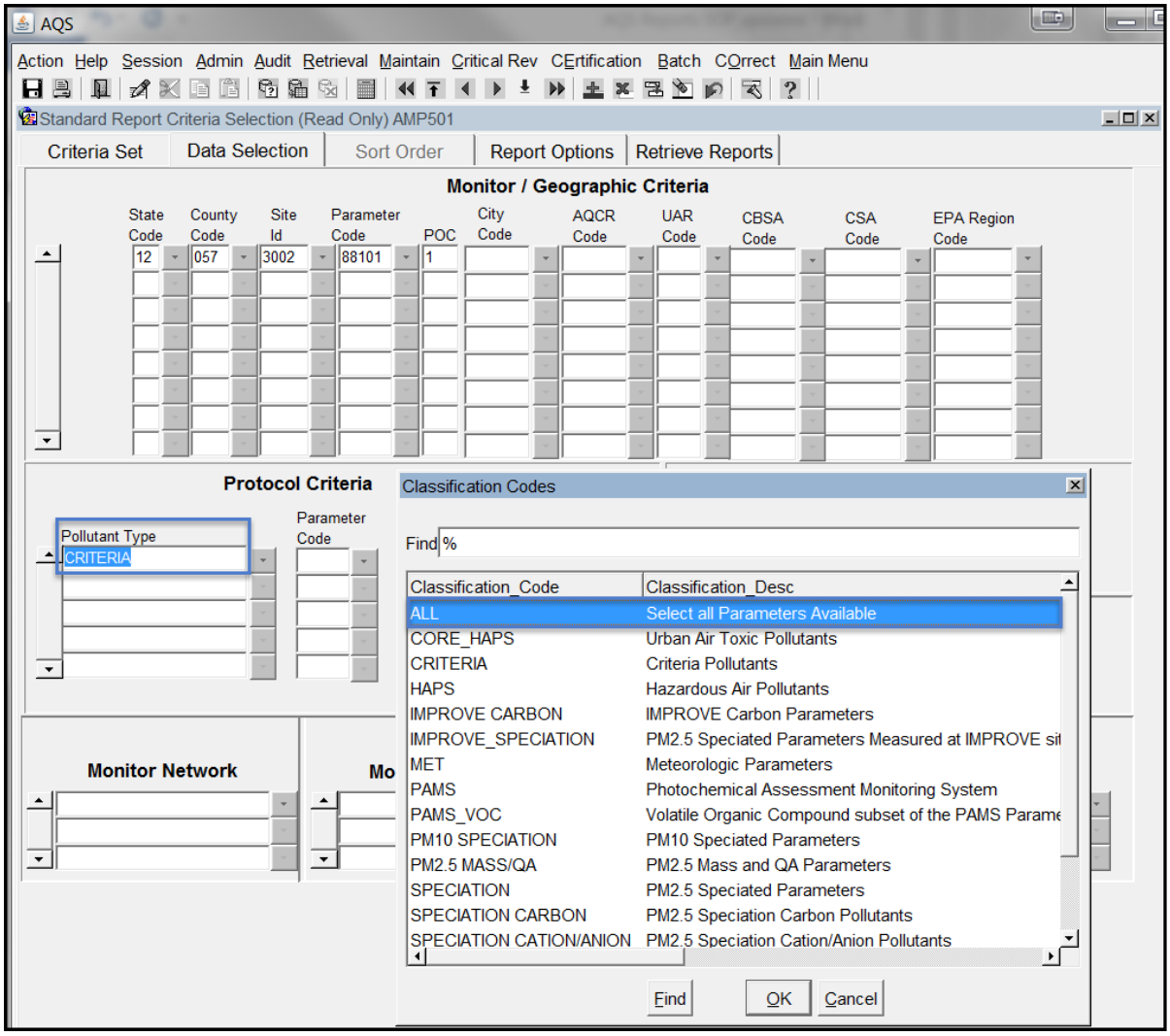


Figure 14-8. AQS Report Data Selection



7. The '***Protocol Criteria***' section allows the user to choose the pollutant(s) to be included in the report. For all the ambient air data reports the '***Pollutant Type***' should be changed to '***All***' through the drop-down menu.

Figure 14-9. AQS Report Data Selection – Protocol Criteria



8. The ***'Date Criteria'*** section allows for a specific time to be selected. The AMP251, AMP501 and AMP504 allow the user to specify a specific date while the AMP430 only specifies a monthly time.

Figure 14-10. AQS Report Data Selection – Protocol Criteria – AMP501

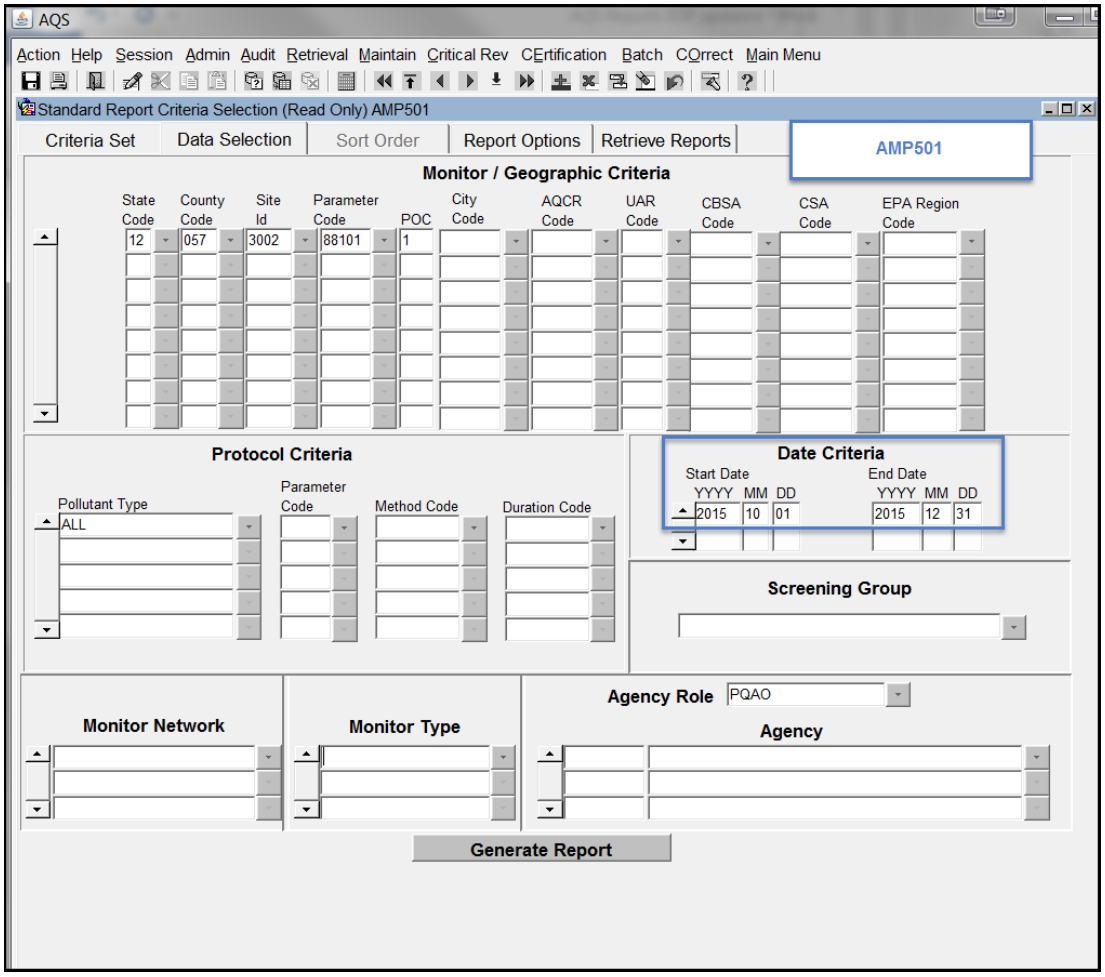
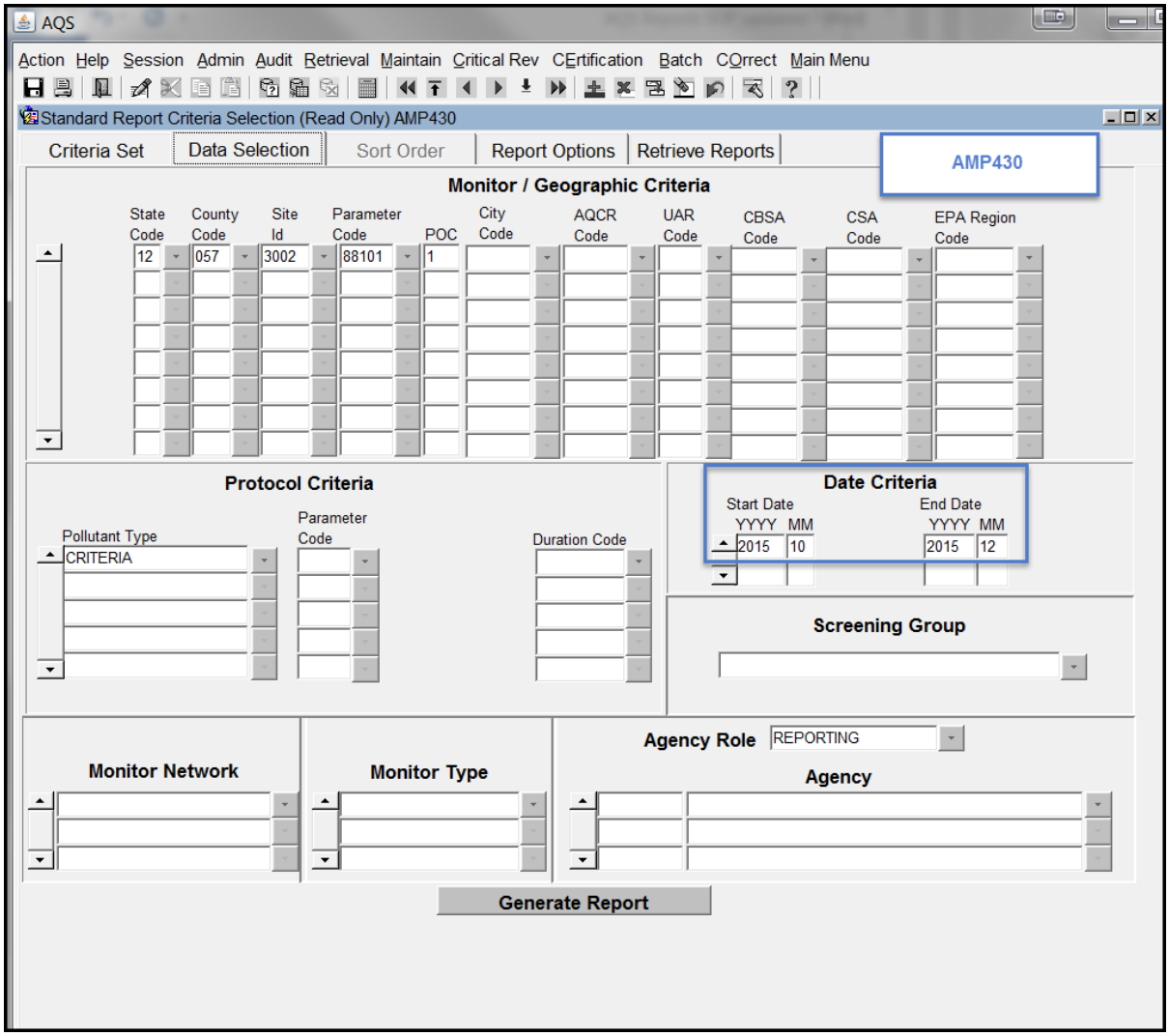


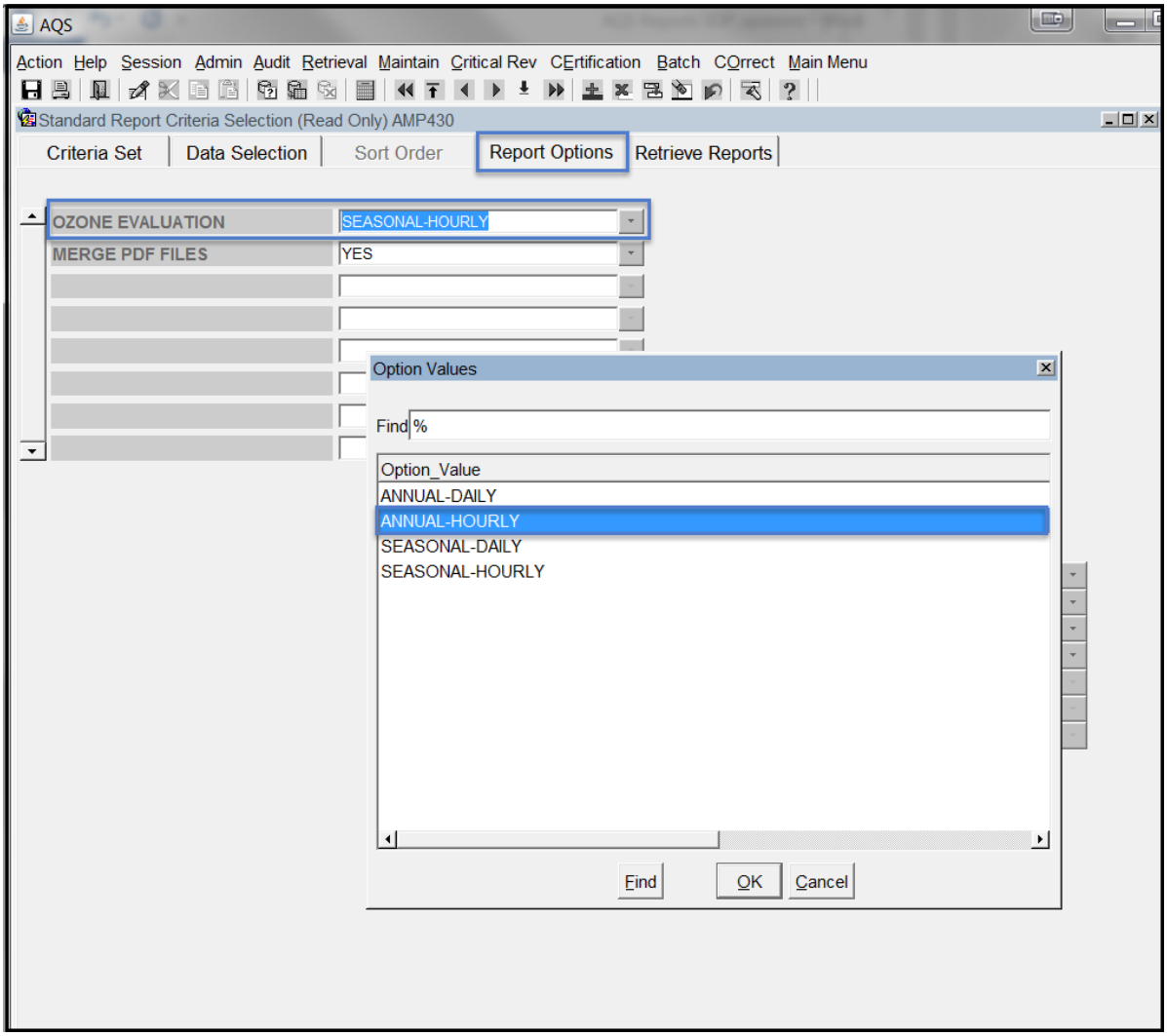
Figure 14-11. AQS Report Data Selection – Protocol Criteria – AMP430



Report Options:

9. The AMP430 is only report that may require the user to make changes under the '***Report Options***' tab. This report allows the user to choose between a "Seasonal-Hourly" and an "Annual-Hourly" completeness report for Ozone. To include the ozone data for the entire year and not just the ozone season (March-October); the user will need change the '***Ozone Evaluation***' from "Seasonal-Hourly" to "Annual-Hourly" before generating this report.

