UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4

Laboratory Services & Applied Science Division
Quality Assurance & Program Services Branch
980 College Station Road
Athens, Georgia 30605-2720

July 22, 2019

Mr. Robert Colby, Director
Chattanooga-Hamilton County Air Pollution Control Bureau
6125 Preservation Drive
Chattanooga, Tennessee 37416

LSASD Project ID: 19-0074

Dear Mr. Colby:

Attached is the final report for the 2019 Technical Systems Audit (TSA) conducted on the ambient air monitoring program operated by the Chattanooga-Hamilton County Air Pollution Control Bureau (CHCAPCB). EPA Region 4 Laboratory Services & Applied Science Division (LSASD) personnel conducted this audit on June 3-6, 2019, capturing data from January 2016 through December 2018.

I want to thank you for working with my staff while we conducted the audit and afterwards to provide the necessary data to finalize the audit. It is clear based on our interactions that CHCAPCB has invested significant resources to improve their program resulting in enhanced operational effectiveness of the program and the quality of the pollutant concentration data reported to the Air Quality System (AQS). During the audit, CHCAPCB's staff demonstrated technical proficiency in the operation and maintenance of the monitoring equipment, and clearly understood their roles and responsibilities. EPA appreciates your commitment and efforts in this regard.

Examples of your commitment to your monitoring program are: 1) CHCAPCB development ed an approved QAPP, and created or revised several SOPs associated with the QAPP; 2) CHCAPCB has provided the necessary training to ensure that the air monitoring program continues to operate effectively taking into account extended leave or unexpected staff turnover; 3) CHCAPCB staff has invested considerable time and resources to develop a method by which $PM_{2.5}$ sample filters are shipped quickly to the analytical laboratory and with minimal impact to the filters' sample integrity; 4) CHCAPCB has dedicated staff and resources to conducting independent performance evaluations of O_3 analyzers more frequently than required by the regulations.

As part of our interaction, a draft TSA report was issued to CHCAPCB on July 5, 2019, for review. On July 18, 2019, CHCAPCB responded to EPA in an email expressing acceptance of the draft report. Thank you for your review of the draft report.

While EPA believes that CHCAPCB has an effective air monitoring program and has made several improvements to that monitoring program and associated quality program, I do ask for you to focus on the following issues identified in the TSA as you develop and implement your corrective action plan: 1) updating CHCAPCB SOPs to fully implement the Bureau's QAPP; and 2) enhancing and standardizing documentation practices.

We look forward to working with you to address the issues identified in the TSA report. Please respond in writing with a corrective action plan within 30 days. If you have any questions regarding the attached audit report or the response process, please contact Denisse D. Diaz at (706) 355-8554 or Tony Bedel at (706) 355-8552.

Sincerely,

John Blevins, Director
Laboratory Services & Applied Science Division

Enclosure
cc (by email), with attachment:
Kathy Jones, CHCAPCB
Todd Rinck, EPA Region 4 Air and Radiation Division (ARD)
Sara Waterson, ARD

Project ID: 19-0074

2019 Technical Systems Audit Report

Chattanooga-Hamilton County
Air Pollution Control Bureau
Air Monitoring Department
Chattanooga, Tennessee

Project Dates: June 3-6, 2019
Report Date: July 18, 2019

Project Leader: Tony Bedel
Quality Assurance Section
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7/18/2019

Date

Approving Official:

Denisse Diaz

Denisse Diaz, Chief
Quality Assurance & Program Services Branch

7/24/19

Date

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1.0 Executive Summary

Personnel from the United States Environmental Protection Agency (U.S. EPA) Region 4 Laboratory Services & Applied Science Division (LSASD) conducted a Technical Systems Audit (TSA) of the Chattanooga-Hamilton County Air Pollution Control Bureau (CHCAPCB or Bureau) ambient air monitoring program in June 2019. The purpose of this TSA was to evaluate the operation and performance of the CHCAPCB ambient air monitoring program, in accordance with 40 CFR Part 58, Appendix A, § 2.5. Data from calendar years 2016-2018 were reviewed during this TSA.

During this TSA period, the CHCAPCB ambient air monitoring program implemented several significant improvements, including revisions and updates to the Bureau's quality management plan (QMP) and air monitoring quality assurance project plan (QAPP), as well as the installation and operation of new monitoring equipment. The Bureau's Instrument Technicians are cross-trained to ensure the air monitoring program continues to operate effectively in the event of extended staff leave or staff turnover. CHCAPCB is also commended for addressing the issues identified in the 2015 EPA TSA report, particularly regarding $PM_{2.5}$ monitor separator maintenance.

CHCAPCB currently operates four regulatory State or Local Air Monitoring Stations (SLAMS) for measuring ambient ozone and $PM_{2.5}$ concentrations. Equipment and sampling configurations, maintenance activities, siting criteria, and general cleanliness were evaluated at all four air monitoring sites. The site shelters were clean, and all sample inlets were observed to comply with applicable siting criteria prescribed in 40 CFR Part 58, Appendix E. Bureau staff appeared proficient in the operation, maintenance, and calibration of the air monitoring equipment. Traceability and certification documents were easily located and provided to EPA.

The primary finding in this TSA identifies criteria pollutant data that were collected and reported without a current, approved QAPP in place during much of the TSA period; this will require the qualification of pollutant concentration data in EPA's Air Quality System (AQS) database.

The primary concerns documented in this report reference inconsistent and inadequate documentation practices, as well as Bureau standard operating procedures (SOPs) that should be updated to implement the Bureau's QAPP.

In general, the CHCAPCB air monitoring program is maintained in accordance with Bureau quality system documents. Data collected within CHCAPCB's air monitoring network are of sufficient quality for regulatory decision-making purposes.

2.0 Introduction

On June 3-6, 2019, U.S. EPA Region 4 personnel conducted a TSA of the CHCAPCB ambient air monitoring program. The audit team included Richard Guillot and Tony Bedel (lead auditor) of LSASD's Quality Assurance & Program Services Branch, Quality Assurance Section.

The purpose of this TSA was to assess CHCAPCB's compliance with established regulations governing the collection, analysis, validation, and reporting of ambient air quality data. Pursuant to 40 CFR Part 58, Appendix A, § 2.5, TSAs of each primary quality assurance organization (PQAO) are required to be conducted at least once every three years. A PQAO is defined in 40 CFR Part 58, Appendix A, § 1.2 as "a monitoring organization or a group of monitoring organizations or other organization that is responsible for a set of stations that monitors the same pollutant and for which data quality assessments will be pooled".

Data reviewed as part of this TSA were collected within the CHCAPCB air monitoring network during the 2016-2018 calendar years. Data were queried from the EPA's AQS database prior to the on-site audit. CHCAPCB staff completed EPA's Ambient Air Monitoring Technical Systems Audit Form prior to the on-site audit; the completed form is included as Appendix A of this report.

The audit included a review of data, recordkeeping, documentation, and support facilities housed at the Chattanooga-Hamilton County Air Pollution Control Bureau's Government Building (i.e., central office) located at 6125 Preservation Drive in Chattanooga, Tennessee. All four air monitoring sites currently active and operated by CHCAPCB were evaluated during this TSA. The sites visited are listed below.

Common Site Name	**AQS Identification**
East Ridge City Hall	47-065-0031
Soddy-Daisy High School	47-065-1011
Siskin Drive	47-065-4002
Eastside Utility	47-065-4003

Continuous ambient ozone (O_3) data are collected at the Soddy-Daisy High School and Eastside Utility sites. Ambient particulate matter 2.5 micrometers or less in diameter ($PM_{2.5}$) data and samples are collected with continuous and intermittent, filter-based monitors, respectively, at the East Ridge City Hall and Siskin Drive sites.

During the audit, the following CHCAPCB personnel were interviewed:

- Robert Colby, Director

- Kathy Jones, Air Monitoring Department Manager
- James Long, Instrument Technician
- Steve Langston, Instrument Technician

The following AQS reports were reviewed in preparation for this TSA:

- AMP 230: Frequency Distribution Report (2016-2018)
- AMP 251: QA Raw Assessment Report (2016-2018)
- AMP 256: QA Data Quality Indicator Report (2016-2018)
- AMP 300: Violation Day Count Report (2016-2018)
- AMP 350: Raw Data Report (2016-2018)
- AMP 360: Raw Data Qualifier Report (2016-2018)
- AMP 380: Site Description Report (2016-2018)
- AMP 390: Monitor Description Report (2016-2018)
- AMP 430: Data Completeness Report (2016-2018)
- AMP 450: Quicklook Criteria Parameters (2016-2018)
- AMP 450NC: Quicklook All Parameters (2016-2018)
- AMP 480: Design Value Report (2016-2018)
- AMP 503: Extract Sample Blank Data (2016-2018)
- AMP 504: Extract QA Data (2016-2018)
- AMP 600: Certification Evaluation and Concurrence (2016-2018)

Additionally, the following documents were reviewed:

- *Chattanooga-Hamilton County Air Pollution Control Bureau Network Review 2016*
- *Chattanooga-Hamilton County Air Pollution Control Network Review 2017*
- *Chattanooga-Hamilton County Air Pollution Control Network Review 2018*
- *Tennessee Department of Environment and Conservation, Bureau of Environment Quality Management Plan, Version 3.0, September 1, 2011*
- *Chattanooga-Hamilton County Quality Management Plan, Version 5, November 29, 2012*
- *Chattanooga-Hamilton County Quality Management Plan, 2019 Version 8, May 17, 2019 (DRAFT)*
- *Quality Assurance Project Plan, Chattanooga-Hamilton County Air Pollution Control Bureau, March 30, 2007*
- *Quality Assurance Project Plan, Chattanooga Hamilton County Air Pollution Control Bureau, Revision 3, September 7, 2018*
- *Standard Operating Procedures, Chattanooga-Hamilton County Air Pollution Control Ozone Monitoring Sites 470654003, 470651011, Ozone Monitors TEI 49CPS, 49C,*

49iPS, 49i, ESC 8816 (4003) and 8832 (1011) Data Loggers MTek 2801 Strip Chart Recorders, Revision 14, December 11, 2015

- *Standard Operating Procedures, Chattanooga-Hamilton County Air Pollution Control, $PM_{2.5}$ FRM Sites, Thermo Environmental R & P Model 2025, 470654002, 470650031, Revision 2, March 16, 2016*
- *Standard Operating Procedures, Chattanooga Hamilton County Air Pollution Control, Thermo Environmental, Inc., Rupprecht & Patashnick TEOM 1400A, $PM_{2.5}$ Continuous: AQI and AirNow only, 911 Siskin Drive, 470654002 POC3, August 29, 2014 (DRAFT)*
- *Standard Operating Procedure, Chattanooga-Hamilton County Air Pollution Control, Particulate Site 470654002, Particulate Monitor Teledyne T640, September 5, 2017 (DRAFT)*
- *Standard Operating Procedures, Chattanooga-Hamilton County Air Pollution Control Bureau, Data Handling, Revision 5, October 2, 2015*

3.0 Commendations

The CHCAPCB ambient air monitoring program has implemented several changes since the November 2015 EPA TSA (Project ID: 16-0004) which have improved the operational effectiveness of the program and enhanced the quality of the pollutant concentration data reported to AQS. In January 2015, the Bureau's ambient air monitoring program began functioning as its own PQAO, independent from the State of Tennessee's PQAO. As a new PQAO, CHCAPCB was required to develop and suitably document a quality system in accordance with EPA requirements. To meet this and other requirements detailed in 40 CFR Part 58, Appendix A, the Bureau produced a QAPP and created or revised several SOPs associated with the QAPP. The QAPP, initially submitted to EPA for review in November 2015, was revised over the course of the TSA period (i.e., 2016-2018) and approved by EPA in September 2018. Bureau staff displayed understanding of their current roles and responsibilities within the CHCAPCB air monitoring network's quality system. The Air Monitoring Department Manager (Manager) validates the air monitoring data following the Instrument Technicians' (Technicians') initial review and verification of the dataset, establishing an independent level of quality assurance (QA) in the data validation process prior to data submittal into AQS.

