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REGION 4**

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March 9, 2018

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SESD Project Number: QT16-0020

Ms. Hodge:

We have reviewed the following document you submitted for approval:

Statewide Standard Operating Procedure (SOP) for Air Monitoring Data Handling and Data Validation, DEP 18-27, Revision 4, March 2018.

The quality assurance and technical elements within this SOP were compared to EPA regulations and current guidance. The stated procedures appear to be clear, sound, and appropriate as written, to the extent they can be evaluated. EPA approval of this document is granted. Please be aware that approval of this SOP does not constitute a waiver from any regulatory requirements, or the agency's QAPP requirements, that are not addressed within the body of this document. Your agency remains accountable for ensuring the data handling and validation procedures implemented adhere to all applicable requirements detailed in 40 CFR Parts 50, 53, and 58. This SOP should be revised when the stated procedures are modified.

If you have any questions, please contact Stephanie McCarthy at 706-355-8745 or via email at mccarthy.stephanie@epa.gov.

Sincerely,

A handwritten signature in blue ink, which appears to read "Laura Ackerman", is written over a horizontal line.

Laura Ackerman, Chief
Superfund and Air Section

STATEWIDE STANDARD OPERATING PROCEDURE FOR AIR MONITORING DATA HANDLING AND DATA VALIDATION



**State of Florida
Department of Environmental Protection
Office of Air Monitoring**

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3/8/2018

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REVISION HISTORY

Revision Number	Date	Author	Updates
0	October 2015	Cadedra Hodge	Initial Release
1	May 2016	Cadedra Hodge	• Addressed EPA comments received February 10, 2016 • Incorporated detailed instructions to run AQS reports • Attached AirVision Guide as an appendix
1	June 2016	Cadedra Hodge	• Corrected some inconsistencies in Section 12.6 • Updated Miami-Dade County local program agency name
2	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)
3	December 2017	Cadedra Hodge	• Addressed EPA comments received October 2017
4	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

REFERENCES

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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 Environmental Resources Management, 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 (O₃), sulfur dioxide (SO₂), oxides of nitrogen (including nitric oxide (NO), oxides of nitrogen (NO_x) and nitrogen dioxide (NO₂)), and particulate matter (PM₁₀ and PM_{2.5}). In addition, continuous data are collected for total reactive nitrogen compounds (NO_y), trace level sulfur dioxide (SO₂TL), and trace level carbon monoxide (COTL). Florida also operates intermittent samplers that collect data for particulate matter (PM₁₀ and PM_{2.5}) and lead (Pb).

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 Florida Air Monitoring and Assessment System (FAMAS) 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. All SOPs can be found alongside their respective equipment, as well as on the shared electronic drives located on each agency's network drive.

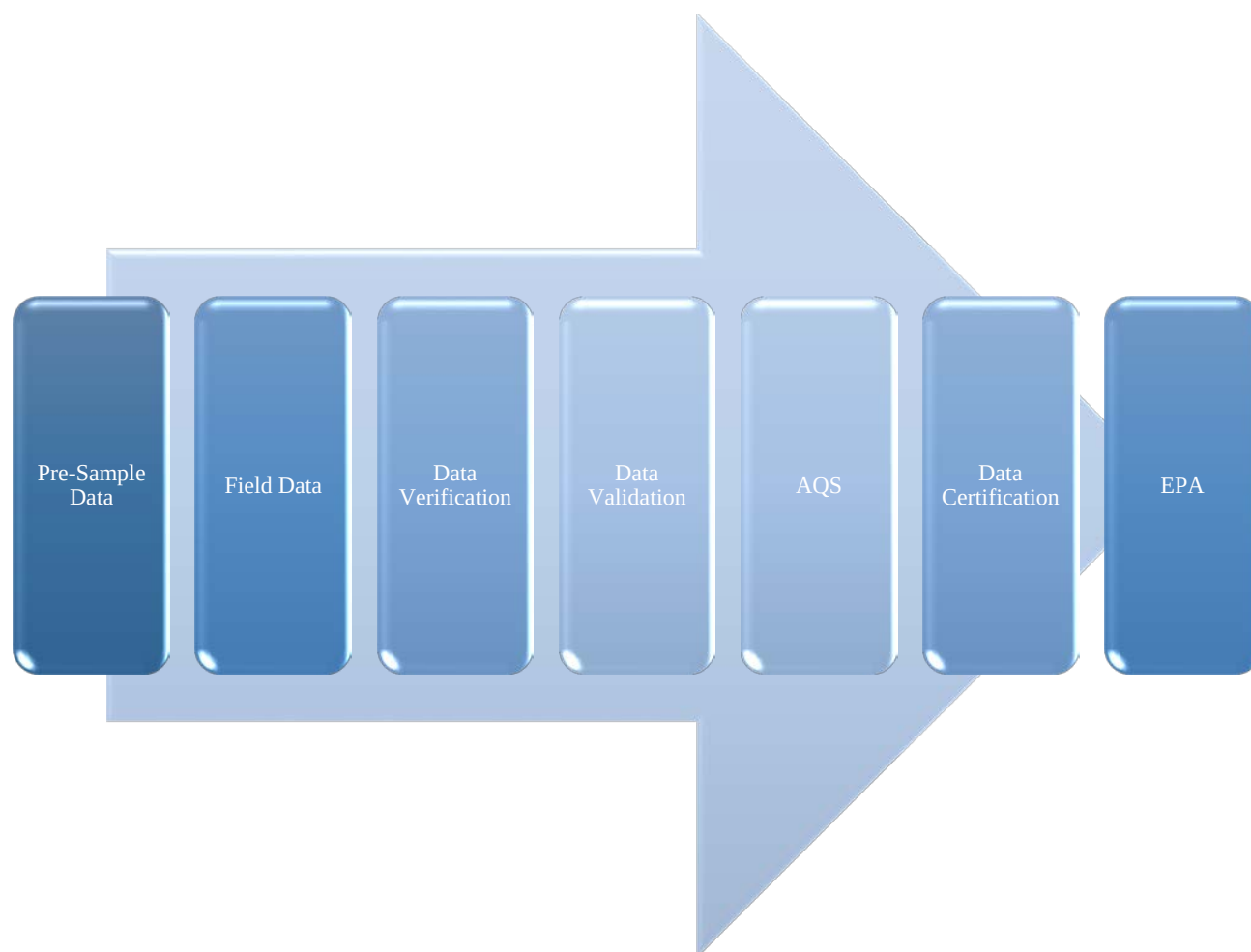
The purpose of this Air Monitoring Data Handling and Data Validation SOP is to provide a description of the data handling and validation procedures utilized by Florida for the criteria pollutant monitors, and of the air quality reports generated at the culmination of these activities.

3.0 SUMMARY OF THE METHOD

3.1 Data Flow

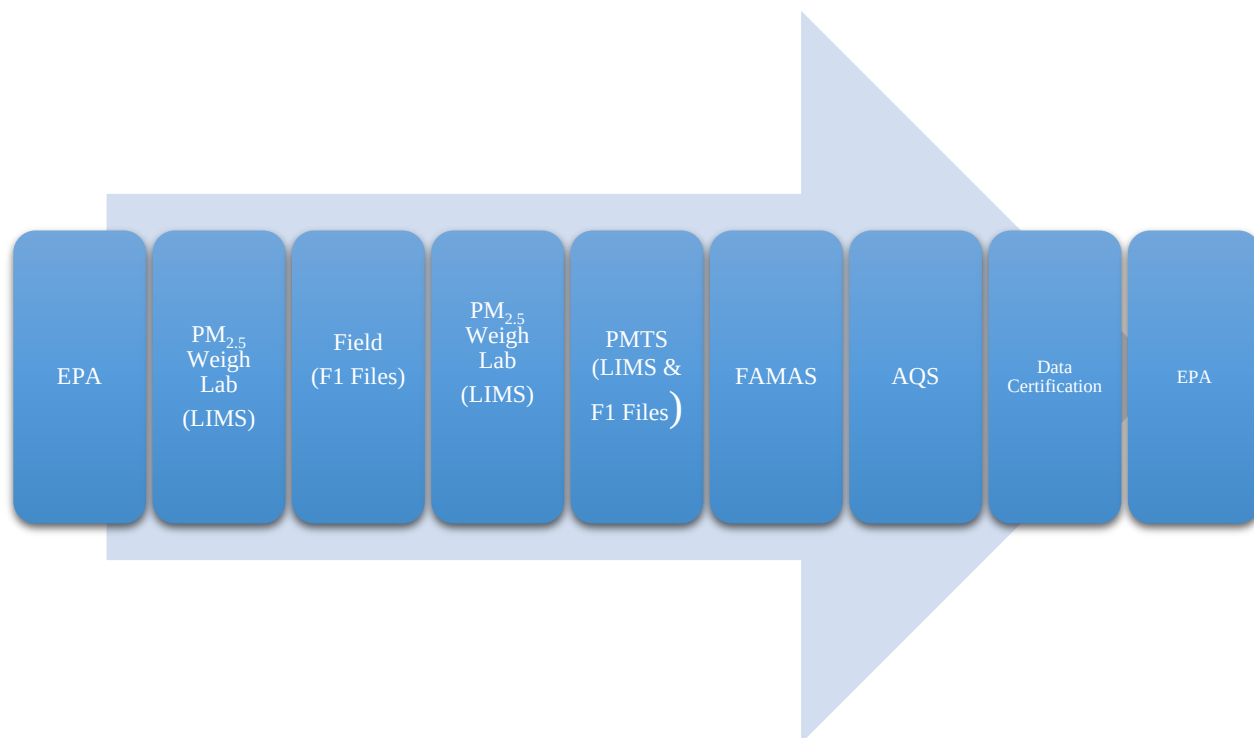
The statewide data flow for continuous air monitoring data for Florida is represented in Figure 3-1.

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



Florida has a single PM_{2.5} Gravimetric Laboratory located in Tallahassee, Florida, as well as four PM₁₀ laboratories located in Hillsborough, Pinellas, Broward, and Miami-Dade counties and a lead laboratory in Hillsborough County. The data flow for manual PM_{2.5} is depicted in Figure 3-2.

Figure 3-2. Florida Statewide PM_{2.5} 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 FAMAS Database. DEP transmits Florida’s data into the EPA’s AQS database. The local programs, additionally, utilize an intermediate (between the field and FAMAS) database, AirVision. They QA their data in AirVision and then it is transmitted into FAMAS. This process is detailed more in Sections 12 and 13 of this document.

Pollutant data collected through manual monitors (i.e. PM_{2.5}, PM₁₀, 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 12.6.3 and 12.6.5 of this document. Sections 12.6.3 and 12.6.6 of this document addresses PM₁₀ and lead data validation.

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 FAMAS. The deadline for regular data certification and the deadlines for other related tasks have been established:

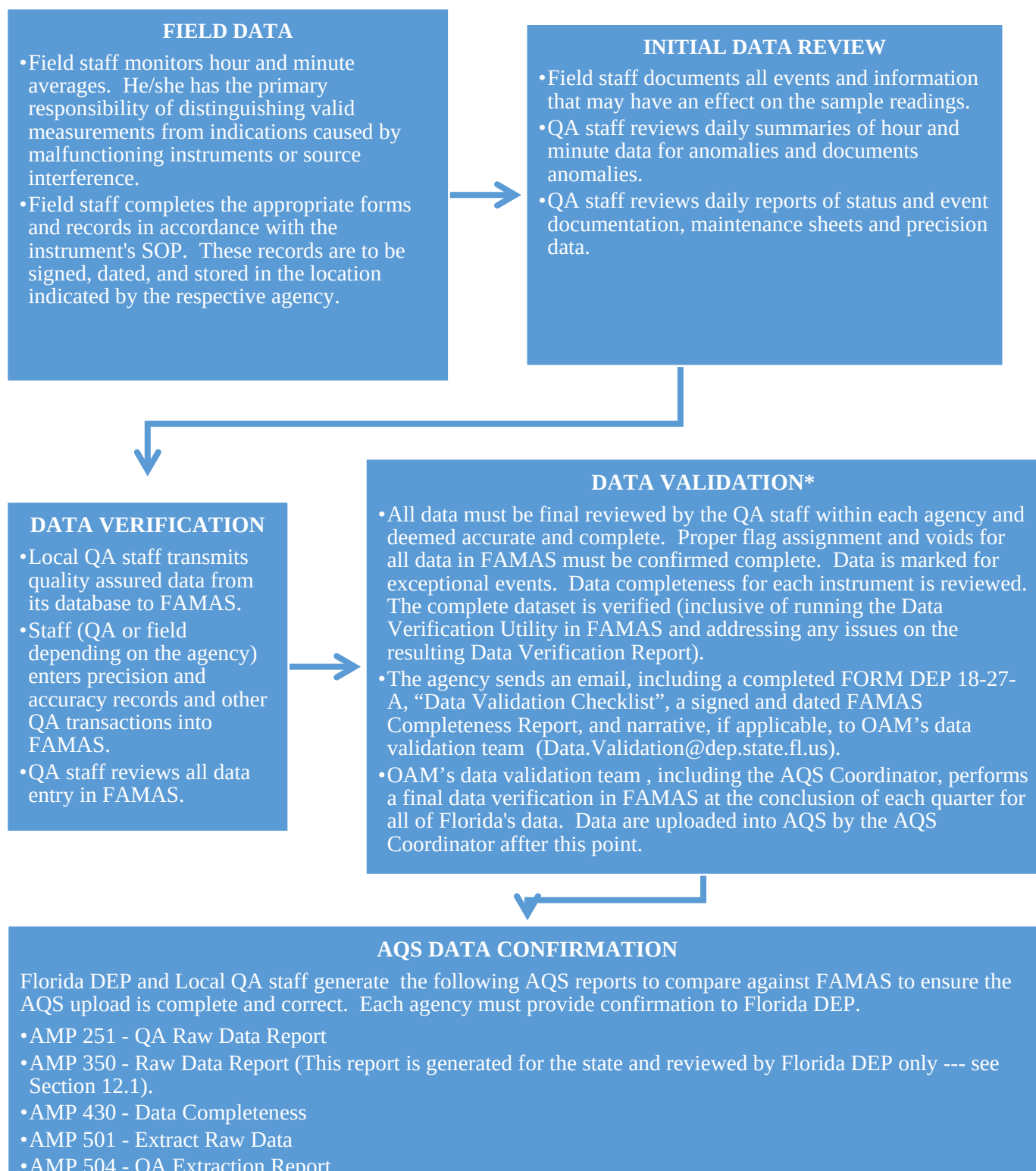
- Routine, preferably no later than the following business day, review of pollutant concentrations, meteorological and instrument diagnostic parameters by the field staff. The field staff are reviewing these data for outliers and anomalies and performing the additional investigation/action, as needed. 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 FAMAS to generate these electronic strip charts, a time series graphical presentation of the data, and will make the annotation via the Matrix Editor in FAMAS; 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 FAMAS 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 FAMAS needs to be completed monthly, no later than 25 days after the end of each month.
- The complete and final submittal to FAMAS 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 general flow of Florida's data review are depicted in Figure 3-3 and Figure 3-4 shown below. The local program agencies perform their initial data review and QA of data in AirVision. Subsequently, the data are transferred to FAMAS which is the repository for Florida's air monitoring data. See Section 13.0.

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

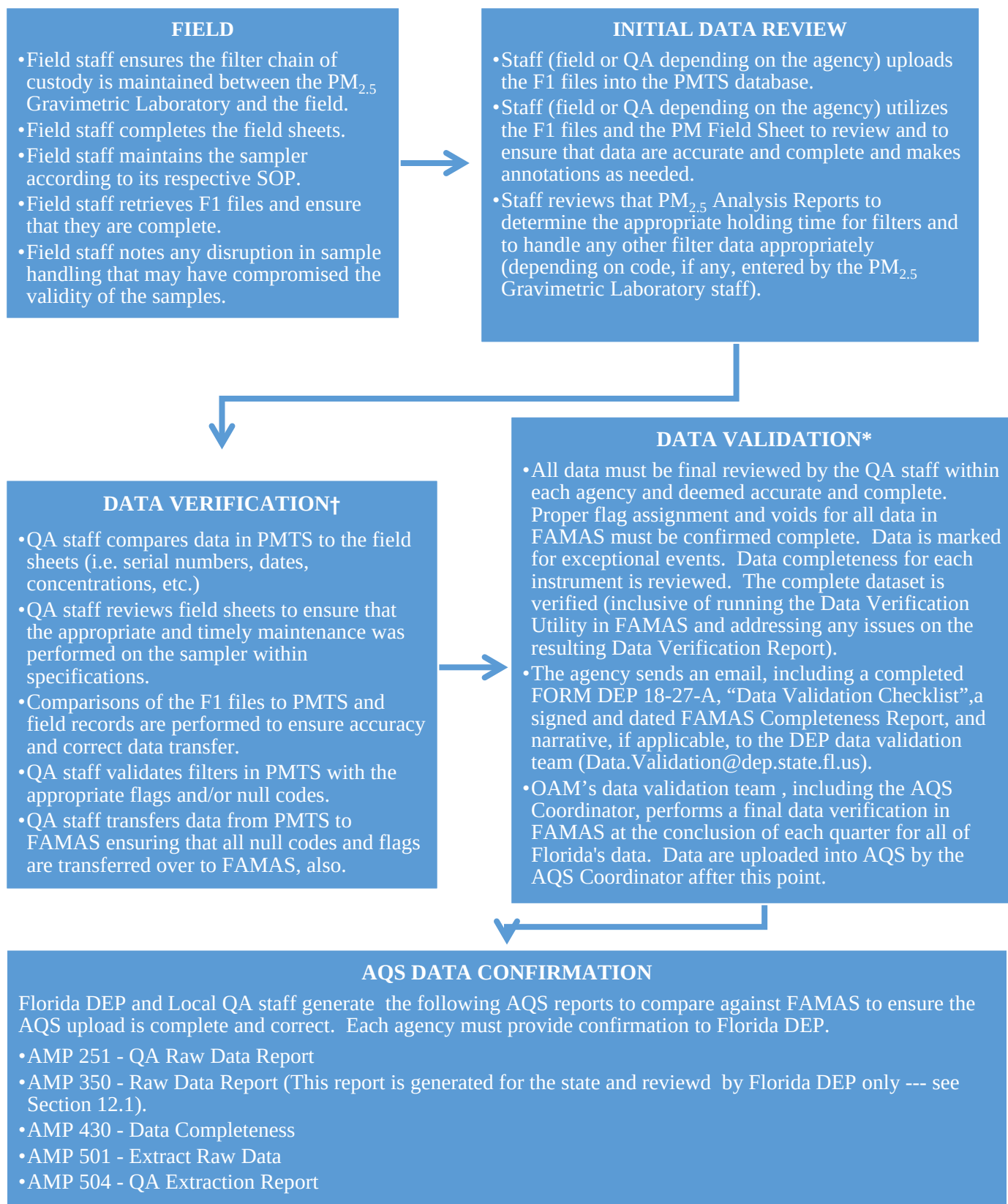
Figure 3-3. Data Review – Continuous Pollutant Monitors



* - The QA coordinators from the local program agencies are responsible for setting the verified flags 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 a completed FORM DEP 18-27-A, "Data Validation Checklist", a signed and dated FAMAS Completeness Report, and narrative, if applicable, to OAM's data validation team (see Section 12.6 and Section 12.7). For the OAM, the data validation team is responsible for these same tasks.

The following figure, Figure 3-4, 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.

Figure 3-4. Data Review – Manual PM_{2.5}



† - 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 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 a completed FORM DEP 18-27-A, "Data Validation Checklist", a signed and dated FAMAS Completeness Report, and narrative, if applicable, to OAM's data validation team (see Section 12.6 and Section 12.7). For the OAM, the data validation team is responsible for these same tasks.

The one lead laboratory and four high-volume PM₁₀ laboratories located within Florida's PQAQO are to provide the OAM with regular reports of their environmental conditions data to ensure that these conditions are being maintained in accordance with specifications outlined in 40 CFR Part 50 Appendix G and Appendix J. 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. 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 (SO₂), C (CO), D (O₃), and F (NO₂) using the specified measurement principle and calibration procedure.
4. Continuous Data - Data collected from all gaseous pollutants sampled by an automated method.
5. Control Limits – The level of allowable imprecision before data invalidation is required.
6. Data Verification – The process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements.
7. 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.
8. 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 FAMAS databases.
9. Form – A blank controlled document, either paper or electronic, that has not been completed or filled-in.
10. OCULUS™ - Document management software used to catalog, index and archive electronic files to enable efficient search and retrieval operations.
11. Manual Data – Data collected from analysis of a PM (PM_{2.5} or PM₁₀) filter or a Pb-TSP filter
12. 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).
12. 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.
13. 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. Regardless of title, each agency has field staff, QA staff, and various level of management. In general, the field staff is responsible for calibrating and maintaining the equipment associated with their respective agencies. They are responsible for the initial data review. They verify preliminary data from each of the monitors associated with their respective agencies. The QA staff checks all records and data collected from the ambient air monitoring network per the official standard operating procedures (SOPs) to assure compliance with the State's Quality Assurance Project Plan (QAPP), the Environmental Protection Agency (EPA) guidelines, and the Code of Federal Regulations (CFR). The QA staff ensures the record of certification and the NIST-traceability for all standards/consumables utilized in the network. And, lastly, the QA managers, supervisors, or coordinators oversee all staff and ensures protocols are followed. These staff review monthly data for verification and validation and addresses errors or discrepancies in data.

Note: Depending on the agency, these functions may be shared by staff. For example, some field staff may also perform QA staff tasks. Or management/supervisors may dually serve as QA staff. Care should be taken that independent reviews are performed at some level to ensure the integrity of the data.

All personnel should be trained in accordance with training requirements specified in the Quality Assurance Project Plans for the State of Florida.

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
- Internet Explorer
- Microsoft Office
- Adobe Acrobat (full version)
- Any other software that is required to utilize Oculus, FAMAS, 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 FAMAS 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 FAMAS and AQS remain updated. Site ID Forms must be completed when a new site is added so that FAMS 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) is required to maintain accurate records in FAMAS 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 schedule to include the updated certification timetable. 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).

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

- 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 of anticipated changes.
2. For changes requiring approval, formal request for site modification.
3. Receive approval in writing from EPA Region 4 and Florida DEP.
4. Implement change.

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 statewide corrective action form is to be completed and submitted for review and approval by the agency's Quality Assurance Coordinator. The Florida Statewide Corrective Action SOP and associated forms can be found within FAMAS: <https://fldep.dep.state.fl.us/famas/>. (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 Coordinator 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 Data Quality Section Environmental Administrator runs the AMP 350 – Raw Data Report on a quarterly basis to ensure that null codes and qualifiers are being used consistently across the PQAQ. Due to the size of these reports, a random selection of the state will be chosen

for review – a minimum of one site per agency per quarter.

- 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 FAMAS, 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).

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 12-10. 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 Gaseous QAPP, 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.

Table 12-1. Ozone Validation Template

1) Requirement (O ₃)	2) Frequency	3) Acceptance Criteria	Information /Action
CRITICAL CRITERIA-OZONE			
<i>Monitor</i>	NA	<i>Meets requirements listed in FRM/FEM designation</i>	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
<i>One Point QC Check Single analyzer</i>	<i>Every 14 days</i>	$< \pm 7.1\%$ (percent difference) or $< \pm 1.5$ 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 $< \pm 3.1$ ppb (24 hr) $< \pm 5.1$ ppb (> 24 hr-14 day) Span drift $< \pm 7.1\%$	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)	$< 2.1^\circ \text{C}$ 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	$< \pm 2.1^\circ \text{C}$ of standard	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
<i>Annual Performance Evaluation Single analyzer</i>	<i>Every site every 365 days and 1/ calendar year within period of monitor operation,</i>	Percent difference of audit levels 3-10 $< \pm 15.1\%$ Audit levels 1&2 $< \pm 1.5$ ppb difference or $< \pm 15.1\%$	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
<i>Federal Audits (NPAP)</i>	<i>20% of sites audited in calendar year</i>	Audit levels 1&2 $< \pm 1.5$ ppb difference all other levels percent difference $< \pm 10.1\%$	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 $< \pm 2.1\%$ or $\leq \pm 1.5$ ppb difference of best-fit straight line whichever is greater and Slope $1 \pm .05$	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
<i>Zero Air/Zero Air Check</i>	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
<i>Certification/recertification to Standard Reference Photometer (Level 1)</i>	Every 365 days and 1/calendar year	single point difference $< \pm 3.1\%$	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
<i>Level 2 and Greater Transfer Standard Precision</i>	Every 365 days and 1/calendar year	<i>Standard Deviation less than 0.005 ppm or 3.0% whichever is greater</i>	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	$< \pm 4.1\%$ or $< \pm 4$ 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 $\leq 3.7\%$ Std. Dev. of 6 intercepts ≤ 1.5	1, 2 and 3) Transfer Standard Guidance EPA-545/B-10-001 1
Recertification to higher level standard	Beginning and end of O ₃ season or every 182 days and 2/calendar year whichever less	New slope = ± 0.05 of previous and RSD of six slopes $\leq 3.7\%$ 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.			
<i>Noise</i>	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
<i>Lower detectable limit</i>	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			
<i>Standard Reporting Units</i>	<i>All data</i>	<i>ppm (final units in AQS)</i>	1, 2 and 3) 40 CFR Part 50 App U Sec. 3(a)
<i>Rounding convention for design value calculation</i>	<i>All routine concentration data</i>	<i>3 places after decimal with digits to right truncated</i>	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.
<i>Completeness (seasonal)</i>	<i>3-Year Comparison</i>	$\geq 90\%$ (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)
	<i>8- hour average</i>	$\geq$ 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)
	<i>Valid Daily Max</i>	$\geq$ 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)
<i>Sample Residence Time Verification</i>	Every 365 days and 1/calendar year	≤ 20 Seconds	1) 40 CFR Part 58 App E, Sec. 9 (c) 2) Recommendation

1) Requirement (O ₃)	2) Frequency	3) Acceptance Criteria	Information /Action
			3) 40 CFR Part 58 App E, Sec. 9 (c)
<i>Sample Probe, Inlet, Sampling train</i>	<i>All sites</i>	<i>Borosilicate glass (e.g., Pyrex[®]) or Teflon[®]</i>	1) 40 CFR Part 58 App E, Sec. 9 (a) 2) Recommendation 3) 40 CFR Part 58 App E, 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
<i>Siting</i>	Every 365 days and 1/calendar year	<i>Meets siting criteria or waiver documented</i>	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
<i>Precision (using 1-point QC checks)</i>	<i>Calculated annually and as appropriate for design value estimates</i>	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)	<i>Calculated annually and as appropriate for design value estimates</i>	95% CL < $\pm 7.1\%$	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			
<i>Sampler/Monitor</i>	NA	<i>Meets requirements listed in FRM/FEM designation</i>	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
<i>One Point QC Check Single analyzer</i>	<i>Every 14 days</i>	$< \pm 10.1\%$ (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 $< \pm 0.41$ ppm (24 hr) $< \pm 0.61$ ppm (>24hr-14 day) Span drift $< \pm 10.1\%$	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)	$< 2.1^{\circ}\text{C}$ 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	$< \pm 2.1^{\circ}\text{C}$ of standard	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
<i>Annual Performance Evaluation Single Analyzer</i>	<i>Every site every 365 days and 1/ calendar year</i>	Percent difference of audit levels 3-10 $< \pm 15.1\%$ Audit levels 1&2 $< \pm 0.031$ ppm difference or $< \pm 15.1\%$	1 and 2) 40 CFR Part 58 App A Sec. 3.1.2 3) Recommendation- 3-audit concentrations not including zero. AMTIC Technical Memo
<i>Federal Audits (NPAP)</i>	<i>20% of sites audited in a calendar year</i>	Audit levels 1&2 $< \pm 0.031$ ppm difference all other levels percent difference $< \pm 15.1\%$	1 and 2) 40 CFR Part 58 App A Sec. 3.1.3 3) NPAP QAPP/SOP
<i>Verification/Calibration</i>	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 $< \pm 2.1\%$ or $\leq \pm 0.03$ ppm difference of best-fit straight line, whichever is greater and Slope $1 \pm .05$	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
<i>Gaseous Standards</i>	All gas cylinders	<u>NIST Traceable</u> (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
<i>Zero Air/Zero Air Check</i>	Every 365 days and 1/ calendar year	$< 0.1 \text{ ppm CO}$	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 $< \pm 2.1 \%$	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.			
<i>Noise</i>	Every 365 days and 1/ calendar year	$\leq 0.2 \text{ ppm (standard range)}$ $\leq 0.1 \text{ ppm (lower range)}$	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
<i>Lower detectable level</i>	Every 365 days and 1/ calendar year	$\leq 0.4 \text{ ppm (standard range)}$ $\leq 0.2 \text{ ppm (lower range)}$	1) 40 CFR Part 53.23 (c) (definition & procedure) 2) Recommendation 3) 40 CFR Part 53.20 Table B-1
SYSTEMATIC CRITERIA-CO			
<i>Standard Reporting Units</i>	<i>All data</i>	<i>ppm (final units in AQS)</i>	1, 2 and 3) 40 CFR Part 50.8 (a)
<i>Rounding convention for design value calculation</i>	<i>All routine concentration data</i>	<i>1 decimal place</i>	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.
<i>Completeness</i>	<i>8-hour standard</i>	<i>75% of hourly averages for the 8-hour period</i>	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	$\leq 20 \text{ Seconds}$	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	<i>Meets siting criteria or waiver documented</i>	1) 40 CFR Part 58 App E, Sec. 2-6 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-6
<i>Precision (using 1-point QC</i>	<i>Calculated annually and as</i>	<i>90% CL CV < 10.1%</i>	1) 40 CFR part 58 App A Sec. 3.1.1