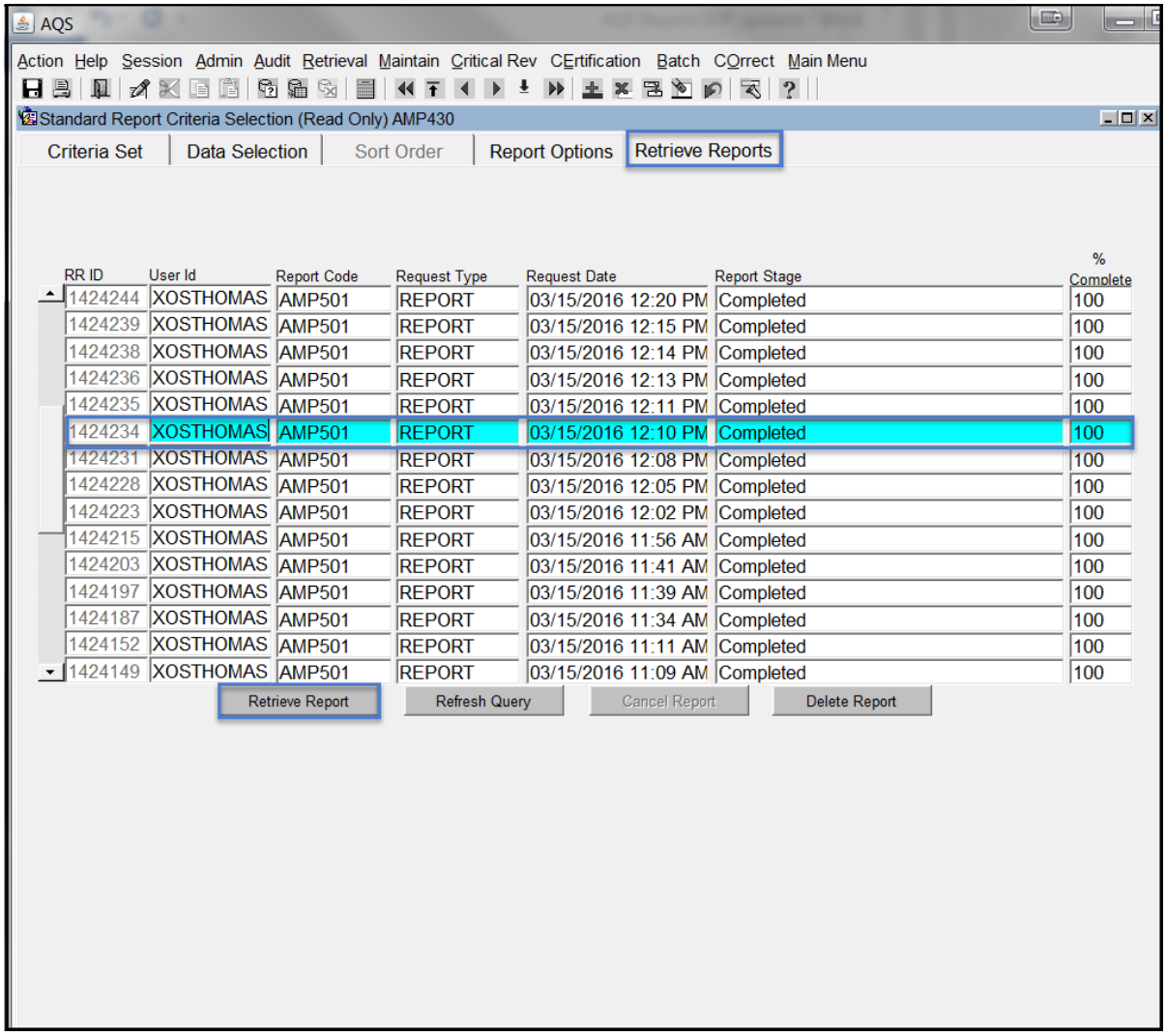
Figure 14-12. AQS Report Options



Retrieve Reports:

10. The '***Retrieve Reports***' tab allows the user to view all reports that were executed and recover or re-open these reports without running the report again. The user would select the report and then choose the '***Retrieve Report***' button.

Figure 14-13. AQS Retrieve Reports



Delivery of Reports:

The AMP251, AMP430, AMP501 and AMP504 can be delivered to the user either online, through the web browser, or via email.

Online:

1. The AMP251 and AMP430 report will open as a PDF in a separate tab within the web browser, but it can be saved as a physical PDF file on the user's device.

Figure 14-14. AQS Reports – AMP430

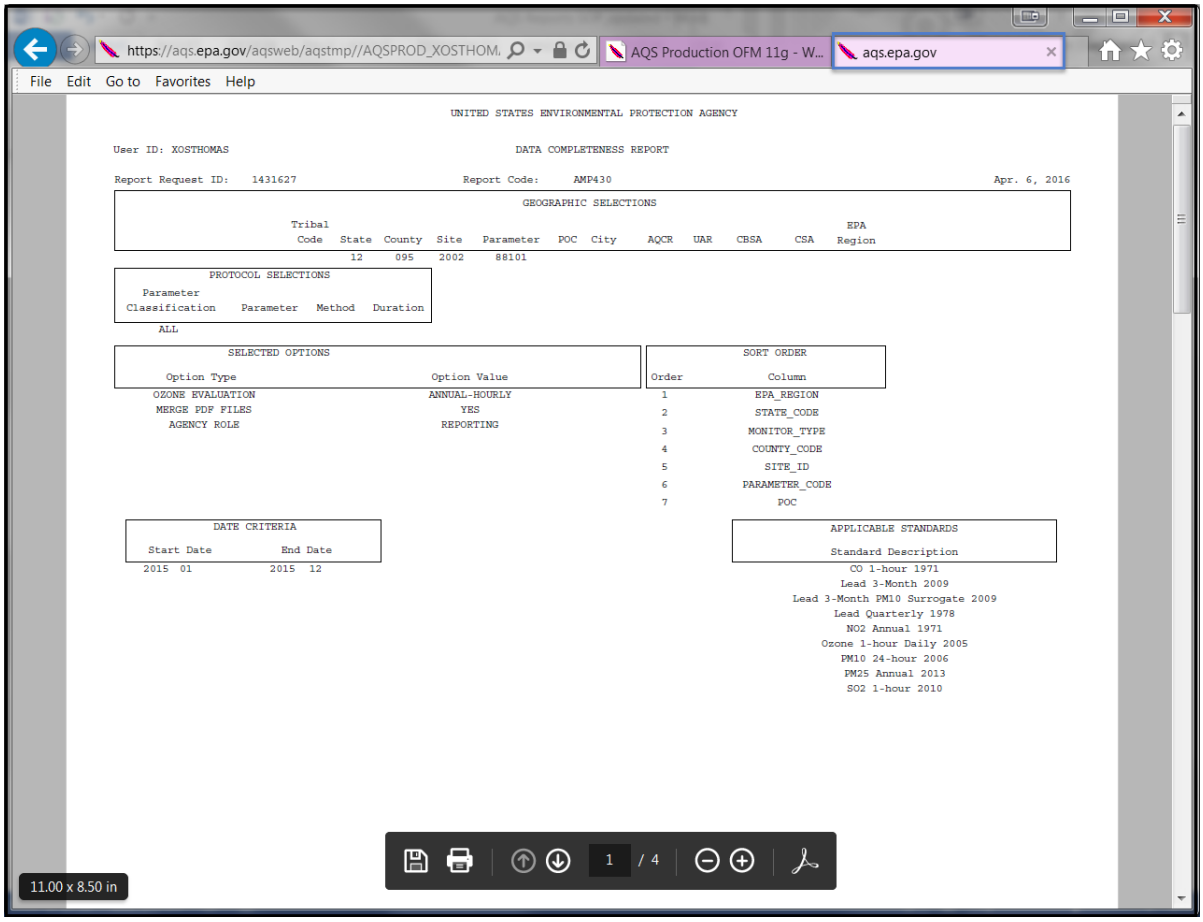
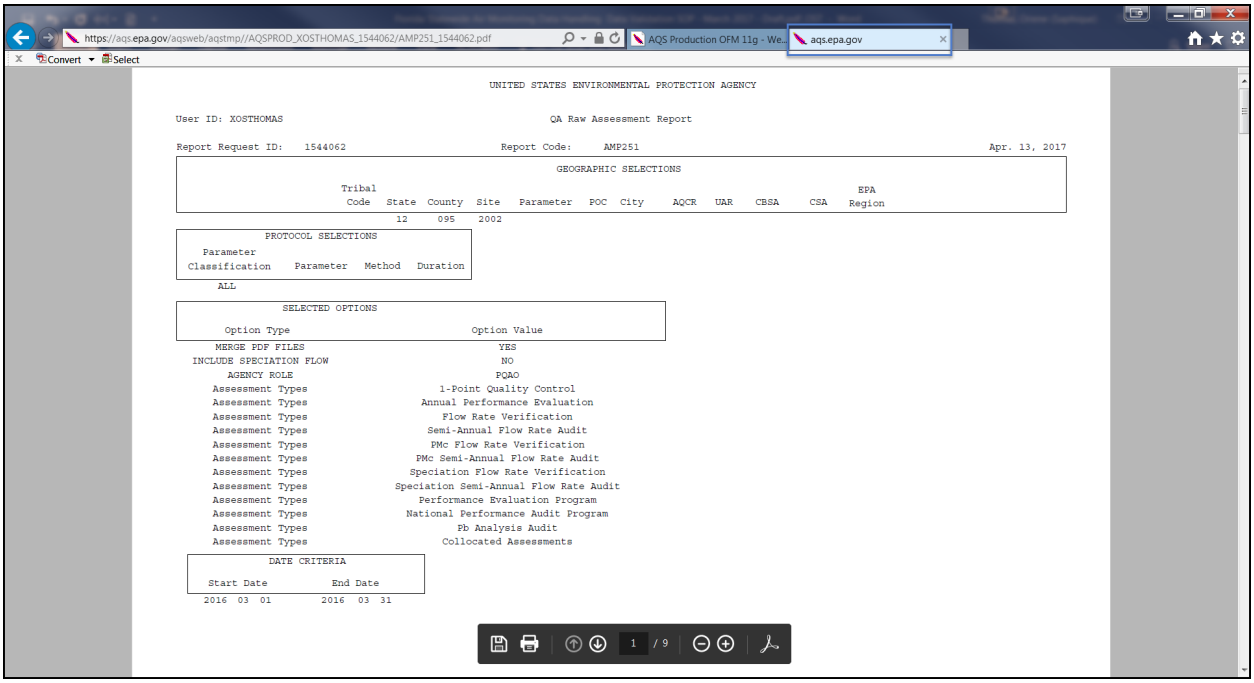


Figure 14-15. AQS Reports – AMP251



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: XOSTHOMAS — QA Raw Assessment Report

Report Request ID: 1544062 — Report Code: AMP251 — Apr. 13, 2017

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
	12	095	2002								

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
ALL			

SELECTED OPTIONS

Option Type	Option Value
MERGE PDF FILES	YES
INCLUDE SPECIATION FLOW	NO
AGENCY ROLE	PQAO
Assessment Types	1-Point Quality Control
Assessment Types	Annual Performance Evaluation
Assessment Types	Flow Rate Verification
Assessment Types	Semi-Annual Flow Rate Audit
Assessment Types	PMc Flow Rate Verification
Assessment Types	PMc Semi-Annual Flow Rate Audit
Assessment Types	Speciation Flow Rate Verification
Assessment Types	Speciation Semi-Annual Flow Rate Audit
Assessment Types	Performance Evaluation Program
Assessment Types	National Performance Audit Program
Assessment Types	Pb Analysis Audit
Assessment Types	Collocated Assessments

DATE CRITERIA

Start Date	End Date
2016 03 01	2016 03 31

2. The AMP501 and AMP504 reports present the user with the option of saving or opening the report/file. It is recommended that the user select the 'Open' option at each prompt until a Windows Explorer window appears and displays both a PDF and a Text file. The user then has the option of saving these files under a name of their choosing on their device.

Figure 14-16. AQS Reports – AMP501

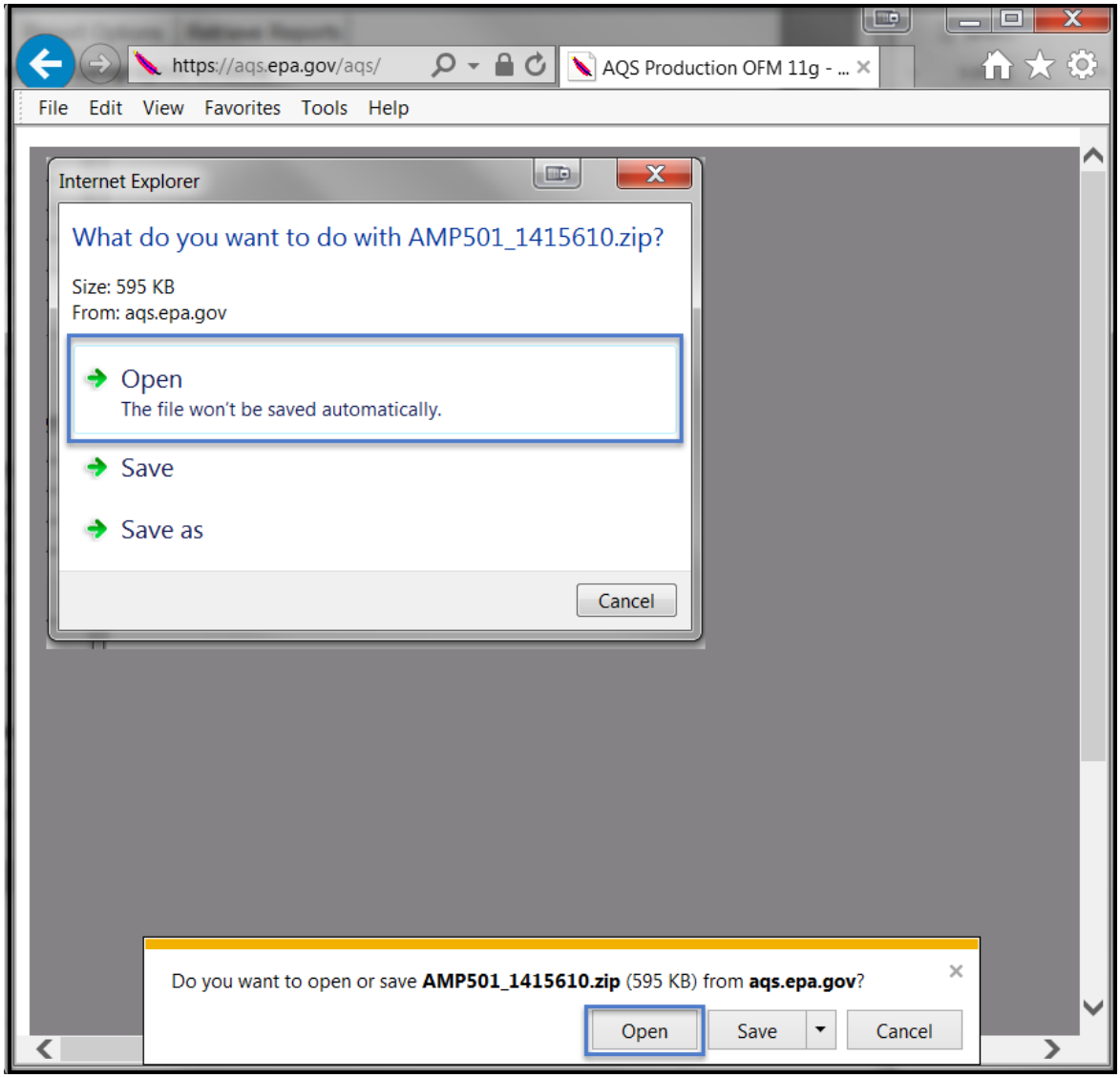
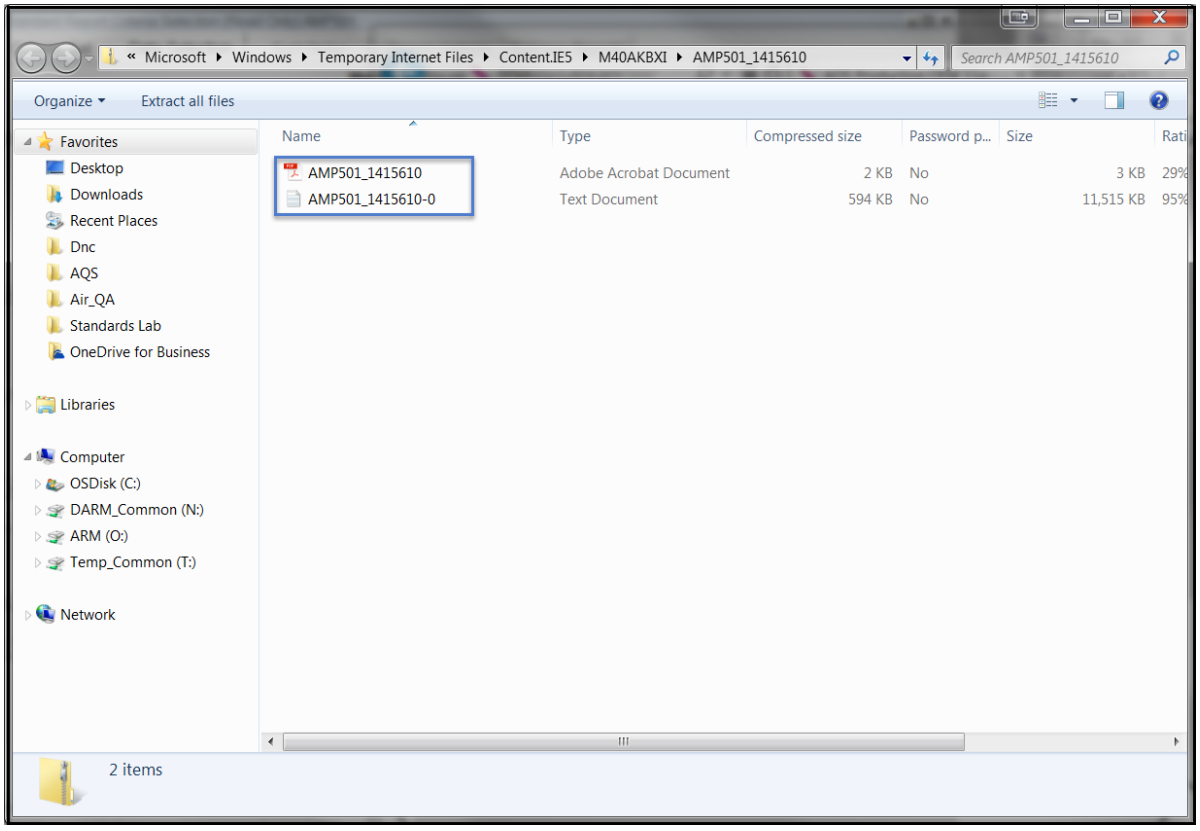