CHCAPCB is committed to ensuring backup personnel are trained in the event staff take extended leave or the Bureau experiences unexpected staff turnover. Both Bureau Technicians are cross-trained to ensure air monitoring procedures are completed in the event a Technician is out on extended leave. This Technician cross-training now includes completing independent performance evaluations (PEs) of Bureau O_3 analyzers, normally a duty of the Bureau's Manager. Bureau staff are also required to sign a form to attest that they have read a new or revised quality system document (e.g., QAPP or SOP). The Manager and Technicians are all

tasked with reporting defined datasets to AQS; with that, all staff maintain this skillset so that the Bureau may continue to report data to AQS on schedule.

Bureau staff have also invested considerable time and resources into the process for shipping exposed $PM_{2.5}$ sample filters to Inter-Mountain Labs, Inc. (IML). Staff utilize temperature loggers in the exposed $PM_{2.5}$ sample filter shipping containers sent to IML. These loggers, which are checked by Bureau staff against National Institute of Standards and Technology (NIST) traceable temperature standards, collect and record data every minute. Staff download these temperature data every two weeks and compare the data against paperwork associated with the shipment to determine if issues have occurred during transport to the lab. The Bureau has also determined that use of styrofoam containers shipped overnight to IML provides an optimal method by which sample filters arrive at the lab well within analytical holding time requirements. Investments such as these support the Bureau's objective to achieve high data capture of its intermittent, filter-based $PM_{2.5}$ sample dataset and allow the Bureau to be proactive as issues arise with shipping sample filters.

Bureau staff demonstrated technical proficiency with regards to the operation and maintenance of the monitoring equipment utilized within the Bureau's air monitoring network. Bureau staff also appeared knowledgeable of the data acquisition software (i.e., AirVision™) that is primarily used for reviewing and reporting continuous pollutant concentration data. Bureau staff have recently upgraded and installed new monitoring equipment at the air monitoring sites, including Thermo Scientific™ 49i-PS O_3 calibrators, a Teledyne Advanced Pollution Instrumentation (TAPI) T640 continuous $PM_{2.5}$ analyzer at the Siskin Drive site, and Agilaire LLC 8872 dataloggers with associated backup, uninterruptible power supplies at the O_3 monitoring sites. Environmental Systems Corporation (ESC) 8816 dataloggers are operated as backup dataloggers to the 8872 units at the O_3 monitoring sites to assist in attaining high data capture in the event the 8872 unit is unable to record or produce monitoring data. Bureau staff complete independent PEs of O_3 analyzers on a quarterly basis, more frequently than is required in 40 CFR Part 58, Appendix A. It is noteworthy for a local air monitoring program to dedicate staffing and resources to complete these independent audits on a quarterly schedule.

4.0 Findings and Recommendations

The observations from this TSA were compared with U.S. EPA regulations, technical policies and guidance, and CHCAPCB quality system documentation.

Quality system deviations found through this TSA are classified into three categories: **Findings**, **Concerns**, and **Observations**. These quality system deviations are defined as follows:

Finding:	Nonconformance of high importance which is unacceptable and must be remedied. Includes departures from or absences of specified requirements (e.g., regulatory, QMP, QAPP, SOP, etc.) or a guidance deviation which could significantly impact data quality.
Concern:	Nonconformance of somewhat lesser importance as compared to a finding, but one that should be remedied. Includes departures from widely accepted best science/management practices, as well as practices which could have potential detrimental effect on the ambient air monitoring program's operational effectiveness, quality system, or sampling/measurement results.
Observation:	An infrequent deviation, error, or omission which does not impact the output of the quality of the work product, but may impact the record for future reference.

For each of these categories, corrective action recommendations are provided. Corrective actions are required for all quality system deviations ranked as **Findings** or **Concerns**. Depending on the severity of the deviation, a specific data deliverable(s) may be requested to show that the corrective action recommendation has been successfully implemented. In these cases, the TSA report will specify the deliverable(s) that will be required for AQS and/or EPA submittal. **Observations** do not require corrective actions.

4.1 FIELD OPERATIONS

Evaluations of all four active CHCAPCB air monitoring sites were completed as part of this TSA. Monitor inlets at each site met the siting criteria requirements detailed in 40 CFR Part 58, Appendix E for minimum acceptable drip line distance and unrestricted airflow. The shelters at both O_3 monitoring sites were clean and organized and housed safety equipment (e.g., first aid kit, certified fire extinguisher) for staff use. A section of rotting flooring inside the Eastside Utility shelter presents a potential safety hazard and may lead to other shelter integrity problems. Bureau staff indicated that the Eastside Utility shelter is on the schedule to be replaced in the near future. $PM_{2.5}$ monitors and associated separator components (e.g., PM_{10} inlet heads, very sharp cut cyclones (VSCCs®)) were also found clean and appeared to be well-maintained. Bureau staff have increased the maintenance frequency of such components, addressing a quality system concern recorded in the 2015 EPA TSA report (Concern 3.1.1).

4.1.1 **<u>Concern</u>**: The TAPI T640 continuous $PM_{2.5}$ analyzer's shelter temperature is not monitored to ensure the analyzer is operating within specification.

<u>Discussion</u>: In January 2017, Bureau staff installed a TAPI T640 continuous $PM_{2.5}$ analyzer at the Siskin Drive air monitoring site. At the time, the site included an air monitoring shelter large enough to house multiple pieces of monitoring equipment and to allow staff entry. In 2018, the shelter was removed from the site, and the Bureau

relocated the $PM_{2.5}$ monitors that continued to operate on site to a ground-level wooden deck in the space created with the shelter's removal. The TAPI T640 analyzer was placed on the deck inside a small shelter designed to house the instrument and protect it from the elements. Although the shelter is equipped with a fan designed to cool the shelter's compartment as it heats, the temperature of this shelter is not currently monitored or recorded.

EPA has designated the TAPI T640 continuous $PM_{2.5}$ analyzer as a federal equivalent method (FEM) for $PM_{2.5}$ sample data collection, in accordance with 40 CFR Part 53. For the data collected and reported by this monitor to be used for making comparisons to the $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS), the monitor must be operated in accordance with the requirements detailed within the FEM designation. It is stated in the TAPI T640 $PM_{2.5}$ FEM designation (i.e., EQPM-0516-236) that the instrument must be "operated in accordance with the Teledyne Model T640 Operations Manual"; Table 1-1 of the *Model T640 PM Mass Monitor* (June 29, 2018) user manual prescribes an "Operating temperature" range of 0-50°C for the instrument.

Pursuant to 40 CFR Part 58, Appendix C, § 2.1, any pollutant monitoring method used for making NAAQS-attainment decisions must be a federal reference method (FRM) or a FEM. The Bureau has been reporting the data collected by the TAPI T640 analyzer with a "NAAQS-exclusion" flag in AQS in order to test the monitor in the field; however, the Bureau plans to begin using the TAPI T640 monitoring data for NAAQS comparisons in 2019. Without recorded shelter temperature data, the Bureau cannot demonstrate that the TAPI T640 analyzer is operating within the allowable 0-50°C operating temperature range provided in the instrument manual.

Recommendation: The Bureau should begin collecting hourly temperature data for the shelter in which the TAPI T640 analyzer is housed. The shelter temperature data should be recorded with a temperature device that is verified against a NIST-traceable temperature standard on the frequency prescribed in the Bureau's QAPP. The site datalogger (i.e., ESC 8832) may be used to record such data, which will allow the Bureau to confirm that the TAPI T640 analyzer is operating within specification in accordance with the instrument's $PM_{2.5}$ FEM designation. Please provide EPA with a photograph of the installed temperature device, a copy of the record confirming the device's NIST-traceability certification, and a printout of the hourly temperature data collected by the device.

4.1.2 **Concern**: Reported $PM_{2.5}$ monitor flowrate verifications are not consistently completed on a monthly frequency.

Discussion: A one-point flowrate verification must be performed at least once every month – with each verification minimally separated by 14 days – for each $PM_{2.5}$ monitor intended to be used for NAAQS-compliance determinations, pursuant to 40 CFR Part 58, Appendix A, § 3.2.1. Line items listed in data validation templates provided in the Bureau's QAPP require one-point flowrate verifications of continuous and intermittent, filter-based $PM_{2.5}$ monitors every 30 days, each separated by 14 days. Section 7.4.7 of EPA's QA guidance document for $PM_{2.5}$ monitoring (*Quality Assurance Guidance Document 2.12: Monitoring $PM_{2.5}$ in Ambient Air Using Designated Reference or Class I Equivalent Methods* (EPA-454/B-16-001; January 2016)), which is referenced in 40 CFR Part 50, Appendix L (i.e., FRM for $PM_{2.5}$ monitoring), states that a flowrate verification of a $PM_{2.5}$ monitor is required every 30 days.

In preparation for the TSA, $PM_{2.5}$ monitor flowrate verification data were reviewed in the AQS AMP 251 report. Multiple instances were observed in which 40 or more days separated reported $PM_{2.5}$ monitor flowrate verifications (e.g., June 7 to July 25, 2017, for all three intermittent, filter-based FRM samplers). On other occasions, it appears that no flowrate verification results were reported to AQS for an entire calendar month (e.g., July 2017 and October 2018 for the Siskin Drive TAPI T640 analyzer).

Recommendation: To ensure compliance with the QAPP, the Bureau should complete $PM_{2.5}$ monitor flowrate verifications at least every 30 days. The Bureau may consider implementing a goal for increasing the frequency with which $PM_{2.5}$ monitor flowrate verifications occur (e.g., every 14 or 21 days). Such a goal should ensure that the Bureau meets the 30-day required frequency on a regular basis, even when staff take leave. The Bureau's SOPs (e.g., Thermo Environmental R&P 2025, TAPI T640, and Data Handling SOPs) should be updated to reflect the 30-day requirement listed in the QAPP as well as any new frequency goal(s) the Bureau implements. Please provide EPA with copies of these three SOPs once they have been revised to incorporate the flowrate verification frequency goal(s) (if applicable) and 30-day minimum requirement.

4.1.3 **Observation**: Copies of quality system documents and instrument operating manuals are not stored at each air monitoring site.

Discussion: During evaluations of the air monitoring sites, Bureau quality system documents and/or instrument operating manuals were not always found. For example, copies of the TAPI T640 draft SOP and the Thermo Environmental R&P 2025 SOP were not located at the Siskin Drive site. A copy of the QAPP could not be found at any air monitoring site. Copies of instrument manuals for equipment the Bureau currently operates, while maintained by the Technicians in their work vehicles, were not retained at all sites.

Recommendation: As a best practice, copies of Bureau quality system documents (e.g., QAPP and SOPs) and instrument operating manuals should be kept at each air monitoring site, either in hard copy or electronically on the site computer (if applicable). By retaining copies of such documents on site, all Bureau staff may quickly access information contained within the documents while on site, allowing staff to complete quality control (QC) procedures and equipment maintenance in a consistent manner.

4.1.4 **Observation**: Spare instruments are not currently powered on or tested on any routine frequency.