1) Requirement (CO)	2) Frequency	3) Acceptance Criteria	Information /Action
<i>checks)</i>	<i>appropriate for design value estimates</i>		2) 40 CFR Part 58 App A Sec. 4 (b) 3) 40 CFR Part 58 App A Sec. 4.1.2
<i>Bias (using 1-point QC checks)</i>	<i>Calculated annually and as appropriate for design value estimates</i>	<i>95% CL < $\pm$ 10.1%</i>	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. NO₂, NO_x, NO Validation Template

1) Requirement (NO ₂)	2) Frequency	3) Acceptance Criteria	Information /Action
CRITICAL CRITERIA- NO₂			
<i>Sampler/Monitor</i>	<i>NA</i>	<i>Meets requirements listed in FRM/FEM designation</i>	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
<i>One Point QC Check Single analyzer</i>	<i>Every 14 days</i>	$< \pm 15.1\%$ (percent difference) or $< \pm 1.5$ 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 $< \pm 3.1$ ppb (24 hr) $< \pm 5.1$ ppb (> 24 hr-14 day) Span drift $< \pm 10.1\%$	1 and 2) QA Handbook Volume 2 Sec. 12.3 3) Recommendation and related to DQO
<i>Converter Efficiency</i>	During multi-point calibrations, span and audit Every 14 days	$(\geq 96\%)$ 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 $\geq 96\%$, 96 – 104.1% is a recommendation.
OPERATIONAL CRITERIA- NO₂			
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)	$< 2.1^{\circ}$ 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	$< \pm 2.1^{\circ}$ C of standard	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
<i>Annual Performance Evaluation Single Analyzer</i>	<i>Every site every 365 days and 1/ calendar year</i>	Percent difference of audit levels 3-10 $< \pm 15.1\%$ Audit levels 1&2 $< \pm 1.5$ ppb difference or $< \pm 15.1\%$	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
<i>Federal Audits (NPAP)</i>	20% of sites audited in calendar year	Audit levels 1&2 $< \pm 1.5$ ppb difference all other levels percent difference $< \pm 15.1\%$	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
<i>Verification/Calibration</i>	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 $\leq \pm 2.1\%$ or $\leq \pm 1.5$ ppb difference of best-fit straight line whichever is greater and Slope $1 \pm .05$	1) 40 CFR Part 50 App F 2 and 3) Recommendation Multi-point calibration (0 and 4 upscale points) Slope criteria is a recommendation
<i>Gaseous Standards</i>	All gas cylinders	<u>NIST Traceable</u> (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 requirement. Gas producer used must participate in EPA Ambient Air Protocol Gas Verification Program 40 CFR Part 58 App A Sec. 2.6.1
<i>Zero Air/ Zero Air Check</i>	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 $< \pm 2.1\%$	1, 2 and 3) Recommendation based on SO ₂ 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.			
<i>Noise</i>	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
<i>Lower detectable level</i>	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- NO₂			
<i>Standard Reporting Units</i>	<i>All data</i>	<i>ppb (final units in AQS)</i>	1, 2 and 3) 40 CFR Part 50 App S Sec. 2 (c)
<i>Rounding convention for data reported to AQS</i>	<i>All routine concentration data</i>	<i>1 place after decimal with digits to right truncated</i>	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.
<i>Completeness</i>	<i>Annual Standard</i>	$\geq 75\%$ 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)
	<i>1-hour standard</i>	1) 3 consecutive calendar years of complete data 2) 4 quarters complete in each year 3) $\geq 75\%$ sampling days in quarter 4) $\geq 75\%$ 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
<i>Sample Residence Time Verification</i>	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)
<i>Sample Probe, Inlet, Sampling train</i>	<i>All sites</i>	<i>Borosilicate glass (e.g., Pyrex®) or Teflon®</i>	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
<i>Siting</i>	Every 365 days and 1/ calendar year	<i>Meets siting criteria or waiver documented</i>	1) 40 CFR Part 58 App E, Secs 2-6 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-6
<i>Precision (using 1-point QC checks)</i>	<i>Calculated annually and as appropriate for design value estimates</i>	<i>90% CL CV < 15.1%</i>	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
<i>Bias (using 1-point QC checks)</i>	<i>Calculated annually and as appropriate for design value estimates</i>	<i>95% CL < ± 15.1%</i>	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. SO₂ Validation Template

1) Requirement (SO ₂)	2) Frequency	3) Acceptance Criteria	Information /Action
CRITICAL CRITERIA- SO₂			
<i>Sampler/Monitor</i>	NA	<i>Meets requirements listed in FRM/FEM designation</i>	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
<i>One Point QC Check Single analyzer</i>	<i>Every 14 days</i>	$< \pm 10.1\%$ (percent difference) or $< \pm 1.5$ 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 $< \pm 3.1$ ppb (24 hr) $< \pm 5.1$ ppb (> 24 hr-14 day) Span drift $< \pm 10.1\%$	1 and 2) QA Handbook Volume 2 Sec. 12.3 3) Recommendation and related to DQO
OPERATIONAL CRITERIA- SO₂			
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)	$< 2.1^{\circ}$ 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	$< \pm 2.1^{\circ}$ C of standard	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
<i>Annual Performance Evaluation Single Analyzer</i>	<i>Every site every 365 days and 1/ calendar year</i>	Percent difference of audit levels 3-10 $< \pm 15.1\%$ Audit levels 1&2 $< \pm 1.5$ ppb difference or $< \pm 15.1\%$	1 and 2) 40 CFR Part 58 App A Sec. 3.1.2 3) Recommendation - 3-audit concentrations not including zero. AMTIC Technical Memo
<i>Federal Audits (NPAP)</i>	20% of sites audited in calendar year	Audit levels 1&2 $< \pm 1.5$ ppb difference all other levels percent difference $< \pm 15.1\%$	1&2) 40 CFR Part 58 App A Sec. 3.1.3 3) NPAP QAPP/SOP
<i>Verification/Calibration</i>	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 $< \pm 2.1\%$ or $< \pm 1.5$ ppb difference of best-fit straight line whichever is greater and Slope $1 \pm .05$	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
<i>Gaseous Standards</i>	<i>All gas cylinders</i>	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
<i>Zero Air/ Zero Air Check</i>	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
<i>Gas Dilution Systems</i>	Every 365 days and 1/ calendar year or after failure of 1point QC check or performance evaluation	<i>Accuracy</i> < ± 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.			
<i>Noise</i>	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
<i>Lower detectable level</i>	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- SO₂			
<i>Standard Reporting Units</i>	<i>All data</i>	<i>ppb (final units in AQS)</i>	1, 2 and 3) 40 CFR Part 50 App T Sec. 2 (c)
<i>Rounding convention for design value calculation</i>	<i>All routine concentration data</i>	<i>1 place after decimal with digits to right truncated</i>	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.
<i>Completeness</i>	<i>1 hour standard</i>	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.
<i>Sample Residence Time Verification</i>	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)
<i>Sample Probe, Inlet, Sampling train</i>	<i>All sites</i>	<i>Borosilicate glass (e.g., Pyrex®) or Teflon®</i>	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
<i>Siting</i>	Every 365 days and 1/ calendar year	<i>Meets siting criteria or waiver documented</i>	1) 40 CFR Part 58 App E, Sec. 2-6 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-6
<i>Precision (using 1-point QC checks)</i>	<i>Calculated annually and as appropriate for design value estimates</i>	<i>90% CL CV < 10.1%</i>	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
<i>Bias (using 1-point QC checks)</i>	<i>Calculated annually and as appropriate for design value estimates</i>	<i>95% CL < ± 10.1%</i>	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 (PM _{2.5} LC)	2) Frequency	3) Acceptable Range	Information /Action
CRITICAL CRITERIA- PM_{2.5} Filter Based Local Conditions			
Field Activities			
<i>Sampler/Monitor</i>	NA	<i>Meets requirements listed in FRM/FEM/ARM designation</i>	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
Filter Holding Times			
<i>Pre-sampling</i>	<i>all filters</i>	<i>≤ 30 days before sampling</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.3.5
<i>Sample Recovery</i>	<i>all filters</i>	<i>≤ 7 days 9 hours from sample end date</i>	1, 2 and 3) 40 CFR Part 50, App. L 10.10
<i>Sampling Period (including multiple power failures)</i>	<i>all filters</i>	<i>1380-1500 minutes, or if value < 1380 and exceedance of NAAQS ^{1/} midnight to midnight local standard time</i>	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			
<i>Average Flow Rate</i>	<i>every 24 hours of op</i>	<i>average within 5% of 16.67 liters/minute</i>	1, 2 and 3) Part 50 App L Sec. 7.4.3.1
<i>Variability in Flow Rate</i>	<i>every 24 hours of op</i>	<i>CV ≤ 2%</i>	1, 2 and 3) 40 CFR Part 50, App L Sec. 7.4.3.2
<i>One-point Flow Rate Verification</i>	<i>every 30 days each seperated by 14 days</i>	<i>< + 4.1% of transfer standard < ± 5.1% of flow rate design value</i>	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
<i>Design Flow Rate Adjustment</i>	<i>After multi-point calibration or verification</i>	<i>< ± 2.1% of design flow rate</i>	1, 2 and 3) 40 CFR Part 50, App. L, Sec. 9.2.6
<i>Individual Flow Rates</i>	<i>every 24 hours of op</i>	<i>no flow rate excursions > ±5% for > 5 min. ^{1/}</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 7.4.3.1
<i>Filter Temp Sensor</i>	<i>every 24 hours of op</i>	<i>no excursions of > 5° C lasting longer than 30 min ^{1/}</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 7.4.11.4
<i>External Leak Check</i>	<i>Before each flow rate verification/calibration and before and after PM_{2.5} separator maintenance</i>	<i>< 80.1 mL/min (see comment #1)</i>	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
<i>Internal Leak Check</i>	<i>If failure of external leak check</i>	<i>< 80.1 mL/min</i>	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
<i>Post-sampling Weighing</i>	<i>all filters</i>	<i>Protected from exposure to temperatures above 25C from sample retrieval to conditioning</i> <i>≤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</i>	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
<i>Filter Visual Defect Check (unexposed)</i>	<i>all filters</i>	<i>Correct type & size and for pinholes, particles or imperfections</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 10.2
<i>Filter Conditioning Environment</i>			
<i>Equilibration</i>	<i>all filters</i>	<i>24 hours minimum</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.5
<i>Temp. Range</i>	<i>all filters</i>	<i>24-hr mean 20.0-23.0° C</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.1
<i>Temp. Control</i>	<i>all filters</i>	<i>< 2.1° C SD* over 24 hr.</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.2 SD use is a recommendation
<i>Humidity Range</i>	<i>all filters</i>	<i>24-hr mean 30.0% - 40.0% RH or Within ±5.0 % sampling RH but ≥ 20.0%RH</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.3
<i>Humidity Control</i>	<i>all filters</i>	<i>< 5.1 % SD* over 24 hr.</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.2.4 SD use is recommendation
<i>Pre/post Sampling RH</i>	<i>all filters</i>	<i>difference in 24-hr means < ± 5.1% RH</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.3.3
<i>Balance</i>	<i>all filters</i>	<i>located in filter conditioning environment</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 8.3.2
<i>Microbalance Auto-Calibration</i>	<i>Prior to each weighing session</i>	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			
<i>One-point Temp Verification</i>	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
<i>Pressure Verification</i>	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			
<i>Temperature multi-point Verification/Calibration</i>	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
<i>Pressure Verification/Calibration</i>	on installation, and on one-point verification failure	$< \pm 10.1$ 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
<i>Flow Rate Multi-point Verification/Calibration</i>	<i>Electromechanical maintenance or transport or every 365 days and once a calendar year</i>	$< \pm 2.1\%$ 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			
<i>Collocated Samples</i>	<i>every 12 days for 15% of sites by method designation</i>	CV $< 10.1\%$ of samples $\geq 3.0 \mu\text{g}/\text{m}^3$	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	$< \pm 2.1^\circ\text{C}$	1, 2 and 3) Method 2.12 Sec. 11.2.2
Pressure Audit	every 180 days and at time of flow rate audit	$< \pm 10.1$ mm Hg	1, 2 and 3) Method 2.12 Sec. 11.2.3
<i>Semi Annual Flow Rate Audit</i>	<i>Twice a calendar year and between 5-7 months apart</i>	$< \pm 4.1\%$ of audit standard $< \pm 5.1\%$ 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	$< \pm 15.1 \mu\text{g}$ 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	$< \pm 15.1 \mu\text{g}$ 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 (PM _{2.5} LC)	2) Frequency	3) Acceptable Range	Information /Action
<i>Field Filter Blank</i>	10% or 1 per weighing session	$< \pm 30.1 \mu\text{g}$ 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
<i>Lab Filter Blank</i>	10% or 1 per weighing session	$< \pm 15.1 \mu\text{g}$ 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	$< \pm 3.1 \mu\text{g}$ 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	$< \pm 15.1 \mu\text{g}$ change between weighings	1, 2 and 3) Method 2.12 Sec. 10.8
Microbalance Audit	every 365 days and once a calendar year	$< \pm 0.003 \text{ mg}$ or manufacturers specs, whichever is tighter	1, 2 and 3) Method 2.12 Sec. 11.2.7
Lab Temp Check	Every 90 days	$< \pm 2.1^\circ\text{C}$	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			
<i>Microbalance Calibration</i>	<i>At installation</i> 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	$< \pm 2.1^\circ\text{C}$	1, 2 and 3) Method 2.12 Sec. 4.3.8 and 9.4
Lab Humidity Certification	every 365 days and once a year	$< \pm 2.1\%$	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	$< \pm 2.1 \mu\text{g}$	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			
<i>Siting</i>	every 365 days and once a calendar year	<i>Meets siting criteria or waiver documented</i>	1) 40 CFR Part 58 App E, Sec. 2-5 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-5
<i>Data Completeness</i>	<i>Annual Standard</i>	$\geq 75\%$ scheduled sampling days in each quarter	1, 2 and 3) 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
	<i>24- Hour Standard</i>	$\geq 75\%$ scheduled sampling days in each quarter	1, 2 and 3) 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
<i>Reporting Units</i>	<i>all filters</i>	$\mu\text{g}/\text{m}^3$ at ambient temp/pressure (PM _{2.5})	1, 2 and 3) 40 CFR Part 50 App N Sec. 3.0 (b)
<i>Rounding convention for design value calculation</i>	<i>all filters</i>	<i>to one decimal place, with additional digits to the right being truncated</i>	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
<i>Annual 3-yr average</i>	<i>all concentrations</i>	<i>nearest 0.1 µg/m³ (≥ 0.05 round up)</i>	1, 2 and 3) 40 CFR Part 50, App. N Sec. 3 and 4 Rounding convention for data reported to AQS is a recommendation
<i>24-hour, 3-year average</i>	<i>all concentrations</i>	<i>nearest 1 µg/m³ (≥ 0.5 round up)</i>	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			
<i>Lower DL</i>	<i>all filters</i>	<i>≤ 2 µg/m³</i>	1, 2 and 3) 40 CFR Part 50, App. L Sec. 3.1
<i>Upper Conc. Limit</i>	<i>all filters</i>	<i>≥ 200 µg/m³</i>	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/m ³	1, 2 and 3) Recommendation in order to provide early (quarterly) evaluation of achievement of DQOs.
<i>Primary Quality Assurance Org.</i>	<i>Annual and 3 year estimates</i>	<i>90% CL of CV < 10.1 % for values ≥ 3.0 µg/m³</i>	1, 2 and 3) 40 CFR Part 58, App A, Sec. 4.2.1 and 2.3.1.1
Bias			
<i>Performance Evaluation Program (PEP)</i>	<i>5 audits for PQAOs with ≤ 5 sites</i> <i>8 audits for PQAOs with > 5 sites</i>	<i>< ± 10.1% for values ≥ 3.0 µg/m³</i>	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 <u>NIST Traceable</u> standards			
<i>Flow Rate Transfer Std.</i>	every 365 days and once a calendar year	<i>< ± 2.1% of <u>NIST Traceable</u> Std.</i>	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	<i>1 min/mo</i>	1 and 2) Method 2.12 Sec. 4.2.1 3) <u>40 CFR Part 50, App. L</u> Sec. 7.4.12
Laboratory Activities			
<i>Microbalance Readability</i>	<i>At purchase</i>	<i>1 µg</i>	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.			
<u>1</u> / value must be flagged SD ± = standard deviation CV= coefficient of variation			

Table 12-6. PM₁₀ Filter Based High Volume (HV) STP Conditions Validation Template

1) Criteria (PM ₁₀ Hi-Vol STP)	2) Frequency	3) Acceptable Range	Information /Action
CRITICAL CRITERIA- PM₁₀ Filter Based Hi-Vol			
Field Activities			
<i>Sampler/Monitor</i>	NA	<i>Meets requirements listed in FRM/FEM/ARM designation</i>	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
Filter Holding Times			
<i>Sample Recovery</i>	<i>all filters</i>	<i>ASAP</i>	1, 2 and 3) 40 CFR Part 50 App J Sec. 9.15
<i>Sampling Period</i>	<i>all filters</i>	<i>1440 minutes ± 60 minutes midnight to midnight local standard time</i>	1, 2 and 3) 40 CFR Part 50 App J Sec. 7.1.5
<i>Average Flow Rate</i>	<i>every 24 hours of op</i>	<i>~1.13 m³/min (varies with instrument)</i>	1, 2 and 3) Method 2.11
Verification/Calibration			
<i>One-point Flow Rate Verification</i>	<i>every 90 days and 4 times a calendar year</i>	<i><± 7.1% of transfer standard and <±10.1% from design</i>	1 and 2) 40 CFR Part 58, App A, Sec. 3.3.2 3) Method 2.11 Sec. 3.5.1, Table 2-1
Lab Activities			
Filter			
<i>Visual Defect Check (unexposed)</i>	<i>all filters</i>	<i>see reference</i>	Method 2.11 Sec. 4.2
<i>Collection efficiency</i>	<i>all filters</i>	<i>99 %</i>	1, 2 and 3) 40 CFR Part 50, App J Sec. 7.2.2
<i>Alkalinity</i>	<i>all filters</i>	<i>< 25.0 microequivalents/gram</i>	1, 2 and 3) 40 CFR Part 50, App J Sec. 7.2.4
Filter Conditioning Environment			
<i>Equilibration</i>	<i>all filters</i>	<i>24 hours minimum</i>	1, 2 and 3) 40 CFR Part 50, App.J Sec. 9.3
<i>Temp. Range</i>	<i>all filters</i>	<i>15.0-30.0° C</i>	1, 2 and 3) 40 CFR Part 50, App.J Sec. 7.4.1
<i>Temp. Control</i>	<i>all filters</i>	<i>< 3.1° C SD* over 24 hr</i>	1, 2 and 3) 40 CFR Part 50, App.J Sec. 7.4.2 SD use is recommendation
<i>Humidity Range</i>	<i>all filters</i>	<i>20.0% - 45.0% RH</i>	1, 2 and 3) 40 CFR Part 50, App.J Sec. 7.4.3
<i>Humidity Control</i>	<i>all filters</i>	<i>< 5.1% SD* over 24 hr</i>	1, 2 and 3) 40 CFR Part 50, App.J Sec. 7.4.4 SD use is recommendation
<i>Pre/post Sampling RH</i>	<i>all filters</i>	<i>difference in 24-hr means < ± 5.1% RH</i>	1, 2 and 3) Recommendation based on Part 50, App. L Sec. 8.3.3
<i>Balance</i>	<i>all filters</i>	<i>located in filter conditioning environment</i>	1, 2 and 3) Recommendation based on Part 50, App. L Sec. 8.3.2
OPERATIONAL EVALUATIONS TABLE PM₁₀ Filter Based Hi-Vol			
Field Activities			
Verification/Calibration			
<i>System Leak Check</i>	<i>During precalibration check</i>	<i>Auditory inspection with faceplate blocked</i>	1, 2 and 3) Method 2.11 Sec. 2.3.2
<i>FR Multi-point Verification/Calibration</i>	<i>every 365 days and once a calendar year</i>	<i>3 of 4 cal points within <± 10.1% of design</i>	1, 2 and 3) Method 2.11 Sec. 2.3.2
<i>Field Temp M-point Verification</i>	<i>on installation, then every 365 days and once a calendar year</i>	<i>< ± 2.1°C</i>	1, 2 and 3) Recommendation
Precision			

1) Criteria (PM ₁₀ Hi-Vol STP)	2) Frequency	3) Acceptable Range	Information /Action
<i>Collocated Samples</i>	<i>every 12 days for 15% of sites</i>	$CV < 10.1\%$ of samples $\geq 15 \mu\text{g}/\text{m}^3$	1) and 2) 40 CFR Part 58 App A Sec. 3.3.4 3) Recommendation
<i>Semi Annual Flow Rate Audit</i>	<i>every 180 days and twice a calendar year</i>	$< \pm 7.1\%$ of transfer standard and $< \pm 10.1\%$ from design	1 and 2) 40 CFR Part 58, App A, Sec. 3.3.3 3) Method 2.11 Sec. 7 Table 7-1
Monitor Maintenance			
Inlet/downtube Cleaning	every 90 days and 4 times a calendar year	cleaned	1, 2 and 3) Method 2.11 Sec. 6
Motor/housing gaskets	every 90 days and 4 times a calendar year	Inspected replaced	1, 2 and 3) Method 2.11 Sec. 6
Blower motor brushes	600-1000 hours	Replace	1, 2 and 3) Method 2.11 Sec. 6
Manufacturer-Recommended Maintenance	per manufacturers' SOP	per manufacturers' SOP	NA
Lab Activities			
Lab QC Checks			
Balance Check (Standard Weight Check and Calibration Check)	beginning, 15th sample, end	$< \pm 0.51 \text{ mg}$ of true zero and $< \pm 0.51 \text{ mg}$ 1-5 g check weight	1, 2, and 3) Method 2.11 Sec. 4.5.1 and 4.5.2
"Routine" duplicate weighing	5-7 per weighing session	$< \pm 2.8 \text{ mg}$ change from original value	1, 2 and 3) Method 2.11 Sec. 4.5.3 From routine filter set
Integrity- Random sample of test field blank filters	10%	$< \pm 5.1 \mu\text{g}/\text{m}^3$	1) 40 CFR Part 50 App J Sec. 7.2.3 2) Recommendation 3) 40 CFR Part 50 App J Sec. 7.2.3
Lab Temperature Calibration	every 180 days and twice a calendar year	$< \pm 2.1^\circ\text{C}$	1, 2 and 3) Recommendation related to 40 CFR Part 50, App. L
Lab Humidity Calibration	every 180 days and twice a calendar year	$< \pm 2.1\%$	1, 2 and 3) Recommendation related to 40 CFR Part 50 App L
Microbalance Calibration	every 365 days and once a calendar year	Manufacturer's specification	
Primary Mass Stds. (compare to NIST-traceable standards)	every 365 days and once a calendar year	NIST traceable (e.g., ANSI/ASTM Class 1, 1.1 or 2)	1, 2 and 3) Method 2.11 Sec. 9
Audits			
Filter Weighing	every 365 days and once a calendar year	$< \pm 5.1 \text{ mg}$ change from original value	1) Method 2.11 Table 7-1 2) Recommendation 3) Method 2.11 Table 7-1
Balance Audit	every 365 days and once a calendar year	Observe weighing technique and check balance with ASTM Class 1 standard	1) Method 2.11 Table 7-1 2) Recommendation 3) Method 2.11 Table 7-1
SYSTEMATIC CRITERIA - PM₁₀ Filter Based Hi-Vol			

1) Criteria (PM10 Hi-Vol STP)	2) Frequency	3) Acceptable Range	Information /Action
<i>Siting</i>	Every 365 days and 1/ calendar year	<i>Meets siting criteria or waiver documented</i>	1) 40 CFR Part 58 App E, Sections 2-5 2) Recommendation
Data Completeness	quarterly	$\geq 75\%$	3) 40 CFR Part 58 App E, Sections 2-5 1, 2 and 3) 40 CFR Part 50 App. K, Sec. 2.3b & c
Reporting Units	all filters	$\mu\text{g}/\text{m}^3$ at standard temperature and pressure	1, 2 and 3) 40 CFR Part 50 App K Sec. 1
<i>Rounding convention for design value calculation</i>	<i>Each routine concentration</i>	<i>nearest 10 $\mu\text{g}/\text{m}^3$ (≥ 5 round up)</i>	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.
Precision			
Single analyzer	every 90 days and 4 times a calendar year.	Coefficient of variation (CV) $\leq 10\% \geq 15 \mu\text{g}/\text{m}^3$	1, 2 and 3) Recommendation
Single analyzer	1/ yr	$\text{CV} < 10.1\% \geq 15 \mu\text{g}/\text{m}^3$	1, 2 and 3) Recommendation
Primary Quality Assurance Org.	Annual and 3 year estimates	90% CL of CV $< 10.1\% \geq 15 \mu\text{g}/\text{m}^3$	1, 2 and 3) Recommendation
Field Activities			
Verification/Calibration Standards and Recertifications - All standards should have multi-point certifications against <u>NIST Traceable</u> standards			
<i>Flow Rate Transfer Std.</i>	every 365 days and once a calendar year	$< \pm 2.1\%$ 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	$\pm 0.1^\circ\text{C}$ resolution, $\pm 0.5^\circ\text{C}$ accuracy	1, 2 and 3) Method 2.11 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 2.11 Sec. 1.1.2
<i>Clock/timer Verification</i>	4/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
Lab Activities			
<i>Microbalance</i>	at purchase	Readability 0.1 mg Repeatability 0.5 mg (HV)	1 and 2) 40 CFR Part 50, App.J Sec. 7.5 3) Method 2.11 Sec. 4.4
Primary Mass Stds. (compare to NIST-traceable standards)	at purchase	NIST traceable (e.g., ANSI/ASTM Class 1, 1.1 or 2)	1, 2 and 3) Method 2.11 Sec. 9
SD= standard deviation CV= coefficient of variation			

Table 12-7. 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			
<i>Sampler/Monitor</i>	NA	<i>Meets requirements listed in FRM/FEM/ARM designation</i>	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			
<i>Sample Recovery</i>	<i>all filters</i>	<i>ASAP</i>	1, 2 and 3) 40 CFR Part 50 App B Sec. 6.3
<i>Sampling Period</i>	<i>all filters</i>	<i>1440 minutes ± 60 minutes midnight to midnight local standard time</i>	1, 2 and 3) 40 CFR Part 50 App B Sec. 8.15
Sampling Instrument			
<i>Average Flow Rate</i>	<i>every 24 hours of op</i>	<i>1.1-1.70 m³/min (varies with instrument) in actual condition</i>	1, 2 and 3) 40 CFR Part 50 App B Sec. 8.8
<i>One-point Flow Rate Verification</i>	<i>every 90 days and 4 times a calendar year</i>	<i>< ±7.1% from transfer standard</i>	1 and 2) 40 CFR Part 58 App A Sec. 3.4.2 3) Method 2.2 Sec. 2.6
Lab Activities			
Filter			
<i>Visual Defect Check (unexposed)</i>	<i>all filters</i>	<i>Initial backlight inspection- no pinholes or imperfections. Visual inspection prior to shipping to analytical lab</i>	1, 2 and 3) 40 CFR Part 50 App B Sec. 8.2
<i>Collection Efficiency</i>	<i>all filters</i>	<i>99 %</i>	1, 2 and 3) 40 CFR Part 50 App B Sec. 7.1.4
<i>Pressure Drop Range</i>	<i>all filters</i>	<i>42-54 mm Hg</i>	1, 2 and 3) 40 CFR Part 50 App B Sec. 7.1.5
<i>pH</i>	<i>all filters</i>	<i>6-10</i>	1, 2 and 3) 40 CFR Part 50, App B Sec. 7.1.6
<i>Pb Content</i>	<i>all filters pre-sampling batch check</i>	<i>< 75 µg/filter</i>	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.
<i>Calibration Reproducibility Checks</i>	<i>Beginning, every 10 samples and end</i>	<i>± 5% of value predicted by calibration curve</i>	1, 2 and 3) 40 CFR Part 50, App G Sec. 9.3 May be FEM dependent
<i>Initial Calibration Blank</i>	<i>Before first sample</i>	<i>< 0.001 µg/mL</i>	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	400-500	Replace	1, 2 and 3) Method 2.2 Sec. 7
Manufacturer-Recommended Maintenance	per manufacturers' SOP	per manufacturers' SOP	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)	1 st , 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
<i>Reporting Units</i>	<i>all filters</i>	$\mu\text{g}/\text{m}^3$ at local temperature and pressure.	1, 2 and 3) 40 CFR Part 50 App R Sec. 3 (b)
<i>Rounding convention for design value calculation (3-month arithmetic mean)</i>	<i>quarterly</i>	<i>Report data to 3 decimal places (data after 3 are truncated).</i>	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.
<i>Lower Detectable Limit (A4)</i>	<i>all samples</i>	$0.07 \mu\text{g Pb}/\text{m}^3$	1, 2 and 3) 40 CFR Part 50 App G Sec. 2.3
Precision			
Single analyzer	every 90 days and 4 times a calendar year.	Coefficient of variation (CV) $< 20.1\% \geq 0.02 \mu\text{g}/\text{m}^3$	1 and 2) 40 CFR Part 58 App A Sec. 3.4.4 3) Recommendation related to DQO
Primary Quality Assurance Org.	Annual and 3 year estimates	90% CL of CV $< 20.1\% \geq 0.02 \mu\text{g}/\text{m}^3$	1, 2 and 3) 40 CFR Part 58 App A Sec. 3.4.4 and Sec. 2.3.1.3
Bias			
Performance Evaluation Program (PEP)	5 audits for PQAOs with ≤ 5 sites 8 audits for PQAOs with > 5 sites	95% CL Absolute bias $< \pm 15.1\% \geq 0.02 \mu\text{g}/\text{m}^3$	1, 2 and 3) 40 CFR Part 58 App A Sec. 3.4.7 and Sec. 2.3.1.3 The PEP include 1 or independent collocated audits and 4 or 6 samples from the monitoring organizations collocated monitor sent to the independent National PEP Laboratory.
Field Activities			
Verification/Calibration Standards and Recertifications - All standards should have multi-point certifications against NIST Traceable standards			
Flow Rate Transfer Std.	every 365 days and once a calendar year	Resolution $0.02 \text{ m}^3/\text{min}$ $\pm 2\%$ 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	$\pm 5 \text{ mm Hg}$ 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.	$\pm 2 \text{ min}/24\text{-hour}$	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 $\text{Pb}(\text{NO}_3)_2$	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