Figure 14-17. AQS Reports – AMP501 Output



Email:

For the email delivery option, a link to a zip/compressed folder will be sent to the user's email which contains the requested reports. The AMP251 and AMP430 will only contain a PDF while the AMP501 and AMP504 folder will include a PDF and a text file.

1. Select the hyperlink in the email and it will open a new tab in the user's web browser, prompting the user to '***Open***' or '***Save***' the compressed file(s).
2. If the user chooses to open the files, a Windows Explorer window will appear containing the requested reports.

Figure 14-18. AQS Reports Email Delivery

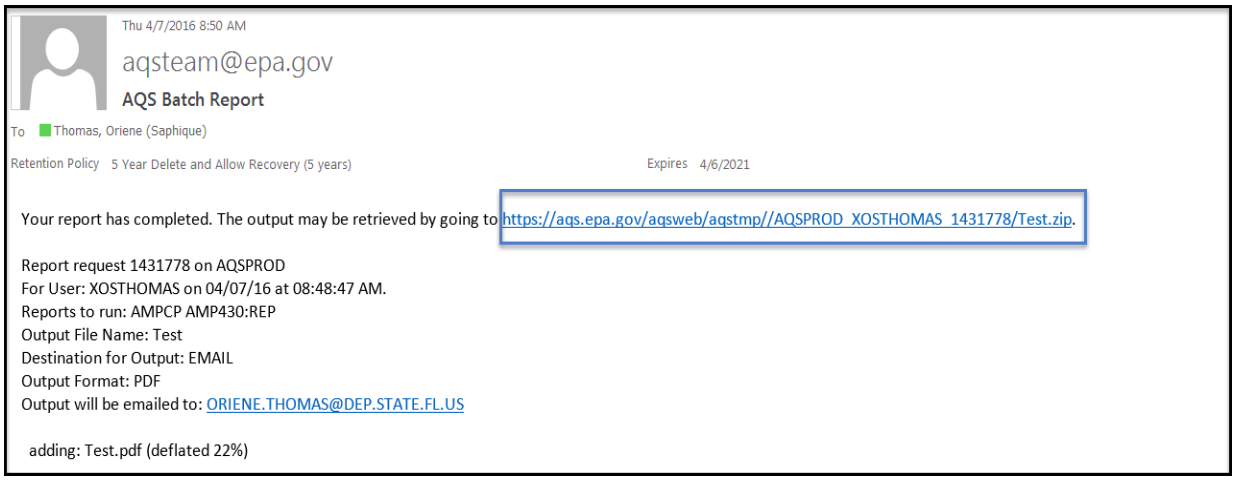
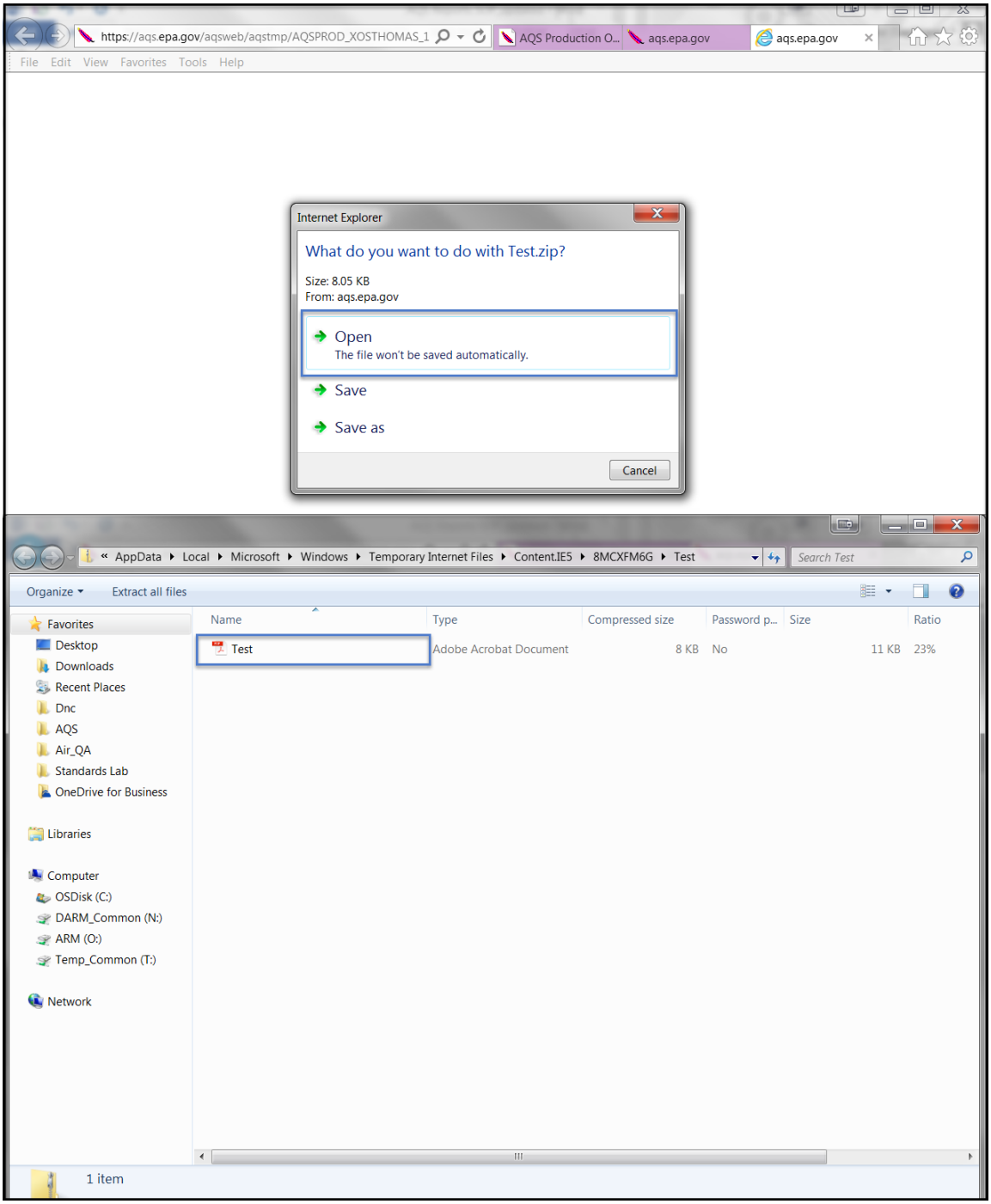


Figure 14-19. AQS Reports



3. If the user chooses to save the files, a Windows Explorer window will appear after selecting '***Save As***,' allowing the user to choose the location where the file should be stored.

Figure 14-20. AQS Reports – Saving the File

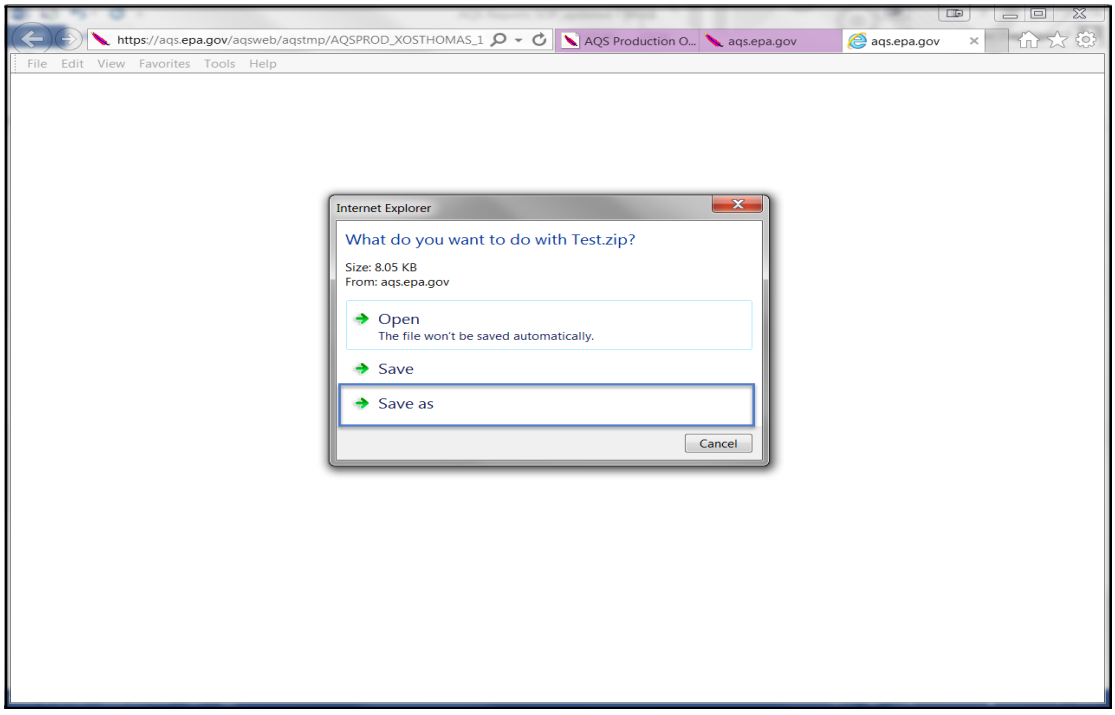
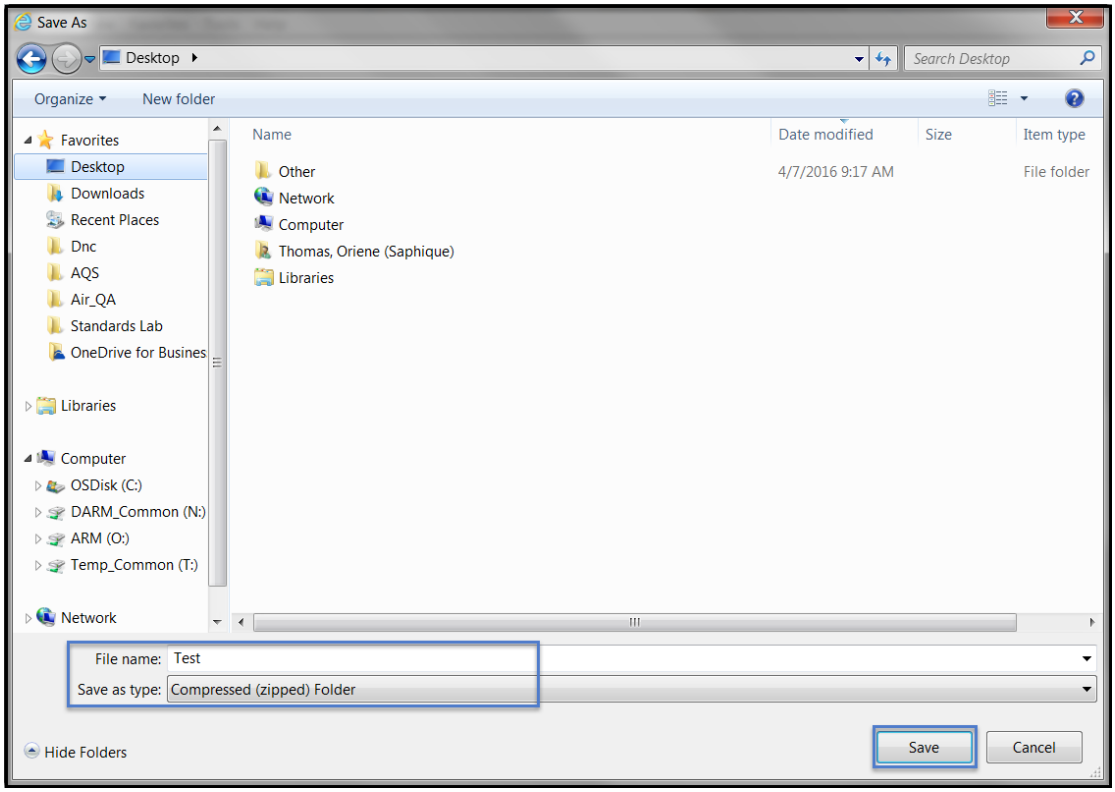


Figure 14-21. AQS Reports – Saving the File



14.2.2 Quality Assurance Comparisons

AMP251- QA Raw Assessment Report:

The percentage difference for quality control check in the AMP251 should be visually compared to the control limit for each pollutant.