Discussion: Bureau staff indicated that spare air monitoring instruments were not powered on or tested on any routine frequency. Instruments that are stored without periodic operation over an extended period of time may develop "shelf disease". "Shelf disease" may cause certain components of the instrumentation to malfunction when the time comes to use the instrument, possibly necessitating costly repairs or the purchase of replacement parts or instruments sooner than the Bureau anticipated. Periodic testing of spare instruments will also ensure that replacement equipment is available to be deployed in the field at any time, which may help mitigate data loss as a result of field equipment malfunction.

Recommendation: As a best practice, Bureau staff should consider powering on and testing spare instruments on a routine frequency (e.g., quarterly, bi-annually, or annually). Such testing may extend the usable life of spare instruments, delaying the need to purchase replacement parts and instruments.

4.1.5 **Observation**: O_3 calibration gases are not scrubbed or vented outside of air monitoring shelters.

Discussion: During routine QC procedures for O_3 analyzers, site calibrators exhaust concentrations of O_3 that are produced to challenge the analyzers; these concentrations may exceed typical ambient O_3 concentrations. It was noted during the site visits that calibrators at both sites with an O_3 analyzer currently exhaust concentrations of O_3 from QC procedures into the shelters; such exhausted gases are not scrubbed at the exhaust ports of the calibrators to mitigate the O_3 concentrations introduced into the shelters.

Recommendation: To protect staff from potential exposure to exhausted calibration gases, gases should either be scrubbed at the calibrator exhaust ports or should be routed outside the shelters.

4.2 LABORATORY OPERATIONS

No laboratory operations were observed during this TSA. IML provides gravimetric analyses of intermittent, filter-based $PM_{2.5}$ samples collected in the CHCAPCB air monitoring network. Bureau staff indicated that they review the data packages provided by IML; if any issues are observed, Bureau staff reach out to IML for further information.

Bureau Technicians handle sample filters in a manner that promotes the integrity of the collected samples throughout the handling process. The Bureau also utilizes sealed petri dishes for each sample filter as an additional layer of protection against possible contamination that would bias the samples collected.

4.3 RECORDS MANAGEMENT

Certification records retained in the central office demonstrated NIST-traceability of the O_3 and flow rate standards used by the Bureau during this TSA period, in accordance with 40 CFR Part 58, Appendix A, § 2.6. Other records associated with the air monitoring equipment (e.g., copies of $PM_{2.5}$ monitor flowrate verification and leak check forms, archived copies of logbook documentation) were found to be readily available at the central office during the on-site TSA. Most of the air monitoring records retained by the Bureau are now stored in a central location (i.e., metal book shelf in the Bureau's equipment workspace), a change implemented since the previous EPA TSA.

4.3.1 **Concern**: Air monitoring equipment standard identification information is not consistently documented in monitor logbooks.

Discussion: The Bureau maintains multiple O_3 and flowrate standards for completing required QC and QA procedures on monitoring equipment in the field. Spare O_3 standards are also stored inside the O_3 monitoring shelters; these spare O_3 standards have not been certified for several years. During the site evaluations, documentation of some recent O_3 analyzer PEs completed by Bureau staff was reviewed. On several occasions, the documentation lacked sufficient information to confirm the identity of the O_3 standard used to complete the PE. Documentation of some recent $PM_{2.5}$ monitor flowrate verifications and independent semi-annual flowrate audits completed by Bureau staff was also reviewed; on several occasions, the documentation did not include flowrate standard identification information. Without the necessary documentation to confirm the identity of the O_3 or flowrate standard used, the Bureau is unable to demonstrate NIST-traceability of the standard used for the completed procedure. The Bureau is also unable to confirm without such documentation that the standard used for O_3 PEs and

independent $PM_{2.5}$ semi-annual flowrate audits is independent from the standard used for routine QC procedures.

Recommendation: The Bureau should adopt a practice by which the identity of all authoritative O_3 and flowrate standards used to challenge Bureau monitors is consistently documented alongside the results of the QC or QA procedure. Language in the Bureau's instrument SOPs (e.g., O_3, Thermo Environmental R&P 2025, and TAPI T640 SOPs) should be updated to instruct the SOP user to record such information. Such documentation will allow the Bureau to link the QC/QA procedure with the standard used and adequately defend the NIST-traceability and – for audit standards – the independence of the procedure itself. Please provide EPA with scanned copies of monitor logbooks that include equipment standard identification information for completed O_3 PEs, $PM_{2.5}$ flowrate verifications, and independent $PM_{2.5}$ semi-annual flowrate audits.

4.3.2 Observation: Documentation technique and transparency could be improved.

Discussion: Logbook and QC procedure form documentation was reviewed during air monitoring site visits and as part of follow-up discussions with staff. Several instances were noted in which documentation best practices had not been incorporated. Examples are listed below:

- Bureau staff routinely complete a copy of the "Ozone Calibration Report" to document the results of O_3 analyzer calibrations. These reports are completed back at the central office following the calibration. The information recorded in the report is copied from the monitor logbook, where the results of the calibration are documented. As a best practice, O_3 calibration reports should be completed while on site as the calibration is occurring so that all relevant information – including instrument identification numbers and diagnostics – is captured and recorded in real-time.
- The Bureau's calibration report is not a controlled document (i.e., the report does not contain unique document identification information or a revision date). Bureau staff indicated that the O_3 calibration report has not been revised in years; however, as a best practice, the report should be controlled with unique document identification information so that staff may ensure the most up-to-date version of the report is used.
- No reports or forms are used to record the results of O_3 analyzer PEs. Although this information is documented in the monitor logbooks, no information is documented regarding whether the audit results passed or exceeded acceptance criteria. Similarly, no additional documentation is provided in the O_3 calibration report to indicate to staff if the calibration results were within or exceeded

acceptance criteria. As a best practice, O_3 analyzer PE and calibration results should be recorded in controlled documents in a manner by which the results of these procedures are easily and quickly shown to Bureau staff in real-time so that corrective action measures may be implemented, if necessary. Computer spreadsheets with cells containing formulae for automated calculations provide an option in which PE and calibration results can be assessed in real-time.

- The method by which logbook entry mistakes are corrected is inconsistent (e.g., some logbook corrections were not dated). In accordance with Section 10.3.1 of the Bureau's QAPP, all logbook corrections shall be made by inserting one line through the incorrect entry, initialing and dating this correction, and placing the correct entry alongside the incorrect entry (if this can be accomplished legibly) or by providing the information on a new line if needed.

Recommendation: The Bureau should consider incorporating the documentation and recordkeeping best practices listed in the "Discussion" going forward. These best practices, while providing Bureau staff with information regarding the results of completed QC/QA procedures in real-time, would enhance the transparency and defensibility of the Bureau's documentation. If documents are revised, controlled documents are developed, and documentation best practices are incorporated, the Bureau's SOPs should be updated with such information.

4.4 DATA MANAGEMENT

4.4.1 **Finding**: Continuous, hourly averaged $PM_{2.5}$ sample concentration data gaps are present in AQS.

Discussion: All ambient $PM_{2.5}$ mass concentration data must be reported to AQS within 90 days following each quarterly reporting period, pursuant to 40 CFR 58.16. Data gaps caused by sample concentrations or null codes missing from AQS may negatively impact monitor data completeness, among other statistics associated with the concentration dataset.

In preparation for the on-site TSA, AQS AMP 350 reports containing pollutant concentration data were reviewed. No hourly concentration data appears to have been reported for both the Siskin Drive TEOM and TAPI T640 continuous $PM_{2.5}$ analyzers for the hours of 0000-1900 on January 1, 2018, and on February 1, 2018. During the on-site TSA, Bureau staff located records of these concentration data in-house.

Recommendation: The Bureau must determine the validity of the Siskin Drive TEOM and TAPI T640 continuous $PM_{2.5}$ hourly sample concentration data associated with the time periods referenced in the "Discussion". The Bureau must then report the appropriate sample concentration or AQS null code for each hour of missing data based on the information available. Please provide EPA with an AQS AMP 350 report once the missing hourly sample concentration and/or AQS null code data have been reported to AQS.

4.4.2 **Observation**: O_3 performance evaluation results are stored in incorrect audit concentration levels in AQS.

Discussion: In preparation for the on-site TSA, O_3 analyzer PE results reported to AQS were assessed to determine if the O_3 audit concentrations chosen by the Bureau adhere to the requirements in 40 CFR Part 58, Appendix A, § 3.1.2.1. Although it appears the Bureau's chosen PE audit concentrations comply with federal regulations, a review of these O_3 PE results indicate that the PE results are not stored in the correct audits levels available in AQS. For example, PE results for the required low-level audit concentration for the Bureau's O_3 analyzers (i.e., typically 0.015 parts per million (ppm)) are stored in AQS audit level 3 (i.e., 0.020-0.039 ppm) for each PE in 2018; however, PE results at this concentration should be stored in audit level 2 (i.e., 0.006-0.019 ppm) in AQS given the audit concentration ranges listed in 40 CFR Part 58, Appendix A, § 3.1.2.1.

Bureau staff suggested that it was their understanding that AQS would store the reported PE results in the correct audit levels. Following the on-site TSA, the auditors reached out to EPA's Office of Air Quality Planning & Standards (OAQPS) regarding the reporting and storage of PE data in AQS. OAQPS indicated that the AQS AMP 251 report should automatically sort the PE data into the correct audit levels; however, they noted with this example that AQS programming is not sorting the PE data as expected. As of this writing, EPA's AQS team has opened a ticket to correct this issue in AQS.

Recommendation: O_3 analyzer PE results should be stored in the correct audit concentration levels in AQS to ensure the reported QA data are an accurate representation of the results collected in the field. Once the AQS ticket referenced in the "Discussion" has been resolved, Bureau staff should review the 2016-2018 O_3 analyzer PE results in an AQS AMP 251 report to verify that the results are stored in the correct audit levels in AQS. Going forward, reported O_3 analyzer PE results should be reviewed in AQS to ensure the data are sorted in the correct audit concentration levels.

4.4.3 **Observation**: Different AQS null codes could be used for data invalidated in AQS to provide transparency to the end data user.

Discussion: EPA maintains a list of null codes that are used to replaced invalidated concentration data in AQS. Upon reviewing the Bureau's concentration dataset reported to AQS, it is apparent the Bureau routinely replaces concentration data invalidated in AQS for O_3 analyzer PEs with the AZ null code (i.e., Q C Audit), regardless if the PE is completed by the Bureau or the State of Tennessee. By using the same null code for Bureau and State PEs, the end data user is unable to determine which Bureau completed the O_3 analyzer PE while reviewing the concentration dataset in AQS.

The AZ null code is also used for all $PM_{2.5}$ monitor flowrate checks (e.g., flowrate verifications completed by the Bureau and semi-annual flowrate audits completed by the State of Tennessee). When the same null code replaces concentration data invalidated for Bureau flowrate verifications and State flowrate audits, the end data user is unable to determine in the AQS concentration dataset which procedure was completed on the monitor.

Recommendation: The Bureau should review the list of available AQS null codes to determine if a more descriptive code may be chosen to differentiate O_3 analyzer PEs and $PM_{2.5}$ monitor flowrate checks in the concentration dataset reported to AQS, as detailed in the "Discussion". If the Bureau adopts new null codes for such procedures, the codes and associated descriptions explaining how they are to be used in the dataset should be included in an update to the Bureau's Data Handling SOP to ensure these codes are used consistently going forward.

4.4.4 **Observation**: Site or monitor metadata in AQS is inaccurate or, in some cases, missing.