Table 12-8. Continuous PM₁₀ STP Conditions Validation Template

1) Criteria (PM ₁₀ Cont)	2) Frequency	3) Acceptable Range	Information /Action
CRITICAL CRITERIA- PM₁₀ Continuous			
<i>Sampler/Monitor</i>	NA	<i>Meets requirements listed in FRM/FEM/ARM designation</i>	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 $\pm$ 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 $< \pm 5.1\%$ of design	recommendation
Verification/Calibration			
<i>One-point Flow Rate Verification</i>	<i>every 30 days each seperated by 14 days</i>	$< \pm 7.1\%$ 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 PM₁₀ 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
<i>FR Multi-point Verification/Calibration</i>	every 365 days and once a calendar year	3 of 4 cal points within $< \pm 10.1\%$ of design	1) 40 CFR Part 50 App J Sec. 8.0 2 and 3) Method 2.10 Sec. 2.2.4
Audits			
<i>Semi Annual Flow Rate Audit</i>	<i>Twice a calendar year and 5-7 months apart</i>	$< \pm 10.1\%$ 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 - PM₁₀ Continuous			
<i>Siting</i>	Every 365 days and 1/ calendar year	<i>Meets siting criteria or waiver documented</i>	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	$\geq 75\%$	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	µg/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 µg/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 12-9. Continuous PM_{2.5} STP Conditions Validation Template

1) Criteria (PM _{2.5} Cont)	2) Frequency	3) Acceptable Range	Information /Action
CRITICAL CRITERIA- PM_{2.5} Continuous, Local Conditions			
<i>Sampler/Monitor Designation</i>	NA	<i>Meets requirements listed in FRM/FEM/ARM designation</i> 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. <i>Firmware settings must be set for flowrate to operate and report at "local conditions" (i.e., not STP).</i>	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. <i>A 24-hour period is calculated in AQS if 18 or more valid hours are reported for a day ¹².</i>	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 separator 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	$CV \leq 2\%$	1, 2 and 3) 40 CFR Part 50, App L Sec. 7.4.3.2
One-point Flow Rate Verification	every 30 days each separated 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	$< \pm 2.1\%$ 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. 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	$< \pm 2.1^{\circ}\text{C}$	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	$< \pm 2.1^{\circ}\text{C}$	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	$< \pm 10.1$ 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
<i>Flow Rate Multi-point Verification/ Calibration</i>	<i>Electromechanical maintenance or transport or</i> Every 365 days and 1/ calendar year	$< \pm 2.1\%$ 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			
<i>Collocated Samples</i>	<i>every 12 days for 15% of sites by method designation</i>	$CV < 10.1\%$ of samples $\geq 3 \mu\text{g}/\text{m}^3$	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	$< \pm 2.1^\circ\text{C}$	1, 2 and 3) Method 2.12 Sec. 11.2.2
Pressure Audit	every 180 days and at time of flow rate audit	$< \pm 10.1 \text{ mm Hg}$	1, 2 and 3) Method 2.12 Sec. 11.2.3
<i>Semi Annual Flow Rate Audit</i>	<i>Twice a calendar year and 5-7 months apart</i>	$< \pm 4.1\%$ of audit standard $< \pm 5.1\%$ 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)	$< 2.1^\circ\text{C}$ 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	$< \pm 2.1^\circ\text{C}$	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 $< \pm 5.1\%$	1,2 and 3) TEOM SOP Sec. 10.1.2
Bypass leak check (TEOM)	every 30 days	$\pm 0.60 \text{ lpm}$	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 $\pm 1 \mu\text{g}/\text{m}^3$ (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	$\leq 0.42 \text{ L/min}$	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)	Every 30 days 10 randomly selected values	agree exactly (digital) and $\pm 1 \mu\text{g}/\text{m}^3$ (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
Clean/replace internal debris filter	Every 365 days and 1/ calendar year		
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 $< 2.4 \mu\text{g}/\text{m}^3$	Per operator manual
SYSTEMATIC CRITERIA- PM_{2.5} Continuous, Local Conditions			
<i>Siting</i>	every 365 days and once a calendar year	<i>Meets siting criteria or waiver documented</i>	1) 40 CFR Part 58 App E, Sec. 2-5 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-5
<i>Data Completeness</i>	<i>Annual Standard</i>	$\geq 75\%$ scheduled sampling days in each quarter	1, 2 and 3) 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
	<i>24- Hour Standard</i>	$\geq 75\%$ scheduled sampling days in each quarter	1, 2 and 3) 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
<i>Reporting Units</i>	<i>all filters</i>	$\mu\text{g}/\text{m}^3$ at ambient temp/pressure (PM _{2.5})	1, 2 and 3) 40 CFR Part 50 App N Sec. 3.0 (b)
<i>Rounding convention for data reported to AQS</i>	<i>all filters</i>	<i>to one decimal place or as reported by instrument</i>	1, 2 and 3) 40 CFR Part 50 App N Sec. 3.0 (b)
<i>Annual 3-yr average</i>	<i>all concentrations</i>	<i>nearest 0.1 $\mu\text{g}/\text{m}^3$ (≥ 0.05 round up)</i>	1,2 and 3) 40 CFR Part 50, App. N Sec. 3 and 4 Rounding convention for data reported to AQS is a recommendation
<i>24-hour, 3-year average</i>	<i>all concentrations</i>	<i>nearest 1 $\mu\text{g}/\text{m}^3$ (≥ 0.5 round up)</i>	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			
<i>Flow Rate Transfer Std.</i>	every 365 days and once a calendar year	$< \pm 2.1\%$ of <i>NIST Traceable Std.</i>	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	$\pm 0.1^\circ \text{C}$ resolution, $\pm 0.5^\circ \text{C}$ 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	Every 30 days	1 min/mo^{**}	1 and 2) Method 2.12 Sec. 4.2.1 3) 40 CFR Part 50, App I , Sec. 7.4.12
Precision			
Single analyzer (collocated monitors)	every 90 days	Coefficient of variation (CV) $< 10.1\%$ for values $\geq 3.0 \mu\text{g}/\text{m}^3$	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	$90\% \text{ CL of CV} < 10.1\% \text{ for values } \geq 3.0 \mu\text{g}/\text{m}^3$	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	$< \pm 10.1\% \text{ for value } > 3 \mu\text{g}/\text{m}^3$	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 12-10. PM2.5 Continuous Local Conditions Validation Template

1) Criteria (PM2.5 Cont)	2) Frequency	3) Acceptable Range	Information /Action
CRITICAL CRITERIA- PM_{2.5} Continuous, Local Conditions			
<i>Sampler/Monitor Designation</i>	NA	<i>Meets requirements listed in FRM/FEM/ARM designation</i> 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. <i>Firmware settings must be set for flowrate to operate and report at "local conditions" (i.e., not STP).</i>	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. <i>A 24-hour period is calculated in AQS if 18 or more valid hours are reported for a day ¹².</i>	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 separator 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	$CV \leq 2\%$	1, 2 and 3) 40 CFR Part 50, App L Sec. 7.4.3.2
One-point Flow Rate Verification	every 30 days each separated by 14 days	$< \pm 4.1\%$ of transfer standard $< \pm 5.1\%$ 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	$< \pm 2.1\%$ 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. 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	$< \pm 2.1^\circ\text{C}$	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	$< \pm 2.1^\circ\text{C}$	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	$< \pm 10.1$ 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
<i>Flow Rate Multi-point Verification/ Calibration</i>	<i>Electromechanical maintenance or transport or Every 365 days and 1/ calendar year</i>	$< \pm 2.1\%$ 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			
<i>Collocated Samples</i>	<i>every 12 days for 15% of sites by method designation</i>	$CV < 10.1\%$ of samples $\geq 3 \mu\text{g}/\text{m}^3$	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	$< \pm 2.1^\circ\text{C}$	1, 2 and 3) Method 2.12 Sec. 11.2.2
Pressure Audit	every 180 days and at time of flow rate audit	$< +10.1 \text{ mm Hg}$	1, 2 and 3) Method 2.12 Sec. 11.2.3
<i>Semi Annual Flow Rate Audit</i>	<i>Twice a calendar year and 5-7 months apart</i>	$< \pm 4.1\%$ of audit standard $< \pm 5.1\%$ 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)	$< 2.1^\circ\text{C}$ 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	$< \pm 2.1^\circ\text{C}$	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 $< \pm 5.1\%$	1,2 and 3) TEOM SOP Sec. 10.1.2
Bypass leak check (TEOM)	every 30 days	$\pm 0.60 \text{ lpm}$	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 $\pm 1 \mu\text{g}/\text{m}^3$ (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	$\leq 0.42 \text{ L/min}$	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)	Every 30 days 10 randomly selected values	agree exactly (digital) and $\pm 1 \mu\text{g}/\text{m}^3$ (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
Clean/replace internal debris filter	Every 365 days and 1/ calendar year		
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 $< 2.4 \mu\text{g}/\text{m}^3$	Per operator manual
SYSTEMATIC CRITERIA- PM_{2.5} Continuous, Local Conditions			
<i>Siting</i>	every 365 days and once a calendar year	<i>Meets siting criteria or waiver documented</i>	1) 40 CFR Part 58 App E, Sec. 2-5 2) Recommendation 3) 40 CFR Part 58 App E, Sec. 2-5
<i>Data Completeness</i>	<i>Annual Standard</i>	$\geq 75\%$ scheduled sampling days in each quarter	1, 2 and 3) 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
	<i>24- Hour Standard</i>	$\geq 75\%$ scheduled sampling days in each quarter	1, 2 and 3) 40 CFR Part 50, App. N, Sec. 4.1 (b) 4.2 (a)
<i>Reporting Units</i>	<i>all filters</i>	$\mu\text{g}/\text{m}^3$ at ambient temp/pressure (PM _{2.5})	1, 2 and 3) 40 CFR Part 50 App N Sec. 3.0 (b)
<i>Rounding convention for data reported to AQS</i>	<i>all filters</i>	<i>to one decimal place or as reported by instrument</i>	1, 2 and 3) 40 CFR Part 50 App N Sec. 3.0 (b)
<i>Annual 3-yr average</i>	<i>all concentrations</i>	<i>nearest $0.1 \mu\text{g}/\text{m}^3$ (≥ 0.05 round up)</i>	1,2 and 3) 40 CFR Part 50, App. N Sec. 3 and 4 Rounding convention for data reported to AQS is a recommendation
<i>24-hour, 3-year average</i>	<i>all concentrations</i>	<i>nearest $1 \mu\text{g}/\text{m}^3$ (≥ 0.5 round up)</i>	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 <u>NIST Traceable</u> standards			
<i>Flow Rate Transfer Std.</i>	every 365 days and once a calendar year	$< \pm 2.1\%$ of <u>NIST Traceable</u> 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	$\pm 0.1^\circ \text{C}$ resolution, $\pm 0.5^\circ \text{C}$ 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 $\mu\text{g}/\text{m}^3$	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 $\mu\text{g}/\text{m}^3$	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	$< \pm 10.1\%$ for value > 3 $\mu\text{g}/\text{m}^3$	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

Additionally, below, Table 12-11, are action levels established by EPA's Region 4 (November 2016) that have subsequently been adopted by Florida's PQAQ. These action levels are comprised of both control limits and warning limits.

Table 12-11. 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 12-12 below. For the zero drift, if the monitor exceeds these control limits, the data must first be investigated, and if deemed appropriate, invalidated back to the last passing check. The control limit is the level of allowable imprecision before data invalidation is required.

Table 12-12. 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%

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 (NO₂)	Annual	53 ppb ^c	Primary and Secondary	Annual Mean
	1-hour	100 ppb	Primary	98th percentile, averaged over 3 years
Ozone (O₃)	8-hour	0.070 ppm	Primary and Secondary	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Lead (Pb)	Rolling 3-month	0.15 µg/m ³	Primary and Secondary	Not to be exceeded
Particulate Matter (PM₁₀) ^d	24-hour	150 µg/m ³	Primary and Secondary	Not to be exceeded more than once per year on average over 3 years
Particulate Matter (PM_{2.5}) ^e	Annual	12.0 µg/m ³	Primary	Annual mean, averaged over 3 years
	Annual	15.0 µg/m ³	Secondary	Annual mean, averaged over 3 years
	24-hour	35 µg/m ³	Primary and Secondary	98th percentile, averaged over 3 years
Sulfur Dioxide (SO₂)	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, nitrogen oxides, particulate matter, and lead within the Florida PQAQ. 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.

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.

- 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 Section 3.1.1 of 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. If the results of the failed audit are confirmed and results in the invalidation of data, the audit results should not be reported to AQS or used in the determination of an agency's accuracy. However, all audits (passing and failing) must be entered into FAMAS. Furthermore, corrective actions must be completed in accordance with the Corrective Action SOP (DEP 01-4).

Note: Enter all audits, both passing and failing, at all levels (1 thru 10) into FAMAS. Exclude failed audits (if an audit fails at levels 3-10) from being uploaded into AQS.

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 are sufficient. If data needs to be invalidated or flagged, the onus is on the agency to do so in FAMAS. However, OAM's data validation team ensures that these data are handled appropriately in FAMAS and subsequently in AQS.

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.
	>±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.

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%

Pollutant Type	Precision & Accuracy or Design Percent Difference Limits	Acceptable Limit: No Action Required	Action Required	Out of Tolerance: Corrective Action
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%
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 PM₁₀ field and laboratory requirements stated here are consistent with those stated in 40 CFR Part 50. See Appendix G.

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}, PM₁₀, and lead). Florida DEP also conducts internal audits of their quality system. If the outcome of a TSA, 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 FAMAS 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 the calendar year. OAM staff will review agency records and data reported in FAMAS 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 reviews 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 EPCHC 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, $\leq \pm 10.1\%$ (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 FAMAS must be completed monthly, no later than 25 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. Additionally, the QA Coordinator from each agency is required to submit a completed FORM DEP 18-27-A, “Data Validation Checklist”, a signed and dated FAMAS Completeness Report, and narrative, if applicable, to OAM’s data validation team (see Section 12.7) no later than 40 days after the completion of the quarter. OAM’s data validation team is also responsible for completing this form for each of its eight territories. The following describes ongoing data review that each agency must perform.

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 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, NO₂, NO_x)

Nitrogen dioxide (NO₂) is one of a group of highly reactive gases known as "oxides of nitrogen," or "nitrogen oxides (NO_x)." NO₂ forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment.

1. The NO or NO₂ 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, NO₂ greater than 30 ppb/hour needs to be evaluated.
5. Constant NO, NO_x, or NO₂ 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 be 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 (SO₂)

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 SO₂ concentration should be less than 75 ppb.
2. The minimum SO₂ concentration should be greater than -2 ppb.
3. A rate of change in SO₂ concentration greater than 40 ppb/hour needs to be investigated.
4. Constant SO₂ 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 $\mu\text{g}/\text{m}^3$.
2. Minimum PM₁₀/PM_{2.5} concentrations should be greater than the negative Federal MDL.
3. Rates of change in PM₁₀/PM_{2.5} concentrations greater than 50 $\mu\text{g}/\text{m}^3$ per hour should

be investigated.

4. Particulate concentrations (concentrations greater than $50 \mu\text{g}/\text{m}^3$) 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 $\text{PM}_{2.5}$ monitors, $\text{PM}_{2.5}$ concentrations should be less than PM_{10} concentrations.

12.6.3 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 $\text{PM}_{2.5}$ hourly concentrations should normally be less than $200 \mu\text{g}/\text{m}^3$ but greater than $2 \mu\text{g}/\text{m}^3$.
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 ($\text{PM}_{2.5}$, 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 $\text{PM}_{2.5}$ monitors, $\text{PM}_{2.5}$ concentrations should be less than PM_{10} concentrations.
6. $\text{PM}_{2.5}$ filter blanks should not exceed $\pm 30 \mu\text{g}/\text{m}^3$.
 - If exceeded, the instrument should be checked and more frequent maintenance/cleaning may be required.

12.6.4 Overall Data Review (Continuous and Manual Sampling)

The following procedures cover the review of continuous monitor data and the overall data review.

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.

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 FAMAS 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. 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.
4. 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.
5. Check that due dates for all preventative maintenance are being met.
6. 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.
7. Ensure that the certification dates for certified equipment are correct and up-to-date.
8. 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. (See Section 12.2's validation templates for the shelter temperature control limits associated with each parameter. See also Section 12.9 for the list of null codes and QA qualifiers).
9. 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.
10. 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.
11. 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 FAMAS, etc.).
 - a. For example, a bench temperature of 345⁰C 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.
12. 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 Table 12-11 for the summary of control and warning limits for gaseous parameters). 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.

Note: Effective January 1, 2017, the Florida PQAQO implemented the use of the EPA Rounding Policy. Ensure the rounding policy is utilized appropriately (see Appendix F in this document).

- a. The nightly/bi-weekly analyzer checks are done to establish legally defensible data. This check is also done to bracket periods of valid data and to document analyzer responses before and after any major maintenance/repair activities. The Z/S/P check may be performed using either a manual or automated system. To meet the minimum data validation requirements (see Tables 12-1 through 12-4), a Z/S/P check must be run at a minimum of once every 14 days. The requirement of the traditional 14-day manual Z/S/P check is met at sites running the automated nightly checks.
 - i. In the event a required manual one-point QC check is performed beyond the 14-day period, ensure that the QA qualifier flag (6-QAPP issue) is applied in FAMAS to those days exceeding the 14th day if the next QC check passes. However, if the subsequent QC check fails, apply a null code back to the last passing QC check.
 - ii. If the 14-day manual one-point QC check is outside the control limits (see Table 12-11), the ambient data will be voided back to the last passing manual QC check. For the failed QC check, the null code to use is AS (Poor Quality Assurance Results).
 - iii. If a Z/S/P is performed beyond the minimum frequency, a QA qualifier flag (6-QAPP issue) must be applied in FAMAS to those days exceeding the frequency of the check if the next Z/S/P passes. However, if the subsequent check fails, a null code back to the last passing Z/S/P must be applied in FAMAS.
 - iv. If a Z/S/P exceeds the control limits, the data are invalidated back to the last Z/S/P within control limits. For the failed Z/S/P, the null code to use is AS (Poor Quality Assurance Results).
- b. If a flow rate verification is performed beyond the minimum frequency, a QA qualifier flag (6-QAPP issue) must be applied in FAMAS 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 FAMAS.
- c. For continuous particulate instruments, if the flow rate results are greater than the control limits, the ambient data will be voided back to the last passing flow rate

check. For the failed flow check, the null code to use is AH (Sample Flow Rate Out of Limits).

13. 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*).
14. 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.
15. 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.
16. 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 FAMAS. (*Note: Exceedance reports are not required for ozone*).
17. 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 FAMAS, 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.
18. Upload all automatically generated data into the FAMAS database. Manually enter other required data into the FAMAS database. These are data such as 1-point QC records and flow checks. Check the **Exclude from Export/Reports** box for failing records or those records associated with invalidated data. EPA does not want failing checks or checks associated with invalidated data. However, if a check failed, but the data were not invalidated, ensure that the appropriate qualifier code (along with comments) are applied to the data (see Section 12.9). However, the **Exclude from Export/Reports** box **must** be checked for any failing QC checks. Additionally, if an audit fails the **Exclude from Export/Reports** button **must** be checked. **All passing and failing audits and QC checks must be reported in FAMAS.**

19. 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 12-16.
20. Ensure that the QA comparisons of the F1 files have been performed.
21. Transfer quality-assured PM_{2.5} data from PMTS to FAMAS. Ensure that data are transferred accurately.
 - a. Compare all null codes and qualifiers in PMTS against what's transferred to FAMAS.
 - b. Compare all method codes in PMTS against what's transferred to FAMAS.
 - c. Compare all concentration values in PMTS against what's transferred to FAMAS.

If data do not match between PMTS and FAMAS, notify OAM's QA Manager and correct data accordingly in FAMAS.

22. Compare the FAMAS database with the local program agency database to ensure accurate data transmission.
23. Inspect the FAMAS database for long strings of repeated data values and verify these are reasonable and correct. Verify the data in FAMAS (i.e. run the Data Verification Utility in FAMAS and ensure that all data issues have been addressed on the resulting report).
24. Set the verified flags on the Data Verification Report in FAMAS signifying that all appropriate QA/QC procedures have been employed when reviewing the data set.

12.6.5 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 FAMAS 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:

1. Review the PM_{2.5} Analysis Report provided by the PM_{2.5} Gravimetric Laboratory in Tallahassee, Florida. See Figure 12-1 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 FAMAS (i.e. flag, null code, etc.). (Refer to Table 12-16).
2. Review the PM_{2.5} Analysis Reports for filter magazines received above 4°C. 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).

- a. Compare the PM_{2.5} Gravimetric Laboratory's received temperature to the ambient average sampling temperature.
 - 1) 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.
 - 2) 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.
- b. Document your review of the "ISP" code or any other laboratory code in FAMAS. (See Table 12-16 for detailed instructions).
- c. 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.
- d. Based on the aforementioned temperature and date comparisons, flag or null code data, accordingly.

See Section 12.5.3 and Table 12-16 of this document for additional details.

3. Have all filters and magazines been accounted for in these reports (PM_{2.5} Analysis Report) for each month? For the quarter?

Figure 12-1. PM_{2.5} Analysis Report

PM_{2.5} Analysis Report

Florida Department of Environmental Protection
Central Laboratory
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

DEP Central District Office
3319 Maguire Blvd.
Suite 232
Orlando, FL 32803
(407) 894-7555
Attention: Pat Washington, Tom Bess, Raul Rivera

For Additional Information Contact:
Dr. Liang Lin
Dr. Kerry Tate
Phone (850) 245-8085

Printed: 10/8/2015 9:58:13 AM

Abbreviations and Data Remark Codes

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

Certified By:

Kerry Tate

Date: 08-OCT-2015 09:54

Filters Received in Magazine: M0020

T4611407	<u>Weight (mg)/Delta (ug)</u>	<u>Date</u>	<u>Qualifier</u>	<u>Comment</u>
PRE	382.514	14-JUL-2015 08:42		
POST	382.683	25-AUG-2015 12:31	ISP SIS	Particles on filter surface. Received at 8.6 degrees C and weighed more than 10 days after sampling.
DELTA	169	NA		
T4611408	<u>Weight (mg)/Delta (ug)</u>	<u>Date</u>	<u>Qualifier</u>	<u>Comment</u>
PRE	376.811	14-JUL-2015 08:43		
POST	377.124	25-AUG-2015 12:30	ISP	Received at 8.6 degrees C and weighed more than 10 days after sampling.
DELTA	313	NA		
T4612319	<u>Weight (mg)/Delta (ug)</u>	<u>Date</u>	<u>Qualifier</u>	<u>Comment</u>
PRE	366.068	24-AUG-2015 08:57		
POST	366.189	05-OCT-2015 09:53	ISP	Received at 6.1 degrees C and weighed more than 10 days after sampling.
DELTA	121	NA		
T4612320	<u>Weight (mg)/Delta (ug)</u>	<u>Date</u>	<u>Qualifier</u>	<u>Comment</u>
PRE	371.208	24-AUG-2015 08:58		
POST	371.276	05-OCT-2015 09:50	VOD	Voided by customer.
DELTA	68	NA		

4. Have all laboratory qualifiers been addressed in FAMAS (i.e. comments, qualifier, null code, etc.)? (See Table 12-16)
5. Check the site field sheets for completeness and verify that all entries are correct.
 - a. Check that the Run Data Sheets are complete and correlate to the PMTS “Compared Collocated Data” report (see Figure 12-2 below).

Figure 12-2. PMTS Compare Collocated Data Report

Act Start Date	Filter ID	Primary Filter Serial	Primary Conc.	Primary Units	Collocated Filter Serial	Collocated Conc.	Collocated Units	
01-OCT-2017								
02-OCT-2017	PH25	T7676470	6.4	157				Y
03-OCT-2017								
04-OCT-2017	PH25	T7676745	5.2	128				Y
05-OCT-2017								
06-OCT-2017								
07-OCT-2017								
08-OCT-2017								
09-OCT-2017	PH25	T7676945	6.2	150				Y
10-OCT-2017								
11-OCT-2017	PH25	T7676946	0.1	3				Y
12-OCT-2017								
13-OCT-2017								
14-OCT-2017								
15-OCT-2017								
16-OCT-2017								
17-OCT-2017								
18-OCT-2017	PH25	T7677110	5.4	133				Y
19-OCT-2017								
20-OCT-2017								
21-OCT-2017	PH25	T7677156	5.0	142				Y
22-OCT-2017								
23-OCT-2017								
24-OCT-2017	PH25	T7677340	4.0	101				Y
25-OCT-2017								
26-OCT-2017								
27-OCT-2017	PH25	T7677356	6.3	156				Y
28-OCT-2017								
29-OCT-2017								
30-OCT-2017	PH25	T7677502	12.1	306				Y
31-OCT-2017								
01-NOV-2017								
02-NOV-2017	PH25	T7677503	10.0	248				Y
03-NOV-2017								
04-NOV-2017								
05-NOV-2017								

- b. 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.
- c. 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).
 - 1) If a flow rate verification is performed outside of the minimum frequency, a QA qualifier flag (6-QAPP issue) must be applied in FAMAS 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 FAMAS.
6. Compare the data in PMTS against field records.
 - a. Do the filter serial numbers in PMTS match the field sheets?
 - b. Do the dates in PMTS match the field sheets?
 - c. Are there any missed runs? If so, you must enter a null code --- see Table 12-16.
 - d. Are there make-up runs?
 - 1) 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.
 - 2) Ensure that these make-up sample run concentrations are populated.
Note: If these make-up runs are not ran within the required timeframes, AQS will not count them towards data completeness.
 - e. Are the concentrations of the primary and collocated comparable in PMTS?
7. Review the PM Filter Custody Logs.
 - a. Cross-check the filter IDs and weigh dates to the field sheets.

- b. Ensure that the PM Filter Custody Logs have been appropriately signed and dated by staff (i.e. field staff, laboratory staff, etc.).
8. Validate data in PMTS and transfer it to FAMAS.
9. 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:

10. 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.
11. 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 12-16 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.

Table 12-16. 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

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.

12.6.6 Manual High-Volume PM₁₀ and Lead

Currently, only Hillsborough County performs lead analysis. However, Hillsborough, Pinellas, Broward, and Miami-Dade Counties perform high-volume PM₁₀ analysis. This section addresses the transferring and verifying of the lead (Pb) and particulate matter 10 (PM₁₀) data produced by these agencies. The final data are verified and submitted to FAMAS, 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 Tables 12-6, 12-7, 12-17, 12-18, and 12-19 in 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 and PM₁₀ 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 manual high-volume PM₁₀ and lead 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 Tables 12-17 through 12-19 for requirements utilized as part of the data validation process.