5. Ensure that all QC checks in AQS are passing checks, i.e. within the specified control limit for each pollutant, respectively.
    - If there are failing QC checks in AQS, check the Exclude from Export/Reports box in AirMVP, under the QA/QC Checks Tab, for each of these checks.
    - Contact the AQS Coordinator with the site, pollutant and date of the failed QC checks so it can be removed.
    - Re-run the AMP251 to verify the removal of all failing checks.

Figure 14-22. AQS QA Raw Assessment Report (AMP251)

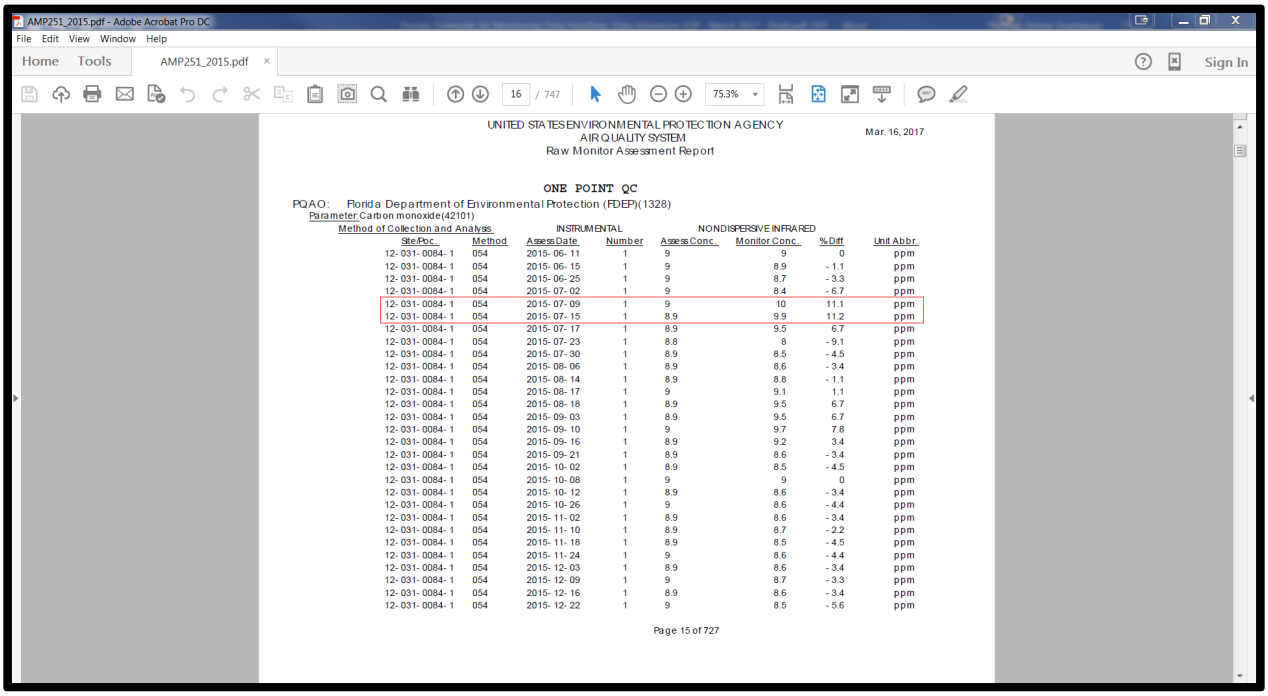
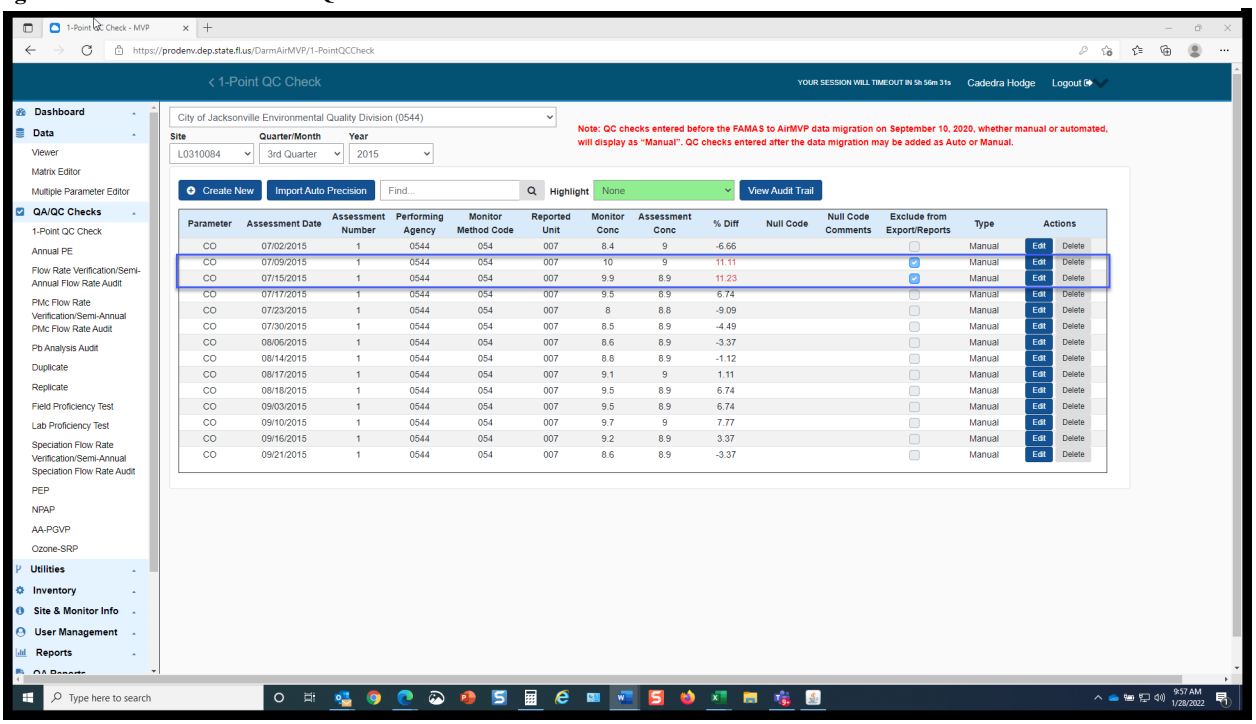


Figure 14-23. AirMVP 1-Point QC Screen



AMP430- Data Completeness Report:

The percentages for each month as well the quarter in the AMP430 should be visually compared to the percentages noted in '***Completeness***' report in AirMVP.

1. Select the 'Completeness' tab under the Reports sub menu and choose all necessary sites and parameters as well as the date range for the report.
2. Visually compare the percentages for each report to ensure that they match.

Figure 14-24. AirMVP Data Completeness Report – Criteria Selection

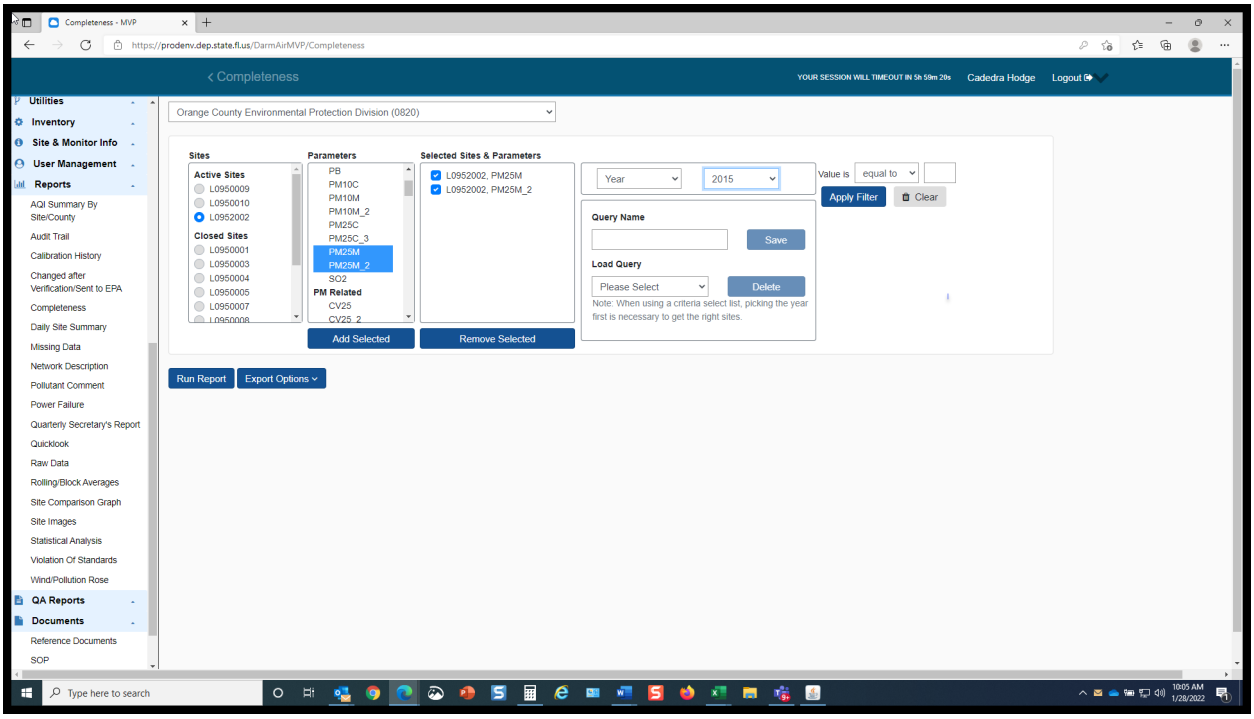
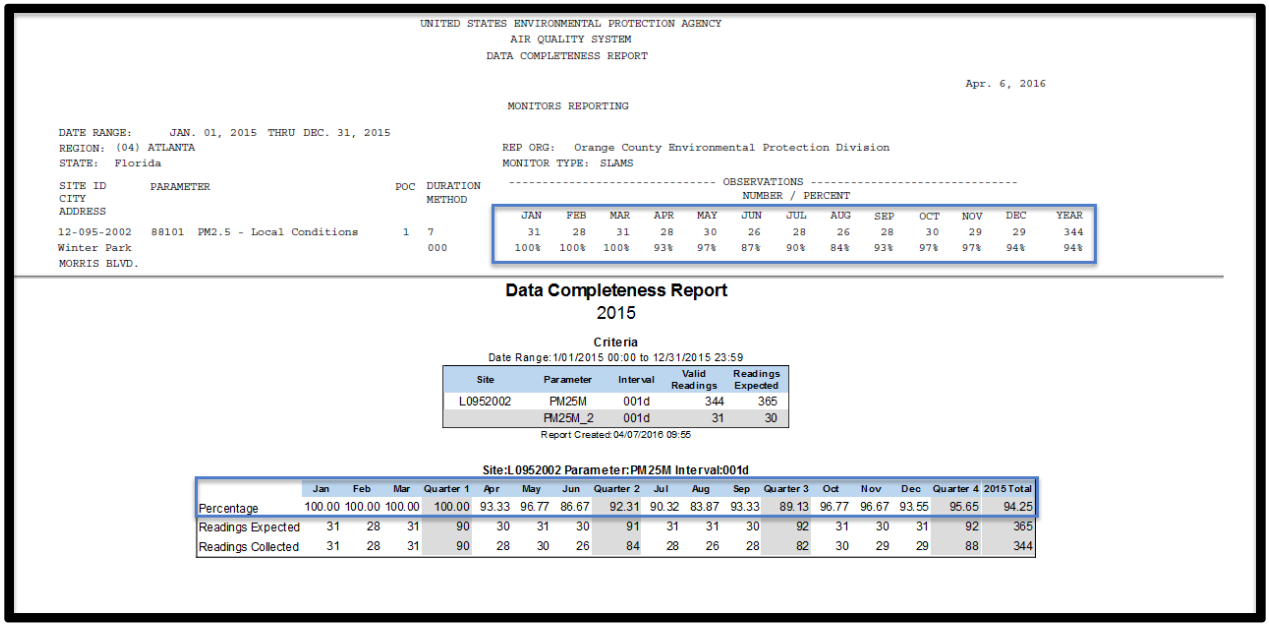


Figure 14-25. AQS Data Completeness Report (AMP430) – Top; AirMVP Data Completeness Report - Bottom



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Apr. 6, 2016

MONITORS REPORTING

DATE RANGE: JAN. 01, 2015 THRU DEC. 31, 2015
REGION: (04) ATLANTA
STATE: Florida

REP ORG: Orange County Environmental Protection Division
MONITOR TYPE: SLAMS

SITE ID / CITY / ADDRESS	PARAMETER	POC	DURATION / METHOD	OBSERVATIONS NUMBER / PERCENT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
12-095-2002	88101 PM2.5 - Local Conditions	1	7		31	28	31	28	30	26	28	26	28	30	29	29	344
Winter Park			000		100%	100%	100%	93%	97%	87%	90%	84%	93%	97%	97%	94%	94%
MORRIS BLVD.																	

Data Completeness Report
2015

Criteria
Date Range:1/1/2015 00:00 to 12/31/2015 23:59

Site	Parameter	Interval	Valid Readings	Readings Expected
L0952002	PM25M	001d	344	365
	PM25M_2	001d	31	30

Report Created:04/07/2016 09:55

Site:L0952002 Parameter:PM25M Interval:001d

	Jan	Feb	Mar	Quarter 1	Apr	May	Jun	Quarter 2	Jul	Aug	Sep	Quarter 3	Oct	Nov	Dec	Quarter 4	2015 Total
Percentage	100.00	100.00	100.00	100.00	93.33	96.77	86.67	92.31	90.32	83.87	93.33	89.13	96.77	96.67	93.55	95.65	94.25
Readings Expected	31	28	31	90	30	31	30	91	31	31	30	92	31	30	31	92	365
Readings Collected	31	28	31	90	28	30	26	84	28	26	28	82	30	29	29	88	344

AMP501-Raw Data Report:

The AMP501 is the only report that can be compared to AirMVP using the '***File Comparison***' utility in AirMVP. To compare the AMP501 report in AIRMVP the user must save the Text file of the AMP501 report on the device and then upload this file into AirMVP.

1. Select '***File Comparison***' under the Utilities submenu in AirMVP
2. Choose the '***Browse***' button to locate and choose the AMP501 text file.
3. Select the '***Compare***' tab to upload the file into the AirMVP database.
4. The results from this comparison will be automatically sent to the user's email address and will provide details of any discrepancies between AirMVP and AQS.