Discussion: AQS metadata associated with air monitoring network sites and monitors provide the end data user with important summary information regarding these sites and monitors. Such metadata also provides data users with information regarding those organizations responsible for sample collection, analysis, reporting, and certification. Several items were noted during the TSA that were not accurately reflected in AQS site or monitor metadata. For example, CHCAPCB is identified as the "Analyzing" agency in the monitor metadata for the intermittent, filter-based $PM_{2.5}$ samplers operated at the East Ridge and Siskin Drive sites; however, IML currently fulfills this role for these three monitors. The measurement scales listed in the metadata for both O_3 monitors do not match the monitors' measurement scales provided in the Bureau's 2018 Network Review. Other infrequent issues (e.g., East Ridge $PM_{2.5}$ monitor probe height, Siskin Drive $PM_{2.5}$ monitor probe heights and locations) were observed in the AQS site or monitor metadata as well.

Recommendation: The Bureau should review and correct the metadata issues highlighted in the "Discussion", as well as any other inaccuracies that may be present in the metadata, to ensure the AQS site and monitor metadata are accurate for the end data user. Going forward, AQS site and monitor metadata should be reviewed on a routine frequency to ensure such metadata accurately reflect changes within the air monitoring network as well as information provided in the annual monitoring network plan.

4.5 QUALITY ASSURANCE

4.5.1 **Finding**: Criteria pollutant data were collected at SLAMS monitoring stations and reported to AQS without a current, approved QAPP.

Discussion: Monitors collecting data for regulatory decision-making purposes must operate with a current, approved QAPP in place, pursuant to 40 CFR Part 58, Appendix A, § 2.1.2. The regulation further states that QAPPs must be suitably documented in accordance with EPA requirements; the regulation references *EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5)* (EPA/240/B-01/003; March 2001) for such requirements. It is stated in Section 2.7 of the EPA QA/R-5 document that QAPPs developed for multi-year monitoring programs must be revised and resubmitted for review and approval whenever revisions to the document are necessary. Beginning with fiscal year (FY) 2015, EPA Region 4 grant commitments/reporting requirements have either indicated or directly stated that QAPP approvals expire every five years.

The QAPP in effect for the Bureau during much of the TSA period (i.e., *Quality Assurance Project Plan Chattanooga-Hamilton County Air Pollution Control Bureau* (March 30, 2007)) was approved by EPA on April 23, 2007. Since that time, a number of regulatory and Bureau programmatic changes have been implemented. For example, the O_3 NAAQS were revised and published in the Federal Register in 2008 and again in 2015. The $PM_{2.5}$ NAAQS were also revised and published in the Federal Register in 2012. In March 2016, EPA promulgated revisions in 40 CFR Part 58 to ambient air monitoring requirements generally related to quality assurance. As noted earlier, CHCAPCB became an independent PQAO in 2015. Because of these and other significant changes related to air monitoring procedures, the 2007 QAPP did not represent current regulatory requirements and programmatic policy during the TSA period.

The November 2015 EPA TSA report indicated that the Bureau had submitted a revised QAPP and associated SOPs for EPA review and approval. Following additional revisions to the document, the QAPP was finalized and approved on September 14, 2018. (Please

note: During the on-site TSA, auditors discussed several items in the approved QAPP with Bureau staff (e.g., "Five Steps of the Data Quality Assessment Process" described in Section 25.1.1) that should be reviewed and updated as needed during the next annual review of the document to better reflect current Bureau practices.)

Recommendation: Since the Bureau's QAPP did not reflect current regulatory and programmatic procedures during the TSA period, the Bureau must apply "6" (i.e., QAPP Issue) qualifier flags to its entire concentration dataset in AQS from January 1, 2016, through September 13, 2018, to alert end data users. Please provide EPA with an AQS AMP 350 report once the concentration data have been qualified in AQS.

Going forward, the QAPP and its associated SOPs should be reviewed on an annual basis, with the reviews documented to attest to their completion. The QAPP should be revised whenever significant changes to federal regulation, Bureau procedures, or other requirements or guidance occur. Minimally, the QAPP must be revised within five years of its approval date.

4.5.2 **Concern**: Outdated SOPs do not reflect current Bureau procedures or implement the Bureau's QAPP.

Discussion: Pursuant to 40 CFR Part 58, Appendix A, § 2.1.2, QAPPs must be suitably documented in accordance with EPA requirements and include SOPs, either attached or appropriately referenced. Several changes have been implemented within the Bureau's air monitoring program since the Bureau's SOPs were last approved. Several other items of concern observed within the SOPs were discussed with Bureau staff during the on-site TSA. Some examples include:

- Certain details related to required QC procedures (e.g., one-point QC and span check concentrations of O_3 analyzers) and associated acceptance criteria are inconsistent with the Bureau's QAPP;
- The O_3 SOP does not clearly state at which concentrations O_3 analyzers must be challenged during multi-point verifications and PEs;
- The Data Handling SOP does not clearly state how Bureau staff are to evaluate pollutant concentration data (e.g., spikes or "flat-lines" in the data, stability in QC procedures and PEs) when reviewing the data using the Bureau's AirVision™ software;
- The TAPI T640 SOP is in draft status and does not incorporate elements of the finalized EPA TAPI T640X SOP;
- Paper strip chart recorders have been removed from operation at air monitoring sites; and

- Agilaire LLC 8872 dataloggers are now operated at monitoring sites with O_3 analyzers.

Other concerns and observations listed in this report (e.g., 4.1.2 – $PM_{2.5}$ monitor flowrate verification frequency; 4.3.1 – Documentation of equipment standard identification information; 4.3.2 – Documentation technique and transparency; 4.4.3 – AQS null code usage) point to additional updates needed to ensure the effectiveness of the Bureau's SOPs going forward.

During the TSA, Bureau staff noted that EPA had recommended the Bureau prioritize the revision of the Bureau's QAPP and QMP over the past several years. SOPs have not been reviewed and updated as a result of the additional attention and effort devoted to revising the QAPP and QMP; however, the Bureau acknowledged in the completed Ambient Air Monitoring Technical Systems Audit Form (See Appendix A of this report) that SOP updates are needed.

Recommendation: Bureau SOPs should be revised to incorporate current program procedures and to implement the Bureau's QAPP. Up-to-date SOPs promote consistency among staff in completing certain tasks. SOPs updated with current program information should also allow the Bureau's ambient air monitoring program to continue to operate effectively in the event of staff turnover. Please provide EPA with a schedule for revising Bureau SOPs, detailing the order of revision priority as well as the projected completion dates. As each SOP is revised and internally approved by Bureau staff, please provide EPA with a copy of the approved SOP. EPA recommends the TAPI T640 SOP revision be prioritized to ensure the Bureau's SOP for operating this method is approved as soon as possible.

5.0 Conclusions

CHCAPCB staff are commended for their commitment to operating an air monitoring program that produces quality and defensible data. During this TSA period, the Bureau has made several improvements to its air monitoring program's quality system. Bureau staff revised the air monitoring program's QAPP and QMP to reflect current regulatory requirements, EPA guidance, and program practices. The Bureau's Technicians are cross-trained to ensure the air monitoring program continues to operate effectively in the event of extended staff leave or staff turnover. The Bureau has invested in new monitoring and ancillary field equipment, including backup dataloggers and power supplies to assist in capturing O_3 concentration data at a high percentage. The Bureau has devoted time and resources to develop a method by which $PM_{2.5}$ sample filters are shipped quickly to the analytical laboratory (i.e., IML) and with minimal impact to the filters'

sample integrity. Bureau staff demonstrated technical proficiency in the operation and maintenance of the monitoring equipment; all Bureau monitoring equipment and associated components (e.g., $PM_{2.5}$ sampler separators) appeared to be clean and well-maintained. Bureau staff also appeared knowledgeable of their roles and responsibilities within the CHCAPCB air monitoring program.

Going forward, Bureau staff should focus their efforts on updating SOPs and consistently documenting air monitoring information in a transparent and defensible manner. Since the Bureau's QAPP and QMP have both been granted EPA approval as of this writing, Bureau staff should begin to focus their efforts on revising and updating the Bureau's SOPs to ensure they implement the QAPP and reflect current air monitoring program practices and procedures. Bureau staff acknowledged that several staff members within the Bureau may retire in the next five years; thus, it is incumbent upon the staff to bring the air monitoring SOPs into alignment with the QAPP and current program procedures so that critical knowledge is retained in the event of staff turnover. Logbook documentation should also be enhanced to include greater transparency as well as information that identifies the equipment used during QC and QA procedures. With equipment standard identification information documented alongside the results of such procedures, the Bureau may demonstrate that the standard used and the procedure itself are traceable to authoritative standards in accordance with federal regulation.

Certain corrective actions recommended in this TSA report will require data qualification or insertion in AQS. Please note that any modification to data in AQS after it has been originally certified pursuant to 40 CFR 58.15 requires recertification of the data.

CHCAPCB staff must develop a corrective action plan and timeline to address the findings and concerns identified in Section 4 of this report and respond back to EPA within 30 days of receipt of the final TSA report. Please note that the corrective actions do not have to be completed by this date, only a plan to address the findings and concerns. Observations do not require a corrective action; thus, they are not required to be addressed. If CHCAPCB anticipates that the development of the corrective action plan will not be completed within 30 days following receipt of the final TSA report, please contact EPA to request an extension.

Appendix A

CHCAPCB Response – Technical Systems Audit Form

APPENDIX A

United States

Environmental Protection Agency

Region 4

Science & Ecosystem Support Division

980 College Station Road

Athens, Georgia 30605

Ambient Air Monitoring

Technical Systems Audit Form

Contents

1. General

Note: As you answer the questions throughout this questionnaire, please keep in mind that answers to some questions may be documented in your agency's QMP, QAPP(s), SOP(s), and/or annual monitoring network plan. As an alternative to providing language in the comment field for such questions, please consider listing an appropriate reference to the document(s) – including document name and section number – in which the relevant information has been documented. Such references should help reduce the burden of completing this questionnaire through mitigating redundancy.

Chattanooga-Hamilton County Air Pollution Control Bureau

Address:

6125 Preservation Drive

Chattanooga, Tennessee 37416

Date(s) of Technical Systems Audit: 6/3/2019

This section of the questionnaire completed by: Kathy Jones

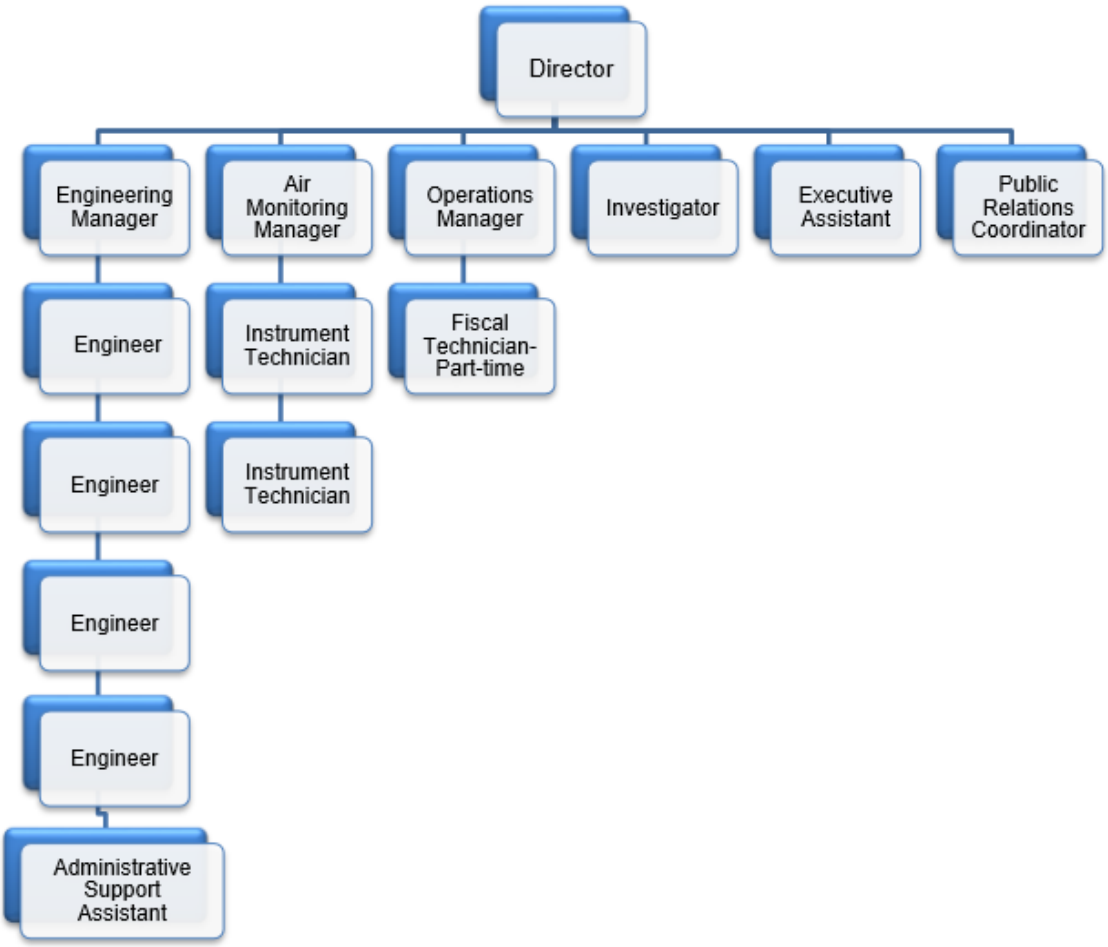
Key Individuals (e.g., Agency Director, Ambient Air Monitoring Network Manager, QA Manager, Technical Support/Instrument Repair Manager, etc.):

Title/Position	Name
Director	Robert H. Colby
Air Monitoring Manager	Kathy Jones
Air Monitoring Technicians	Steve Langston, Jim Long

a. Program Organization

a.1 Organizational Chart

Upload an organizational chart, or attach to the form:



The Bureau is in the process of some internal reorganization that is not finalized as the Bureau lost one long time employee in October, another is retiring in May 2019, and two were out on extended leave. One of the extended leaves was an Air Monitoring Technician on 6 months military leave, the other is still on extended medical leave.

a.2 Key Position Staffing

Enter the number of personnel available to each of the following program areas, and any vacancies, if applicable.

Program Area	Number of People (Primary)	Number of People (Backup)	Number of Vacancies
Network Management (site setup, siting, ANP, etc.)	1	2	0
Field Operations (QC checks, site visits, site maintenance, etc.)	2	1	0
Quality Management (audits, QA documentation, certifications, etc.)	1	2	0
Data and Data Management (data review, validation and acquisition system, AQS, etc.)	1	2	0
Technical Support (equipment repair and maintenance)	2	1	0
Internal Analytical Laboratory (if applicable) ($PM_{2.5}$ gravimetric, high-volume PM_{10}/Pb, toxics, etc.)	NA	0	0

Comment on the need for additional personnel, if application.

b. Facilities

*Identify the principal facilities where the agency conducts work related to air monitoring. **Do not include monitoring stations**, but do include facilities where work is performed by contractors or other organizations.*

Ambient Air Monitoring Function	Facility Location	Comment on any significant changes to be implemented within the next one to two years.
Instrument repair	6125 Preservation or at site	Click or tap here to enter text.
Certification of Standards (e.g., gases, flow transfers, MFCs)	Take all calibrators to the SRP10 at SESD deltaCals & tetraCal sent to MesaLabs for certifications Chinooks are sent to IML Air Sciences	Click or tap here to enter text.
PM filter weighing	Inter-Mountain Lab (IML) of Sheridan, Wyoming	The Bureau will be reducing the number of filter based monitors.
Pb analysis	NA	Click or tap here to enter text.
Data verification and processing	6125 Preservation Dr.	Click or tap here to enter text.
General office space	6125 Preservation Dr.	Click or tap here to enter text.
General lab/work space	6125 Preservation Dr.	Click or tap here to enter text.
Storage space (short and long term)	6125 Preservation Dr.	Click or tap here to enter text.
Air Toxics (Carbonyls, VOCs, PAHs, Metals)	NA	Click or tap here to enter text.

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

The shelter at Eastside Utility is budgeted to be replaced in 2019-2020. The Siskin Drive shelter was just replaced with a deck in June 2018.

c. General Documentation Policies

Complete the following table. If relevant information is provided in a QMP, QAPP, and/or SOP, please provide an appropriate reference in the comment field in place of descriptive language.

Question	Yes	No	Comment
Does the agency have a documented records' management plan?	☒	☐	**Records Management is discussed in the QAPP, the QMP, and in the Data Handling SOP**
• If yes, does this include electronic records?	☒	☐	Click or tap here to enter text.
Does the agency have a list of files considered official records and their media type (i.e., paper and/or electronic)?	☒	☐	**Located in the QAPP**
Does the agency have a schedule for retention and disposition of records? Are records kept for at least three years? Comment on how long records are retained.	☒	☐	**Records are retained for a minimum of 5 years according to *40CFR* requirements**
Who is responsible for the storage and retrieval of records? If more than one person, please indicate those personnel responsible for storing/retrieving records, including what records each is responsible for.			**Kathy Jones Jim Long, a technician, would retrieve data from Airvision**
What security measures are utilized to protect records?			**Stored in a locked room**
Where/when does the agency rely on electronic files as primary records?			**Files are retained now as electronic files if possible. AQS serves as electronic storage as AMP reports are easy to run.**
What is the system for storage, retrieval and backup of these files?			Major documents are placed on a thumb drive stored on the bookcase (with paper records) for a personal computer back-up. The server is backed up every two weeks.

d. Training

d.1 Training Plan

Complete the following table.

Question	Yes	No	Comment
Does the agency have a training plan? If yes, where is it documented?	☒	☐	**Training Plan is related to circumstances. Long time employees do not require as much training as a newly hired person. A newly hired person with extensive experience in air monitoring will not need as much training as a new hire with no experience. Documented in QMP.**
If yes, does the training plan include:			
• Training requirements by position?	☒	☐	**Only two positions- Manager and Technician**
• Frequency of training?	☐	☒	**Frequency related to length of service and type of training needed.**
• Training for contract personnel?	☐	☒	**Won't hire a contract person that needs training**
• A list of core QA-related courses? Please attach a list of required courses or cite where such information may be found.	☒	☒	**There is not a list of required courses. Training is related to how much experience the person has when he/she is hired, what training is available, and if there is enough money in the budget to cover the travel. EPA QA courses are not offered often so any offered by EPA will be attended by the appropriate personnel.**
• Does it make use of seminars, courses, EPA-sponsored college level courses, etc.?	☒	☐	**Employees are sent to seminars and EPA courses as funding allows.**
Are personnel cross-trained for other ambient air monitoring duties?	☒	☐	**Since CHCAPCB is small, cross training is encouraged. All Air Monitoring employees are trained on AQS loading and load quarterly. Each tech subs for the other's complete duties**

			during vacations or military leaves.
Are training funds specifically designated in the annual budget?	☒	☐	**Required EPA sponsored training is included in the annual budget if the agency is aware of the training far in advance. The budget is prepared at least 6 months ahead of the budget year.**

d.2 Training Events

Indicate below the most recent training events, and identify the personnel who participated in them.

Event	Date(s)	Participant(s)
National Air Monitoring Conference	**8/7/2018**	**Kathy Jones**
Sent both technicians to Nashville for training from experienced Nashville local operator for a Thermo 2025i (set up by Managers at the agencies)	**5/23/2018**	**Jim Long and Steve Langston**
Region 4 Workshop	**4/16/2018**	**Kathy Jones**
QA Training in Athens, Georgia	**9/1/2018**	**Kathy Jones and Jim Long**

e. Oversight of Contractors and Supplies

e.1 Contractors

Complete the following table. If your agency does not use contract personnel, proceed to section e.2 Supplies.

Contractors	Yes	No	Comment
Who is responsible for oversight of contract personnel?			**Air Monitoring Manager**
Are contractors providing a service (e.g., independent performance audits, $PM_{2.5}$ lab) audited? How often?	☒	☐	**Independent audits once per year and $PM_{2.5}$ lab services continuously**
What steps are taken to ensure contract personnel meet training and experience criteria?			**Contacted references and reviewed information supplied by the companies**
Are contractor Quality Documents reviewed before procuring a service?	☐	☐	**NA, have used IML since before Jan 1, 1999. Quality Documents have developed with the development of the 2.5 program.**
How often are contracts reviewed and/or renewed?			**Independent audits: contracted yearly if desired $PM_{2.5}$ Lab Services: every 5 years but contract is reviewed yearly**

e.2 Supplies

Complete the following table. If relevant information is provided in a QMP, QAPP, and/or SOP, please provide an appropriate reference in the comment field in place of descriptive language.

Suppliers	Yes	No	Comment
Have specifications been established for consumable supplies and/or equipment?	☒	☐	**The Bureau usually stays with the same vendors for the same type of equipment. It is too expensive to maintain vendor parts for multiple vendor models for the same pollutants.**
What supplies and equipment have established specifications?			EPA formally approves instruments for FEM or FRM designation (list posted on EPA website) which establishes operational specs for that instrument.
Is equipment from suppliers open for bid?	☒	☐	Three quotes are required for over $1000 and a bid is required over $10,000. At this writing City purchasing is requesting

			quotes even when the purchase is less than $1,000

2. Quality Management

This section of the questionnaire completed by: Kathy Jones

Key Individual(s):

Title/Position	Name
Air Monitoring Manager	Kathy Jones

a. Status of QA Program

a.1 QA and QC Activities

Complete the following table.

Question	Yes	No	Comment
Does the agency perform *all* quality assurance (QA) activities with internal personnel (i.e., developing QMPs/QAPPs/SOPs and DQOs/MQOs, performing systems audits, assessments and performance evaluations, corrective actions, validating data, QA reporting, etc.)? If not, please indicate in the comment field who is responsible and which QA activities are performed.	☐	☒	State of Tennessee has been doing quarterly audits of all monitors. Chattanooga-Hamilton County has a certificate of exemption from regulatory authority of the state. The state is, therefore, a third party. An independent contractor (EEMS) was hired in 2018 to perform an audit of all monitors for one quarter(except for the T640 which was not functioning at the time of the audit).
If the agency has contracts or similar agreements in place with either another agency or contractor to perform audits or calibrations, please name the organization and briefly describe the type of agreement.			EEMS was hired to perform one set of ozone and particulate audits in 2018. The T640 was the only instrument not audited because it was down. Four companies were contacted for quotes. EEMS had the best quote, owned their own equipment, and had a lot of experience. EEMS owns a mobile NPAP type lab, and EEMS is performing audits of other local agency monitors in TN. It worked well for Eric Hebert to audit our agency's sites while he was in Tennessee. EEMS has been auditing in Memphis and in Nashville. The State of Tennessee has traditionally audited the instruments quarterly dating back many years (when all the agencies were in the same PQAO). The audits continued even though the Bureau became its

			own PQAO. There is no formal contract with the state.
Does the agency perform *all* quality control (QC) activities with internal personnel (i.e., zero/span/one-point QC checks, calibrations, flowrate, temperature, pressure and humidity checks, certifying/recertifying standards, lab and field blanks, data collection, balance checks, leak checks, etc.)? If not, please indicate in the comment field who is responsible and which QC activities are performed.	☐	☒	The Technician and Air Monitoring Manager are responsible for local quality control and the IML Supervisor is responsible for the QC in the laboratory. The Air Monitoring Manager is responsible for making sure IML is performing appropriately.

a.2 QC Acceptance Criteria

Complete the following tables.