1. Review the field run sheets for completeness.
2. Utilizing the field sheets and records from the sampler's digital timer, if applicable, or records from a certified transfer standard, validate the following:
 - a. Temperature and pressure
 - b. Average flow
 - c. Elapsed time "total"
3. Validate balance weight checks, weight log, and other quality control checks associated with the filter analysis.
4. The laboratory provides hardcopies of the analytical results of the lead and PM₁₀ filter analysis. Values such the total minutes and corrected flows may be validated on these reports.
5. Ensure QA/QC checks have been met. Below is a summary of the QA/QC checks and acceptance criteria associated with the PM₁₀/Pb-TSP High-Volume samplers:

Table 12-17. PM₁₀/Pb TSP High-Volume QA/QC Schedule – Field Operations

Parameter	Frequency	Acceptance Criteria
Average Flow Rate in standard conditions for PM ₁₀ Average Flow Rate in local conditions for Pb-TSP	Every sample run	±10 % diff from 1.13 m ³ /min for PM ₁₀ 1.1 – 1.7 m ³ /min for Pb-TSP
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

Parameter	Frequency	Acceptance Criteria
1-pt. Flow Rate Verification for PM ₁₀ in standard conditions	Every 90-days (Quarterly)	± 10% diff from design (1.13 m ³ /min) ± 7% of the NIST-traceable standard
1-pt. Flow Rate Verification for Pb-TSP in local conditions	Every 90-days (Quarterly)	± 7% of the NIST-traceable standard
Operational Flow Rate Check	Every 90-days (Quarterly)	± 7% diff from 1.13 m ³ /min for PM ₁₀ 1.1 – 1.7 m ³ /min for Pb-TSP
Multi-point Flow Rate Verification for PM ₁₀ in standard conditions	Every 365-days (Annual)	± 4% diff of the NIST-traceable calibration orifice
Multi-point Flow Rate Verification for Pb-TSP in local conditions	Every 365-days (Annual)	± 5% of the best fit linear regression line
Elapsed Timer Verification	Every 365-days (Annual)	1440 ± 60 minutes; ± 2 mins per 24-hour verification

Table 12-18. PM₁₀/Pb TSP High-Volume QA/QC Schedule – Laboratory Operations

Parameter	Requirement	Acceptance Criteria
Report Units	µg/m ³	N/A
Equilibration Period	24 hours	≥24 hours
Relative Humidity	Equilibration	20-45% ±5%
Weighing (Outside Equilibration Chamber)	Weighing	Within 30 seconds
Temperature	Equilibration	15-30°C ±3°C
Initial Calibration Verification	3 weights prior to each batch	±0.5 mg of expected
Re-weight check	5 to 7 filters per batch	±2.8 mg tare/gross weights
Balance zero check	After every 10 filters	±0.5 mg
Continuing Calibration Verification	After every 15 filters	±0.5 mg
Tare Weights	All filters	Between 3.7 and 4.7 g
Mass Reference Standards	Every 3 to 6 months	±0.5 mg

Parameter	Requirement	Acceptance Criteria
Tare Weight Audit	Minimum of 10% or 1 filter per batch	±5.0 mg

Table 12-19. PM₁₀/Pb TSP High-Volume Transfer Standard Performance Criteria.

Equipment	Frequency	Criteria ¹
Mass Standard Calibration	Annual	±0.025 mg
Weight Set Check	3-6 months	±0.5 mg
Thermometer Check	6 months	±2°C
Hygrometer Check	6 months	±2% Relative Humidity
Analytical Balance Calibration	Annual	±0.1 mg

¹The performance criteria are measured as the difference between the instrument and the NIST-traceable standard in the units, as shown.

Internal Audits

1. Data Processing – Check the calculations of at least 7% of the samples in a batch by using the raw data compared to the reported PM₁₀ value. If any checks fail to match the reported value, all sample calculations in the batch are checked.
2. Tare Weight Audit – Prior to releasing a batch of filters for use, at least 10% of the filters in the batch (e.g. 7 filters per box of 65) are taken through the entire weighing process by the supervisor or manager. If any of the tare weights fail to meet the criteria outlined in Section 8.1a, the entire box is reweighed.
3. Mass Reference Standards – Every 3 to 6 months, the working weight standards are checked for accuracy using the primary weight set.
4. System Audit – At least annually the filter weighing process is evaluated. The quality assurance staff will observe the entire weighing process, ensuring all required criteria are met and documented. All balance and weight certificates will be reviewed to ensure all calibrations are up to date. Records of the audit will be maintained by the quality assurance staff.

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 hardcopies 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 FAMAS must be completed monthly, no later than 25 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. After the completion of the monthly tasks within a given quarter, agency QA staff will use FAMAS to generate a Quarterly Data Completeness Report. For example, the data completeness report for January, February, and March should be ran at the end of the 1st quarter. This report is to be ran once the quarterly data has been verified; the “Completeness” Report in FAMAS should be utilized. The signed and dated report must be submitted to the OAM no later than 40 days after the conclusion of the quarter. If findings from the data review results in the quarterly data completeness for any monitor being less than 75% (90% for ozone), the QA staff will write a memorandum/report to agency management, thoroughly detailing the situation. The agency will discuss and research the associated issues and make determinations and decisions regarding the validity of the data and recommendations going forward. This memorandum/report should also be submitted to the OAM no later than 40 days after the conclusion of the quarter. Minimum data completeness requirements are prescribed in 40 CFR Part 58 Appendix A, various appendices of 40 CFR Part 50, and the EPA Quality Assurance Handbook for Air Pollution Measurement Systems. However, Florida’s data completeness goal is set at 90% on a quarterly and annual basis for the entire statewide air monitoring network. Additionally, the operation and maintenance of federally-required monitoring sites and equipment and other air monitoring sites deemed necessary by the Department must be the Local Agency’s first monitoring priority.

After each quarterly upload to AQS, the OAM performs a statewide file comparison between FAMAS 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.

- AMP 251 - QA Raw Assessment Report – Review this report to ensure that failed checks have not been erroneously uploaded to AQS.
- AMP 350 – Raw Data Report – Review this report to ensure that the agencies within Florida’s PQA consistently and correctly use null codes and qualifier codes. (This report is generated for the state and reviewed by Florida DEP only --- see Section 12.1).
- AMP 430 – Data Completeness Report - Review this report to ensure that all parameters made it up to AQS.
- AMP 501 – Extract Raw Data Report - Use this report for file comparison to ensure that the data matches FAMAS.

- AMP 504 – QA Data Extraction Report - Use this report for file comparison to ensure that the data matches FAMAS.

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 FAMAS.

Additionally, the AQS Coordinator will run the AMP 256 – 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:
 - o Confirmation that there were no discrepancies between the data in FAMAS and the data in the AMP 251, AMP 501, and AMP 504 AQS reports.
 - o AMP 430 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.
- Data Validation Checklist
- FAMAS Data Completeness Report (signed by the QA coordinator)
- Memo stating which parameters were below 75% (90% for ozone) and why (if applicable).
- Corrective Action/FAMAS Missing Data Report (see Figure 12-3) (if applicable). The FAMAS Missing Data Report details the number and percentage of missed data readings for the month/quarter/year and the associated null codes and comments.

Figure 12-3. FAMAS Missing Data Report

Missing Data Report

2014 Quarter 1

Criteria

Date Range: 1/01/2014 00:00 to 3/31/2014 23:59

Site	Parameter	Interval	Valid Readings	Readings Expected
G0730012	O3	001h	2073	2160

Report Created: 11/08/2017 12:28

Site: G0730012 Parameter: O3 Interval: 001h

January	February	March
744 Readings Expected	672 Readings Expected	744 Readings Expected
Valid Readings 738 99.19%	*Valid Readings 592 88.10%	Valid Readings 743 99.87%
BF-PRECISION/ZERO/SPAN 6 0.81%	AN-MACHINE MALFUNCTION 72 10.71%	BF-PRECISION/ZERO/SPAN 1 0.13%
3 Comments	BA-MAINTENANCE/ROUTINE REPAIRS 8 1.19%	1 Comment
3 Comments		

2014 Quarter 1 Totals

2160 Readings Expected

Valid Readings	2073	95.97%
AN-MACHINE MALFUNCTION	72	3.33%
BA-MAINTENANCE/ROUTINE REPAIRS	8	0.37%
BF-PRECISION/ZERO/SPAN	7	0.32%

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 AMP 251, 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

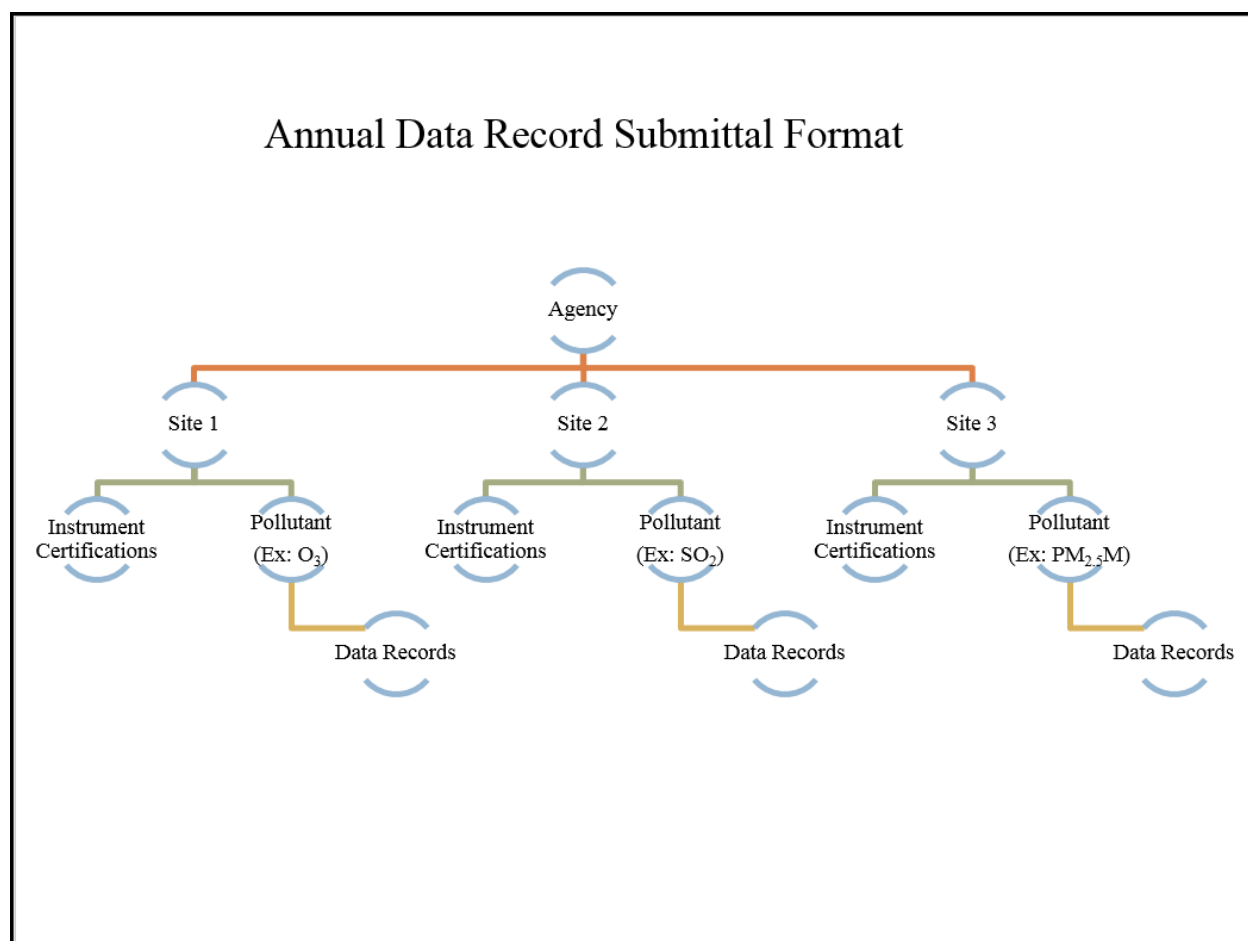
- AMP 256 QA Data Quality Indicator Report
- AMP 430 for completeness for all data submitted to AQS. This report is required for PM_Coarse only and must be submitted with the Data Certification Packet.
 - Ensure that all parameters are about 75% completeness for each quarter and if not check to see if documentation/explanation was provided.
- AMP 450NC 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.
- AMP 600 (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 AMP 600 – Certification Evaluation and Concurrence showing our certification flags and the AMP 430 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 AMP 450NC 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}, no later than June 30 of the following calendar year. Below is the format of the records for submittal to Florida DEP (Figure 12-4).

Figure 12-4. Annual Data Record Submittal Format



12.9 Qualifier Flags, Null Codes, and Comments

The quality characteristics of the data in FAMAS 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. FAMAS retains text comments. However, the current AQS equivalent is not as straightforward in its location within its system and its correlation to FAMAS, so Florida DEP does not submit text comments to AQS. FAMAS comments allows events surrounding data collection to be recorded with the data and are important when recreating operational history or timelines.

Tables 12-20 and 12-21 details when to apply commonly used QA qualifiers and null codes. See Section 12.6.5 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 12-20. Commonly Used QA Qualifiers

QA Qualifier	Code Description	When to Use
1	Deviation from a CFR/Critical Criteria Requirement	This code should only be used when instructed to do so by Florida DEP.
6	QAPP Issue	QC check is completed outside the required timeframe (ex. a precision check is due on the 14 th of the month, but it isn't performed until the 18 th of the month; data from the 15 th to the 18 th must be flagged).
SX	Does Not Meet Siting Criteria	Site does not meet siting criteria (ex. flag applied to all pollutants from the date the issue is identified, usually by the Florida DEP audit staff, until the issue is resolved).
V	Validated Value	Validates data when data integrity may be questioned (ex. a QC check fails but the issue is not the analyzer, and the data is believed to be valid).

Table 12-21. Commonly Used Null Codes

Null Code	Code Description	When to Use
AE	Shelter Temperature Outside Limits	Shelter temperature exceeds limits defined by the EPA's QA Handbook and approved Equivalency Reference Methods (ex: data is collected when shelter temperature is outside the 20°-30° range or approved ranges for Teledyne instruments; the concentration data associated with these out of range temperatures must be invalidated).
AF	Scheduled but not Collected	A manual sample is scheduled to occur, but it is not collected (ex: filter shuttle issues).
AG	Sample Time Out of Limits	Valid sample time total is outside of limits (ex: less than 1380 or greater than 1500 minutes).

Null Code	Code Description	When to Use
AH	Sample Flow Rate Out of Limits	Sample flow rate exceeds control limits (ex: failed flow check).
AN	Machine Malfunction	Machine/equipment malfunctions (ex: pump fails).
AQ	Collection Error	Data collection issues with continuous instruments (ex: less than 45 valid minutes collected).
AS	Poor Quality Assurance Results	Failed QC checks (ex: failed 1-point check and data invalidated back to last good check).
AT	Calibration	Continuous particulate matter calibrations (ex: calibrations on a TEOM).
AV	Power Failure	Power failure (ex: site loses power).
AY	Q C Control Points (Zero/Span)	Only a zero and span checks are performed (ex: equipment verification or troubleshooting).
AZ	Q C Audit	Internal quality control audit by agency (ex: agency does an official analysis of their procedures).
AX	Precision Check	Continuous particulate QC check (ex: flow checks).
BA	Maintenance/ Routine Repairs	Routine maintenance and repairs (ex: filter change).
BF	Precision/Zero/ Span	ZSP is performed (ex: prior to a filter change – to bracket the data).
BC	Multi-point Calibration	Gaseous calibrations (ex: multi-point calibrations are performed).
BK	Site computer/ datalogger down	Datalogger or internet connection issues (ex: data logger locks up); datalogger calibrations.
BL	QA Audit	Florida DEP or EPA audits are performed (ex: annual performance evaluations).
BR	Sample Value Below Acceptable Range	Sample is below the CFR required limits (ex: PM _{2.5} sample is less than 2 µg/m ³); typically used for <u>manual particulates</u> . See below (DA should be used for continuous data).
DA	Aberrant Data (Corrupt Files, Aberrant Chromatography, Spikes, Shifts)	Anomalous data below acceptable data quality standards (ex: corrupt files, spikes, shifts, negative SO ₂); typically used for continuous data.
SA	Storm Approaching	Hurricane or storm approaching (ex: when equipment must be taken offline in preparation for storm).
ST	Calibration Verification Standard	Verifications with a NIST (ex: checking the concentration of a new gas bottle).
XX	Experimental Data	Data collected prior to a passing calibration (ex: first calibration of a new monitor failed and a passing recalibration did not occur immediately afterwards).

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.

Table 12-22 and Table 12-23 is the full listing of QA qualifier flags and null codes.

FAMAS 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 FAMAS 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 FAMAS and are truncated). Text comments may be used to help establish a timeline for corrective actions. Text comments are not transmitted to AQS and should not be viewed as a substitute for consistent qualifier or null code application.

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 FAMAS 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 FAMAS 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).
- Overall, edit FAMAS 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 FAMAS to AQS. However, continue to add descriptive text comments to FAMAS 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.

Table 12-22. AQS QA Qualifier Codes

< Qualifier Code >	< Qualifier Desc >	< Qualifier Type Desc >
1	Deviation from a CFR/Critical Criteria Requirement	Quality Assurance Qualifier
2	Operational Deviation	Quality Assurance Qualifier
3	Field Issue	Quality Assurance Qualifier
4	Lab Issue	Quality Assurance Qualifier
5	Outlier	Quality Assurance Qualifier
6	QAPP Issue	Quality Assurance Qualifier
7	Below Lowest Calibration Level	Quality Assurance Qualifier
9	Negative value detected - zero reported	Quality Assurance Qualifier
CB	Values have been Blank Corrected	Quality Assurance Qualifier
CC	Clean Canister Residue	Quality Assurance Qualifier
CL	Surrogate Recoveries Outside Control Limits	Quality Assurance Qualifier
DI	Sample was diluted for analysis	Quality Assurance Qualifier
EH	Estimated; Exceeds Upper Range	Quality Assurance Qualifier
FB	Field Blank Value Above Acceptable Limit	Quality Assurance Qualifier
FX	Filter Integrity Issue	Quality Assurance Qualifier
HT	Sample pick-up hold time exceeded	Quality Assurance Qualifier
LB	Lab blank value above acceptable limit	Quality Assurance Qualifier
LJ	Identification Of Analyte Is Acceptable; Reported Value Is An Estimate	Quality Assurance Qualifier
LK	Analyte Identified; Reported Value May Be Biased High	Quality Assurance Qualifier
LL	Analyte Identified; Reported Value May Be Biased Low	Quality Assurance Qualifier
MD	Value less than MDL	Quality Assurance Qualifier
MS	Value reported is 1/2 MDL substituted.	Quality Assurance Qualifier
MX	Matrix Effect	Quality Assurance Qualifier
ND	No Value Detected	Quality Assurance Qualifier
NS	Influenced by nearby source	Quality Assurance Qualifier
QX	Does not meet QC criteria	Quality Assurance Qualifier
SQ	Values Between SQL and MDL	Quality Assurance Qualifier
SS	Value substituted from secondary monitor	Quality Assurance Qualifier
SX	Does Not Meet Siting Criteria	Quality Assurance Qualifier
TB	Trip Blank Value Above Acceptable Limit	Quality Assurance Qualifier
TT	Transport Temperature is Out of Specs.	Quality Assurance Qualifier
V	Validated Value	Quality Assurance Qualifier
VB	Value below normal; no reason to invalidate	Quality Assurance Qualifier
W	Flow Rate Average out of Spec.	Quality Assurance Qualifier
X	Filter Temperature Difference out of Spec.	Quality Assurance Qualifier
Y	Elapsed Sample Time out of Spec.	Quality Assurance Qualifier

Table 12-23. AQS Null Codes

<u>≤ Qualifier Code ≥</u>	<u>≤ Qualifier Desc ≥</u>	<u>≤ Qualifier Type Desc ≥</u>
AA	Sample Pressure out of Limits	Null Data Qualifier
AB	Technician Unavailable	Null Data Qualifier
AC	Construction/Repairs in Area	Null Data Qualifier
AD	Shelter Storm Damage	Null Data Qualifier
AE	Shelter Temperature Outside Limits	Null Data Qualifier
AF	Scheduled but not Collected	Null Data Qualifier
AG	Sample Time out of Limits	Null Data Qualifier
AH	Sample Flow Rate out of Limits	Null Data Qualifier
AI	Insufficient Data (cannot calculate)	Null Data Qualifier
AJ	Filter Damage	Null Data Qualifier
AK	Filter Leak	Null Data Qualifier
AL	Voided by Operator	Null Data Qualifier
AM	Miscellaneous Void	Null Data Qualifier
AN	Machine Malfunction	Null Data Qualifier
AO	Bad Weather	Null Data Qualifier
AP	Vandalism	Null Data Qualifier
AQ	Collection Error	Null Data Qualifier
AR	Lab Error	Null Data Qualifier
AS	Poor Quality Assurance Results	Null Data Qualifier
AT	Calibration	Null Data Qualifier
AU	Monitoring Waived	Null Data Qualifier
AV	Power Failure	Null Data Qualifier
AW	Wildlife Damage	Null Data Qualifier
AX	Precision Check	Null Data Qualifier
AY	Q C Control Points (zero/span)	Null Data Qualifier
AZ	Q C Audit	Null Data Qualifier
BA	Maintenance/Routine Repairs	Null Data Qualifier
BB	Unable to Reach Site	Null Data Qualifier
BC	Multi-point Calibration	Null Data Qualifier
BD	Auto Calibration	Null Data Qualifier
BE	Building/Site Repair	Null Data Qualifier
BF	Precision/Zero/Span	Null Data Qualifier
BG	Missing ozone data not likely to exceed level of standard	Null Data Qualifier
BH	Interference/co-elution/misidentification	Null Data Qualifier
BI	Lost or damaged in transit	Null Data Qualifier
BJ	Operator Error	Null Data Qualifier
BK	Site computer/data logger down	Null Data Qualifier
BL	QA Audit	Null Data Qualifier
BM	Accuracy check	Null Data Qualifier
BN	Sample Value Exceeds Media Limit	Null Data Qualifier
BR	Sample Value Below Acceptable Range	Null Data Qualifier
CS	Laboratory Calibration Standard	Null Data Qualifier
DA	Aberrant Data (Corrupt Files, Aberrant Chromatography, Spikes, Shifts)	Null Data Qualifier
DL	Detection Limit Analyses	Null Data Qualifier
FI	Filter Inspection Flag	Null Data Qualifier
MB	Method Blank (Analytical)	Null Data Qualifier
MC	Module End Cap Missing	Null Data Qualifier
SA	Storm Approaching	Null Data Qualifier
SC	Sampler Contamination	Null Data Qualifier
ST	Calibration Verification Standard	Null Data Qualifier
TC	Component Check & Retention Time Standard	Null Data Qualifier
TS	Holding Time Or Transport Temperature Is Out Of Specs.	Null Data Qualifier
XX	Experimental Data	Null Data Qualifier

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 FAMAS database.

1. See Section 12.2. Specifics, including the validation tables along with the control limits and warning limits, are included in that section. Effective January 1, 2017, the Florida PQAO implemented the use of the EPA Rounding Policy. Ensure the rounding policy is utilized appropriately (see Appendix F in this document). In general:
 - a. If a one-point QC check exceeds the control limits, the data must be invalidated back to the last passing check.
 - b. 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.
 - c. If the one-point flow rate verification exceeds the control limits, the data must be invalidated back to the last passing verification.
 - d. 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.
 - e. For intermittent samplers, 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).
2. If the monitor records less than 45 minutes for one hour. The hour is invalidated.
3. 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.
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. 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.
6. For sample line filter changes, as opposed to a calibration where adjustments are made to the equipment, please document on paper and in FAMAS 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.

7. Enter ALL precision checks in FAMAS. It tells the entire story regarding why the data may have been invalidated or any problems the equipment may be experiencing and allows the QA person to troubleshoot when reviewing the data.
*Note: Be sure you check the **Exclude from Export/Reports** button in FAMAS to ensure that those records associated with invalidated data and failed checks are not reported to EPA's AQS.*
8. Post calibration checks performed after adjustments have been made to an instrument should not be reported to AQS. Per EPA's Science and Ecosystem Support Division (SESD), this post maintenance check is only confirming that the calibration adjustment is holding and doesn't represent ambient air data, and reporting these checks will bias the data upward. Remember these checks must be reported to FAMAS, however. Utilize the **Exclude from Export/Reports** button in FAMAS to ensure that those checks are not submitted to AQS.
9. Florida does not keep days where a TEOM's 24-hour average is negative. In the case of a negative 24-hour average, investigate the reason and null code or apply qualifier to the hours appropriately. For example, if there is a rain event in which the TEOM concentration swings positive due to being saturated with moisture, dries out, and swings extremely negative once the moisture evaporates, add a "V" (validated value) QA qualifier on the hours that were above/below the acceptable ranges. The acceptable ranges are down to $-50 \mu\text{g}/\text{m}^3$ for PM_{10} and $-10 \mu\text{g}/\text{m}^3$ for $\text{PM}_{2.5}$. AQS will accept the data and we can avoid altering data for the sake of AQS limits by placing the "V" qualifier on the data beyond these limits. This would represent the data more accurately. 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; $\text{PM}_{10-2.5}$ only; $\text{PM}_{2.5}$ 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).
10. For TEOM data, apply a null code 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.
11. Do not enter the zero level of an audit. AQS does not accept the zero level of the audit.
12. Do not apply null codes to data with a QA qualifier or vice versa. AQS will reject data that has both applied.
13. 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.
14. Enter all audits in FAMAS. If an audit fails, check the **Exclude from Export/Reports** button. Failing audits are not reported to EPA.
15. 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. 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. The agency should investigate the possible issue. 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. The agency should email the results of its investigation 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.

16. The following (Table 12-24) details how the level of precision of the data will be reflected in FAMAS and AirVision (effective January 2017). FAMAS will truncate the values accordingly:

Table 12-24. Florida PQAQ 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.

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 are 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 FAMAS. As such, only the hourly data (aside from the 5-minute SO₂ data) are stored in FAMAS for the locals. All the minute and hourly data for Florida DEP are stored in FAMAS. The local programs utilize AirVision software as their intermediary data acquisition between the monitors in the field and the State's FAMAS 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 FAMAS 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 FAMAS

The data that are to be reported to AQS for Florida's entire network are ultimately transferred to FAMAS; however, within the DEP OAM, the instruments collect data which are transferred to FAMAS 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

- **Collection from Dataloggers**

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 FAMAS. 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 the FAMAS ATX Client. The FAMAS ATX Client is a front-end tool used by FAMAS Administrators to configure FAMAS and many of its internal activities. Site and polling schedule configurations are verified at the time of setup through connection and data transmission testing.

FAMAS 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.

- **Directly Polled Instruments**

There are a few instruments in DEP's ambient air monitoring network which are not connected to dataloggers. Therefore, these instruments are not being polled by FAMAS. However, third-party software packages (e.g., Ccomm, RPComm, etc.) are used to retrieve data directly from the instrument. The third-party software is installed on an office computer with a modem. The software uses the computer's modem to contact a modem connected to the instrument and transfer data.

Data are collected from these instruments daily. The software packages are used to review data and create files in a FAMAS-readable format from the gathered data. These files are then imported into the FAMAS database where another data review is made by comparing the import's results to the data gathered by the software.

13.2.2 Data Storage

There are two areas in the FAMAS database used for ambient air monitoring data storage: the foundation and ambient tables. The foundation table is populated by the data collected during the FAMAS 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 FAMAS.

Data stored in the ambient table, on the other hand, can be altered. However, this manipulation of data is limited based on the FAMAS user's security level (see the FAMAS 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 FAMAS as audit trails.

13.2.3 Data Editing

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

13.2.4 QA Transactions

Beginning with calendar year 2015, DEP replaced its precision and accuracy records format in FAMAS 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. Beginning first quarter 2015, all Florida agencies began using this new format in FAMAS. Please see Appendix A of this document for detailed directions to record QA transactions in FAMAS. As of December 2017, the FAMAS User Guide has not been updated to reflect these revised steps resulting from the FAMAS updates in calendar years 2015, 2016 and 2017. Once the manual is updated, these instructions will be rendered void.

13.2.5 Data Verification Utility

Once all data are in FAMAS, as part of the data validation, the Data Verification Utility in FAMAS must be ran and the data checked for completeness. Please see Appendix C for detailed directions for data verification. As of December 2017, the FAMAS User Guide has not been updated to reflect these revised steps resulting from the FAMAS updates in calendar 2015, 2016, and 2017. Once the manual is updated, these instructions will be rendered void.

In the **Data Verification Report** that is generated, it is important to go through each section individually and comprehensively review all the data that is presented. FAMAS 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 FAMAS. For example, PM_{2.5} 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 FAMAS to document due diligence regarding **FAILED** Verification Results.

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. Additionally, the agency is responsible for submitting a completed FORM DEP 18-27-A, “Data Validation Checklist”, to OAM’s data validation team (see Section 12.7). For the OAM, the data validation team is responsible for these tasks. This email and completed form will serve as the official documentation of your agency’s review of your 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.

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 FAMAS. In FAMAS, 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.