Figure 14-26. AQS File Comparison

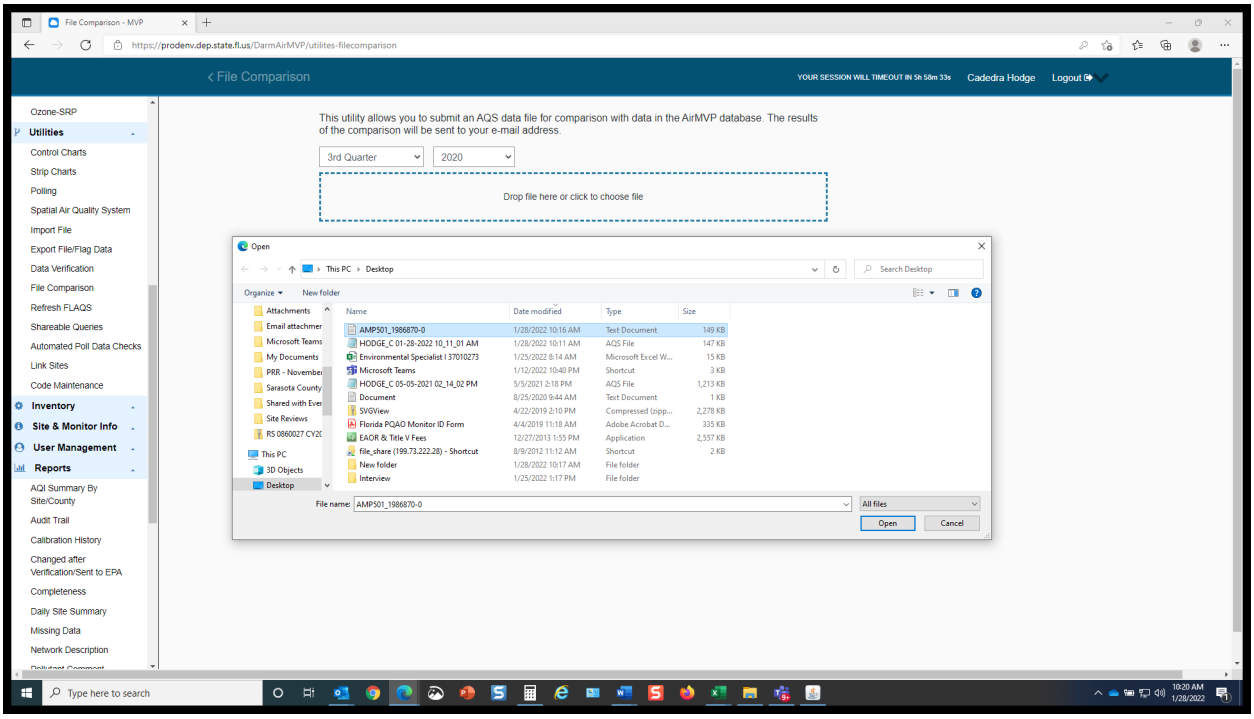


Figure 14-27. AirMVP. AQS File Comparison - AirMVP

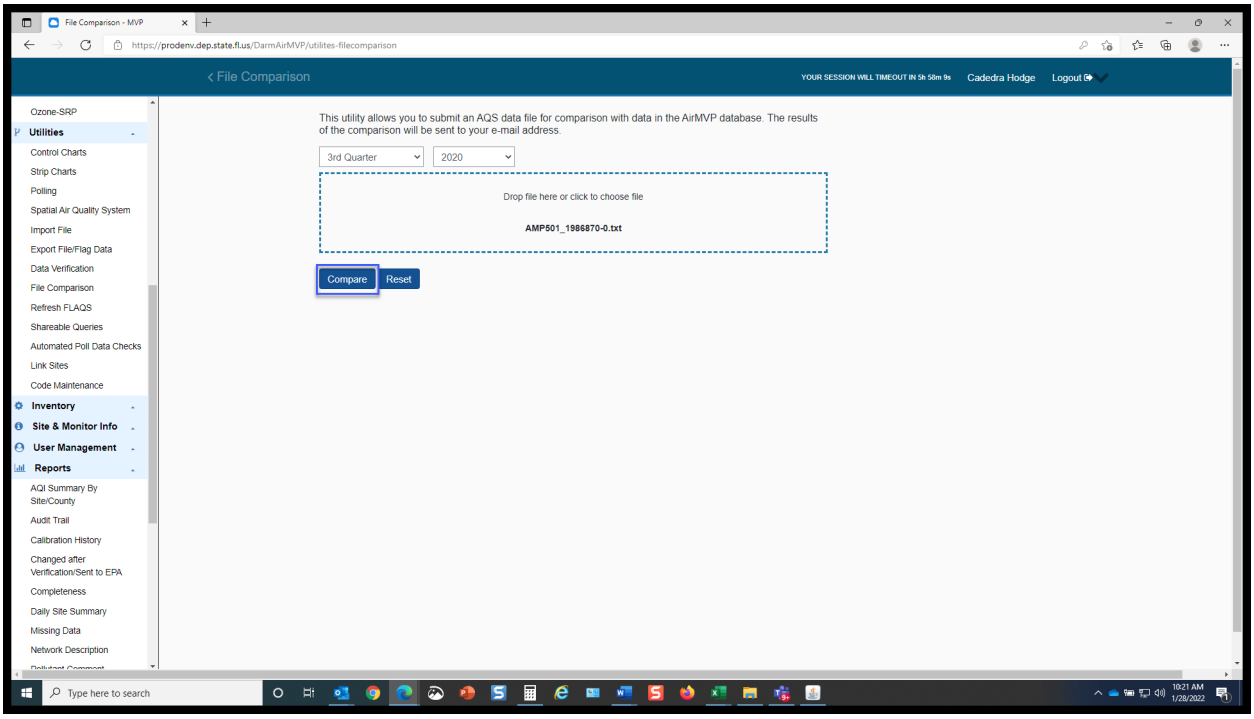
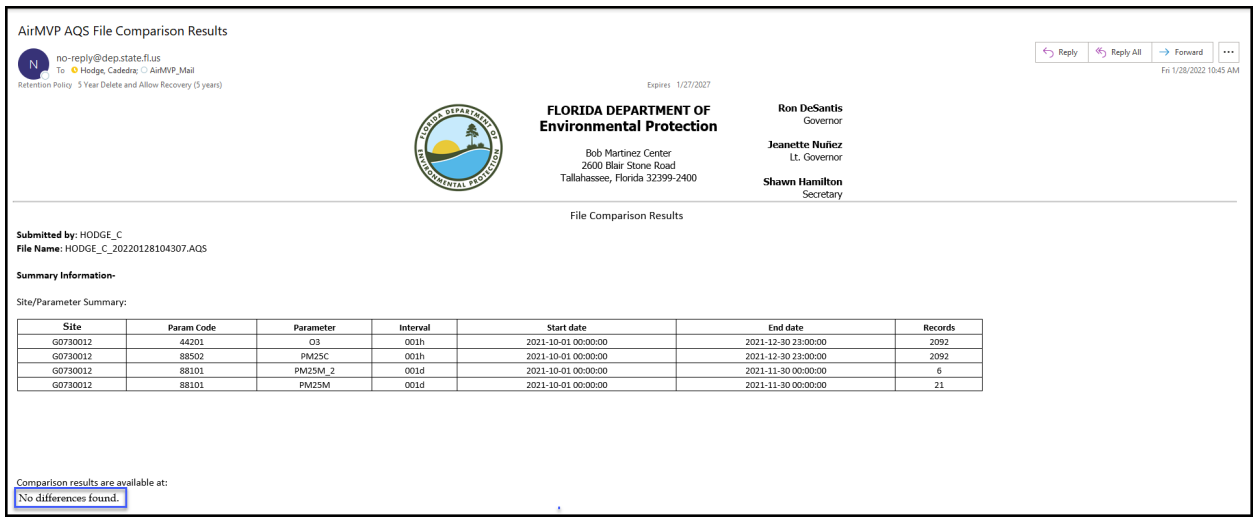
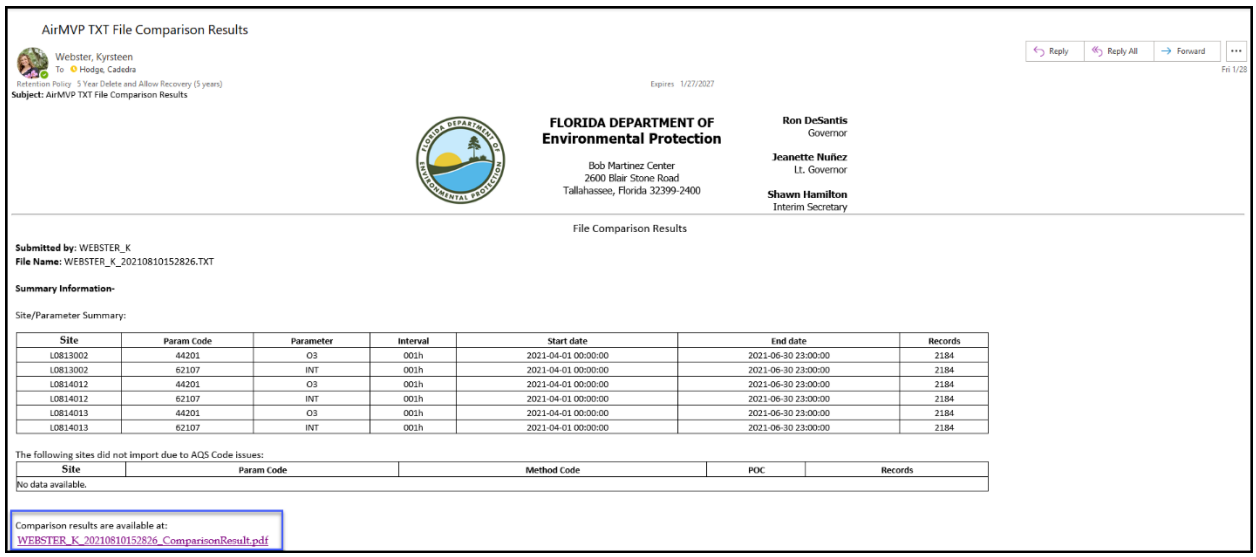


Figure 14-28. AQS File Comparison – No Differences Found



5. If there are differences, a link to a report listing the differences will be provided in the email.

Figure 14-29. AQS File Comparison – Differences Found



AirMVP TXT File Comparison Results

Webster, Kyrsteen
To Hodge, Cadedra

Retention Policy 5 Year Delete and Allow Recovery (5 years) Expires 1/27/2027

Subject: AirMVP TXT File Comparison Results

Reply | Reply All | Forward

Fri 1/28

FLORIDA DEPARTMENT OF Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Shawn Hamilton
Interim Secretary

File Comparison Results

Submitted by: WEBSTER_K
File Name: WEBSTER_K_20210810152826.TXT

Summary Information-

Site/Parameter Summary:

Site	Param Code	Parameter	Interval	Start date	End date	Records
L0813002	44201	O3	001h	2021-04-01 00:00:00	2021-06-30 23:00:00	2184
L0813002	62107	INT	001h	2021-04-01 00:00:00	2021-06-30 23:00:00	2184
L0814012	44201	O3	001h	2021-04-01 00:00:00	2021-06-30 23:00:00	2184
L0814012	62107	INT	001h	2021-04-01 00:00:00	2021-06-30 23:00:00	2184
L0814013	44201	O3	001h	2021-04-01 00:00:00	2021-06-30 23:00:00	2184
L0814013	62107	INT	001h	2021-04-01 00:00:00	2021-06-30 23:00:00	2184

The following sites did not import due to AQS Code issues:

Site	Param Code	Method Code	POC	Records
No data available.				

Comparison results are available at:
WEBSTER_K_20210810152826_ComparisonResult.pdf

Figure 14-30. AQS File Comparison – Differences Found – Report

File Comparison Diff Report

Raw Data

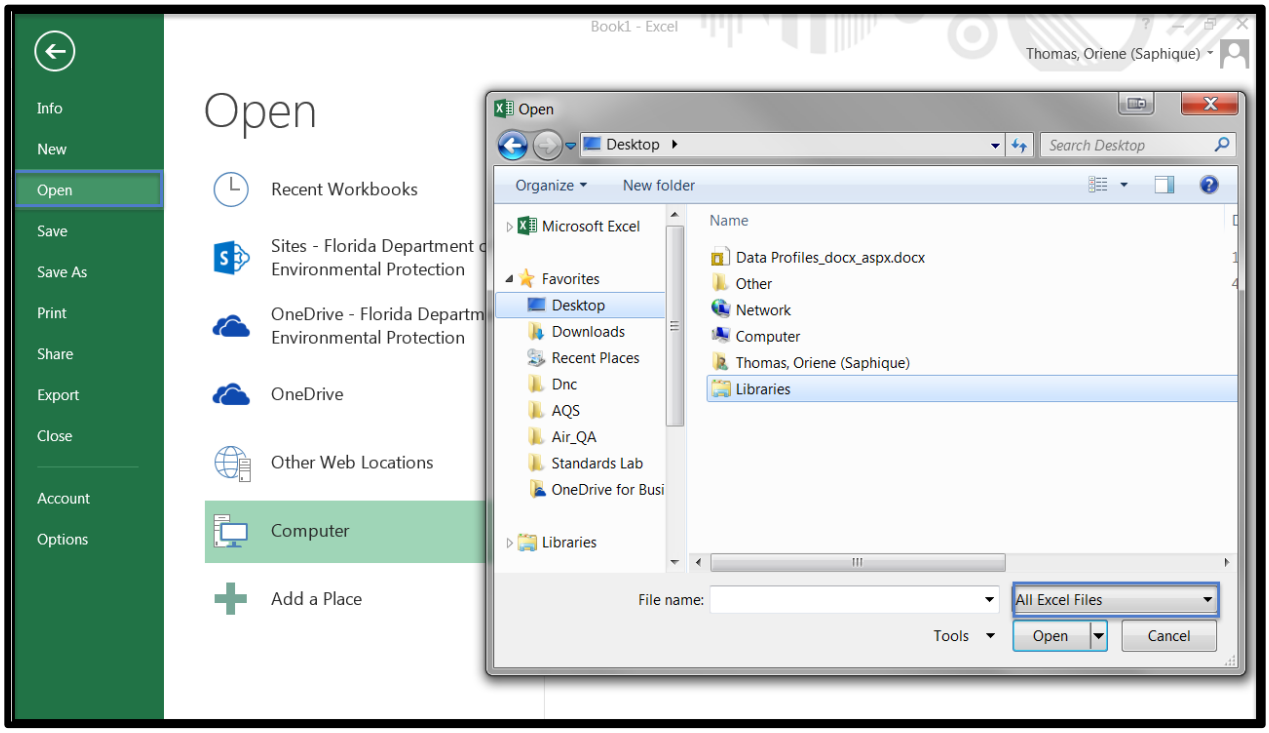
Site Name	Parameter Name	Interval	Sample Date	Sample Begin Time		Sample Value	Null Code	Method Code	Qualifier Code 1	Qualifier Code 2	Qualifier Code 3	Qualifier Code 4	Qualifier Code 5
L0814012	O3	001h	20210428	11:00	AirMVP		AM	215					
L0814012	O3	001h	20210428	11:00	Line #5028		AQ	215					
L0814012	O3	001h	20210505	09:00	AirMVP		AM	215					
L0814012	O3	001h	20210505	09:00	Line #5194		BF	215					
L0814012	O3	001h	20210505	10:00	AirMVP		AM	215					
L0814012	O3	001h	20210505	10:00	Line #5195		BA	215					
L0814012	O3	001h	20210505	11:00	AirMVP		AM	215					
L0814012	O3	001h	20210505	11:00	Line #5196		BA	215					
L0814012	O3	001h	20210505	12:00	AirMVP		AM	215					
L0814012	O3	001h	20210505	12:00	Line #5197		BA	215					
L0814012	O3	001h	20210505	13:00	AirMVP		AM	215					
L0814012	O3	001h	20210505	13:00	Line #5198		BA	215					
L0814012	O3	001h	20210505	14:00	AirMVP		AM	215					
L0814012	O3	001h	20210505	14:00	Line #5199		BA	215					
L0814012	O3	001h	20210505	15:00	AirMVP		AM	215					
L0814012	O3	001h	20210505	15:00	Line #5200		BF	215					
L0814012	O3	001h	20210608	08:00	AirMVP		AM	215					
L0814012	O3	001h	20210608	08:00	Line #6009		BK	215					
L0814012	O3	001h	20210608	09:00	AirMVP		AM	215					
L0814012	O3	001h	20210608	09:00	Line #6010		BK	215					
L0814012	O3	001h	20210608	10:00	AirMVP		AM	215					
L0814012	O3	001h	20210608	10:00	Line #6011		BK	215					
L0814012	O3	001h	20210608	11:00	AirMVP		AM	215					
L0814012	O3	001h	20210608	11:00	Line #6012		BK	215					
L0814012	O3	001h	20210608	12:00	AirMVP		AM	215					
L0814012	O3	001h	20210608	12:00	Line #6013		BK	215					
L0814012	O3	001h	20210615	09:00	AirMVP		AM	215					
L0814012	O3	001h	20210615	09:00	Line #6178		BF	215					
L0814012	O3	001h	20210615	10:00	AirMVP		AM	215					
L0814012	O3	001h	20210615	10:00	Line #6179		BA	215					
L0814012	O3	001h	20210615	11:00	AirMVP		AM	215					
L0814012	O3	001h	20210615	11:00	Line #6180		BA	215					
L0814012	O3	001h	20210615	12:00	AirMVP		AM	215					
L0814012	O3	001h	20210615	12:00	Line #6181		BA	215					
L0814012	O3	001h	20210615	13:00	AirMVP		AM	215					
L0814012	O3	001h	20210615	13:00	Line #6182		BF	215					
L0814012	O3	001h	20210616	21:00	AirMVP		AM	215					
L0814012	O3	001h	20210616	21:00	Line #6214		AV	215					
L0814012	O3	001h	20210616	23:00	AirMVP	16		215					
L0814012	O3	001h	20210616	23:00	Line #6216		AV	215					
L0813002	O3	001h	20210413	08:00	AirMVP		AM	190					
L0813002	O3	001h	20210413	08:00	Line #9033		BF	190					
L0813002	O3	001h	20210413	09:00	AirMVP		AM	190					
L0813002	O3	001h	20210413	09:00	Line #9034		BF	190					
L0813002	O3	001h	20210416	09:00	AirMVP		AM	190					
L0813002	O3	001h	20210416	09:00	Line #9106		BF	190					

AMP504-QA Data Report:

The AMP504 report must be compared manually by the user to ensure that the QA data in AirMVP matches the QA data in AQS. The user can convert the AMP504 text file to an excel file for easier viewing.