Question	Yes/No	Location	Comment
Has the agency established and documented criteria to define agency-acceptable QC results?	Yes	QAPP, SOPs	Criteria parameter excursions are investigated on a case by case basis.

Pollutant	Does the agency adhere to the critical QC acceptance criteria for criteria pollutants[1] and meteorological measurements[2]?	QC Acceptance Criteria (if other than validation templates)	Action or Warning Limits	Corrective Action
Ozone and Particulate	*The agency scrutinizes data that exceeds critical acceptance criteria on a case by case basis and determines if the data will be voided.*	Data comparisons locally and regionally and statistical studies indicate there is nothing wrong with the data.	Critical Criteria Tables	If the data does not meet critical criteria tables, necessary steps will be taken to meet the criteria tables.

[1] Appendix D Validation Templates of the *QA Handbook for Air Pollution Measurement Systems Volume II*
[2] Appendix C Validation Templates of the *QA Handbook for Air Pollution Measurement Systems Volume IV*

b. Internal PE Audits

b.1 Internal Audit Questions

Complete the following table.

Question	Yes	No	Response
Does the agency maintain a laboratory to support QA activities?	☐	☒	**The Bureau contracts with Inter-Mountain Laboratories of Sheridan, Wyoming.**
Has the agency documented and implemented specific audit SOPs separate from monitoring SOPs?	☐	☒	**The audit procedures are written in the Ozone and $PM_{2.5}$ SOPs.**
Are the QA personnel organizationally independent from the personnel responsible for generating environmental data (40 CFR Part 58, Appendix A, § 2.2)? If no, please explain in the comment field.	☒	☐	**The State is organizationally independent and the contractor, EEMs, has no ties to the agency or EPA Region 4 of which we are aware.**
Are annual performance evaluation (PE) audits conducted by technician(s) other than the routine site operator(s) (40 CFR Part 58, Appendix A, § 3.1.2)? If no, please explain in the comment field.	☒	☐	**The State of Tennessee conducts audits quarterly of all operating monitors and in 2018 an independent contractor, EEMS, was hired for one full set of audits. Local audits may be performed by a technician that is not responsible for the regular operation of a monitor.**
Does the agency have identifiable auditing equipment and standards (specifically intended for sole use) for audits?	☒	☐	**The Bureau has a set of equipment only used for auditing. There is a 49iPS calibrator for ozone audits that is calibrated against the SRP10 (Level 2). The State of TN and EEMS have their own sets of auditing equipment only used for audits.**
Are audit equipment and standards ever used to support routine calibration and QC checks required for monitoring network operations? If yes, please explain in the comment field.	☐	☒	**Audit equipment is not used for routine operations. It is purchased and maintained for audits only.**

b.2 Internal Audit Procedures

If the agency includes performance audit procedures in pollutant-specific monitoring SOPs, please provide an appropriate reference for each pollutant. Otherwise, if the agency does not have a performance audit SOP, please describe the performance audit procedure for each type of pollutant.

Pollutant	SOP/Performance Audit Procedure
Ozone	Ozone/Datalogger SOP
PM2.5	PM2.5 SOP
T640	T640 SOP

b.3 Certification of Audit Standards

Attach a list or use the table below to provide information on the certification(s) of audit standards (e.g., flowmeters, gas standards, etc.) currently being used.

Vendor	Audit Standard	Certification	Certification Frequency	Date of Last Certification
MesaLabs	deltaCal	Temp, Pressure, Flow	Yearly	12/7/18
Thermo	49i	SRP10 in Athens	Yearly	2/7/2018

Complete the following table.

Question	Yes	No	Comment
Does the agency have a separate certified source of zero air for performance audits?	☐	☒	The agency uses a separate set of canisters of charcoal and drierite for audits. There is no certification for these- attention must be paid to freshness.
Does the agency have procedures for auditing and/or validating performance of meteorological monitoring?	☐	☒	We use the National Weather Service meteorological information from the nearby airport. NWS data is assumed to be reliable.

b.4 Audit Equipment

Use the table provided below to list the agency's audit equipment and age of audit equipment (e.g., flow standards, calibrators, zero air systems, etc.).

Manufacturer	Make and Model Number	Purchase Year or Year Acquired
Thermo Environmental	49i	About 2006
MesaLabs/BGI	deltaCal	About 2004

b.5 Audit Acceptance Criteria

Complete the following tables.

Question	Yes/No	Location	Comment
Has the agency established and documented criteria to define agency acceptable audit results? If yes, comment where (page number, section, etc.)	Yes	QAPP, Ozone or Particulate SOPs	QAPP: Page 85, Section 21 *Assessments and Response Actions*

Pollutant	Does the agency adhere to the audit acceptance criteria for criteria pollutants[3] and meteorological measurements[4]?	PE Audit Acceptance Criteria (if other than validation templates)	Do the audit levels (gaseous PE audits only) meet 40 CFR Part 58, Appendix A, § 3.1.2.1 criteria?	Corrective Action
Ozone	Yes, normally	The Bureau looks at the audit on a case by case basis and makes the determination (if there is an excursion of the validation templates).	Yes. The Air Monitoring Manager normally audits more data points than required.	If the State's audit is off more than expected because of local audit results the same quarter, the Bureau may request a reaudit with a different calibrator.
PM2.5	Yes, normally	Same as above	NA	If the State's audit is off more than expected because of local flow checks or other audits the same quarter, the Bureau may request a reaudit.

[3] Appendix D Validation Templates of the *QA Handbook for Air Pollution Measurement Systems Volume II*
[4] Appendix C Validation Templates of the *QA Handbook for Air Pollution Measurement Systems Volume IV*

c. Planning Documents Including QMP, QAPP, & SOP

c.1 QMP Questions

Complete the following table.

Question	Response
Does the agency have an EPA-approved quality management plan (QMP)?	No- it was submitted and returned for changes. It was resubmitted 1/7/19. It was returned again to the Bureau for changes and the Bureau has not resubmitted it
• If yes, what is the approval date of the QMP?	NA
• If yes, has the QMP been approved by EPA within the last 5 years?	No
• If yes, is the QMP multi-media or air-specific?	Air specific
• If yes, are changes to the plan needed that have not yet been approved by EPA?	No

c.2 QAPP Questions

Complete the following table.

Question	Response
Does the agency have an EPA-approved QA project plan (QAPP)?	Yes
• If no, has the agency been delegated self-approval?	Choose an item.
How often does the air monitoring agency review QAPPs? Are these reviews documented? If so, please provide a location.	QAPP is reviewed yearly and a list is kept of minor changes. The QAPP is reviewed and updated every 5 years unless there is some major change. In the case of a major change, the QAPP will be reworked and resubmitted during the 5 year period.
Does the agency have any QAPP revisions still pending EPA approval?	No. The current QAPP was approved in 2018.
How does the agency verify that the QAPP is fully implemented?	Air Monitoring employees are required to read it and sign that they have read and understand it.
How are staff notified and trained when a QAPP is revised?	Monitoring Staff are requested to read it and sign that it has been read.
What personnel regularly receive updates?	Air Monitoring personnel
Does the agency have any missing QAPPs that need to be developed?	No
• If yes, list any missing QAPPs.	Click or tap here to enter text.

Provide a list of all QAPPs as an attachment or use the table below. If provided elsewhere, please provide a reference.

QAPP Title	Approval Date	Pollutant(s)	Status
Chattanooga Hamilton County Air Monitoring QAPP	9/14/2018	Ozone and PM2.5	Approved

c.3 SOP Questions

Complete the following tables.

Question	Response
Are all standard operating procedures (SOPs) complete, or are some in development?	T640 was submitted, comments were received back, but has not been resubmitted. EPA asked that the Bureau prioritize the QAPP and QMP over SOPs. SOPs need updating after the QMP is approved.
Does the agency have any missing SOPs that need to be developed?	T640 SOP must be resubmitted
• If yes, list the SOPs that need to be developed.	Click or tap here to enter text.
Are SOPs available to all field operations personnel?	Yes
Are SOPs for "episodic monitoring" prepared and available to field personnel? Refer to *QA Handbook Volume II, Section 6.0*.	No SOP for Episodic monitoring. Episodic monitoring is covered under the QAPP.
Are SOPs based on the framework contained in *Guidance for Preparing Standard Operating Procedures (SOPs) (EPA QA/G-6)*?	Yes
Does the agency have SOPs specific to data handling and validation?	Yes. EPA has approved a Data Handling SOP
Who approves SOPs?	Air Monitoring Manager
How often are SOPs reviewed? Are these reviews documented? If so, please provide a location. How often are SOPs updated?	SOPs are reviewed every time there is a change in procedure.
How are staff notified and trained when a SOP is revised?	The technicians are asked to review the approved SOP and sign that it has been reviewed.

Provide a list of all SOPs as an attachment or use the table below. If provided elsewhere, please provide a reference.

SOP Title	Approval Date	Pollutant(s)	Status
Data Handling- Revision 5	5/23/2016	All	Approved
TEI 49C and I series, ESC 8816, 8832 Data loggers, MTEK 2801 Strip Chart Recorders	12/17/2015	Ozone	Approved
$PM_{2.5}$ FRM TEI R & P Models 2025 and 2025i	3/24/2016	$PM_{2.5}$	Approved
T640 SOP	Click or tap to enter a date.	T640	Submitted 9/5/17, EPA comments returned 9/20/17. EPA requested submittal of the

			QAPP and QMP before resubmitting the T640 SOP. EPA is no longer approving SOPs.

d. Corrective Action

Complete the following table.

Question	Response
Does the agency have an operational, documented, and comprehensive corrective action program in place?	Yes
• As a part of the QAPP?	Yes
• As a separate document, or part of a SOP?	Choose an item.
Does the agency have established and documented corrective action limits for QA and QC activities?	Yes
Are corrective action procedures based on results of the following that have exceeded established limits?	Data is not automatically voided that does not meet critical criteria (pink sections). It is reviewed and a determination is made on a case by case basis.
• 1-Point QC checks	Yes
• Calibrations and zero/span checks	Yes
• Flow rate verifications	Yes
• PEs (gaseous audits and semi-annual flow rate audits)	Yes
• Precision goals (collocated $PM_{2.5}$ and PM_{10})	Yes
• Bias goals	Yes
• NPAP audits	Yes
• PEP audits	Yes
• Completeness goals	Yes
• Data audits	Yes
• Technical Systems Audits	Yes
How is responsibility for implementing corrective actions assigned?	To the technician responsible for the particular instruments
How does the agency follow up on implemented corrective actions?	The technician reports back to the Manager
Briefly describe at least two recent examples of the ways in which the above corrective action system was employed to remove problems.	
1. The T640 crashed. The technician ran tests to try to determine what was wrong. He determined that the sensor was not functioning correctly. He mailed the T640 back to the manufacturer, Teledyne. Teledyne provided a loaner for our use. Teledyne installed a new sensor and sent it back.	
2. Multiple short power failures caused a Windows-driven 8872 data logger to crash. Lost data was recovered from the 49i itself. The Bureau installed a UPS at the two sites where 8872s	

are used. There have been no further issues. Because it is Windows driven, the logger cannot recover from quick multiple power failures.

e. Quality Improvement

Complete the following table.