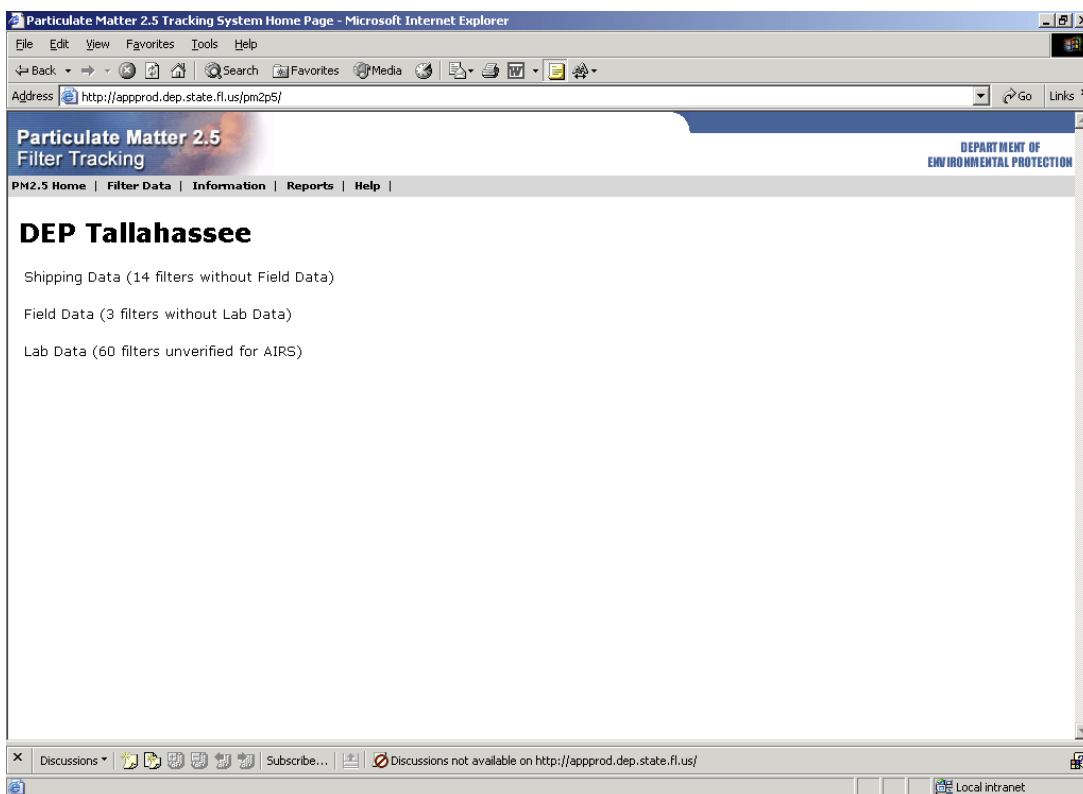
Uploading Validated PM F1 Files into PMTS

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

1. Log on to PMTS (<https://fldep.dep.state.fl.us/pm2p5/>) 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 **[BROWSE]** 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 Field Data**” 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 2025ia: <https://fldep.dep.state.fl.us/famas/>). Additionally, one might need to correct the Filter ID number. This change cannot be done in PMTS. However, please document accordingly in FAMAS 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 FAMAS.

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

13.3.2 PM₁₀ and Lead

Currently, only Hillsborough County performs lead analysis. However, Hillsborough, Pinellas, Broward, and Miami-Dade counties perform high-volume PM₁₀ analysis. See the Florida AirVision Guide located in the Appendix E as well as Section 12.6.6 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, FAMAS, PMTS, AQS, etc.). Florida's records are stored electronically. Most of the agencies within Florida's PQA 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 FAMAS, 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 FAMAS 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). FAMAS's export functions produce AQS-formatted files (see the FAMAS 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 FAMAS. 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. 0 October 2015
Required Signatures: Adobe Signature		
FORM DEP 18-27-A		
Agency Name: _____ Reporting Period: _____		
☐ Verify the latest approved version of each form (as of the date(s) indicated on the form(s)) was/were used for the operation(s) documented. ☐ 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. ☐ Check that due dates for all preventative maintenance are being met. ☐ 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. ☐ Ensure that the certification dates for certified equipment are correct and up-to-date. ☐ Check that the shelter temperature was within specification for the time period of the data being reviewed and null codes are appropriately applied where it was not. ☐ 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. ☐ 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. ☐ Check the accuracy of all calculations and transcripts on the forms. ☐ Make sure all control limits of the maintenance checks were met. If not, 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. ☐ Check that the dates and times of maintenance periods on forms match the dates and times in the data. ☐ Ensure that appropriate null codes describing maintenance performed are applied to the hour(s) the equipment was down. ☐ Ensure that all hours affected by maintenance activities were null coded for all associated parameters. ☐ 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). ☐ 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. ☐ 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. ☐ 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 FAMAS. (Note: Exceedance reports are not required for ozone). ☐ 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. Backfill blank hours of data in FAMAS from local database or datalogger, if possible. Such procedures must have been approved (or have been documented in an SOP).		
FORM DEP 18-27-A Revision No. 0: October 2015 Page 1 of 2		

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).



Florida PQAO
Monitor Identification Form

Modified 12/13/2017

1) General Monitor Information:

a) Pollutant:

b) Monitor Equipment:

c) Parameter Code:

d) Parameter Occurrence Code:

e) Monitoring Method Code:

f) Collocated Monitor:

g) Monitor Type:

h) Monitor Objective:

i) Pollutant Origin:

i) Urban Areas:

ii) CBSA:

iii) CSA:

2) Sampling Begin Date:

3) Agency Roles:

a) Analysis:

b) Collection:

c) Reporting:

d) PQAO:

e) Certifying:

4) Federal Reference or Equivalent Method (optional):

5) Sampling Collection Frequency (if applicable):

a) Manual Monitors:

b) PAMS Only:

6) Project Class:

7) Dominant Source:

8) Measurement Scale:

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).

Modified 7/11/2012

Site Identification Form

M 1 General Site Information

- A** County AQS Code
- B** Site AQS Code
- C** Site Name
- D** Support Agency

M 2 Site Established Date

M 3 Locational Coordinates (either lat-long or UTM coordinates are needed, not both)

- A** Latitude and Longitude
 - i** Longitude
 - ii** Latitude
- B** UTM (Universal Transverse Mercator)
 - i** Zone
 - ii** Easting
 - iii** Northing

M 4 LDP Horizontal Measure

- A** Method of Collection
- B** Datum
- C** Source Scale (**meters**)
- D** Accuracy Value (**meters**)

M 5 LDP Vertical Measure

- A** Method of Collection
- B** Datum
- C** Elevation (**meters**)
- D** Accuracy Value (**meters**)

M 6 Street Address

M 7 Zip Code

O 8 City Code

M 9 Air Quality Control Region

M 10 Land Use

M 11 Location Setting

MA 12 Tangent Streets (If more than 3 streets enclose the site, enter the extra information in the comments section)

- A** Closest Street #1
 - M i** Street Name
 - M ii** Street Type

1 of 3

Instructions to Site ID Form

Item	Mandatory	Description	Example
General Site Information		Contains the site's identifying information (i.e., AQS codes, name)	
County Name and AQS Code	Yes	The county where the site is located and the county's identifying 3-digit AQS code.	073 = Leon, 086 = Miami-Dade, etc.
Site AQS Code	Yes	The identifying 4-digit AQS number of the site (i.e., the last four digits of the 9-digit AQS site ID 12-073-XXXX)	12-101- 6006
Site Name	Yes	The name used locally to identify the site.	Sydney, Fort Pierce, etc.
Support Agency	Yes	The agency responsible for the operation of the monitoring site.	Central District, Hillsborough EPC, etc.
Site Established Date	Yes	The date when the site began collecting air monitoring data.	
Locational Coordinates		The coordinates identifying the geographical location of the site. Only one set of coordinates, either UTM or latitude and longitude, are needed.	
Latitude and Longitude		Latitude and longitude combine to place the site somewhere within a geographic coordinate system defined with respect to the equator and a meridian on the Earth's surface.	
Longitude	Yes	Longitude is a geographic coordinate specifying the east-west position of the site on the Earth's surface.	-84.346389
Latitude	Yes	Latitude is a geographic coordinate specifying the north-south position of the site on the Earth's surface.	30.439722
Universal Transverse Mercator (UTM)		The UTM geographic coordinate system uses a grid-like series of map projections to subdivide the Earth's surface into sixty zones. Each space on the grid is used to determine the location of the site in relation to the side of the space.	
UTM Zone	Yes	The zone of the UTM system in which the site is located. Florida is contained in zones 16 and 17.	16 or 17

UTM Easting	Yes	The eastward-measured distance of the site within the grid space.	754.843
UTM Northing	Yes	The northward-measured distance of the site within the grid space.	3370.502
Locational Data Policy (LDP) Horizontal Measure		Contains information identifying the method used to determine the sites locational coordinates.	
Method of Collection	Yes	Identifies the specific method used to determine the site's locational coordinates.	GPS, Address Matching, Map Interpolation, etc.
Datum	Yes	The edition of the North American Datum used as the basis for determining the site's coordinates.	NAD27, WGS84, etc.
Source Scale	Yes	Identifies the ratio, in meters, of the map or cartographic product to the true location. Only required if the coordinates are derived from a map or photo.	1: 24000 - The bold value on the right is all that is needed from the ratio.
Accuracy Value	Yes	Description of the accuracy of the site coordinates, as a range (i.e., plus or minus some value) reported in meters.	± 4.0 m
LDP Vertical Measure		Contains information identifying the method used to determine the elevation of the site.	
Elevation	Yes	The elevation, in meters, of the site above or below mean sea level.	10.1 m
Accuracy Value	Yes	Description of the accuracy of the vertical measure, as a range, reported in meters.	± 1.0 m
Method of Collection	Yes	The specific method used to determine the site's vertical measure.	Altimetry, Leveling Bench, etc.
Datum	Yes	The edition of the North American Datum used as the basis for determining the site's elevation.	NAVD88, Mean Sea Level, etc.
Street Address	Yes	Specifies the building / street location of the monitoring site.	101 Century Park Cir
Zip Code	Yes	The U.S. Postal Service Zone Improvement Plan (ZIP) Code used to address the monitoring site.	33613, 32102, etc.

City Code	Optional	A 5-digit AQS code representing the city within whose legal boundaries the monitoring site is located.	40450 - Lighthouse Point, 39425 - Largo, etc.
Air Quality Control Region (AQCR)	Optional	Specifies the AQCR in which the monitoring site is located.	048 - Central Florida, 050 - Southeast Florida, etc.
Land Use	Yes	Categorization of the prevalent land use within 1/4 mile of the monitoring site.	Forest, Military Reservation, etc.
Location Setting	Yes	A description of the environmental setting within which the site is located.	Rural, Suburban, etc.
Tangent Streets		Contains information about the streets closest to the site.	
Closest Street # 1, 2, or 3	Yes, if applicable	Identifies the number of the street around the site for which the data are being submitted, beginning with the closest (i.e., street # 1).	1, 2, or 3
Street Name	Yes, if applicable	The name of the street.	Chippewa Ave, Community Cir, etc.
Street Type	Yes, if applicable	The type of road or street being described.	Expressway, Local Street/Highway, etc.
Daily Traffic Volume	Yes, if applicable	An estimate of the daily traffic volume on the nearest roadway segment.	549000, 2000, 350, etc.
Volume Year	Yes, if applicable	The year when the traffic count value was estimated.	2012
Direction	Yes, if applicable	The direction from the site to the street at its nearest point.	N, SSE, WNW, etc.
Source	Yes, if applicable	The method by which the traffic volume / flow count was obtained.	FDOT, etc.
Open Paths		Contains information about any open path monitors present at the monitoring site.	
Open Path # 1, 2, or 3	Yes, if applicable	Indicates an individual open path monitor at the monitoring site.	1, 2, or 3
Beam Direction	Yes, if applicable	The direction from the receiver to the transmitter at the site.	N, SSE, WNW, etc.
Beam Length	Yes, if applicable	The length of the beam projected between the transmitter and the receiver at the site, in meters.	10.5 m

Transmitter Height	Yes, if applicable	The height of the transmitter above the ground, in meters.	2.1 m
Receiver Height	Yes, if applicable	The height of the receiver above the ground, in meters.	3.9 m
Beam Height - Lowest	Yes, if applicable	The height of the beam at its lowest point from the ground, in meters.	1.0 m
Beam Height - Highest	Yes, if applicable	The height of the beam at its highest point from the ground, in meters.	5.0 m
Land Use Type	Yes, if applicable	The prevalent land use under the path of the beam.	Agricultural, Commercial, etc.
Class 1 Area	Optional	The Class One Area within which the monitoring site is located. A Class One Area is a geographic area recognized by the EPA as being of the highest environmental quality and requiring maximum protection.	Chassahowitzka, Everglades, etc.
Local Region	Optional	The state-specific geographic / administrative area within which the site is located.	
Central Business District		Contains information regarding the geographical relationship between the monitoring site and the nearest central business district, if any.	
Direction	Optional	A representation of the true, as opposed to magnetic, direction of the site from the central business district.	N, SSE, WNW, etc.
Distance	Optional	The distance, in kilometers, to the site from the center of the downtown business district of the city in which the site is located.	51.3 km
Meteorological System		Contains information regarding the source of meteorological data associated with the monitoring site.	
Site Type	Yes, if applicable	The type of meteorological station identified for the monitoring site.	Airport, Other AQS Site, etc.
Site ID	Yes, if applicable	The AQS site ID where the meteorological data is collected, if not collected at this monitoring site, but at another air monitoring site.	12-031-2355
Site Distance	Yes, if applicable	The distance of the associated meteorological site from the air quality monitoring site, in meters. The associated site need not be an AQS site.	1026 m
Site Direction	Yes, if applicable	A representation of the true, as opposed to magnetic, direction of the meteorological site from this site.	N, SSE, WNW, etc.
Comments	Optional	A free-format field that may be used in any way desired. It is commonly used to describe special features of a site.	

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).

	Florida Department of Environmental Protection Corrective Action Form	DEP 01-4 REV. NO. 1: 4/16
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): _____ _____ _____ _____ Estimated?		
Start Date & Time: _____ End Date & Time: _____ Parameter(s) affected: _____ Expected Completion Date: _____ *Up to 45 days from Initiation Date		
Manager/QA Approval _____ Date: _____ Manager/QA Coordinator: _____ 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. 1: 4/16		

14.1.5 FORM DEP 01-4-A - Corrective Action Form (Attachment)

(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	DEP 01-4 REV. NO. 1: 4/16
Corrective Action Form		
Required Signatures: Adobe Signature		
Form DEP 01-4-A Corrective Action Form (attachment)		
Site Name: _____		Site AQS #: _____
Initiation Date: _____		Attachment ID# _____
Narrative Category: _____ _____ _____ _____ _____ _____ _____ _____		
Date: _____		Narrators Name: _____
Narrative Category: _____ _____ _____ _____ _____ _____ _____ _____		
Date: _____		Narrators Name: _____
Narrative Category: _____ _____ _____ _____ _____ _____ _____ _____		
Date: _____		Narrators Name: _____
Final Signature: _____		Manager/QA Signature: _____
 DARM DEP 01-4 REV. NO. 1: 4/16		

14.1.6 FORM DEP 01-4-F – Follow-Up 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).

	Florida Department of Environmental Protection Follow-Up Corrective Action Form	DEP-01-4 REV. 1: 4/16
Required Signature: Adobe Signature		
Form DEP 01-4-F (Follow-Up Corrective Action)		
Site Name: _____ Site AQS#: _____		
Initial Start Date: _____ Follow-Up Corrective Action		
Purpose: (continue on an attachment if needed)		

Plan of Action: (continue on an attachment if needed)		

Approved By: _____		Date: _____
Assigned To: _____		
Activity Log & Comments: (continue on an attachment if needed)		

Final Resolution & Assessment: (continue on an attachment if needed)		

Completion Date: _____		
Assignee: _____		
Air Program Administrator: _____		Date: _____
DEP-01-4 REV. 1: 04/16		

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 FAMAS was uploaded into AQS. 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. There are 4 types of reports that need to be run each quarter:

1. AMP 251 – This is the QA Raw Assessment Report, which shows all quality control checks performed during a specific period as well the percent difference for each check.
2. AMP 256 – This is the Data Quality Indicator Report. It provides statistical estimates of the precision, bias, and accuracy of monitors of criteria air pollutants, and it summarizes the completeness of monitor checks (number of 1-point QC audits and performance evaluations conducted during the evaluation period) from which the statistical estimates are derived.
3. AMP 350 – This is the Raw Data Extraction Report. This report extracts all of the raw data in AQS for a specific site or agency.
4. AMP 430 - This is the Data Completeness Report, which shows each parameter's monthly and quarterly completeness in percentages.
5. AMP 501 – This is the Extract Raw Data Report. This report extracts all the raw data in AQS for a specific site or agency.
6. AMP 504 – This is the QA Data Extraction report. 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 FAMAS and the data in the AMP 251, AMP 501, and AMP 504 reports.
 - AMP 430 Completeness Report (1st page only and signed by the QA coordinator).

Subsequently, the OAM Data Quality Section Environmental Administrator generates and reviews the AMP 350 report to ensure that the agencies within Florida's PQAO consistently and correctly use null codes and qualifier codes. (This report is generated for the state and reviewed by Florida DEP only --- see Section 12.1). The AQS Coordinator will also run the AMP 256 – 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 FAMAS on a monthly basis, no later than 25 days after the end of each month. 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.
- Data validation checklist.
- FAMAS Data Completeness Report (signed by the QA coordinator).
- Memo stating which parameters were below 75% (90% for ozone) and why (if applicable).
- Corrective Action/Missing Data Report (if applicable).

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

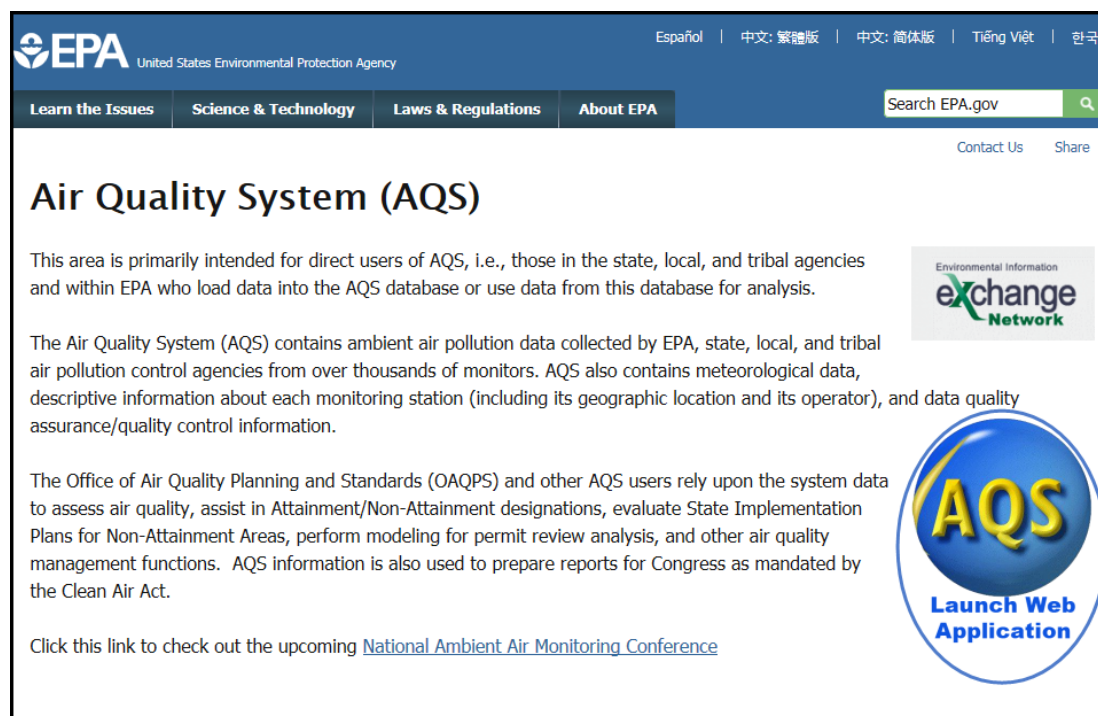


Figure 14-2. AQS Logon Screen

AQS UNIFIED LOGON FORM

Username:

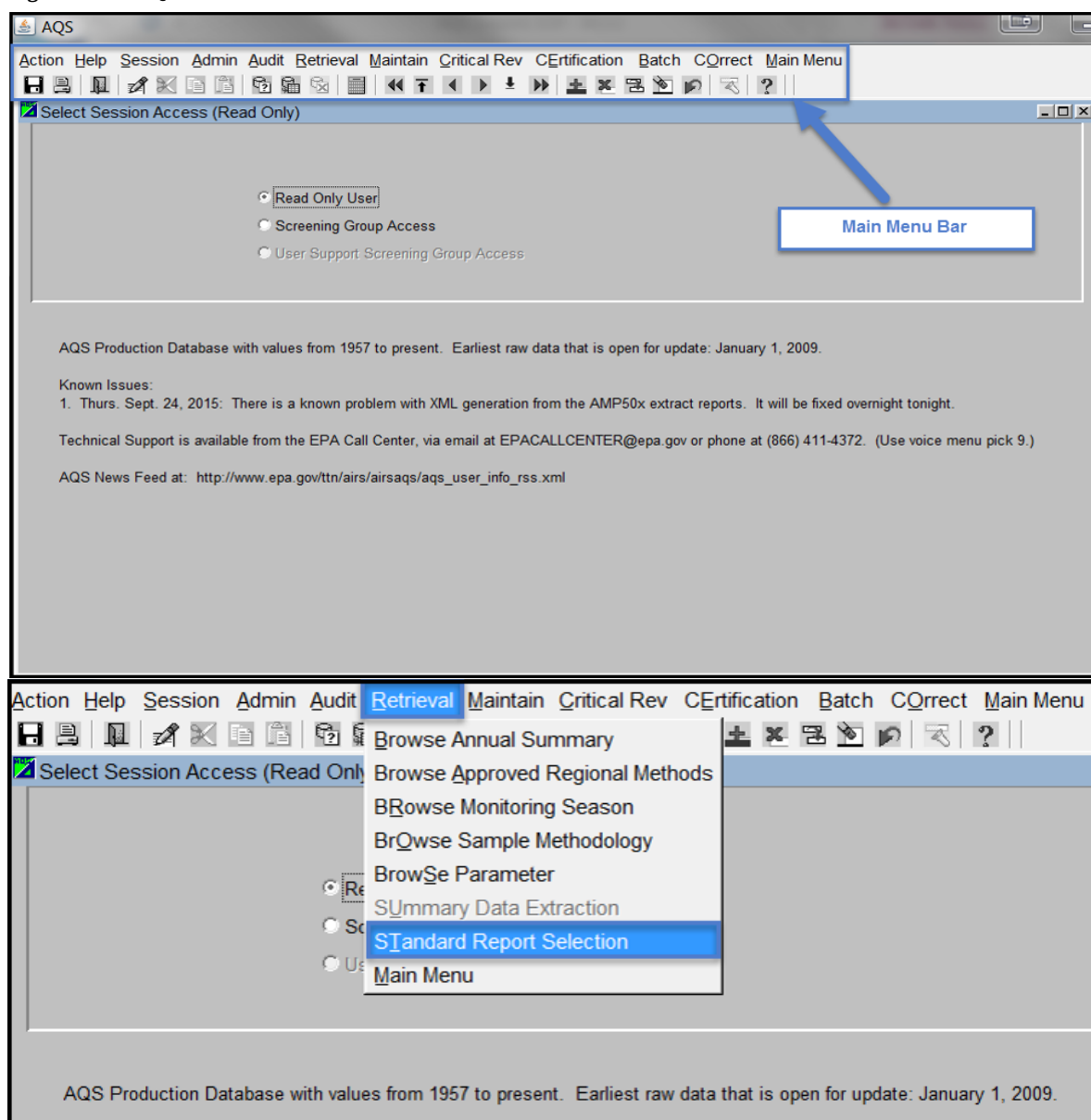
Password:

Database:

The Air Quality System (AQS) is a United States Environmental Protection Agency (EPA) computer system which may be accessed and used for authorized purposes only. Unauthorized access or use of this computer system may subject violators to criminal, civil, and/or administrative action. All information on this computer system may be monitored, recorded, read, copied, and disclosed to and by authorized personnel for official purposes, including law enforcement. Access or use of this computer system by any person, whether authorized or unauthorized, constitutes consent to these terms. AQS is exclusively for the use of federal, State, Territorial, and Tribal environmental agency employees and their delegates working in their official capacities.

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 AMP 251, 430, AMP 501 or AMP 504 and press '**OK**.'

Figure 14-4. AQS Criteria Set Tab

AQS

Action Help Session Admin Audit Retrieval Maintain Critical Rev Certification Batch COrrect Main Menu

Standard Report Criteria Selection (Florida)

Criteria Set Data Selection Sort Order Report Options Retrieve Reports

Criteria Set Desc

Owner ORIENE THOMAS Type PRIVATE

Report Code Report Name

Reports

Find%

Rep_Report_Code	Report_Name
G74	CR RAW DATA
AMP435	DAILY SUMMARY REPORT
AMP430	DATA COMPLETENESS REPORT
AMP480	DESIGN VALUE REPORT
AMP504	EXTRACT QA DATA
AMP501	EXTRACT RAW DATA
AMP503	EXTRACT SAMPLE BLANK DATA
AMP500	EXTRACT SITE/MONITOR DATA
AMP230	FREQUENCY DISTRIBUTION REPORT
AMP440	MAXIMUM VALUES REPORT
AMP390	MONITOR DESCRIPTION REPORT
AMP220D	MONITOR NETWORK REPORT
AMP256	QA Data Quality Indicator Report
AMP251	QA Raw Assessment Report
AMP450NC	QUICKLOOK ALL PARAMETERS
AMP450	QUICKLOOK CRITERIA PARAMETERS
AMP350MX	RAW DATA MAX VALUES REPORT
AMP350NW	RAW DATA NAAQS AVERAGES

Find OK Cancel

- 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 (AMP 251, AMP 430, AMP 501, and AMP 504)

The figure displays three screenshots of the AQS (Automated Quality System) Standard Report Criteria Selection (Read Only) interface, showing the configuration for running reports online for AMP 251, AMP 430, AMP 501, and AMP 504.

AMP 430 Screenshot:

- Criteria Set:** AMP430
- Report Name:** DATA COMPLETENESS REPORT
- Report Outputs:** ☒ WORKFILE, ☒ REPORT
- Print Format:** PDF
- Buttons:** AMP251, AMP430, Generate Report

AMP 501 Screenshot:

- Criteria Set:** AMP501
- Report Name:** EXTRACT RAW DATA
- Report Outputs:** ☒ WORKFILE, ☐ XML
- Buttons:** AMP501, Generate Report

AMP 504 Screenshot:

- Criteria Set:** AMP504
- Report Name:** EXTRACT QA DATA
- Report Outputs:** ☒ WORKFILE, ☐ XML
- Buttons:** AMP504, Generate Report

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 (AMP 251, AMP 430, AMP 501, AMP 504)

The figure displays three screenshots of the AQS Standard Report Criteria Selection (Read Only) interface, showing the 'Criteria Set' tab for different report codes (AMP430, AMP501, and AMP504). The interface includes a menu bar (Action, Help, Session, Admin, Audit, Retrieval, Maintain, Critical Rev, Certification, Batch, CQrect, Main Menu) and a toolbar. The 'Criteria Set' tab is active, showing fields for Criteria Set, Desc, Owner (ORIENE, THOMAS), and Type (PRIVATE). The 'Report Code' is selected as AMP430, AMP501, or AMP504. The 'Report Name' is DATA COMPLETENESS REPORT, EXTRACT RAW DATA, or EXTRACT QA DATA. The 'Send via Email' option is selected under 'Run Online'. The 'Report Outputs' section shows 'WORKFILE' and 'REPORT' (or 'XML') selected. The 'Print Format' is set to PDF. A 'File Name' field is highlighted with a blue box in each screenshot. A 'Generate Report' button is at the bottom of each form.

AMP430 Screenshot: Report Code: AMP430, Report Name: DATA COMPLETENESS REPORT. Report Outputs: WORKFILE, REPORT. Print Format: PDF. File Name: []

AMP501 Screenshot: Report Code: AMP501, Report Name: EXTRACT RAW DATA. Report Outputs: WORKFILE, XML. File Name: []

AMP504 Screenshot: Report Code: AMP504, Report Name: EXTRACT QA DATA. Report Outputs: WORKFILE, XML. File Name: []

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

The screenshot shows the 'Standard Report Criteria Selection (Read Only) AMP501' window. The 'Data Selection' tab is selected. The window contains the following sections:

- Monitor / Geographic Criteria:** A grid of dropdown menus for State Code, County Code, Site Id, Parameter Code, POC, City Code, AQCR Code, UAR Code, CBSA Code, CSA Code, and EPA Region Code.
- Protocol Criteria:** Dropdown menus for Pollutant Type (with 'CRITERIA' selected), Parameter Code, Method Code, and Duration Code.
- Date Criteria:** Fields for Start Date and End Date, each with YYYY, MM, and DD sub-fields.
- Screening Group:** A dropdown menu.
- Monitor Network:** A dropdown menu.
- Monitor Type:** A dropdown menu.
- Agency Role:** A dropdown menu with 'PQAO' selected.
- Agency:** A dropdown menu.

A 'Generate Report' button is located at the bottom center of the window.

Figure 14-8. AQS Report Data Selection

The screenshot displays the 'Standard Report Criteria Selection (Read Only) AMP501' window. The interface includes a menu bar (Action, Help, Session, Admin, Audit, Retrieval, Maintain, Critical Rev, Certification, Batch, CQrect, Main Menu) and a toolbar. The main content area is divided into several sections:

- Criteria Set:** Includes tabs for Criteria Set, Data Selection, Sort Order, Report Options, and Retrieve Reports.
- Monitor / Geographic Criteria:** A table with columns for State Code, County Code, Site Id, Parameter Code, POC, City Code, AQCR Code, UAR Code, CBSA Code, CSA Code, and EPA Region Code. The first row is populated with values: 12, 057, 3002, 88101, 1, and empty fields for the others.
- Protocol Criteria:** Includes fields for Pollutant Type (set to 'CRITERIA'), Parameter Code, Method Code, and Duration Code.
- Date Criteria:** Includes Start Date and End Date fields, each with a YYYY MM DD format.
- Screening Group:** A single text input field.
- Monitor Network:** A list box with a scroll bar.
- Monitor Type:** A list box with a scroll bar.
- Agency Role:** A dropdown menu set to 'PQAO'.
- Agency:** A list box with a scroll bar.
- Generate Report:** A button at the bottom center.