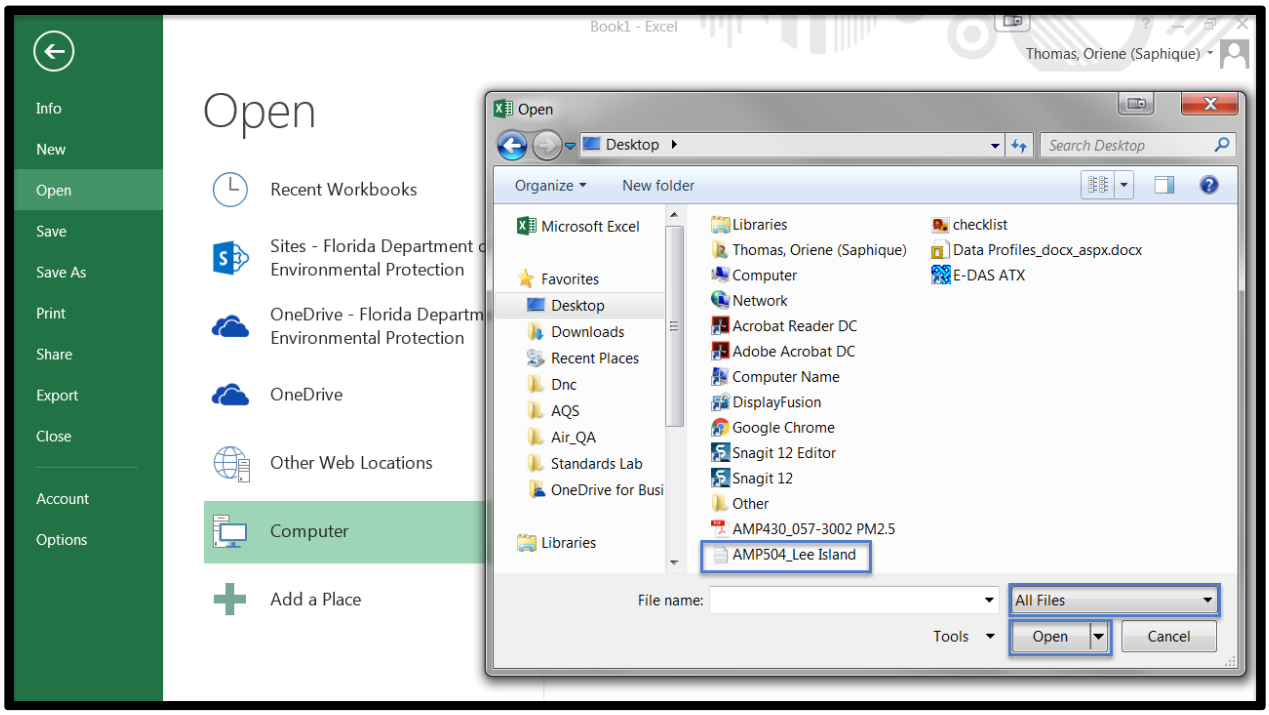
1. Open a blank Excel workbook and select the '***File→Open***' option from the **Main Menu** bar.
2. Navigate to the folder containing the AMP504 text file. The file will not be visible until the user changes the '***All Excel Files***' setting to '***All Files***."

Figure 14-31. AQS AMP504 QA Data Report – Export to Excel



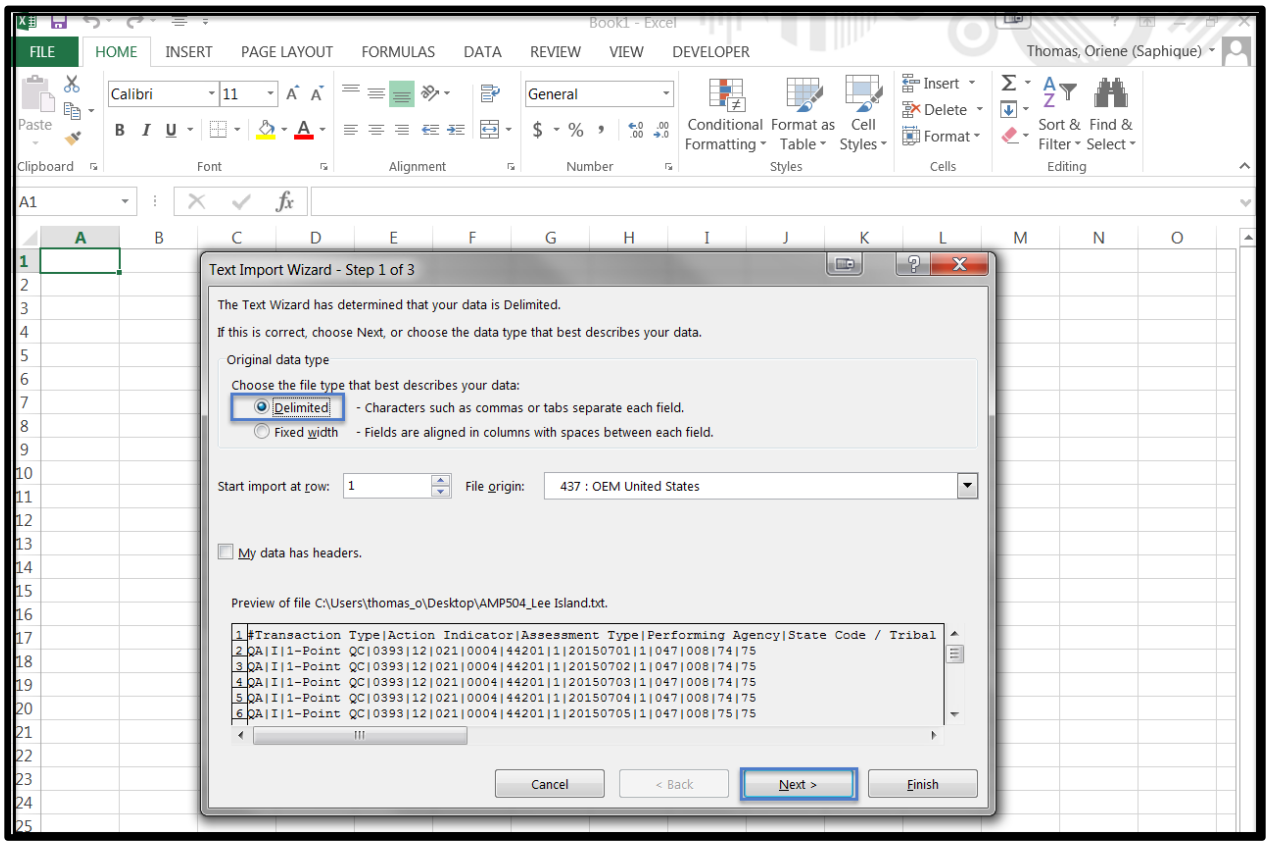
3. Select the text file and click on the '***Open***' button at the bottom of the Windows Explorer window.

Figure 14-32. AQS AMP504 QA Data Report – Export to Excel



4. This will prompt the user to go through the '***Text Import Wizard***.'
5. Ensure the file type that describes the data is 'Delimited' then select '***Next***'.

Figure 14-33. AQS AMP504 QA Data Report – Export to Excel



6. Step 2 allows the user to set the delimiters of the data. Select the '***Other***' checkbox and enter the "pipe" symbol (|).
7. Select '***Finish***' tab to exit the wizard and view the data in Excel.

Figure 14-34. AQS AMP504 QA Data Report – Export to Excel

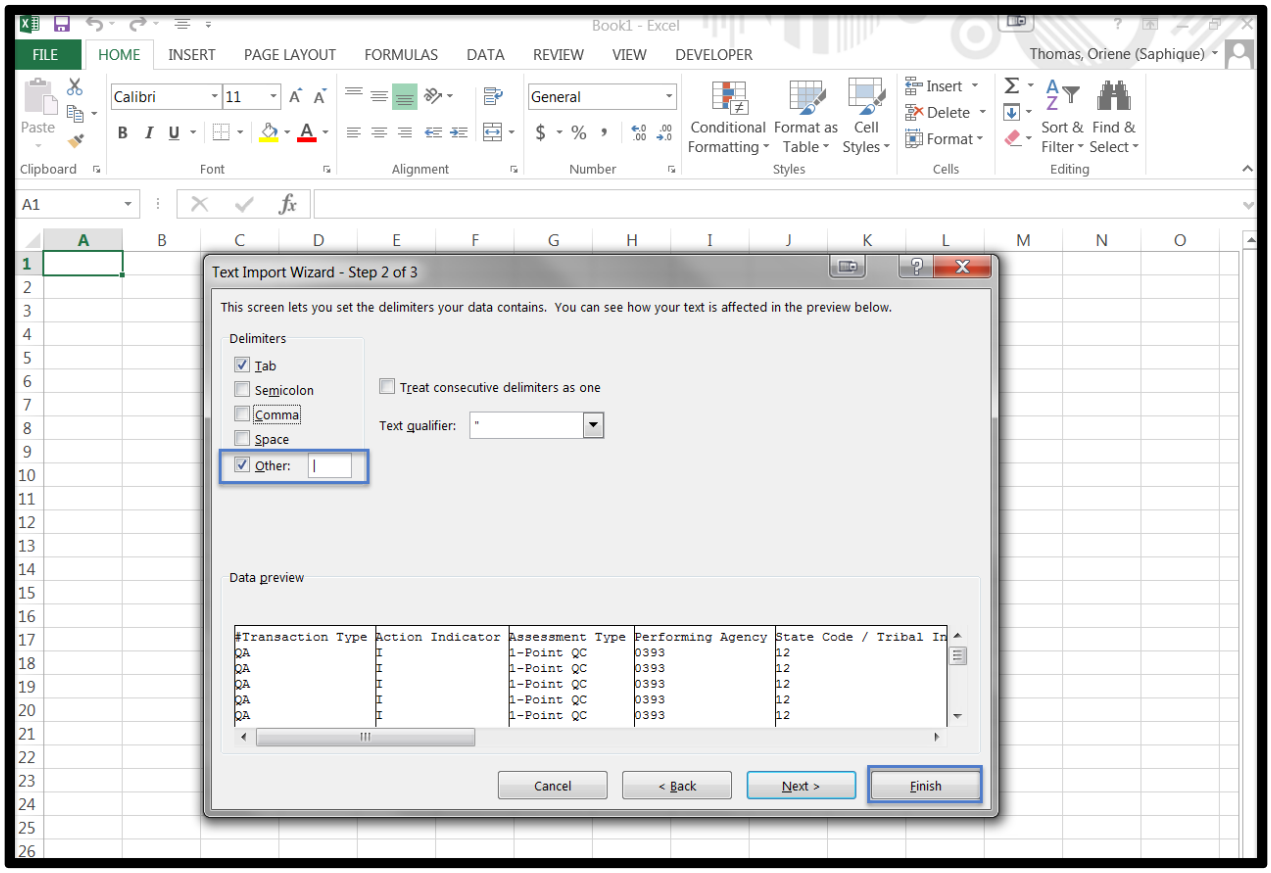
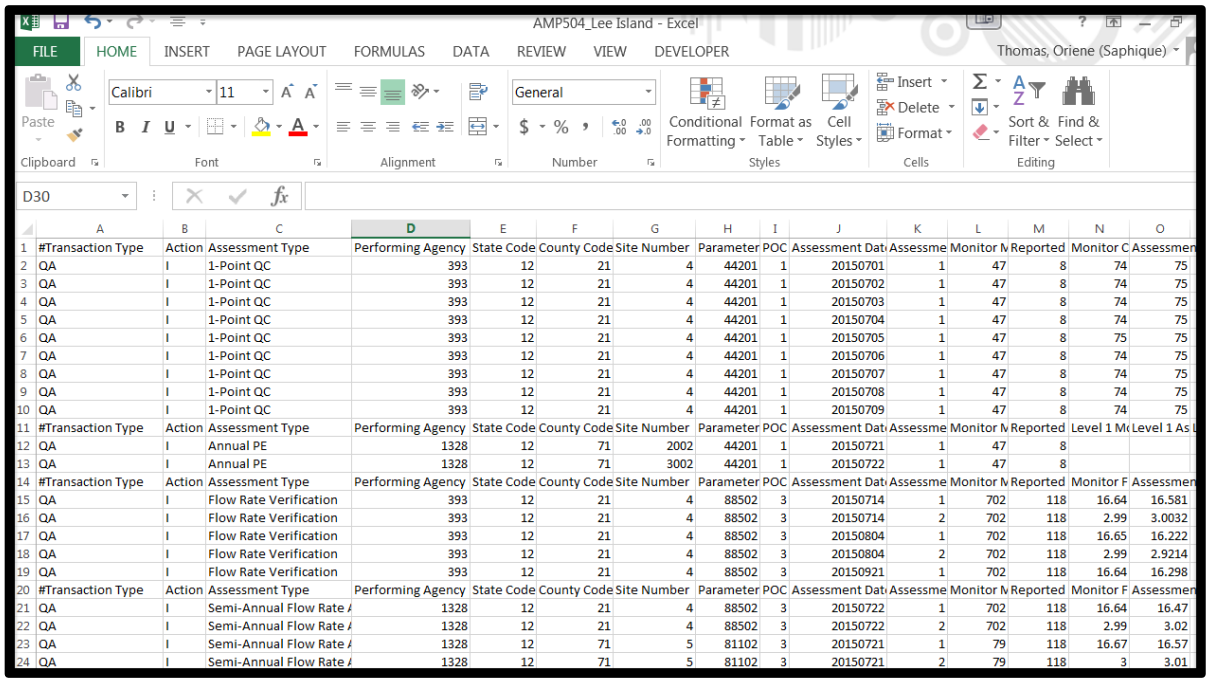


Figure 14-35. AQS AMP504 QA Data Report – Export to Excel



14.3 Appendix C - File Nomenclature

14.3.1 Florida DEP

(Note: To view and/or print this entire document, double-click on the image of the document below for it to open in Adobe Acrobat. The complete document will then be displayed).