Question	Response
Have all deficiencies indicated in the previous TSA report been corrected? If no, please list and explain.	Yes
What actions were taken to improve the quality system since the last TSA?	Installed 8872 loggers, AV Trends, T640 –i.e., upgraded old equipment, operating multiple loggers at ozone sites instead of strip charts, replaced shelter at Siskin Drive in poor condition with a new deck
Since the last TSA, do your control charts and/or AQS reports indicate that the overall data quality for each pollutant is steady or improving?	Yes
What was/were the cause(s) when goals for measurement uncertainty per *40 CFR Part 58, Appendix A* were not met (if applicable)?	NA
What are your agency's plans for quality improvement?	We have purchased all new equipment in the last 6 years except for one PM2.5 2025 which is older. The old one will be replaced with a new one in early 2019 (in a monitor shuffle).

f. External Performance Audits

Complete the following table.

Question	Response	Comment
Does your agency participate in the following external performance audits? If not, please explain why.		Click or tap here to enter text.
• NPAP	Yes	Click or tap here to enter text.
• $PM_{2.5}$-PEP	Yes	Click or tap here to enter text.
• Pb-PEP	NA	Click or tap here to enter text.
• Pb Strip Audit	NA	Click or tap here to enter text.
• Ambient Air Protocol Gas Verification Program (AA_PGVP)	NA	Click or tap here to enter text.
• Round Robin metal PT	NA	Click or tap here to enter text.
• NATTS/PAMS PT	NA	Click or tap here to enter text.
List other performance audit participation.		Click or tap here to enter text.
Who performs NPAP and PEP audits?		EPA contractors (we participate in EPA programs)

3. Network Management

This section of the questionnaire completed by: Kathy Jones

Key Individual(s):

Title/Position	Name
Air Monitoring Manager	Kathy Jones

a. Network Design

*For monitoring organizations and agencies that **do not submit the annual network plan (ANP)** required by 40 CFR 58.10, please complete the table below. For those monitoring organizations that **do submit an ANP**, proceed to section b. Siting.*

Site Name	AQS Site ID #	Pollutant(s) Monitored	Proposed Changes
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

b. Siting

b.1 Site Evaluations

Complete the following table.

Question	Yes	No	Comment
How often are site evaluations for 40 CFR Part 58, Appendix E criteria conducted?	Frequency: Yearly		Click or tap here to enter text.
	Date of last review:		**4/1/2019**
	Where is this documented?'		**Yearly State Air Monitoring Plan**
Are there any siting issues?	☐	☒	**2019 Network Review in 2018 State Air Monitoring Plan**
Does the current level of monitoring effort (station placement, instrumentation, etc.) meet requirements imposed by current grant conditions?	☒	☐	**Exceeds Requirements**

b.2 Site Non-Conformance

Please list any monitors with siting non-conformances, the AQS Site ID numbers for those monitors, the type of non-conformance and the reason(s) for the non-conformance. If none of your agency's monitors have siting non-conformances, proceed to section c. Waivers.

Monitor	AQS Site ID #	Type of Non-Conformance	Reason(s) for Non-Conformance
Choose an item.	Click or tap here to enter text.	Choose an item.	Click or tap here to enter text.

c. Waivers

c.1 Waiver Questions

Complete the following table.

Question	Yes	No	Comment
Does your agency have any waivers?	☒	☐	**For PM_{10} monitoring**
Does your agency plan to request any waivers?	☒	☐	**Continue to request PM_{10} monitoring waiver in the next 5-Year Plan.**
Has your agency obtained necessary waiver provisions to operate equipment which does not meet the effective reference and equivalency requirements (if applicable)?			**The Bureau is collecting T640 PM_{10} data but it is not FRM or FEM (T640 Regular model). PM_{10} Data is not currently being entered into AQS.**
Do any sites vary from the required operating schedules in 40 CFR 58.12?	☒	☐	**The Bureau has operated the collocated FRM $PM_{2.5}$ monitor on a 3 day schedule which is more than required in order to be able to substitute the data for primary data in the event of a loss. The 2019 Network Review states that the collocated FRM will start 12 day monitoring on May 9, 2019. The East Ridge site is being operated on a 3-day schedule.**
Does the number of collocated monitoring stations meet the requirements of 40 CFR Part 58, Appendix A? If no, which pollutant(s)?	☒	☐	Click or tap here to enter text.

c.2 Waiver Types

Indicate any waivers requested or granted by the EPA Regional Office, and provide waiver documentation. If your agency does not have any waivers, proceed to section d. Documentation.

Waiver Type	Reason
PM10 Waiver documentation Waiver in 2014 Granted in EPA response to State Air Monitoring Plan	Many years of PM_{10} low data

d. Documentation

Complete the following table.

Question	Yes	No	Comment
Are hard copy or electronic site information files retained by the agency for all air monitoring stations within the network? If so, please provide the location of these files in the comment field.	☒	☐	**Included in the yearly Network Plan which is in the State of Tennessee Air Monitoring Plan yearly**
Does each station have the required information, including:			
• AQS Site ID Number?	☒	☐	Click or tap here to enter text.
• Photographs of the four cardinal compass points?	☒	☐	**Yearly Network Review Provides 8 cardinal points**
• Startup and shutdown (if applicable) dates?	☒	☐	**Provides historical information for future reference.**
• Documentation of instrumentation?	☒	☐	Click or tap here to enter text.
Who has custody of the current network documents?	**Name:** Kathy Jones **Title:** Air Monitoring Manager		**State of Tennessee incorporates the network documents in the yearly Air Monitoring Plan**

4. Field Operations

This section of the questionnaire completed by: Kathy Jones

Key Individual(s) (e.g., Field Manager, Field Supervisor, Field QA Manager, etc.):

Title/Position	Name
Air Monitoring Manager	Kathy Jones

a. Field Support

Complete the following table.

Question	Yes	No	Comment
On average, how often are most of your stations visited by a field operator?			Once or twice a week- more if needed. Farthest site is no more than 40 minutes away from the office.
Is this visit frequency consistent for all reporting organizations within your agency (if applicable)?			NA
On average, how many stations does a single operator have responsibility for?			Each operator has 2 for a total of 4. One operator is in the military and is sometimes gone 3 to 6 months. Often one operator handles all 4. There is also a lot of earned vacation in the department.
How many of the stations of your SLAMS/NCORE network are equipped with sampling manifolds?			None
Do the sample inlets and manifolds meet the requirements for through-the-probe audits?	☒	☐	We use a solenoid controlled by a data logger switch for the through-the-probe audits. The line is physically moved from the stationary calibrator to the audit calibrator for the audit and back (to resume regular operations). The switch controls whether the air supplied to the instrument is generated ozone or ambient air.
• Briefly describe the most common manifold type and flow rate.			NA
• How often are manifolds cleaned?			NA
• What is used to perform the cleaning?			NA
• Are manifolds equipped with a blower?			NA
• Is there sufficient air flow through the manifold at all times?			NA
• How is the air flow through the manifold monitored?			NA
• Is there a conditioning period for the manifold cleaning?			NA

• What is the residence time?			NA
• How often is the residence time calculated?			NA
Sampling lines: 1) What material is used for instrument sampling lines?			Teflon
2) How often are sampling lines changed or cleaned?			Yearly changed out
Do you utilize uninterruptable power supplies or backup power sources at your sites?	☒	☐	Since we purchased 8872s it is required at ozone sites because Windows does not handle multiple power failures well.
What instruments or devices are protected?			The 8872 primary logger at each ozone sites.

*__***Please attach an example of recent documentation of sample residence time calculation.***__

The QA Handbook Volume II, 7.3. Sampling Probes and Manifolds seems to indicate that the sampling time procedures described relate to calculation with a manifold. Chattanooga Hamilton County does not use a manifold at either gas site.

If it is calculated using the formula provided in 7.3 using just the Volume of the tubing:

Volume of the Line= pi (3.14159) X (diameter in cm/2)^2 X Length in cm

3.14159 (.1778 cm^2/4) 356.14cm=50.0682 cm^3

Flow = 1100 mls/min 1 cm^3=1ml

Volume of the Line/Flow= Residence Time

V/Flow=.0455 minute (60 sec/1 minute) or 2.73 seconds (length of line is about the same at both sites)

Calculated 1/17/19 after determining flow on analyzers after winter maintenance and restringing new lines.

Chattanooga-Hamilton County does change all Teflon lines every season before the season starts.

b. Instrument Acceptance

b.1 Instrumentation

Please list the instruments in your inventory.

Pollutant	Number of Instruments	Make and Models	Reference or Equivalent Number
PM2.5	5	Four 2025 WINS converted to VSCC and one 2025 purchased with VSCC (one in use)	EQPM-0202-145
PM2.5	2	2025i- converted to VSCC	EQPM-0202-145
PM2.5/PM10	1	T640	EQPM-0912-236
PM2.5	1	TEOM (not in use)	EQPM-0609-181
Ozone	2	49C (not in use)	EQPM-0880-47
Ozone	2	49CPS (not in use)	EQPM-0880-47
Ozone	2	49i	EQPM-0880-47
Ozone	3	49iPS	EQPM-0880-47
URG Carbon Monitor	1	URG 3000N (not in use)	RFPS-0400-136
Met One PM2.5 Speciation	1	Met One Super SASS (not in use)	RFPS-0315-221
PM10	3	Anderson Hi Vols	

b.2 Instrument Needs

Please list your instrument needs in order of priority.

All instruments, except for one, have been replaced with newer models in the last few years.

c. Calibration

c.1 Calibration Frequency and Methods

Please indicate the frequency and method of multi-point calibrations of gaseous monitors.

Pollutant	Frequency	Calibration Method: Back of Instrument	Calibration Method: Through-the-Probe
Ozone	Beginning of season Verified by audits and precision checks	☐	☒

c.2 Calibration Questions

Please complete the following table.

Question	Yes	No	Comment
How are field calibration procedures documented, and how are the results recorded?			Reported in log book and in data logger messages/logs where loggers are used
Are calibrations performed according to the guidance in Volume II of the *QA Handbook*?	☒	☐	Click or tap here to enter text.
Are calibration procedures consistent with the operational requirements of Appendices to 40 CFR Part 50 or to analyzer operation/instruction manuals?	☒	☐	**If no, why not?** Click or tap here to enter text.
Have changes been made to calibration methods based on manufacturer's suggestions for a particular instrument?	☐	☒	**If yes, what change(s)?** Click or tap here to enter text.
Do standards used for calibrations meet the requirements of appendices to 40 CFR Part 50 (EPA reference methods) and Appendix A to 40 CFR Part 58 (traceability of materials to NIST, SRMs or CRMs)?	☒	☐	**Comment on deviations.** Click or tap here to enter text.
Are all flow-measurement devices NIST-traceable?	☒	☐	Click or tap here to enter text.

d. Certification

d.1 Flow Devices

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

Flow Device	Serial Number	Primary Standard	Certification Frequency	Use (calibration, audit, or spare)
deltaCal	336	Vendor certified by MESA	Yearly	Calibration
tetraCal	586	Vendor certified by MESA	Yearly	Calibration
deltaCal	420	Vendor certified by MESA	Yearly	Audit
Chinook	981109A	SN10963 at IML	Yearly	Calibration

d.2 Certification Questions

Please complete the following table.