- 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.

8. The **'Date Criteria'** section allows for a specific time to be selected. The AMP 251, AMP 501 and AMP 504 allow the user to specify a specific date while the AMP 430 only specifies a monthly time.

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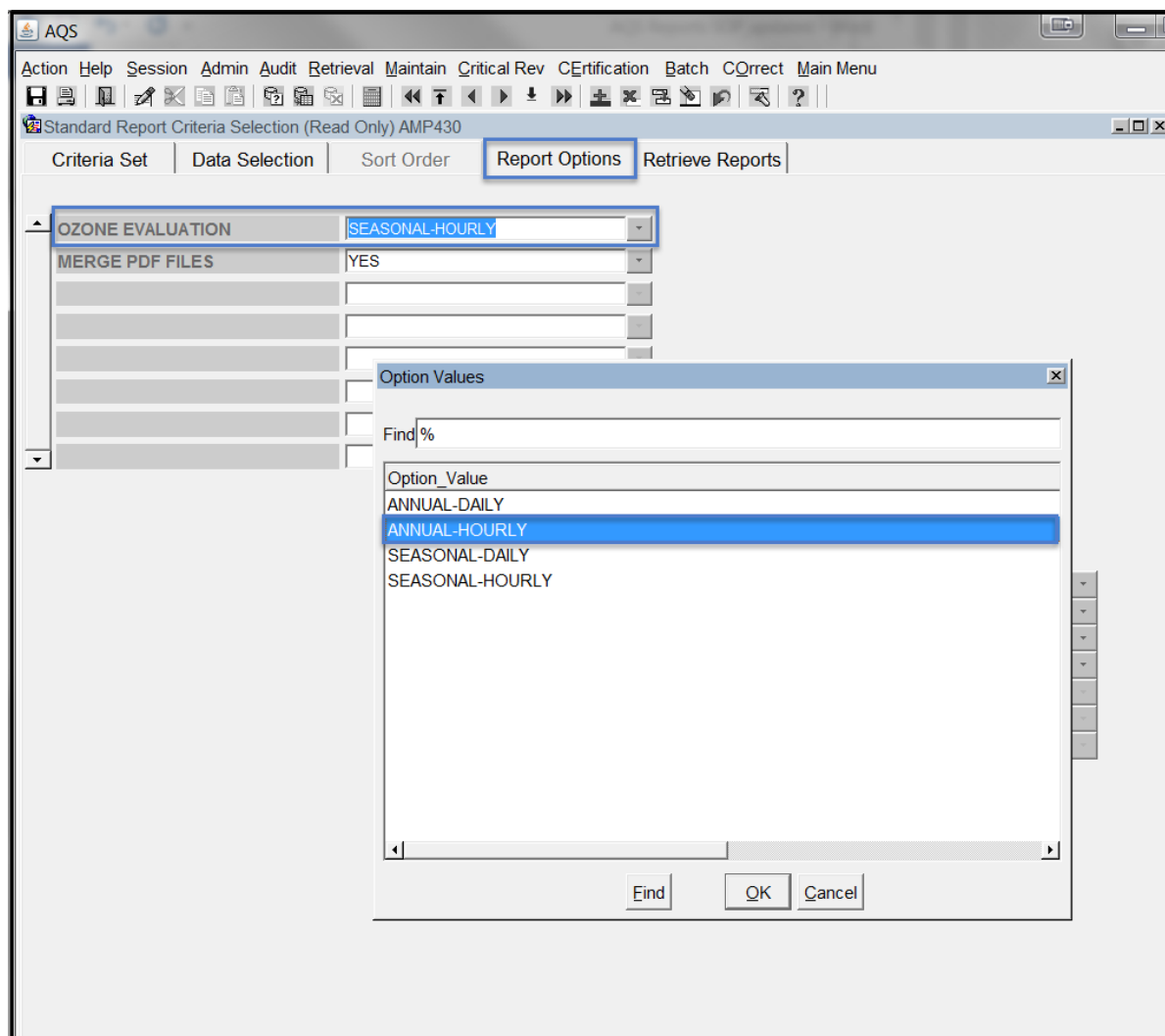
Figure 14-11. AQS Report Data Selection – Protocol Criteria – AMP 430

The screenshot displays the 'Standard Report Criteria Selection (Read Only) AMP430' window. The 'Data Selection' tab is selected, showing a grid for 'Monitor / Geographic Criteria' with columns for State Code, County Code, Site Id, Parameter Code, POC, City Code, AQCR Code, UAR Code, CBSA Code, CSA Code, and EPA Region Code. Below this, the 'Protocol Criteria' section includes fields for Pollutant Type (set to CRITERIA), Parameter Code, and Duration Code. The 'Date Criteria' section shows Start Date (2015-10) and End Date (2015-12). The 'Screening Group' field is empty. The 'Monitor Network' and 'Monitor Type' sections have empty dropdowns. The 'Agency Role' is set to 'REPORTING', and the 'Agency' field is empty. A 'Generate Report' button is located at the bottom center.

Report Options:

- The AMP 430 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

RR ID	User Id	Report Code	Request Type	Request Date	Report Stage	% Complete
1424244	XOSTHOMAS	AMP501	REPORT	03/15/2016 12:20 PM	Completed	100
1424239	XOSTHOMAS	AMP501	REPORT	03/15/2016 12:15 PM	Completed	100
1424238	XOSTHOMAS	AMP501	REPORT	03/15/2016 12:14 PM	Completed	100
1424236	XOSTHOMAS	AMP501	REPORT	03/15/2016 12:13 PM	Completed	100
1424235	XOSTHOMAS	AMP501	REPORT	03/15/2016 12:11 PM	Completed	100
1424234	XOSTHOMAS	AMP501	REPORT	03/15/2016 12:10 PM	Completed	100
1424231	XOSTHOMAS	AMP501	REPORT	03/15/2016 12:08 PM	Completed	100
1424228	XOSTHOMAS	AMP501	REPORT	03/15/2016 12:05 PM	Completed	100
1424223	XOSTHOMAS	AMP501	REPORT	03/15/2016 12:02 PM	Completed	100
1424215	XOSTHOMAS	AMP501	REPORT	03/15/2016 11:56 AM	Completed	100
1424203	XOSTHOMAS	AMP501	REPORT	03/15/2016 11:41 AM	Completed	100
1424197	XOSTHOMAS	AMP501	REPORT	03/15/2016 11:39 AM	Completed	100
1424187	XOSTHOMAS	AMP501	REPORT	03/15/2016 11:34 AM	Completed	100
1424152	XOSTHOMAS	AMP501	REPORT	03/15/2016 11:11 AM	Completed	100
1424149	XOSTHOMAS	AMP501	REPORT	03/15/2016 11:09 AM	Completed	100

Delivery of Reports:

The AMP 251, AMP 430, AMP 501 and AMP 504 can be delivered to the user either online, through the web browser, or via email.

Online:

1. The AMP 251 and AMP 430 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 – AMP 430

The screenshot displays the AQS Production OFM 11g - W... report interface. The browser address bar shows the URL: https://aqs.epa.gov/aqsweb/aqstmp//AQSPROD_XOSTHOM. The report title is "AQS Production OFM 11g - W...". The user ID is XOSTHOMAS. The report code is AMP430. The report date is Apr. 6, 2016.

The report is titled "DATA COMPLETENESS REPORT". It includes several sections for user selection:

- GEOGRAPHIC SELECTIONS:** A table with columns: Tribal Code, State, County, Site, Parameter, POC, City, AQCR, UAR, CBSA, CSA, EPA Region. The values are: Tribal Code 12, State 095, County 2002, Site 88101, Parameter, POC, City, AQCR, UAR, CBSA, CSA, EPA Region.
- PROTOCOL SELECTIONS:** A table with columns: Parameter Classification, Parameter, Method, Duration. The value is: ALL.
- SELECTED OPTIONS:** A table with columns: Option Type, Option Value, Order, Column. The values are:

Option Type	Option Value	Order	Column
OZONE EVALUATION	ANNUAL-HOURLY	1	EPA_REGION
MERGE PDF FILES	YES	2	STATE_CODE
AGENCY ROLE	REPORTING	3	MONITOR_TYPE
		4	COUNTY_CODE
		5	SITE_ID
		6	PARAMETER_CODE
		7	POC
- DATE CRITERIA:** A table with columns: Start Date, End Date. The values are: Start Date 2015 01, End Date 2015 12.
- APPLICABLE STANDARDS:** A table with columns: Standard Description. The values are:

Standard Description
CO 1-hour 1971
Lead 3-Month 2009
Lead 3-Month PM10 Surrogate 2009
Lead Quarterly 1978
NO2 Annual 1971
Ozone 1-hour Daily 2005
PM10 24-hour 2006
PM25 Annual 2013
SO2 1-hour 2010

The interface includes a toolbar at the bottom with icons for save, print, zoom, and navigation. The page size is 11.00 x 8.50 in.

Figure 14-15. AQS Reports – AMP 251

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	096	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	PM ₁₀ Flow Rate Verification
Assessment Types	PM ₁₀ 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	FB Analysis Audit
Assessment Types	Collocated Assessments

DATE CRITERIA

Start Date	End Date
2016 03 01	2016 03 31

- The AMP 501 and AMP 504 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 – AMP 501

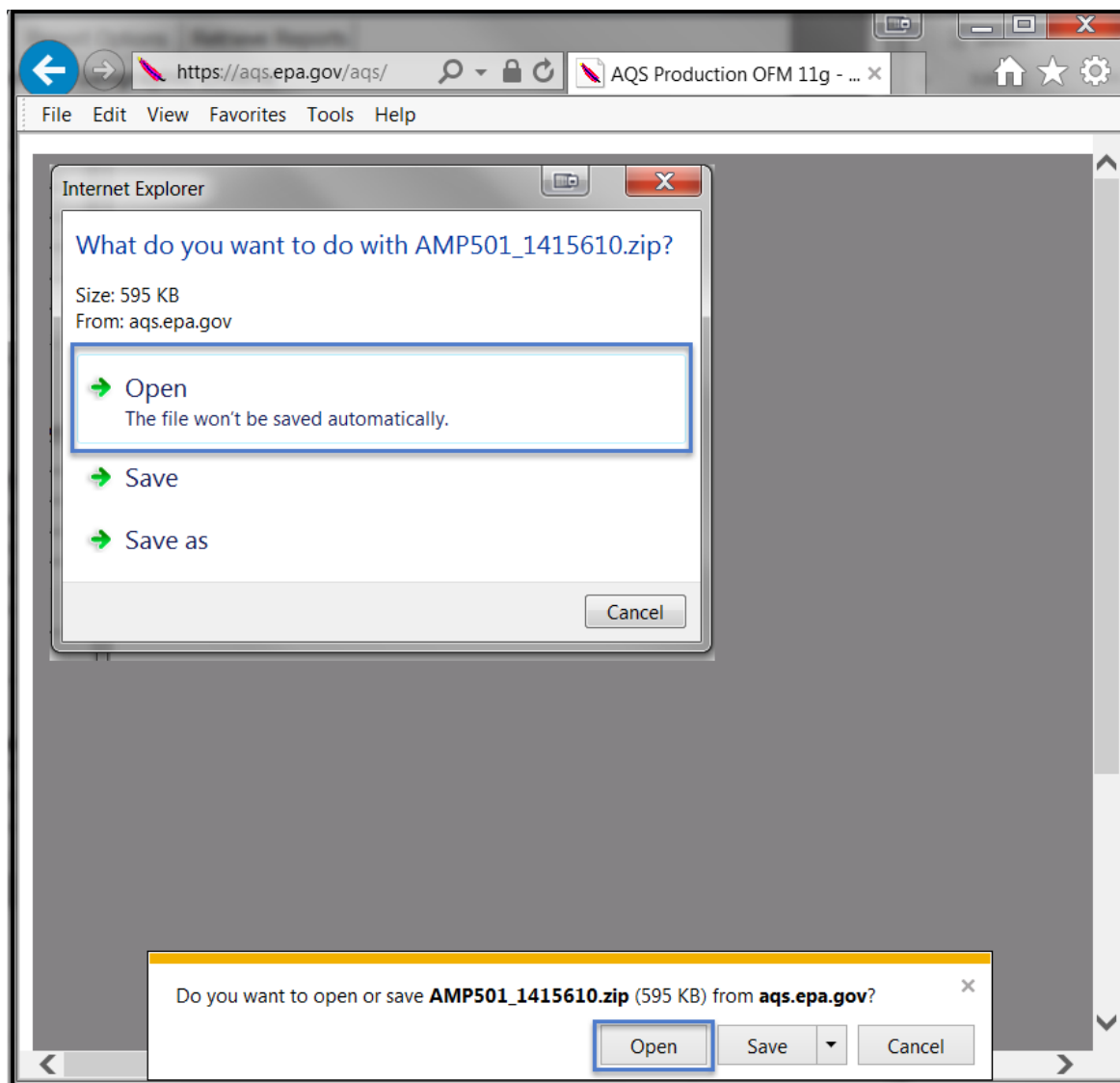
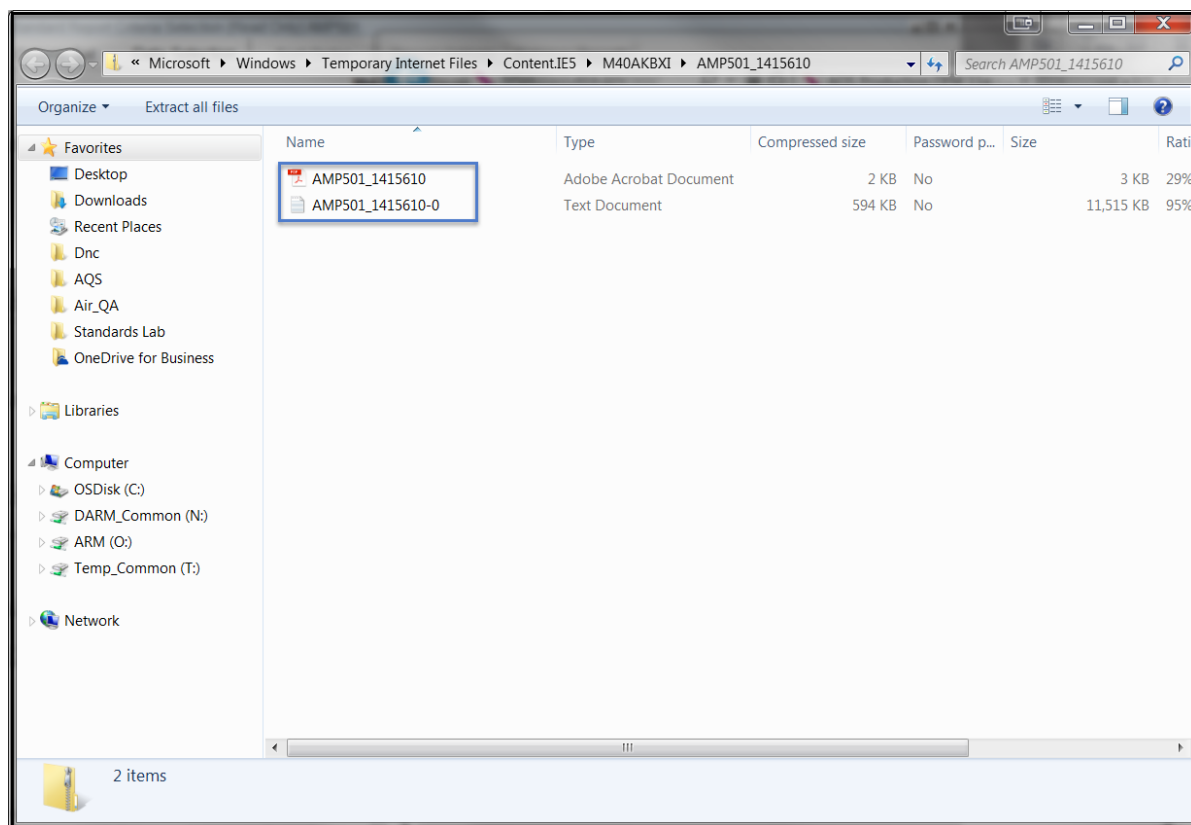


Figure 14-17. AQS Reports – AMP 501 Output



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 AMP 251 and 430 will only contain a PDF while the AMP 501 and AMP 504 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

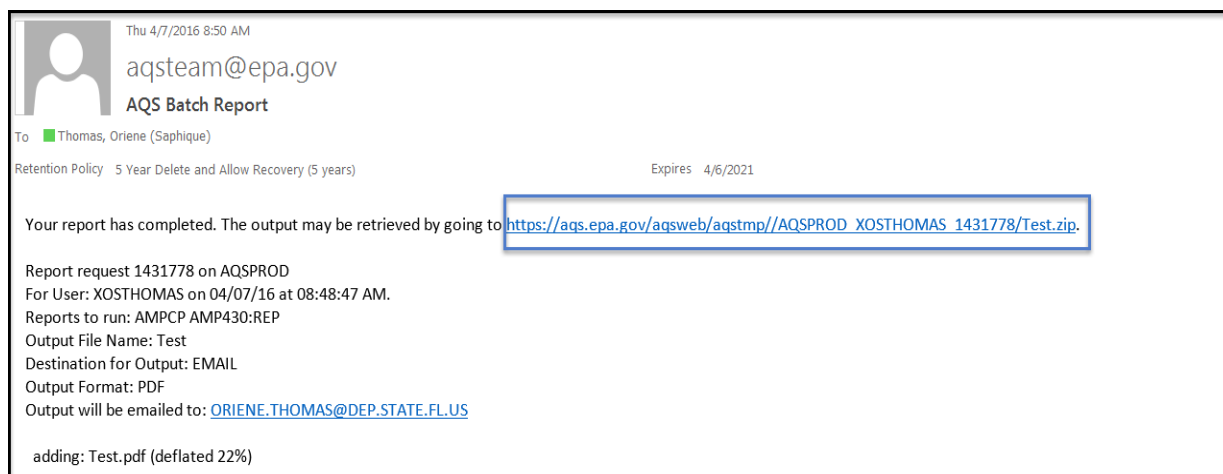
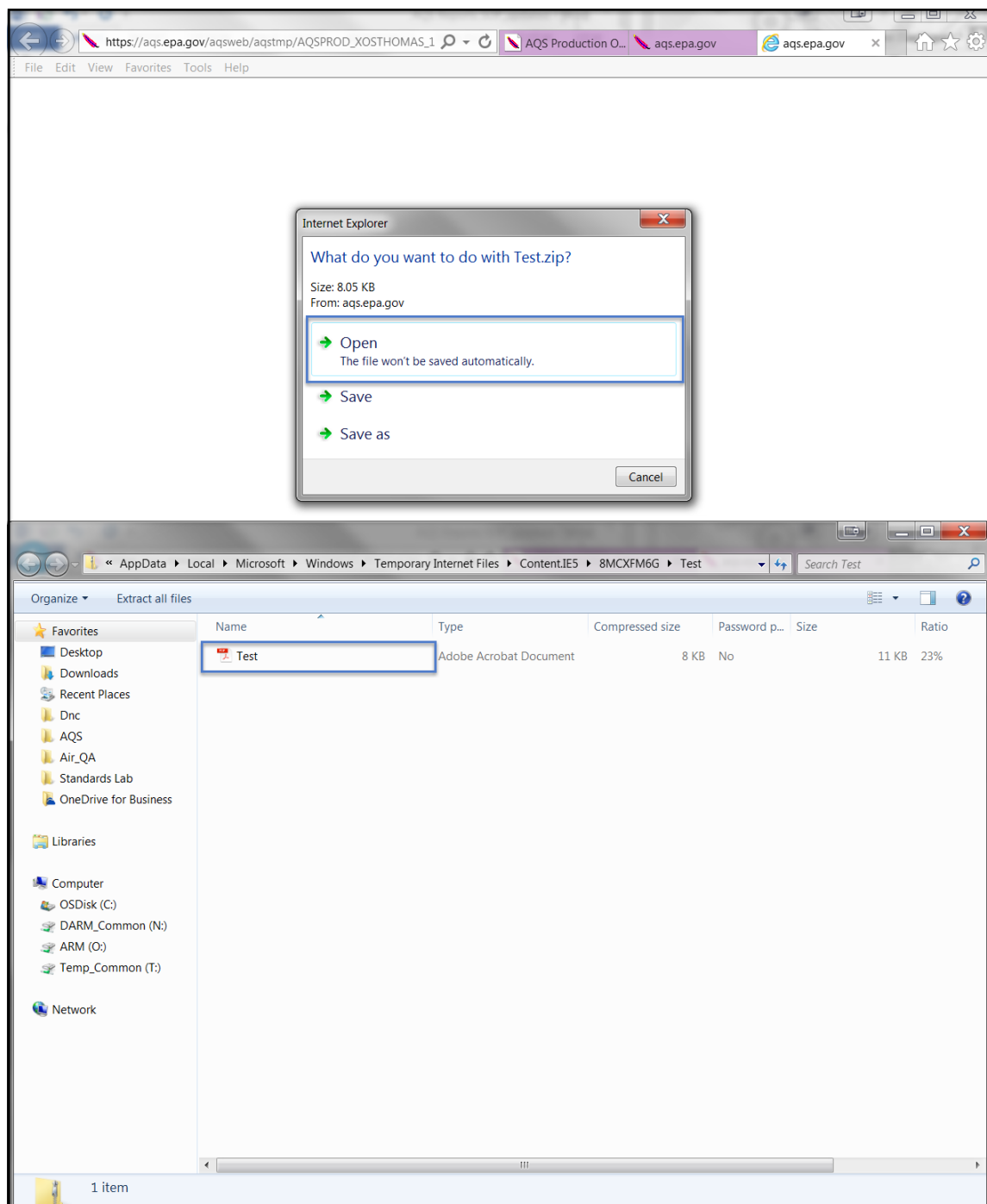


Figure 14-19. AQS Reports



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

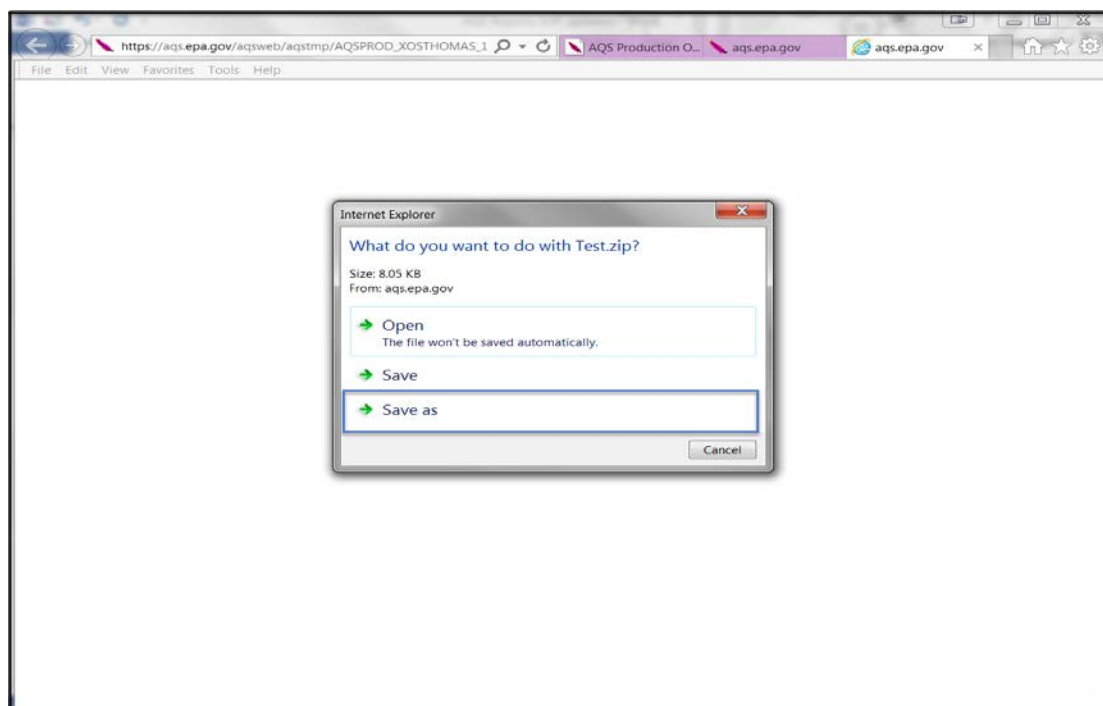
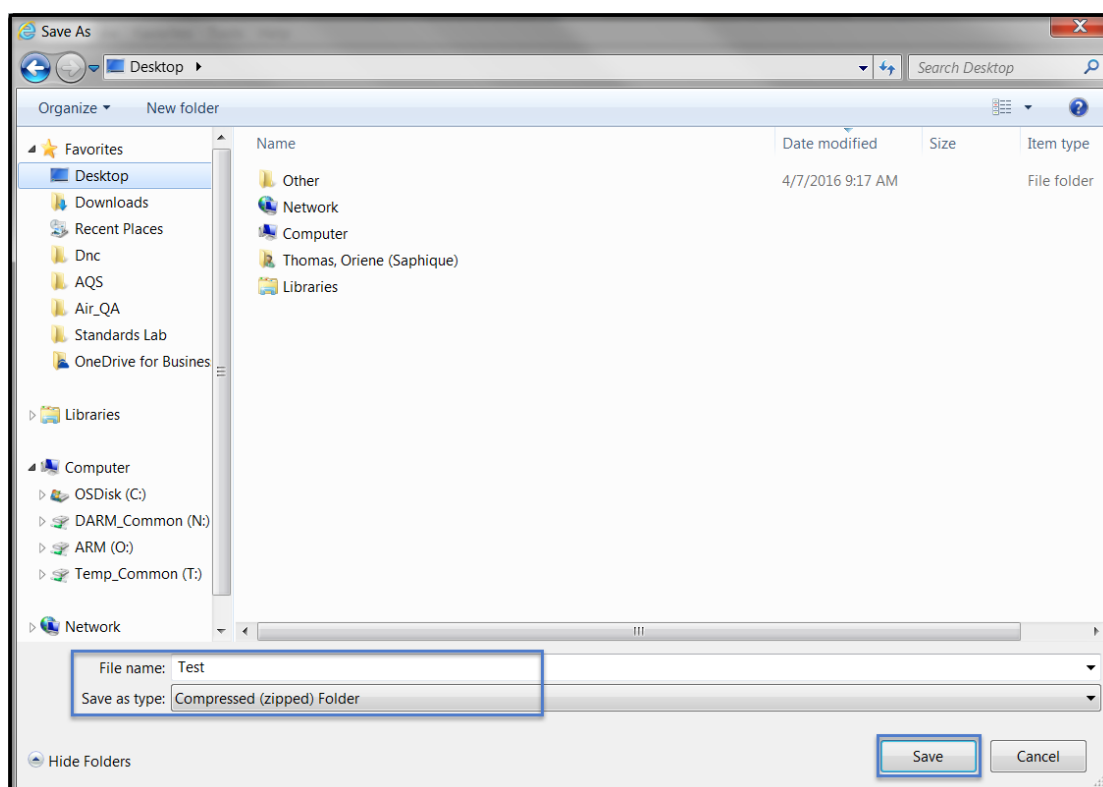


Figure 14-21. AQS Reports – Saving the File



14.2.2 Quality Assurance Comparisons

AMP 251- QA Raw Assessment Report:

The percentage difference for quality control check in the AMP 251 should be visually compared to the control limit for each pollutant.