Updatded April 1, 2016

Naming Documents and Their Use

The forms are templates for use. From the Air_QA \.Form Templates folder, open the template and then save it to your folder with the naming convention.

Generally, the form name will start with parameter, followed by the form number, the AQS number, DEP property number and the date.

So a typical name for an ozone analyzer (DEP 143002) routine operations log for TCC (AQS 0730012) on January 9, 2014 would be:

O3 DEP 06-9-B 0730012 143002 20140109

Parameter file name	Parameter
O3	Ozone
O3PS	Ozone Primary Standard
SO2	Sulfur Dioxide
SO2TL	Sulfur Dioxide Trace Level (N-Core)
COTL	Carbon Monoxide (N-Core)
NOy	Nitrogen Oxides – all (N-Core only)
PM25C	Continuous PM2.5
PM25M	PM2.5 Manual
PM10	PM10

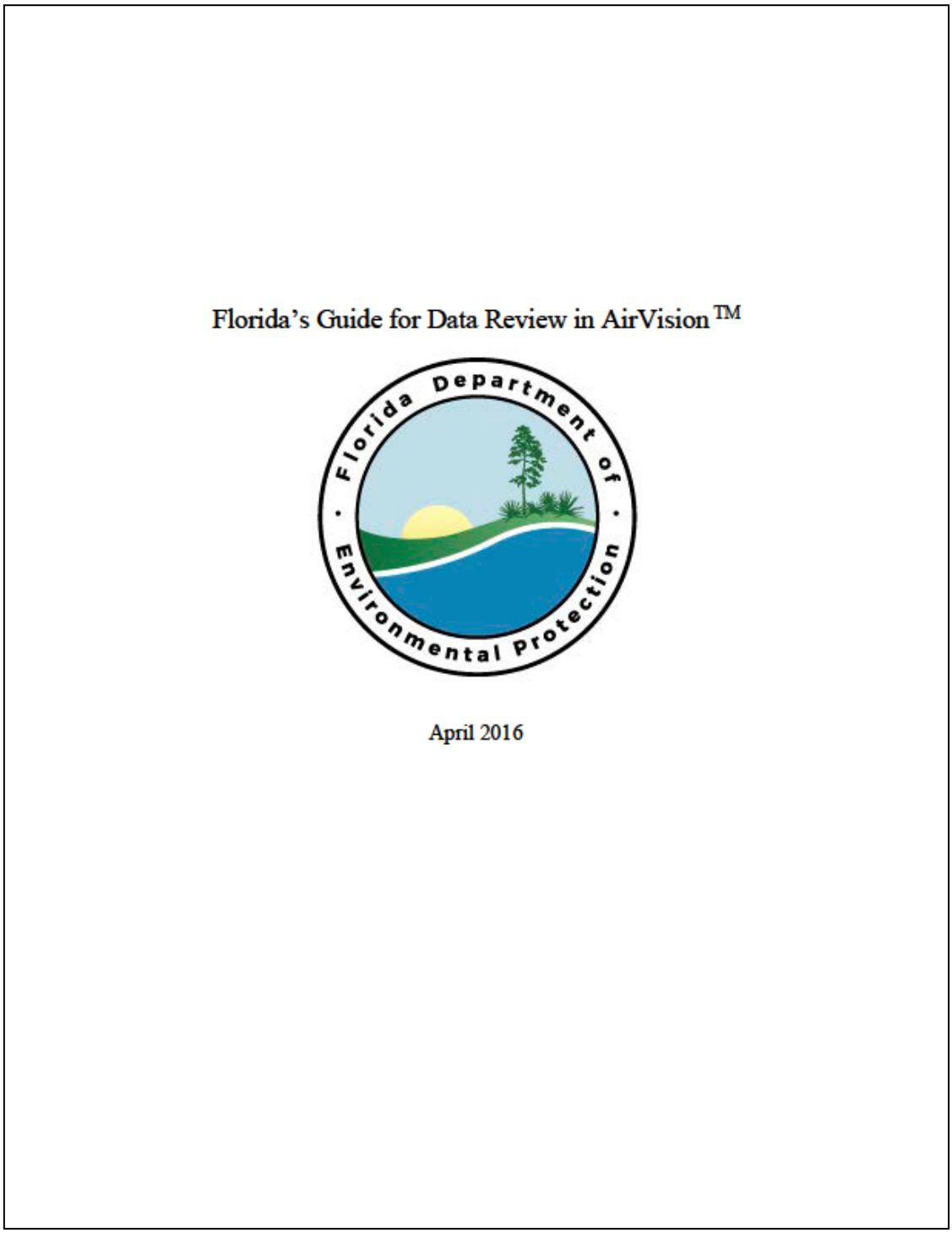
The date will be as explicit as needed, always starting with the 4 digit year.

Date	Example	Form Timeframe
YYYY	2014	Annually
YYYYQQ	2014Q1	Quarterly
YYYYMMM	2014JAN	Monthly
YYYYMMDD	20140131	Daily

Page 1 of 2

14.4 Appendix D - AirVision Guide

(Note: To view and/or print this guide, double-click on the image of the front page of the guide below for it to open in Adobe Acrobat. The complete guide will then be displayed).



14.5 Appendix E – EPA's Rounding Policy for Evaluating NAAQS QA/QC Acceptance Criteria (June 2016)

The Florida PQAO adopted EPA's Rounding Policy effective January 1, 2017.

EPA's interpretation of standard rounding conventions is that the resolution of the measurement device or instrument determines the significant figures used for rounding. The acceptance criteria promulgated in the appendices of 40 CFR Part 50, or otherwise established in EPA guidance documents, are not physical measurements. As an example, the quality control (QC) acceptance criterion of ±5% stated in the fine particulate matter regulations (40 CFR Part 50, Appendix L, Section 7.4.3.1) is not a measurement and, as such, does not directly contribute to either the significant figures or to rounding. However, the flow rate of the sampler – measured either internally by the flow rate control system or externally with a flow rate audit standard – is a measurement, and as such, will contribute to the significant figures and rounding. EPA's position is that it is not acceptable to adjust or modify acceptance criteria through rounding or other means.

Example using $PM_{2.5}$ Sampler Design Flow Rate

40 CFR Part 50, Appendix L, Section 7.4.3.1 defines the 24-hour sample flow rate acceptance criterion as ±5% of the design flow rate of the sampler (16.67 liters per minute, LPM). The QC acceptance criterion of ±5% stated in regulation is not a measurement and, therefore, does not contribute towards significant figures or rounding. The measurement in this example is the flow rate of the sampler. $PM_{2.5}$ samplers display flow rate measurements to the hundredths place (resolution) – e.g., 16.67 LPM, which has 4 significant figures. Multiplying the design flow rate (16.67 LPM) by the ±5% acceptance criterion defines the acceptable flow regime for the sampler. By maintaining 4 significant figures – with values greater than 5 rounding up – the computations provide the following results:

- The low range is -5% of the design flow: $0.95 \times 16.67 = 15.8365 \approx 15.84$
- The upper range is +5% of the design flow: $1.05 \times 16.67 = 17.5035 \approx 17.50$

Rounding in this manner, the lower and upper acceptance limits for the flow rate measurement are defined as 15.84 and 17.50 LPM, respectively.

40 CFR Part 58, Appendix A, Section 3.2.1 requires monthly $PM_{2.5}$ flow rate verifications. The verification is completed with an independent audit standard (flow device). The monthly check includes a calculation to ensure the flow rate falls within ±5% of the design flow rate (see Method 2.12, Section 7.4.7). Therefore, flow rates obtained during monthly flow rate verification checks should measure between 15.84 – 17.50 LPM, as defined above.

Measurements, in general, are approximate numbers and contain some degree of error at the outset; therefore, care must be taken to avoid introducing additional error into the final results. QA Handbook Volume II, Appendix L

With regards to the $PM_{2.5}$ sampler's design flow rate, it is not acceptable to round the ±5% acceptance criterion such that any calculated percent difference up to ±5.4% is acceptable – because rounding the acceptance criterion increases the error in the measurement. It is important to note that the $PM_{2.5}$ sampler must maintain a volumetric flow rate of approximately 16.67 LPM in order for its inertial separators to appropriately fractionate the collected ambient air particles. Flow rates greater than 5% of the nominal 16.67 LPM will shift the cut point of the inertial separator lower than the required aerodynamic diameter of 2.5 microns and, thus, block the larger fraction of the PM2.5 sample from being collected on the sample filter. Conversely, as the sampler's flow rate drops below -5% of the nominal 16.67 LPM, the inertial separator will allow particulate matter with aerodynamic diameters unacceptably larger than 2.5 microns to be passed to the sample filter. Therefore, it is imperative that the flow rate of the sampler fall within the ±5% acceptance criterion.

A Note on Resolution and Rounding

Measurement devices will display their measurements to varying degrees of resolution. For example, some flow rate devices may show measurements to tenths place resolution, whereas others may show measurements to the hundredths place. The same holds true for thermometers, barometers, and other instruments. With this in mind, rounding should be based on the measurement having the least number of significant figures. For example, if a low-volume PM_{10} sampler displays flow rate measurements to the tenths place (3 significant figures) but is audited with a flow device that displays measurements to the hundredths place (4 significant figures), the rounding in this scenario will be kept to 3 significant figures. Table 14-8 below lists some examples of NAAQS regulatory QA/QC acceptance criteria with EPA's interpretation of the allowable acceptance ranges, as well as a column that identifies results that exceed the stated acceptance limits. Table 1 is not a comprehensive list of ambient air monitoring QA/QC acceptance criteria. Rather, Table 1 is provided to demonstrate how EPA evaluates acceptance criteria with respect to measurement resolution. The validation templates in the QA Handbook Vol II will be revised to meet this policy. If you have any questions regarding this policy or the rounding conventions described, please contact your EPA Regional Office for assistance.

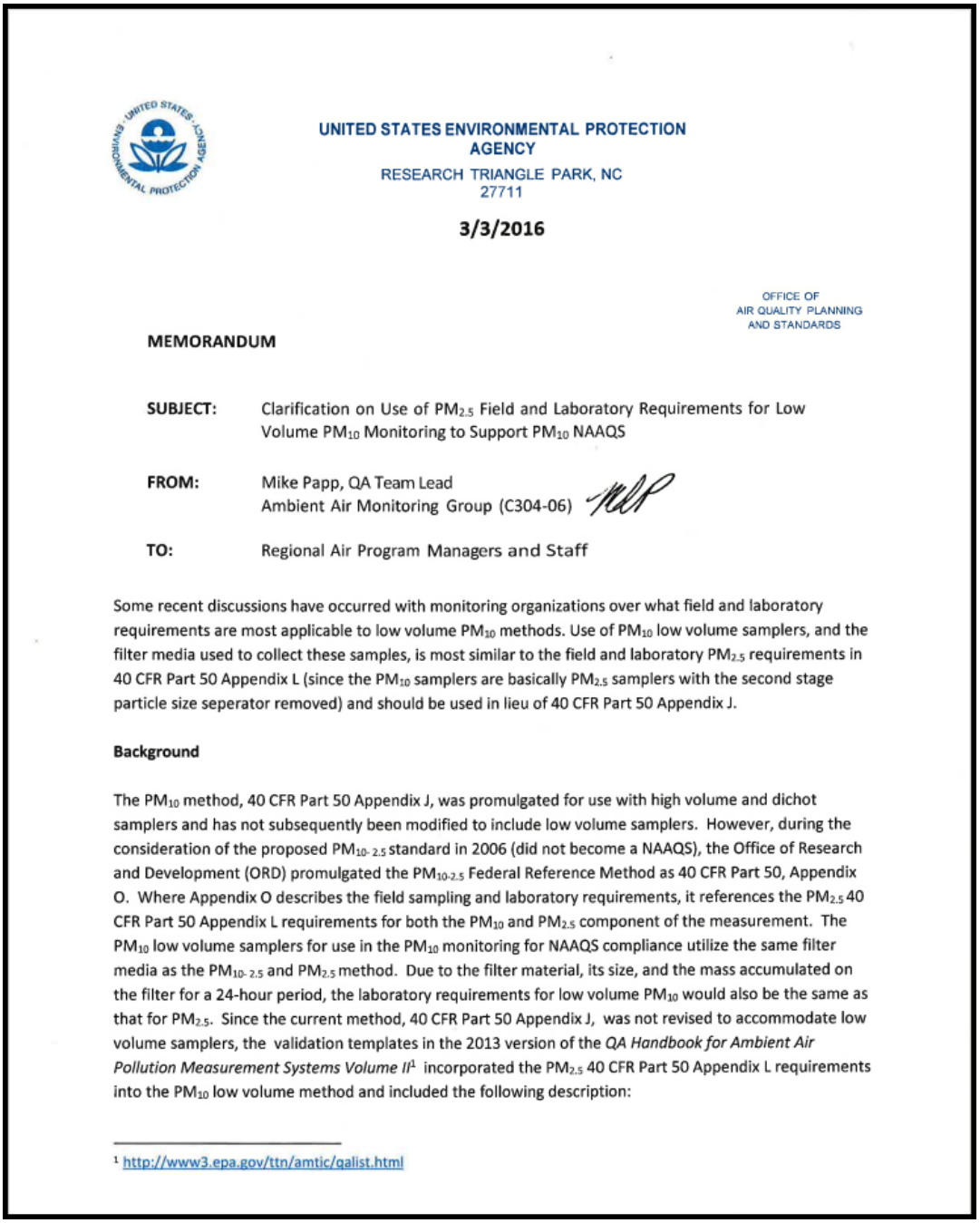
Table 14-1. Example of EPA's Rounding Policy

Regulatory Method Requirement	Method Acceptance Criteria	Typical Measurement Resolution	Acceptance Range (Passing Results)	Exceeding QA/QC Check
Shelter Temperature	20 to 30°C or FEM op. range	1 Decimal, 3 SF*	20.0 to 30.0°C or FEM op. range	≤ 19.9°C ≥ 30.1°C
PM2.5 Design Flow (16.67 lpm)	±5%	2 Decimal, 4 SF	15.84 to 17.50 lpm	≤ -5.1% ≥ +5.1%
PM2.5 Transfer Standard Tolerance	±4%	2 Decimal, 4 SF	-4% Audit Std / Sampler Display / +4% Audit Std 15.84 / 16.47 16.00 / 16.67 / 17.34 16.80 / 17.50	≤ -4.1% ≥ +4.1%
PM2.5 Lab: Mean Temp 24-hr Mean	20 to 23°C	1 Decimal, 3 SF	20.0 to 23.0°C	≤ 19.9°C ≥ 23.1°C
PM2.5 Lab: Temp Control SD over 24-hr	±2°C	1 Decimal, 3 SF	±2.0°C	≤ -2.1°C ≥ +2.1°C
PM2.5 Lab: Mean RH 24-hr Mean	30% to 40%	1 Decimal, 3 SF	30.0% to 40.0%	≤ 29.9% ≥ 40.1%
PM2.5 Lab: RH Control SD over 24-hr	±5%	1 Decimal, 3 SF	±5.0%	≤ -5.1% ≥ +5.1%
PM2.5 Lab: Difference in 24-hr RH Means	±5%	1 Decimal, 3 SF	±5.0%	≤ -5.1% ≥ +5.1%

*SF = Significant Figures

14.6 Appendix F – OAQPS Technical Memorandum – Clarification on Use of $PM_{2.5}$ Field and Laboratory Requirements for Low Volume PM_{10} Monitoring to Support PM_{10} NAAQS

(Note: To view and/or print this entire document, double-click on the image of the document below for it to open in Adobe Acrobat. The complete document will then be displayed).