1. 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 FAMAS, 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 (AMP 251)

AMP251_2015.pdf - Adobe Acrobat Pro DC

File Edit View Window Help

Home ToolsAMP251_2015.pdf

16 / 747

75.3%

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

AIR QUALITY SYSTEM

Raw Monitor Assessment Report

Mar. 16, 2017

ONE POINT QC

PQAO: Florida Department of Environmental Protection (FDEP)(1328)

Parameter: Carbon monoxide(42101)

Method of Collection and Analysis

Site	Pos	Method	Assess Date	Number	Assess Conc.	Monitor Conc.	% Diff	Unit Abbr.
12-031-0084-1	054		2015-06-11	1	9	9	0	ppm
12-031-0084-1	054		2015-06-15	1	9	8.9	-1.1	ppm
12-031-0084-1	054		2015-06-25	1	9	8.7	-3.3	ppm
12-031-0084-1	054		2015-07-02	1	9	8.4	-6.7	ppm
12-031-0084-1	054		2015-07-09	1	9	10	11.1	ppm
12-031-0084-1	054		2015-07-15	1	8.9	9.9	11.2	ppm
12-031-0084-1	054		2015-07-17	1	8.9	9.5	6.7	ppm
12-031-0084-1	054		2015-07-23	1	8.8	8	-9.1	ppm
12-031-0084-1	054		2015-07-30	1	8.9	8.5	-4.5	ppm
12-031-0084-1	054		2015-08-06	1	8.9	8.6	-3.4	ppm
12-031-0084-1	054		2015-08-14	1	8.9	8.8	-1.1	ppm
12-031-0084-1	054		2015-08-17	1	9	9.1	1.1	ppm
12-031-0084-1	054		2015-08-18	1	8.9	9.5	6.7	ppm
12-031-0084-1	054		2015-09-03	1	8.9	9.5	6.7	ppm
12-031-0084-1	054		2015-09-10	1	9	9.7	7.8	ppm
12-031-0084-1	054		2015-09-16	1	8.9	9.2	3.4	ppm
12-031-0084-1	054		2015-09-21	1	8.9	8.6	-3.4	ppm
12-031-0084-1	054		2015-10-02	1	8.9	8.5	-4.5	ppm
12-031-0084-1	054		2015-10-08	1	9	9	0	ppm
12-031-0084-1	054		2015-10-12	1	8.9	8.6	-3.4	ppm
12-031-0084-1	054		2015-10-26	1	9	8.6	-4.4	ppm
12-031-0084-1	054		2015-11-02	1	8.9	8.6	-3.4	ppm
12-031-0084-1	054		2015-11-10	1	8.9	8.7	-2.2	ppm
12-031-0084-1	054		2015-11-18	1	8.9	8.5	-4.5	ppm
12-031-0084-1	054		2015-11-24	1	9	8.6	-4.4	ppm
12-031-0084-1	054		2015-12-03	1	8.9	8.6	-3.4	ppm
12-031-0084-1	054		2015-12-09	1	9	8.7	-3.3	ppm
12-031-0084-1	054		2015-12-16	1	8.9	8.6	-3.4	ppm
12-031-0084-1	054		2015-12-22	1	9	8.5	-5.6	ppm

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Figure 14-23. FAMAS 1-Point QC Screen

Parameter	Assessment Date	Assessment Number	Performing Agency	Monitor Method Code	Reported Unit	Monitor Concentration	Assessment Concentration	Exclude from Export / Reports
CO	07/02/2015	1	0544	054	007	8.4	8	☐
CO	07/09/2015	1	0544	054	007	10	9	☒
CO	07/16/2015	1	0544	054	007	9.9	9.9	☒
CO	07/17/2015	1	0544	054	007	9.5	9.5	☐
CO	07/23/2015	1	0544	054	007	8	8.5	☐
CO	07/30/2015	1	0544	054	007	8.5	8.5	☐
CO	08/06/2015	1	0544	054	007	8.6	8.9	☐
CO	08/14/2015	1	0544	054	007	8.6	8.9	☐
CO	08/17/2015	1	0544	054	007	9.1	9	☐
CO	08/18/2015	1	0544	054	007	9.5	8.9	☐
CO	08/23/2015	1	0544	054	007	9.5	8.9	☐
CO	08/19/2015	1	0544	054	007	9.7	9	☐
CO	08/16/2015	1	0544	054	007	9.2	8.9	☐
CO	08/21/2015	1	0544	054	007	8.6	8.9	☐

AMP 430- 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 FAMAS.

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. FAMAS Data Completeness Report – Criteria Selection

Figure 14-25. AQS Data Completeness Report (AMP 430) – Top; FAMAS 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 PARAMETER POC DURATION METHOD
CITY
ADDRESS
12-095-2002 88101 PM2.5 - Local Conditions 1 7
Winter Park 000
MORRIS BLVD.

OBSERVATIONS												
NUMBER / PERCENT												
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
31	28	31	28	30	26	28	26	28	30	29	29	344
100%	100%	100%	93%	97%	87%	90%	84%	93%	97%	97%	94%	94%

Data Completeness Report 2015

Criteria

Date Range: 1/01/2015 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

AMP 501-Raw Data Report:

The AMP 501 is the only report that can be compared to FAMAS using the '**File Comparison**' utility in FAMAS. To compare the AMP 501 report in FAMAS the user must save the Text file of the AMP 501 report on the device and then upload this file into FAMAS.

1. Select '**File Comparison**' under the Utilities submenu in FAMAS
2. Choose the '**Browse**' button to locate and choose the AMP 501 text file.
3. Select the '**Upload**' tab to upload the file into the FAMAS 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 FAMAS and AQS.

Figure 14-26. AQS File Comparison

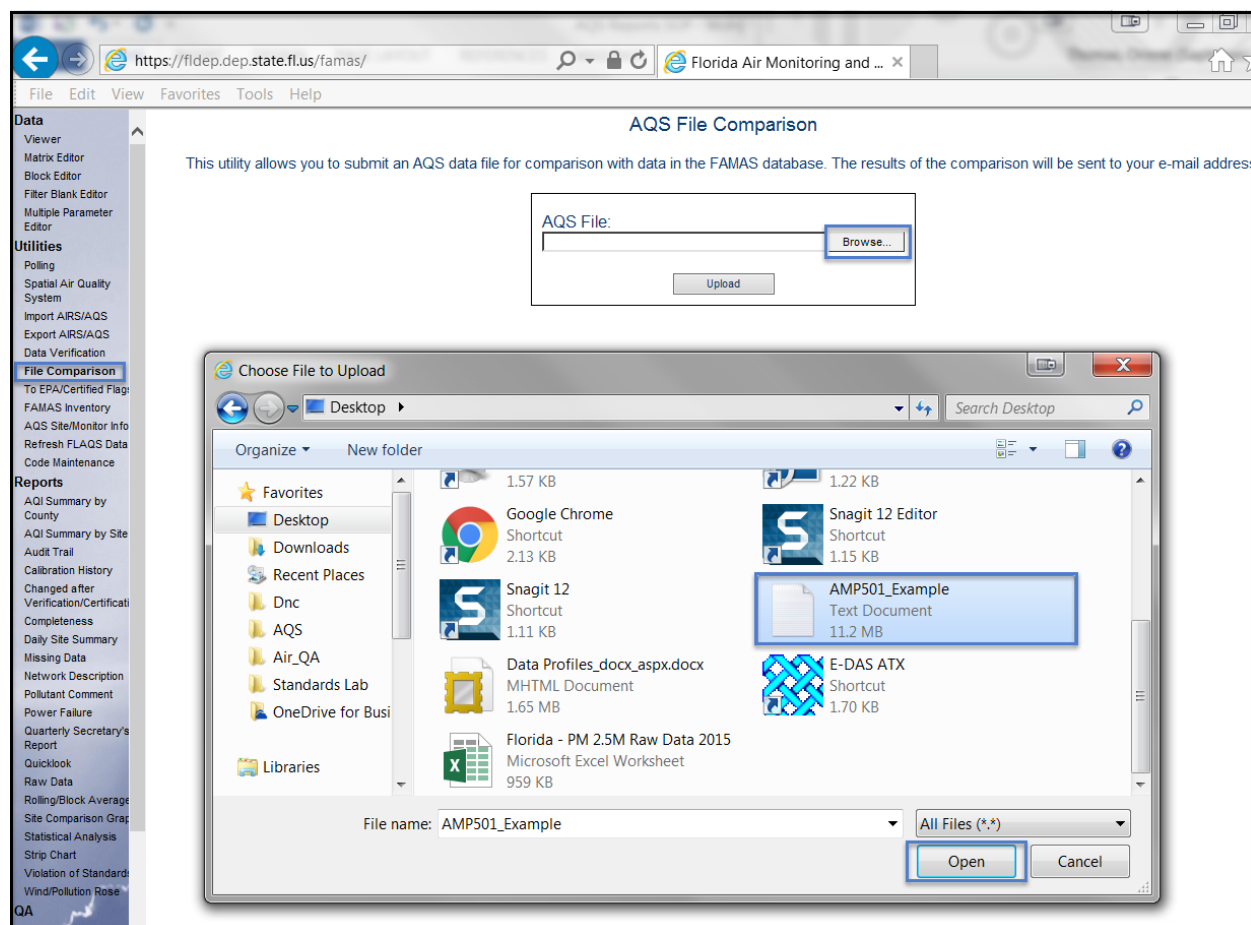


Figure 14-27. FAMAS. AQS File Comparison - FAMAS

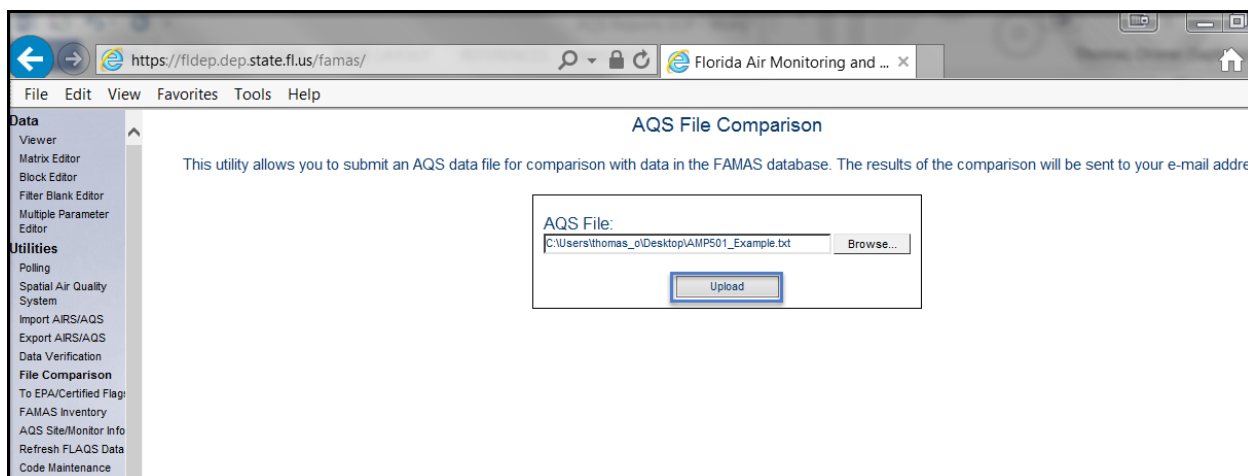


Figure 14-28. AQS File Comparison – No Differences Found

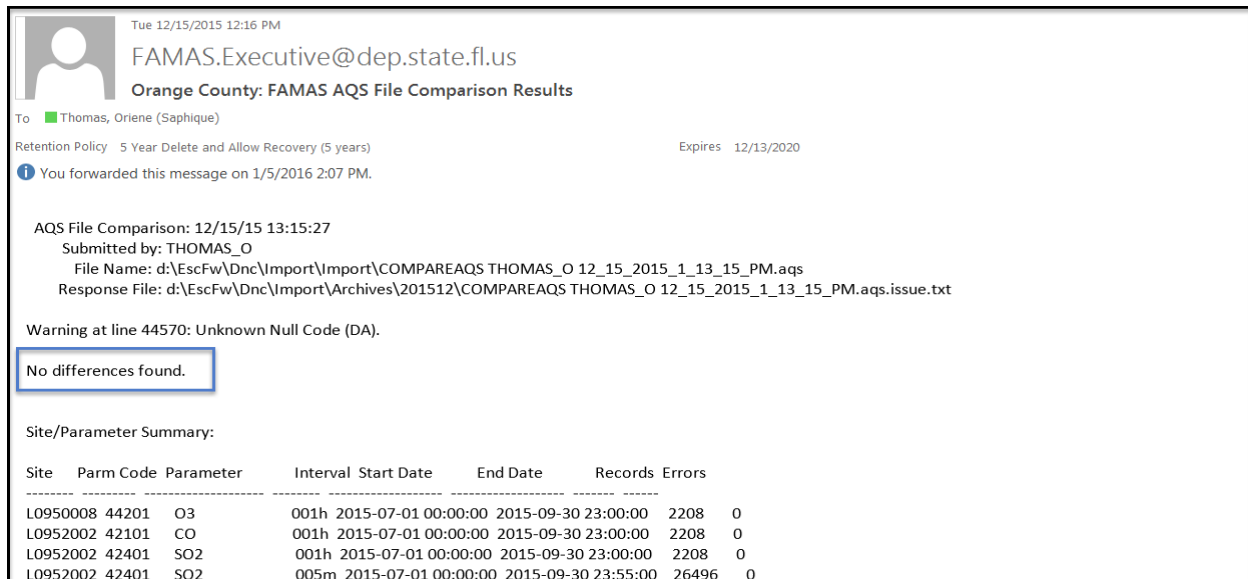


Figure 14-29. AQS File Comparison – Differences Found

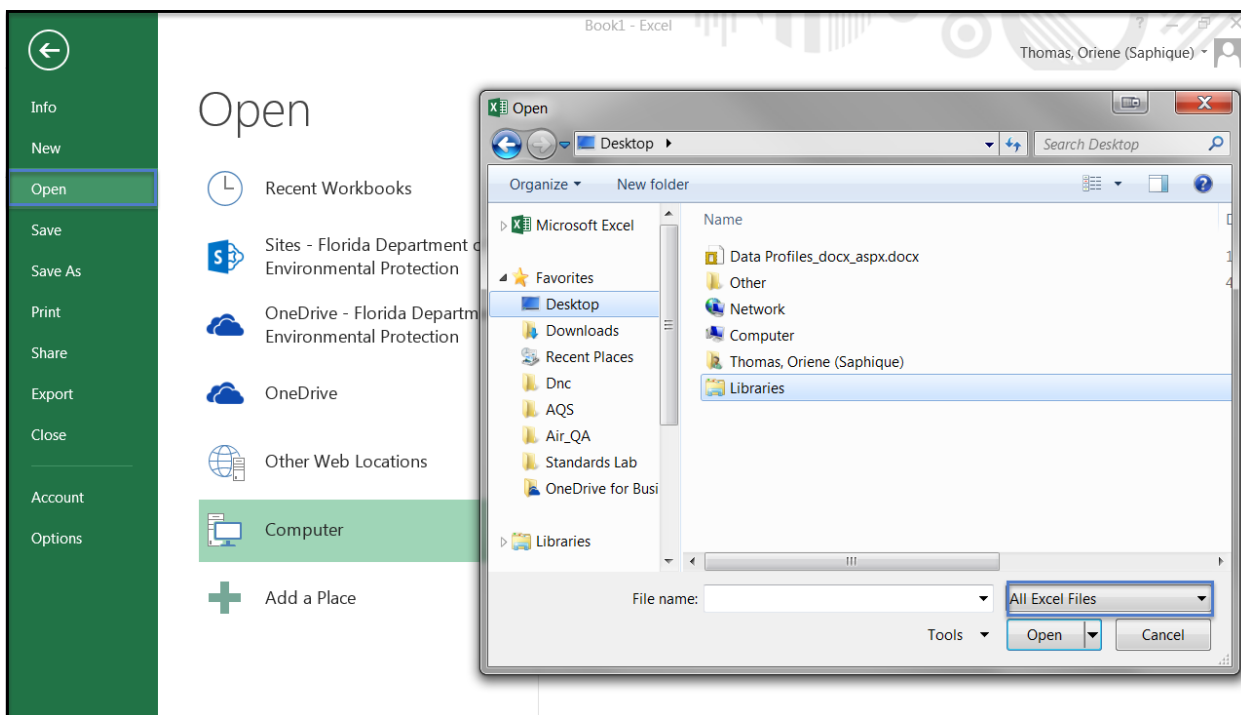
AQS File Comparison: 12/15/15 13:25:01 Submitted by: THOMAS_O File Name: d:\EscFw\Dnc\Import\Import\COMPAREAQS THOMAS_O 12_15_2015_1_23_09_PM.aqs Response File: d:\EscFw\Dnc\Import\Archives\201512\COMPAREAQS THOMAS_O 12_15_2015_1_23_09_PM.aqs.issue.txt									
Site	Param	Interval	Date Stamp	Value/Null Code	Method Code	Exclusion	QA		
L0860027	NO	001h	2015-07-14 07:00:00	FAMAS BA	074	BA	099		AQS
			File Line # 29026						
L0860027	NOX	001h	2015-07-14 07:00:00	FAMAS BA	074	BA	099		AQS
			File Line # 33442						
3 differences found.									
Site/Parameter Summary:									
Site	Param Code	Parameter	Interval	Start Date	End Date	Records	Errors		
L0860019	42401	SO2	001h	2015-07-01 00:00:00	2015-09-30 23:00:00	2208	0		
L0860019	42401	SO2	005m	2015-07-01 00:00:00	2015-09-30 23:55:00	26496	0		
L0860027	42601	NO	001h	2015-07-01 00:00:00	2015-09-30 23:00:00	2208	0		
L0860027	42602	NO2	001h	2015-07-01 00:00:00	2015-09-30 23:00:00	2208	0		
L0860027	42603	NOX	001h	2015-07-01 00:00:00	2015-09-30 23:00:00	2208	0		
L0860027	44201	O3	001h	2015-07-01 00:00:00	2015-09-30 23:00:00	2208	0		

AMP 504-QA Data Report:

The AMP 504 report must be compared manually by the user to ensure that the QA data in FAMAS matches the QA data in AQS. The user can convert the AMP 504 text file to an excel file for easier viewing.

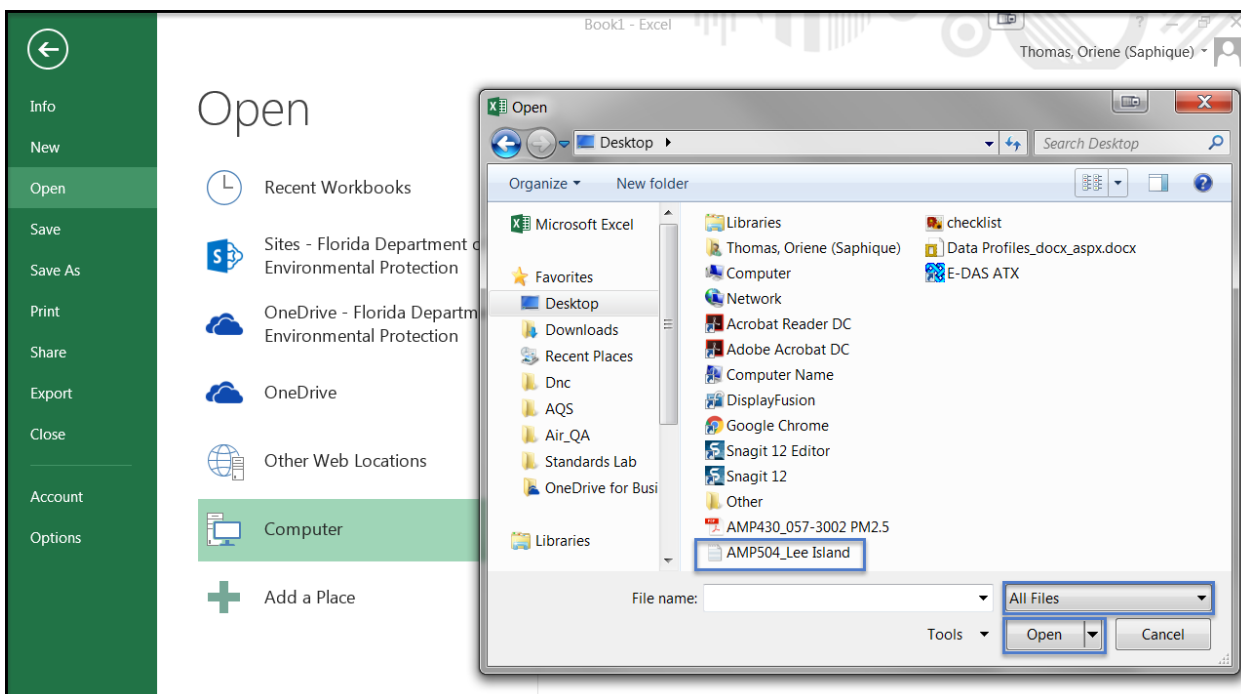
1. Open a blank Excel workbook and select the '**File → Open**' option from the **Main Menu** bar.
2. Navigate to the folder containing the AMP504 text file. The file will not be visible until the user changes the '**All Excel Files**' setting to '**All Files.**'

Figure 14-30. AQS AMP 504 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.

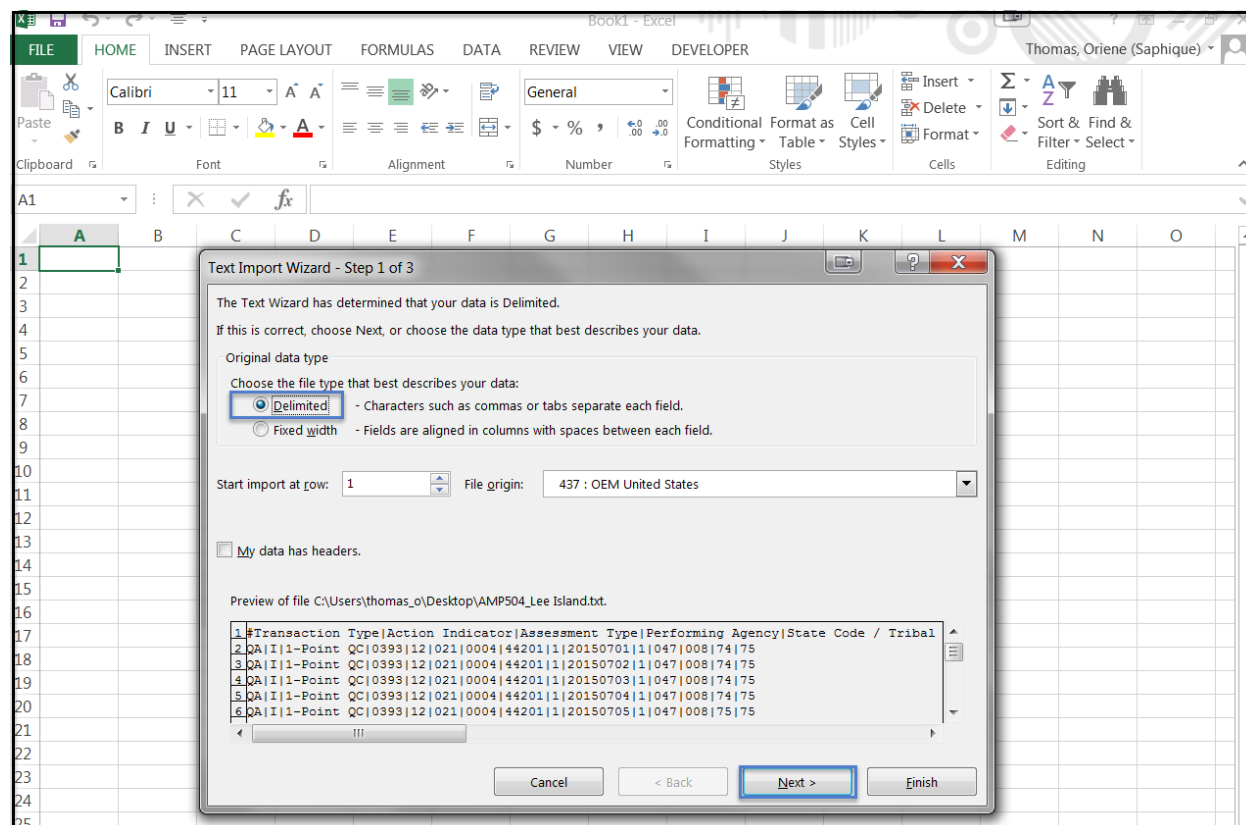
Figure 14-31. AQS AMP 504 QA Data Report – Export to Excel



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 14-32. AQS AMP 504 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 14-33. AQS AMP 504 QA Data Report – Export to Excel

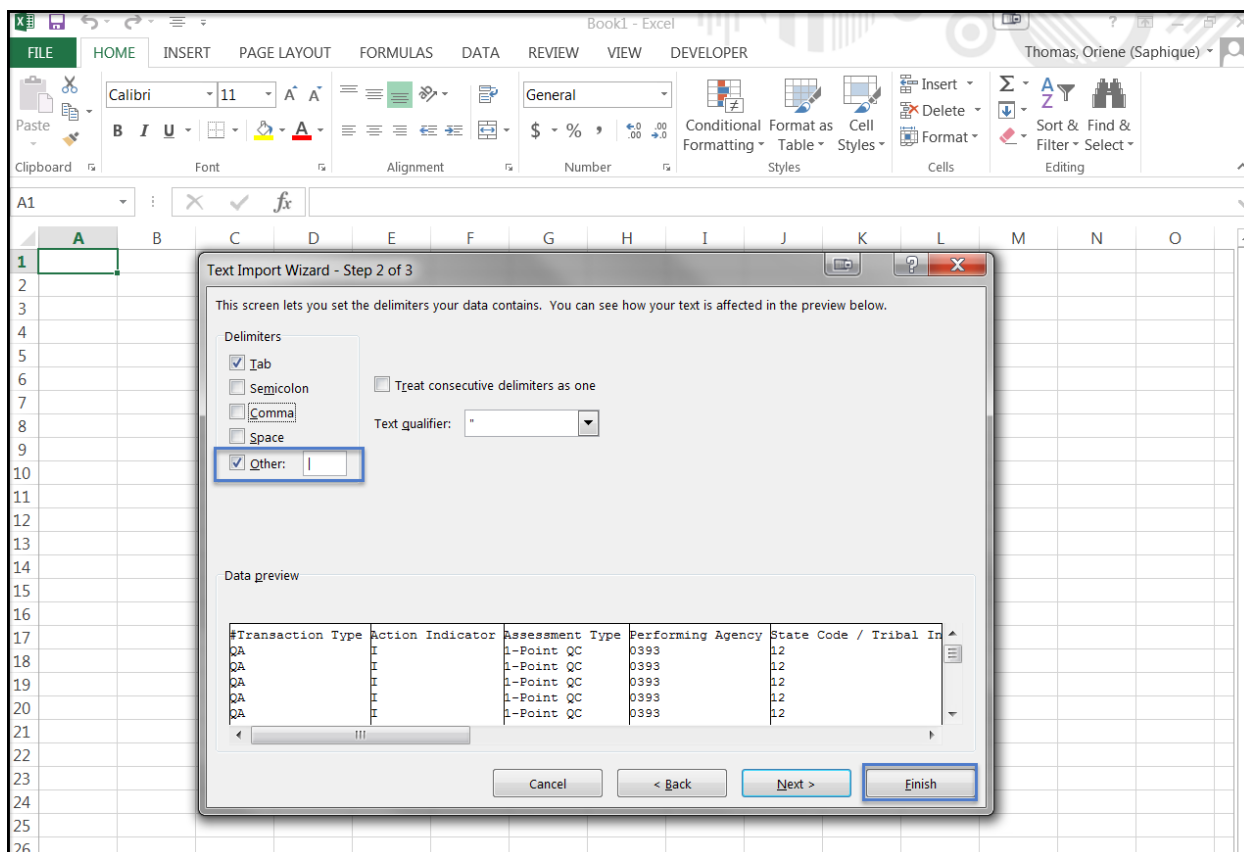


Figure 14-34. AQS AMP 504 QA Data Report – Export to Excel

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14.3 Appendix C – FAMAS QA Transactions and Data Verification Utility

FAMAS Updates - Calendar Year 2015

In lieu of the directions in the FAMAS User Manual dated calendar year 2013, please use the following directions for the FAMAS QA Transactions and Data Verification Utility.

14.3.1 FAMAS QA Transactions

1. Click on [QA/QC CHECKS] to navigate to the QA menu. See Figure 14-35 below.

Figure 14-35. FAMAS Menu



2. The QA menu, Figure 14-36, is where the 17 new screens will be located.
Note: As of December 2017, sixteen of these screens were available. Instructions for those screens that are currently used by the PQAO are detailed in the following pages.

Figure 14-36. FAMAS QA/QC Checks Menu – November 2017

QA/QC Checks

- 1-Point QC
- Annual PE
- Flow Rate Verification
- Semi-Annual Flow Rate Audit
- PMc Flow Rate Verification
- PMc Semi-Annual Flow Rate Audit
- PEP
- NPAP
- Field Proficiency Test
- Duplicate
- Replicate
- Pb Analysis Audit
- AA-PGVP**
- Ozone SRP
- Speciation Flow Rate Verification
- Semi-Annual Speciation Flow Rate Audit
- Main Menu

3. **1-Point QC** is where you can manually enter precision checks by clicking on the **[CREATE NEW]** button. The only records that go here are precision checks. (Flow checks have their own entry screen now under **Flow Rate Verification**). See Figure 14-37 and Table 14-1. Table 14-1 provides a description of what should be entered in the corresponding FAMAS fields shown in Figure 14-37. Enter all, passing and failing, checks into FAMAS.

Note: There is no longer a place to enter collocated pairs precision data. EPA is not requiring it as one of the QA transaction formats.

Figure 14-37. FAMAS 1-Point QC

Parameter	Assessment Date	Assessment Number	Performing Agency	Monitor Method Code	Reported Unit	Monitor Concentration	Assessment Concentration
03	(mm/dd/yyyy)						

Save Cancel

Table 14-1. FAMAS 1-Point QC Field Definitions

Assessment Date	Date that the assessment was performed
Assessment Number	A unique number associated with an assessment performed at a site on a given day. Value should be “1” unless additional same assessments are performed.
Performing Agency	Agency code of the organization performing assessment.
Monitor Method Code	The sampling methodology of the monitor being assessed.
Reported Unit	Units associated with the assessment concentrations (Monitor Concentration and Assessment Concentration)
Monitor Concentration	The concentration value provided by the monitor being assessed.
Assessment Concentration	The value of the check gas standard concentration.

*Note: If a 1-Point QC Check fails or if the check is associated with invalid data, check the **Exclude from Export/Reports** button, so that the check won’t be reported to AQS or included in reports generated by FAMAS.*

4. **Annual PE** is where you will enter the *analytical* audits performed by the DEP auditors. The performing agency will always be “1328” for the PQAO in this case unless you are entering audits performed by your own agency. There are ten (10) audit levels available. It is important to put the values from the audit file in the correct level because the Pass/Fail checks in the verification utility have different % difference limits for each level. In the following example from an ozone audit file, you would enter data in Levels 2, 4, 5, 8, and 10. The rest of the levels should remain empty. Please see Figures 14-38 and 14-39 and Table 14-2. In FAMAS, the **Monitor** column is for the **Analyzer Response** value (DEP Performance Audit Report) and the **Assess** column is the **Audit Concentration** value (DEP Performance Audit Report). In other words, you enter the **Actual O₃ Concentration** values from the DEP performance audit report into the **Assess** column in FAMAS and the **Primary Data Sys.** values into the **Monitor** column in FAMAS. (See below for more detailed instructions). Enter all, passing and failing, audits into FAMAS.

Note: The zero level for any pollutant should never be entered in FAMAS.

- a. In this example, refer to the ozone audit levels for annual performance evaluation in Table 14-2. Cross-reference the values in the DEP performance audit report (see Figure 14-39).
- b. Enter the **Actual O₃ Concentration** values from the DEP performance audit report into the fields in the **Assess** column in FAMAS at the

- appropriate levels.
- c. Enter the **Primary Data Sys.** values from the DEP performance audit report into the fields in the **Monitor** column in FAMAS at the appropriate levels (see Figure 14-38).
 - d. Click **[Save Changes]** and double-check entries.

Figure 14-38. FAMAS Annual PE Screen

Figure 14-39. DEP Performance Audit Report

AUDIT DATA								
ANALYZER RESPONSE (PPB)				AUDIT CONCENTRATIONS (PPB)			REL. % DIFF.	
AUDIT POINT	AUDIT RANGE	PRIMARY DATA SYS.	FRONT PANEL	ACTUAL O ₃ CONCENTRATION	ELEC. OFFSET CORRECTED O ₃	UNCORRECTED O ₃ MEASURE	FRONT PANEL	PRIMARY DAS
ZERO	(PPB)	0	0	0	0.0	0.0	N/A	N/A
POINT 1	6 - 19	14	14	14	14.8	14.8	0.0	0.0
POINT 2	20 - 39	31	31	30	30.0	30.0	3.3	3.3
POINT 3	40 - 69	51	51	49	49.8	49.8	4.1	4.1
POINT 4	70 - 119	81	81	80	80.0	80.0	1.3	1.3
POINT 5	190 - 259	204	205	200	200.2	200.2	2.5	2.0

Table 14-2. Gaseous Audit Levels

Audit level	Concentration Range, ppm			
	O ₃	SO ₂	NO ₂	CO
1	0.004-0.0059	0.0003-0.0029	0.0003-0.0029	0.020-0.059
2	0.006-0.019	0.0030-0.0049	0.0030-0.0049	0.060-0.199
3	0.020-0.039	0.0050-0.0079	0.0050-0.0079	0.200-0.899
4	0.040-0.069	0.0080-0.0199	0.0080-0.0199	0.900-2.999
5	0.070-0.089	0.0200-0.0499	0.0200-0.0499	3.000-7.999
6	0.090-0.119	0.0500-0.0999	0.0500-0.0999	8.000-15.999
7	0.120-0.139	0.1000-0.1499	0.1000-0.2999	16.000-30.999
8	0.140-0.169	0.1500-0.2599	0.3000-0.4999	31.000-39.999
9	0.170-0.189	0.2600-0.7999	0.5000-0.7999	40.000-49.999
10	0.190-0.259	0.8000-1.000	0.8000-1.000	50.000-60.000

5. **Flow Rate Verification** is for the flow checks performed on particulate instruments not including PM Coarse or Speciation Monitors. This screen has the same entry descriptions as the **1-Point QC**. The transfer standard flows are compared against

the assessment flow rates for the corresponding days for the appropriate parameters (particulate instruments not including PM coarse or speciation monitors). See Figure 14-40. The values recorded on the forms, as indicated in the SOP for that instrument, are entered in FAMAS.

See Figure 14-40 and Table 14-3. Table 14-3 provides a description of what should be entered in the corresponding FAMAS fields shown in Figure 14-40. Enter **all**, passing and failing, checks into FAMAS.

Table 14-3. FAMAS Flow Rate Verification Field Definitions

Assessment Number	A unique number associated with an assessment performed at a site on a given day. Value should be “1” unless additional same assessments are performed.
Performing Agency	Agency code of the organization performing assessment.
Monitor Method Code	The sampling methodology of the monitor being assessed.
Reported Unit	Units associated with the assessment
Monitor Flow Rate	The measured flow rate provided by the monitor being assessed.
Assessment Flow Rate	The flow rate of the flow transfer standard.

*Note: If a Flow Rate Verification fails or if the check is associated with invalid data, check the **Exclude from Export/Reports** button, so that the check won’t be reported to AQS or included in reports generated by FAMAS.*

Once all fields are complete, click the **[Save]** button to save the record or click the **[Cancel]** button to cancel the record.

Figure 14-40. FAMAS Flow Rate Verification Screen

FDEP, Forgotten Coast TM (9006)

Site: G1290001
Date Range: 1st Quarter 2015

Flow Rate Verification

Create New
Audit Trail

Parameter	Assessment Date	Assessment Number	Performing Agency	Monitor Method Code	Reported Unit	Monitor Flow Rate	Assessment Flow Rate	Exclude from Export / Reports	
PM25C	01/06/2015	1	1226	702	118	3	3.01	☐	Delete
PM25C	01/06/2015	2	1226	702	118	16.67	16.68	☐	Delete
PM25C	01/09/2015	1	1226	702	118	3	2.98	☐	Delete
PM25C	01/09/2015	2	1226	702	118	16.67	16.51	☐	Delete
PM25C	02/03/2015	1	1226	702	118	3	3	☐	Delete
PM25C	02/03/2015	2	1226	702	118	16.67	16.67	☐	Delete
PM25C	02/25/2015	1	1226	702	118	3	3.09	☐	Delete
PM25C	02/25/2015	2	1226	702	118	16.67	17.35	☐	Delete
PM25C	03/25/2015	1	1226	702	118	3	2.99	☐	Delete
PM25C	03/25/2015	2	1226	702	118	16.67	16.65	☐	Delete

Save Changes
Cancel

6. **Semi-Annual Flow Rate Audit** is the screen where you will enter the *flow* audits performed by the DEP (or your own) audit staff.

See Figure 14-41 and Table 14-4. Table 14-4 provides a description of what should be entered in the corresponding FAMAS fields shown in Figure 14-41. Figure 14-42 is an excerpt of the DEP Performance Audit Report. Enter all, passing and failing, checks into FAMAS.

Table 14-4. FAMAS Semi-Annual Flow Audit Field Definitions

Assessment Date	Date that the assessment was performed
Assessment Number	A unique number associated with an assessment performed at a site on a given day. Value should be “1” unless additional same assessments are performed.
Monitor Method Code	The sampling methodology of the monitor being assessed.
Reported Unit	Units associated with the assessment concentrations.
Monitor Flow Rate	The measured flow rate provided by the monitor being assessed.
Assessment Flow Rate	The flow rate of the flow transfer standard.

*Note: If a Semi-Annual Flow Rate Audit fails, check the **Exclude from Export/Reports** button. Failing audits are not reported to EPA.*

Once all fields are complete, click the **[Save]** button to save the record or click the **[Cancel]** button to cancel the record.

Figure 14-41. FAMAS Semi-Annual Flow Rate Audit Screen

FDEP, Forgotten Coast TM (9006)

Site: G1290001 Date Range: 1st Quarter 2015

Semi-Annual Flow Rate Audit

Parameter	Assessment Date	Assessment Number	Performing Agency	Monitor Method Code	Reported Unit	Monitor Flow Rate	Assessment Flow Rate	Exclude from Export / Reports
PM25C	03/04/2015	1	1328	702	118	3	2.94	☐
PM25C	03/04/2015	2	1328	702	118	16.67	16.46	☐

Buttons: Create New, Audit Trail, Save Changes, Cancel

Figure 14-42. DEP Performance Audit Report

FLOWRATE VERIFICATION						
FLOW AUDIT POINT	PARTICULATE ANALYZER FLOWS		AUDIT FLOWS		RELATIVE	
	LPM @ ACT	LPM @ STP	Man DP	Q act	% DIFF.	
TOTAL FLOW	16.67	17.00	5.80	16.46	1.3	
SAMPLE FLOW	3.00	3.06	3.20	2.94	2.0	
DESIGN FLOW	16.67	corr: 16.46	Design Flow		16.67	-1.3
COMMENTS:	N/A					

7. **Plc. Flow Rate Verification** and **PMc Semi-Annual Flow Rate Audit** screens are for entering flow checks and flow audits for PMcoarse only. This screen has the similar entry descriptions as the **Flow Rate Verification**. The values are recorded on the forms, as indicated in the SOP for that instrument, are entered in FAMAS.

PMc Flow Rate Verification. See Figure 14-43 and Table 14-5. Table 14-5 provides a description of what should be entered in the corresponding FAMAS fields shown in Figure 14-43. Enter all checks, passing and failing, into FAMAS.

Table 14-5. FAMAS PMc Flow Rate Verification Field Definitions

Assessment Date	Date that the assessment was performed
Assessment Number	A unique number associated with an assessment performed at a site on a given day. Value should be “1” unless additional same assessments are performed.
PM ₁₀ Monitor Method Code	The sampling methodology of the PM ₁₀ monitor being assessed.
Reported Unit	Units associated with the assessment
PM ₁₀ Monitor Flow Rate	The measured flow rate provided by the monitor being assessed.
PM ₁₀ Assessment Flow Rate	The flow rate of the flow transfer standard.
PM _{2.5} Monitor Method Code	The sampling methodology of the PM 2.5 monitor being assessed.
PM _{2.5} Monitor Flow Rate	The measured flow rate provided by the monitor being assessed.
PM _{2.5} Assessment Flow Rate	The flow rate of the flow transfer standard.

*Note: If a Flow Rate Verification fails or if the check is associated with invalid data, check the **Exclude from Export/Reports** button, so that the check won’t be reported to AQS or included in reports generated by FAMAS.*

Once all fields are complete, click the Save button to save the record or click the Cancel button to cancel the record.

Figure 14-43. FAMAS PMc Flow Rate Verification

Hillsborough County Environmental Protection Commission (0491)

Site: L0573002 Date Range: 4th Quarter 2015

PMc Flow Rate Verification

Create New Audit Trail

Parameter	Assessment Date	Assessment Number	Performing Agency	PM10 Monitor Method Code	Reported Unit	PM10 Monitor Flow Rate	PM10 Assessment Flow Rate	PM25 Monitor Method Code	PM25 Monitor Flow Rate	PM25 Assessment Flow Rate	Exclude from Export / Reports	
PMCOARSE	10/07/2015	1	0491	127	118	16.72	16.73	145	16.7	16.66	☐	Delete
PMCOARSE	10/14/2015	1	0491	127	118	16.69	16.7	145	16.7	16.67	☐	Delete
PMCOARSE	10/21/2015	1	0491	127	118	16.72	16.74	145	16.72	16.72	☐	Delete
PMCOARSE	10/28/2015	1	0491	127	118	16.7	16.72	145	16.69	16.71	☐	Delete
PMCOARSE	11/04/2015	1	0491	127	118	16.69	16.73	145	16.7	16.73	☐	Delete
PMCOARSE	11/12/2015	1	0491	127	118	16.71	16.74	145	16.71	16.72	☐	Delete
PMCOARSE	11/18/2015	1	0491	127	118	16.68	16.71	145	16.68	16.7	☐	Delete
PMCOARSE	11/25/2015	1	0491	127	118	16.67	16.7	145	16.67	16.72	☐	Delete
PMCOARSE	12/02/2015	1	0491	127	118	16.71	16.75	145	16.7	16.71	☐	Delete
PMCOARSE	12/09/2015	1	0491	127	118	16.69	16.72	145	16.69	16.67	☐	Delete
PMCOARSE	12/16/2015	1	0491	127	118	16.67	16.7	145	16.7	16.69	☐	Delete
PMCOARSE	12/23/2015	1	0491	127	118	16.67	16.7	145	16.7	16.67	☐	Delete
PMCOARSE	12/30/2015	1	0491	127	118	16.67	16.69	145	16.68	16.7	☐	Delete

Save Changes Cancel

PMc Semi-Annual Flow Rate Audit is the screen where you will enter the *flow* audits performed by the DEP (or your own) audit staff. Again, the Performing Agency will stay as “1328” for the PQAO since a single set of Florida DEP auditors perform performance audits for the entire PQAO, in general. However, if the audit is performed by your own audit staff, select the appropriate agency code from the drop-down menu.

- The “Total Flow” under “Audit Flow” on the form is the “PM10 Assessment Flow Rate” (or the PM25 Assessment Flow Rate”) in FAMAS. See Figures 14-44, 14-45, and 14-46. Table 14-6 provides a description of what should be entered in the corresponding FAMAS fields shown in Figure 14-44.
- The “Total Flow” under “Analyzer Flow” on the form is the “PM10 Monitor Flow Rate” (or the “PM25 Monitor Flow Rate”) in FAMAS. See Figures 14-44, 14-45, and 14-46. Table 14-6 provides a description of what should be entered in the corresponding FAMAS fields shown in Figure 14-44.

Enter **all** checks, passing and failing, into FAMAS.

Table 14-6. FAMAS PMc Semi-Annual Flow Rate Audit Field Definitions

Assessment Date	Date that the assessment was performed
Assessment Number	A unique number associated with an assessment performed at a site on a given day. Value should be “1” unless additional same assessments are performed.
PM₁₀ Monitor Method Code	The sampling methodology of the monitor being assessed.
Reported Unit	Units associated with the assessment
PM₁₀ Monitor Flow Rate	The measured flow rate provided by the monitor being assessed.
PM₁₀ Assessment Flow Rate	The flow rate of the flow transfer standard.
PM_{2.5} Monitor Method Code	The sampling methodology of the monitor being assessed.
PM_{2.5} Monitor Flow Rate	The measured flow rate provided by the monitor being assessed.
PM_{2.5} Assessment Flow Rate	The flow rate of the flow transfer standard.

Figure 14-44. FAMAS PMc Semi-Annual Flow Rate Audit

Hillsborough County Environmental Protection Commission (0491)

Site: L0573002 Date Range: 1st Quarter 2015

PMc Semi-Annual Flow Rate Audit

Create New Audit Trail

Parameter	Assessment Date	Assessment Number	Performing Agency	PM ₁₀ Monitor Method Code	Reported Unit	PM ₁₀ Monitor Flow Rate	PM ₁₀ Assessment Flow Rate	PM ₂₅ Monitor Method Code	PM ₂₅ Monitor Flow Rate	PM ₂₅ Assessment Flow Rate	Exclude from Export / Reports
PMCOARSE	01/13/2015	1	1328	127	118	16.73	16.61	145	16.71	16.52	☐

Save Changes Cancel

Figure 14-45. DEP Performance Audit Report – PM₁₀ Sequential

FLOWRATE VERIFICATION						
FLOW AUDIT POINT	ANALYZER FLOW		MANOMETER	AUDIT FLOW		RELATIVE % DIFFERENCE
	LPM @ ACT	CORRECTED		LPM @ REF	@ ACT	
TOTAL FLOW	16.72	N/A	5.73	N/A	16.64	0.5
DESIGN FLOW	16.72	16.64	N/A	N/A	16.70	-0.4
TOTAL TIME ANALYZER WAS IN AUDIT MODE DURING THIS AUDIT [MINUTES (ROUNDED UP)]:						15
COMMENTS:	N/A					

Figure 14-46. DEP Performance Audit Report – PM_{2.5} Sequential

FLOWRATE VERIFICATION						
FLOW AUDIT POINT	ANALYZER FLOW		AUDIT FLOW			RELATIVE % DIFFERENCE
	LPM @ ACT	CORRECTED	MANOMETER	LPM @ REF	@ ACT	
SAMPLE FLOW	16.72	N/A	5.7	N/A	16.61	0.7
DESIGN FLOW	16.72	16.60	N/A	N/A	16.70	-0.6
TOTAL TIME ANALYZER WAS IN AUDIT MODE DURING THIS AUDIT [MINUTES (ROUNDED UP)]:						15
COMMENTS:	Leak Issue Resolved					

Note: If an audit fails, **check** the **Exclude from Export/Reports** button. Failing audits are not reported to EPA.

Table 14-7 is a quick reference list of all seventeen (17) QA transaction types that are and will be available.

Table 14-7. FAMAS QA Transactions Quick Reference List

QA Transaction	Type of Records
1-Point QC	Precision records for SO ₂ , NO ₂ , O ₃ , and CO
Annual Performance Evaluation	Analytical audits performed by DEP for SO ₂ , NO ₂ , O ₃ , and CO (anything other than flow audits)
Flow Rate Verification	All monthly flow checks performed by your agency. This applies to all particulate except PM coarse and speciated PM.
Semi-Annual Flow Rate Audit	All flow audits performed by DEP except PM coarse and speciated PM
Lead Analysis Audit	Quarterly lead strip analysis
PM Coarse (PMc) Flow Rate Verification	All flow checks performed by your agency for PM coarse ONLY
PM Coarse (PMc) Semi-Annual Flow Rate Audit	All flow audits performed by DEP for PM coarse ONLY
Speciation Flow Rate Verification	All flow checks performed by your agency for speciated PM ONLY
Speciation Semi-Annual Flow Rate Audit	All flow audits performed by DEP for speciated PM ONLY
Performance Evaluation Program (PEP)	All PEP audits are entered here.
National Performance Audit Program (NPAP)	All NPAP audits are entered here.
NATTS Duplicate Assessment	Duplicate assessment for toxics
NATTS Replicate Assessment	Replicate assessment for toxics

QA Transaction	Type of Records
Ozone SRP	State ozone primary standard compared to EPA's ozone standard (only DEP will use)
Ambient Air Protocol Gas Verification Program	Gas bottle comparison to Region 9 lab standards
Field Proficiency Test	We do not use this now.
Lab Proficiency Test	We do not use this now.

14.3.2 FAMAS Data Entry Verification

Manually entered data are checked against original forms by another staff member within an agency to ensure that data are correctly entered. The person responsible for entering these data are immediately notified of discrepancies, and the corrections are made by the appropriate personnel. Remember to enter **all** checks, both passing and failing, into FAMAS.

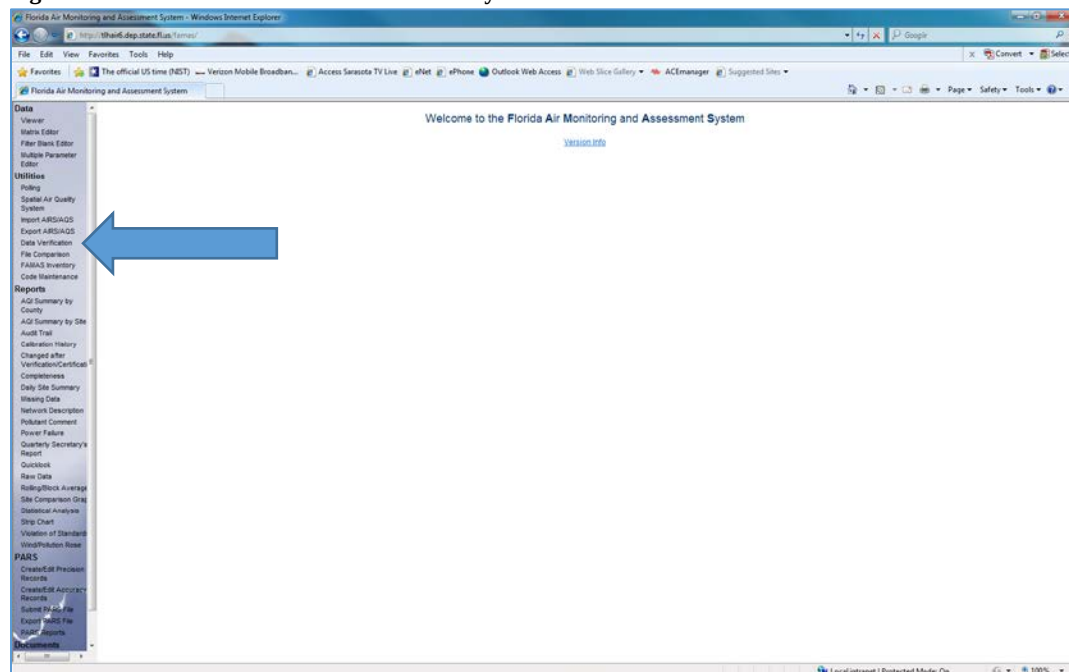
*Note: If a QA/QC check fails or if the check is associated with invalid data, check the **Exclude from Export/Reports** button, so that the audit/check won't be reported to AQS or included in reports generated by FAMAS.*

- 1-Point QC Checks – See 14.3.1 FAMAS QA Transactions - item 3 for specifics.
- Annual PE – The Florida DEP performance audit report is compared against the values entered in FAMAS for this screen. The Florida DEP performance audit report is emailed to each agency within five (5) business day following completion of its audit. (See 14.3.1 FAMAS QA Transactions - item 4 for specifics).
Note: The zero level for any pollutant should never be entered in FAMAS.
- Flow Rate Verification - The values recorded on the forms, as indicated in the SOP for that instrument, are compared against the values entered in FAMAS. (See 14.3.1 FAMAS QA Transactions - item 5 for specifics).
- Semi-Annual Flow Rate Audit – The Florida DEP performs the semi-annual flow rate audit generally. The Florida DEP performance audit is compared against the values entered in FAMAS. (See 14.3.1 FAMAS QA Transactions - item 6 for specifics).
- PMc Flow Rate Verification- The values recorded on the forms, as indicated in the SOP for that instrument, are compared against the values entered in FAMAS. (See 14.3.1 FAMAS QA Transactions - item 7 for specifics).
- PMc Semi-Annual Flow Rate Audit - The Florida DEP performs the semi-annual flow rate audit generally. The Florida DEP performance audit is compared against the values entered in FAMAS. (See 14.3.1 FAMAS QA Transactions - item 7 for specifics).

14.3.3 FAMAS Data Verification Utility

In FAMAS, locate the utility in the left-hand menu. See Figure 14-47 below.

Figure 14-47. FAMAS Data Verification Utility



1. See Figure 14-48. Once the data verification screen is selected, the user must select the sites and parameters, along with the relevant time frame for the data that is going to be reviewed. The list of parameters that are required to be reviewed include all gaseous criteria pollutants, continuous PM samplers, manual PM samplers, as well as all the ancillary parameters for NO₂ and the manual PM_{2.5} samplers. These parameters can be saved in the **Criteria Box** with a **Criteria Name** of your choice for ease of future retrieval. See FAMAS User Manual – Saving Criteria Sets.

Figure 14-48. FAMAS Data Verification Utility Criteria Selection

2. You do not need to check the **P&B*** box. It is only there in case you want to see the pre-2015 data. Make sure the **Ambient** and **QA Transactions** boxes are selected. The **PM Filter Blanks** box only needs to be selected if you have manual PM samplers in the data you have chosen to verify. Select the desired timeframe (whether monthly or quarterly).
3. Click on **[RUN VERIFICATION]**.
4. In the **Data Verification Report** that is generated, it is important to go through each section individually and comprehensively review all the data that is presented. FAMAS 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 FAMAS. For example, PM_{2.5} 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 discrepancy. Comments must be added in FAMAS to document due diligence regarding **FAILED** Verification Results.

5. Once all issues have been addressed and due diligence has been documented, set the verification flags and send an email notification that data has been verified along with a completed and signed FORM DEP 18-27-A, “Data Validation Checklist”, a signed and dated FAMAS Completeness Report, and narrative, if applicable, to OAM’s data validation team (see Section 12.6 and Section 12.7). This email and completed form will serve as the official documentation of your agency’s review of your data for the specified period. It will also give DEP the indication that your data is ready for submission into the AQS system.

14.4 Appendix D - File Nomenclature

14.4.1 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).

Updated 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

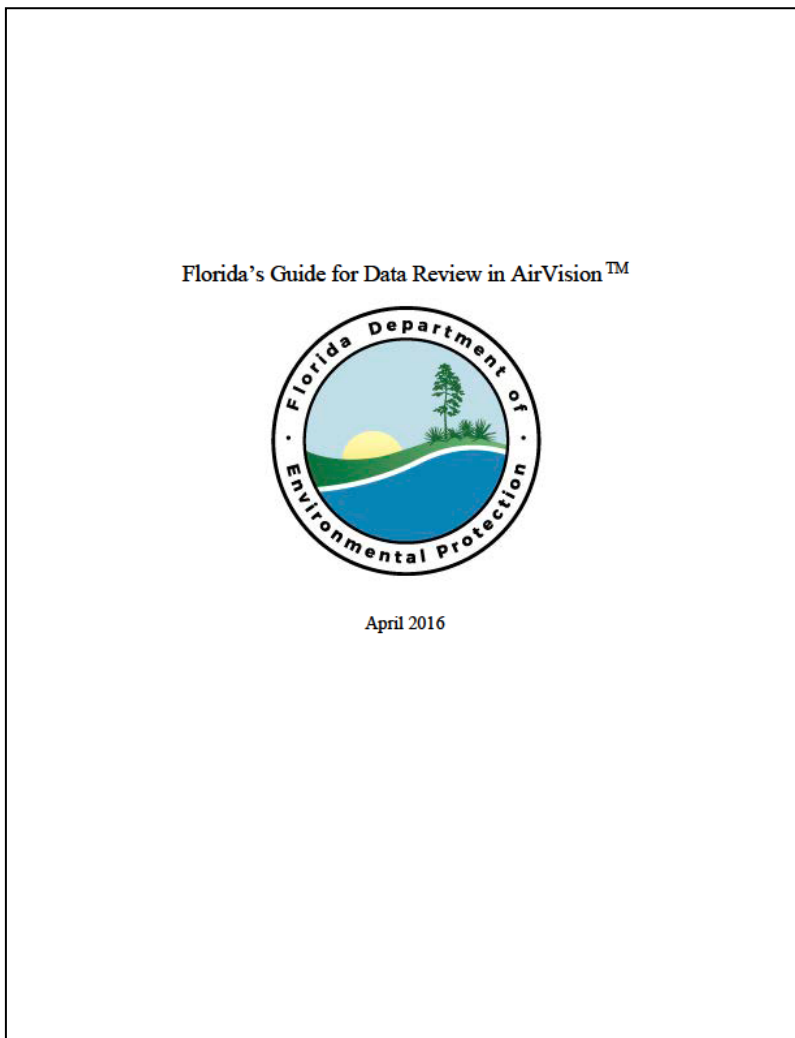
Parameter file name	Parameter
O3	Ozone
O3PS	Ozone Primary Standard
SO2	Sulfur Dioxide
SO2TL	Sulfur Dioxide Trace Level (N-Core)
COTL	Carbon Monoxide (N-Core)
NOy	Nitrogen Oxides – all (N-Core only)
PM25C	Continuous PM2.5
PM25M	PM2.5 Manual
PM10	PM10

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

14.5 Appendix E - 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).



14.6 Appendix F – EPA’s Rounding Policy for Evaluating NAAQS QA/QC Acceptance Criteria (June 2016)

The Florida PQAQO 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 $\pm 5\%$ 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 $\pm 5\%$ of the design flow rate of the sampler (16.67 liters per minute, LPM). The QC acceptance criterion of $\pm 5\%$ 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 $\pm 5\%$ 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 $\pm 5\%$ 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 $\pm 5\%$ acceptance criterion such that any calculated percent difference up to $\pm 5.4\%$ 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 PM_{2.5} 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 $\pm 5\%$ 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 PM₁₀ 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 14-8. 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	≤ -4.1% ≥ +4.1%
				15.84	16.47	
			16.00	16.67	17.34	
			16.80	17.50		
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

14.7 Appendix G – OAQPS Technical Memorandum – Clarification on Use of PM_{2.5} Field and Laboratory Requirements for Low Volume PM₁₀ Monitoring to Support PM₁₀ 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 PM₁₀ Monitoring to Support PM₁₀ NAAQS

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

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 PM₁₀ methods. Use of PM₁₀ 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 PM₁₀ samplers are basically PM_{2.5} samplers with the second stage particle size separator removed) and should be used in lieu of 40 CFR Part 50 Appendix J.

Background

The PM₁₀ 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 PM₁₀ and PM_{2.5} component of the measurement. The PM₁₀ low volume samplers for use in the PM₁₀ 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 PM₁₀ 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 PM₁₀ low volume method and included the following description:

¹ <http://www3.epa.gov/ttn/amtic/qalist.html>

14.8 Appendix H – 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.

The new data reporting requirements identified in the August 30, 2017 technical memorandum from OAQPS will be incorporated into Florida's data management system as soon as practicable.



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 Alert¹ 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 Handbook². These critical criteria checks³ 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.

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

14.9 Appendix I - Glossary

- 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 FAMAS; available only to FAMAS 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
- FAMAS - Florida Air Monitoring and Assessment System; the final data repository for ambient air monitoring data collected in Florida before it is transferred to AQS
- 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
- NO₂ – Nitrogen Dioxide
- NO_y – Total reactive nitrogen compounds
- O₃ – 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
- PM₁₀ - 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 PM₁₀ 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
- SO₂ – Sulfur dioxide
- SO₂TL – 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