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC
27711

3/3/2016

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Clarification on Use of $PM_{2.5}$ Field and Laboratory Requirements for Low Volume PM_{10} Monitoring to Support PM_{10} NAAQS

FROM: Mike Papp, QA Team Lead
Ambient Air Monitoring Group (C304-06)

TO: Regional Air Program Managers and Staff

Some recent discussions have occurred with monitoring organizations over what field and laboratory requirements are most applicable to low volume PM_{10} methods. Use of PM_{10} low volume samplers, and the filter media used to collect these samples, is most similar to the field and laboratory $PM_{2.5}$ requirements in 40 CFR Part 50 Appendix L (since the PM_{10} samplers are basically $PM_{2.5}$ samplers with the second stage particle size seperator removed) and should be used in lieu of 40 CFR Part 50 Appendix J.

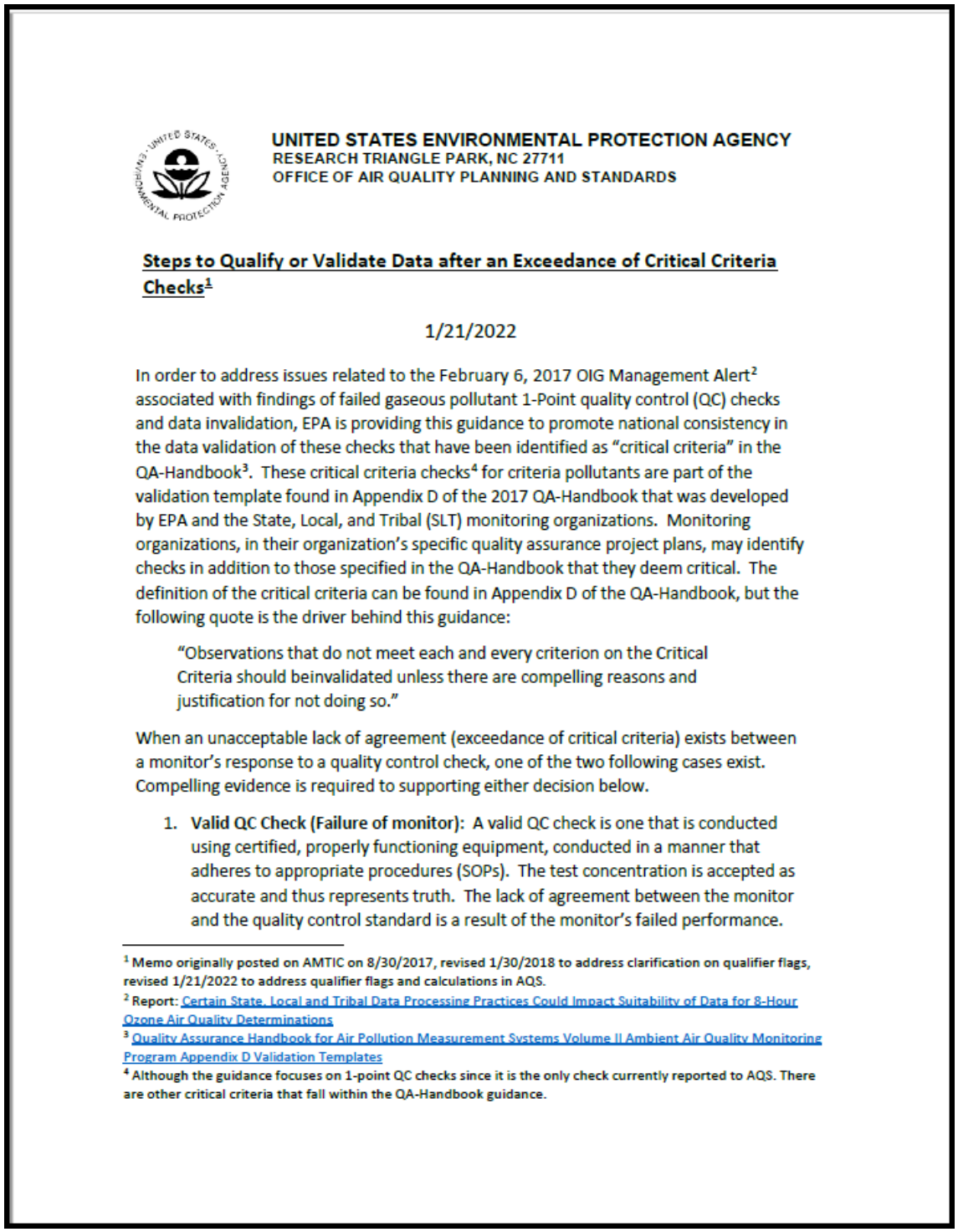
Background

The PM_{10} method, 40 CFR Part 50 Appendix J, was promulgated for use with high volume and dichot samplers and has not subsequently been modified to include low volume samplers. However, during the consideration of the proposed $PM_{10-2.5}$ standard in 2006 (did not become a NAAQS), the Office of Research and Development (ORD) promulgated the $PM_{10-2.5}$ Federal Reference Method as 40 CFR Part 50, Appendix O. Where Appendix O describes the field sampling and laboratory requirements, it references the $PM_{2.5}$ 40 CFR Part 50 Appendix L requirements for both the PM_{10} and $PM_{2.5}$ component of the measurement. The PM_{10} low volume samplers for use in the PM_{10} monitoring for NAAQS compliance utilize the same filter media as the $PM_{10-2.5}$ and $PM_{2.5}$ method. Due to the filter material, its size, and the mass accumulated on the filter for a 24-hour period, the laboratory requirements for low volume PM_{10} would also be the same as that for $PM_{2.5}$. Since the current method, 40 CFR Part 50 Appendix J, was not revised to accommodate low volume samplers, the validation templates in the 2013 version of the *QA Handbook for Ambient Air Pollution Measurement Systems Volume II*[1] incorporated the $PM_{2.5}$ 40 CFR Part 50 Appendix L requirements into the PM_{10} low volume method and included the following description:

[1] http://www3.epa.gov/ttn/amtic/qalist.html

14.7 Appendix G – OAQPS Technical Memorandum – Steps to Qualify or Validate Data after a Failed Critical Criteria Check

(Note: To view and/or print this entire document, double-click on the image of the document below for it to open in Adobe Acrobat. The complete document will then be displayed).



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711
OFFICE OF AIR QUALITY PLANNING AND STANDARDS

Steps to Qualify or Validate Data after an Exceedance of Critical Criteria Checks[1]

1/21/2022

In order to address issues related to the February 6, 2017 OIG Management Alert[2] associated with findings of failed gaseous pollutant 1-Point quality control (QC) checks and data invalidation, EPA is providing this guidance to promote national consistency in the data validation of these checks that have been identified as "critical criteria" in the QA-Handbook[3]. These critical criteria checks[4] for criteria pollutants are part of the validation template found in Appendix D of the 2017 QA-Handbook that was developed by EPA and the State, Local, and Tribal (SLT) monitoring organizations. Monitoring organizations, in their organization's specific quality assurance project plans, may identify checks in addition to those specified in the QA-Handbook that they deem critical. The definition of the critical criteria can be found in Appendix D of the QA-Handbook, but the following quote is the driver behind this guidance:

> "Observations that do not meet each and every criterion on the Critical Criteria should beinvalidated unless there are compelling reasons and justification for not doing so."

When an unacceptable lack of agreement (exceedance of critical criteria) exists between a monitor's response to a quality control check, one of the two following cases exist. Compelling evidence is required to supporting either decision below.

1. **Valid QC Check (Failure of monitor):** A valid QC check is one that is conducted using certified, properly functioning equipment, conducted in a manner that adheres to appropriate procedures (SOPs). The test concentration is accepted as accurate and thus represents truth. The lack of agreement between the monitor and the quality control standard is a result of the monitor's failed performance.

[1] Memo originally posted on AMTIC on 8/30/2017, revised 1/30/2018 to address clarification on qualifier flags, revised 1/21/2022 to address qualifier flags and calculations in AQS.
[2] Report: Certain State, Local and Tribal Data Processing Practices Could Impact Suitability of Data for 8-Hour Ozone Air Quality Determinations
[3] Quality Assurance Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring Program Appendix D Validation Templates
[4] Although the guidance focuses on 1-point QC checks since it is the only check currently reported to AQS. There are other critical criteria that fall within the QA-Handbook guidance.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711
OFFICE OF AIR QUALITY PLANNING AND STANDARDS

Steps to Qualify or Validate Data after a Failed Critical Criteria Checks

8/30/2017

In order to address issues related to the recent OIG Management Alert[1] associated with findings of failed 1-point quality control (QC) checks and data invalidation, EPA is providing some additional guidance on the process to validate or invalidate routine data based on an exceedance of important checks that have been identified as "critical criteria" in the QA Handbook[2]. These critical criteria checks[3] are part of a validation template that were developed for all criteria pollutants around 2006 by EPA and the monitoring organizations. Monitoring organizations, in their organizations specific quality assurance project plans, may identify additional checks that they deem critical. The definition of the critical criteria can be found in Appendix D of the QA Handbook but the following quote is the driver behind this guidance:

> "Observations that do not meet each and every criterion on the Critical Criteria should be invalidated unless there are compelling reasons and justification for not doing so."

Compelling evidence (reason) is data, such as (but not limited to) an independent audit point(s), a multi-point verification, and/or a prior zero/span check that establishes whether the analyzer was in fact operating within the percent difference critical criteria acceptance limits and whether the 1-point QC check itself is considered valid or invalid. This evidence is either available from routine tests within the timeframe of the last acceptable valid QC check or from an independent test/check that establishes that the system that produced the 1-QC was invalid once the failure is discovered. Because these are critical criteria, timely action (i.e., the next day) on the part of the monitoring organization to determine why such a "critical" failure occurred should be the normal course of action.

We define valid and invalid QC checks as follows:

- A valid QC check is one that is conducted using certified, properly functioning equipment, conducted in a manner that adheres to appropriate procedures (SOPs) and the test concentration is accepted as accurate.
- An invalid QC check is check in which there were technical issues with the generation of its test concentration and the test concentration is not accepted as accurate.

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[1] Report: Certain State, Local and Tribal Data Processing Practices Could Impact Suitability of Data for 8-Hour Ozone Air Quality Determinations https://www.epa.gov/office-inspector-general/report-certain-state-local-and-tribal-data-processing-practices-could

[2] Quality Assurance Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring Program https://www3.epa.gov/ttn/amtic/qalist.html

[3] Although the guidance focuses on 1-point QC checks since it is the only check currently reported to AQS. There are other critical criteria that fall within the QA Handbook guidance

14.8 Appendix H – OAQPS Technical Memorandum

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711
OFFICE OF AIR QUALITY PLANNING AND STANDARDS

Technical Note- Clarifications and Guidance on Shelter Temperature Guidance for Ambient Air Pollutant Methods

03/08 /2018

In order to address issues related to the recent OIG Management Alert associated with findings of inconsistencies in the implementation of guidance associated with shelter temperature requirements, EPA is providing some additional guidance on the process. In summary, we will revise our guidance in the QA Handbook to clarify that data from monitors should be considered valid that is outside the 20-30^{O} shelter temperature guidance if the federal reference method (FRM) or federal equivalent method (FEM) monitor has been approved at a wider temperature range. This clarification and guidance is effective immediately.

Background

When the process of approving monitors as federal reference or equivalent methods (FRM/FEM) was started, one of the testing criteria was for monitors to properly operate at 20-30^{O}C. Therefore, the majority (if not all) monitors were initially designated and approved with the 20-30^{O}C temperature operating range. The QA Handbook guidance also suggested that the monitoring shelters be outfitted with HVAC systems to maintain the shelters at 20-30^{O}C with the expectation that data that was collected outside this range was of uncertain quality and be invalidated. However, newer monitors have been designated at wider temperature ranges. The 2017 QA Handbook was revised to accommodate these monitors while also indicating that the shelter must be maintained to accommodate the monitor with the most sensitive temperature requirement. OAQPS believes that if a shelter does go beyond 20-30^{O}C range, data should not be invalidated from all monitors but only those that are not designated to operate at the temperature excursion. EPA expected that the guidance in the QA Handbook would be used in this manner, but OIG did not observe this in all cases. Since the QA Handbook gets updated every five years and was last updated in 2017, in response to this recommendation, OAR will develop and post a table of changes on AMTIC that will apply to monitoring guidance until the next full QA Handbook revision.

Summary

In summary, monitoring organizations should report data as valid that exceeds the general shelter temperature requirement of 20-30^{O}C if the approved FRM/FEM designation allows the monitor to operate at a wider temperature range and the monitor is within the range for which it has been approved.

14.9 Appendix I - Glossary

- AirMVP – Air Monitoring Validation Program; the final data repository for ambient air monitoring data collected in Florida before it is transferred to AQS
- AMP (###) - Standard report or data extraction created by EPA's AQS; Ex. AMP 255 = Data Quality Indicator Report and AMP 501 = Extract Raw Data
- AQS - Air Quality System; EPA's repository for nationally collected ambient air monitoring data; also, the specific type of text file formatting accepted by EPA's AQS
- ATX - Software package created by Agilaire; used to configure sites and monitors and perform other background tasks in AIRMVP; available only to AIRMVP administrators
- Ccomm - Third-party polling program used primarily to poll TEOMs operating without dataloggers
- CFR – Code of Federal Regulations
- COTL – Trace level carbon monoxide
- DARM – Division of Air Resource Management
- DEP - Florida Department of Environmental Protection
- ENSC – Environmental Exchange Network Services Center; a web-based tool designed to allow Exchange Network users to easily send, get, and download information from other partners on the network; set up by the EPA to ease the transfer of data between states' databases and AQS
- EPA - Environmental Protection Agency
- EPC – Environmental Protection Commission of Hillsborough County
- INT – Internal shelter temperature
- LIMS - Laboratory Information Management System; database and associated programs used by the PM Weighing Lab to record and store data and associated information
- MDL – Method Detection Limit
- MET - Meteorological Parameters; instruments which measure meteorological data such as wind speed, directions, ambient temperature, etc.
- NAAQS – National Ambient Air Quality Standards
- NATTS – National Air Toxics Trends Stations
- NIST – National Institute of Standards and Technology
- NO – Nitric Oxide
- NO_2 – Nitrogen Dioxide
- NOy – Total reactive nitrogen compounds
- O_3 – Ozone
- OAM – Office of Air Monitoring
- Pb - Lead
- PM - Particulate Matter; pollution consisting of particles (e.g., smoke, pollen, etc.) of a certain size
- $PM_{2.5}$ - Particulate matter equal to or less than 2.5 microns in diameter
- PM_{10} - Particulate matter equal to or less than 10 microns in diameter

- PMc – Particulate matter coarse
- PMTS - Particulate Matter Tracking System; a Florida DEP database used to consolidate, review, and store PM_{10} and $PM_{2.5}$ data collected using TEI Partisol-Plus 2025s
- POC - Parameter Occurrence Code; number used to indicate the instance of a monitor at a site
- PQAO – Primary Quality Assurance Organization
- RPComm - Polling program created by Rupprecht and Patashnick (R&P) for use with R & P manufactured ambient monitors
- QA - Quality Assurance; the processes and procedures used in the determination of data quality
- QAPP – Quality Assurance Project Plan
- QC – Quality Control
- SLAMS – State and Local Air Monitoring Stations
- SO_2 – Sulfur dioxide
- SO_2TL – Trace level sulfur dioxide
- SOP – Standard Operating Procedure
- TEI - Thermo Environmental Instruments; ambient monitor manufacturer
- Teledyne API – Teledyne Advanced Pollution Instrumentation; ambient monitoring instrumentation manufacturer
- VOC - Volatile Organic Compound; pollutants which are precursors to ozone and, therefore, photochemical smog
- VSCC – Very Sharp Cut Cyclone
- WINS – Wells Impactor Ninety-Six
- ZSP – zero/span/precision