Question	Yes	No	Comment
How are certifications performed? (internally, by a vendor, or third party?)			Devices are sent to the vendor. An electronic thermometer might be checked against a vendor certified NIST traceable thermometer.
Where do field operations personnel obtain gas standards?			NA
How are the gas standards verified after receipt?			NA
What equipment is used to perform calibrations (e.g., dilution devices)?			49IPS for ozone (no dilution)
Do the dilution air flow control and measurement devices conform to CFR requirements?	☐	☐	NA
What traceability is used?			NIST
Is calibration equipment maintained at each station?	☒	☐	Each site has its own stationary calibrator
How is the functional integrity of this equipment documented?			Level 2- the field calibrators are removed from the site and taken to Athens for certification against the SRP10 usually early February. No level 3s are used.
Who has responsibility for maintaining field calibration standards?			Ozone Technician

****Please have copies of certifications of all standards currently in use from your master and/or satellite certification logbooks (i.e., chemical, gas, flow, and zero air standards) available for review during the on-site TSA.***

****Please attach an example of recent documentation of traceability.***

d.3 Calibrator Certification

Please list the authoritative standards and frequency of each type of dilution, permeation and ozone calibrator, and indicate certification frequency.

Calibrator	Primary Standard	Frequency of Certification/Calibration
49i (three of them)	Certified against the SRP10 in Athens so maintained as Level 2	Yearly

e. Repair

Complete the following table.

Question	Yes	No	Comment
Who is responsible for performing preventive maintenance?			Technicians
Is special training provided to those personnel who perform preventive maintenance? Briefly comment on background or courses.	☒	☐	Technicians may be sent to vendor training or another agency with experience in the same make and model instrument. If technicians ask for training on an instrument, an attempt is made to arrange it.
What is the preventive maintenance schedule for each type of field instrumentation? If this information is provided in agency SOPs, please indicate that in the Comment section.			We have our own maintenance schedule based on past experience and the manufacturer recommendations. The PM schedules are in the SOPS for each instrument.
If preventive maintenance is MINOR, it is performed at: (check one or more) ☒Field Station ☐Headquarters Facilities ☐Manufacturer			Click or tap here to enter text.
If preventive maintenance is MAJOR, it is performed at: (check one or more) ☐Field Station ☒Headquarters Facilities ☒Manufacturer			It may be sent off if the repairs are serious.
Does the agency have service contracts or agreements in place with instrument manufacturers? Indicate in the Comment section or attach additional pages to show which instrumentation is covered.	☐	☒	Click or tap here to enter text.
Comment briefly on the adequacy and availability of the supply of spare parts, tools, and manuals available to the field operator to perform any necessary maintenance activities. Do you feel that this is adequate to prevent any significant data loss?	☒	☐	We keep a supply of inexpensive parts. Now we have usable spare instruments that can be deployed in place of a failing instrument. There might be difficulty getting parts for an old 2025 or a 49C if we needed to rebuild a spare.
Is the agency currently experiencing any recurring problem with equipment or manufacturer(s)? If so, please identify the equipment or manufacturer, and comment on steps taken to remedy the problem.	☐	☒	The T640 is a new instrument and we bought one of the first models. We occasionally have run into an issue, but Teledyne has been responsive.

f. Record Keeping

Complete the following table.

Question	Yes	No	Comment
What type of station logbooks are maintained at each monitoring station? (e.g., maintenance logs, calibration logs, personal logs, etc.)			There is a log book for each instrument. If a technician goes to a site, an entry must be in a logbook. If there is no entry he is assumed to not have been there. The 3 loggers used for continuous monitors have electronic logs into which information entered into the paper log are also entered.
• If hard-bound logbooks are used, are they electronically scanned on any routine frequency? If yes, at what frequency?	☒	☐	Quarterly copied with paper copies and filed in notebook in lab
What information is included in the station logbooks?			Anything done at the site is to be recorded included weed eating.
Who reviews and verifies the logbooks for adequacy of station performance? Does the reviewer initial or sign the logbooks to document the review?			A review of the logbook is conducted by the Air Monitoring Manager at the time of ozone audits quarterly (1st and 4th quarter audits performed in March and October). The reviewer has not been notating in the log book to document the review. This is something that we can adopt.
How is control of logbooks maintained?			Logbooks are copied quarterly and the copies are stored on the lab bookcase. The Air Monitoring Manager checks the copies quarterly to make sure they are being kept up.
Where is the completed logbook archived?			Filled books are stored in the lab at the Bureau.
What other records are used? (Use drop-down menu below). Comment on the use and storage of these documents.			Electronic records are put into the data loggers. These are printed from either the Central Messages (8816 or 8832) or the Log (8872) and stored. This is intended as a back up to the bound log.
Log of precision checks			Airvision precision reports are autogenerated, printed, and stored
Maintenance log			Maintenance for continuous monitors is recorded in the bound log and in the electronic logs. Maintenance for Filter based PM2.5s is recorded in bound log only.
Control Charts			The 8872 has a graphing capability by the minute and AV Trends is operating

			on a PC at each site which also has graphing capability. Old control charts were taken out of service.
A record of audits			Logged in the bound logs. For continuous monitors- also recorded in electronic logs.
Zero span record			Airvision zero span reports are autogenerated, printed, and stored
Are calibration records (or calibration constants) available to field operators?	☒	☐	Click or tap here to enter text.

****Please attach an example field calibration record sheet.***

Date Printed: 04/24/2019 06:00

Calibration Report

24-Apr-2019

Site	Parameter	Sequence	Phase	Start Time	End Time	Value		Expected Value	Error	Drift Warning Limit
1A_Eastside Filter Plant	02_CALOUT	Z_LOPREC	70_PPB	24-Apr-2019 00:00:10	00:35:10	70	*	70	.22	
			CLEAR	24-Apr-2019 00:00:10	00:41:10	0	*	0	.06	
	OZONE_PPB		70_PPB	24-Apr-2019 00:00:10	00:35:10	70	*	70	.46	
			CLEAR	24-Apr-2019 00:00:10	00:41:10	0	*	0	-.09	

* - Drift limit exceeded
** - Out of control limit exceeded

5. Laboratory Operations

This section of the questionnaire completed by: Kathy Jones

Laboratory Name:

Inter-Mountain Laboratory

Laboratory Address:

555 Absaraka, Sheridan, Wyoming 82801-5501

Key Individual(s) (e.g., Laboratory Manager, Laboratory Supervisor, Laboratory QA Manager, etc.):

Title/Position	Name
Laboratory Supervisor	Mary Hininger

a. Routine Operation

a.1 Methods

In the table below, identify which of the following analyses are performed in the laboratory, and state the method used to conduct the analyses.

Pollutant	Method
PM2.5	Gravimetric weighing of filters

Please describe areas where there have been difficulties meeting the regulatory requirements for any of the above methods.

Click or tap here to enter text.

a.2 Quality System

Complete the following table.

Question	Yes	No	Comment
Are procedures for the methods listed in Section a.1 included in the agency's QAPP and/or SOPs?	☒	☐	In the SOPs
Have the laboratory SOPs been reviewed and approved by EPA?	☐	☒	EPA reviewed them when they audited IML in 2014. I do not know if they are considered formally approved.
Are SOPs easily and readily accessible for use and reference within the laboratory? If not, where are the documents stored?	☒	☐	Stored on bookcase in Bureau laboratory
Does the lab have sufficient instrumentation to conduct the analyses?	☒	☐	Use IML as contract laboratory. The Bureau no longer has a functioning laboratory.
Are separate facilities maintained for weighing the different sample types? (e.g., hi-volume vs low-volume), or is one weighing room utilized for all samples? Describe.	☒	☐	IML has separate facilities for the weighing of the two different types of filters
Does your laboratory hold certifications? (EPA, NIST, State, NLAC, or other)	☒	☐	IML has several state certifications- TN does not have a state 2.5 weighing round robin program where IML can participate
Does your laboratory operate under a QA Manual or equivalent document?	☒	☐	IML has their own QAPP and SOPs
Does your laboratory participate in PE programs?	☒	☐	IML has a number of certifications for $PM_{2.5}$ and other types of lab work. The State of Tennessee does not have a lab certification program for $PM_{2.5}$ weighing.
Does your laboratory have a corrective action process for non-conforming work?	☒	☐	In their QAPP
Does your laboratory have a laboratory staff person assigned the role of QA Officer?	☒	☐	IML's Lab Manager

Please describe needs for laboratory instrumentation.

Not Applicable

b. Laboratory QC

b.1 Standards

Please identify the equipment and standards used in support of the gravimetric laboratory, including any quality assurance standards (such as additional weight sets or portable RH/temperature probes).

Device	Pollutant	Brand (Make)	Model (Class)	Calibration/Certification Expiration Date
Balance	PM2.5	Sartorius ATI Cahn	MSU2.7s SN 34404765 C-44 SN 40211597	10/2/2018
Primary Weights	See below	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap to enter a date.
RH/Temp Logger	Temperature	Acurite	Min/Max	The thermometers are purchased yearly with NIST certificates. They are replaced yearly.

Please have calibration/certification records for all laboratory standards available for review during the on-site TSA.

Note: Sartorius was certified 7/18/18 and ATI Cahn 10/2/18

016- 2017 Primary (reference) Thermometer Hg Miller&Weber SN 3P5742
2016-2017 Primary (reference) Hygrometer SN51243096

November 2017 verification of RH/Temp automated.
New Reference standard Hygrometer and Temperature Rotronic 2HC2-S3 HygroClip SN20072325

2015 Primary Standards; SN65836-200mg and SN75011-450mg
2016 Primary Standards; SN1376 – 200mg and SN 1379-450mg
Primary Standard SN1376 was scratched and replaced Aug2016 SN6621-200mg
Primary Standard 450mg replaced Nov2016 SN6579-450mg
2017 Primary Standards; SN6621-200mg and SN6579-450mg
June2017 Primary Standards; SN6728-200mg and SN3290-450mg
November 2017 switched to 500mg
Primary Standards; SN3442-200mg and SN4459-500mg
May 2018 Primary Standards; SN1000105800-200mg and SN3443-500mg
2019 Primary Standards; will be changed within the next week.

(Weight Standard information provided by IML in January 2019)

b.2 Laboratory Temperature and RH

Complete the following table.

Question	Yes	No	Comment
What is the accuracy specification and recording time (e.g., 5 min. averaging time) of the temperature sensor (logger) used in the gravimetric laboratory?			Every time a filter is weighed, the previous 86,400 seconds of relative humidity and temperature data are averaged and recorded as the equilibration conditions for that mass determination. During gross mass determination, equilibration conditions are automatically compared to the tare equilibration conditions to ensure that conditions from tare to gross do not differ by more than 5% relative humidity and 2 degrees Celsius. If these conditions are not met, the balance control software prevents further weighing until the room is in compliance for at least 24 hours.
What is the accuracy specification and recording time (e.g., 5 min. averaging time) of the relative humidity (RH) sensor (logger) used in the gravimetric laboratory?			Same as for temperature.
What is the accuracy specification for any RH/temperature audit device used in the laboratory, if applicable?			See above
Does the laboratory utilize an infrared (IR) gun to obtain sample shipment temperatures?	☒	☐	Click or tap here to enter text.
• If yes, is the IR gun NIST-traceable? Provide the certification expiration date.	☒	☐	Click or tap here to enter text.
• If no, what device is used to obtain shipment temperature? Please describe its traceability and provide a certification expiration date.			IML provides a NIST traceable minimum/maximum thermometer for transport. They purchase new ones every year and take the expired ones out of service. We use an additional portable minute logger to log the entire trip, and we check the logger against a NIST traceable thermometer quarterly.

c. Laboratory Preventive Maintenance

Complete the following table.

Question	Yes	No	Comment
For laboratory equipment, who has the responsibility for performing preventive maintenance?			The Lab Manager is ultimately responsible

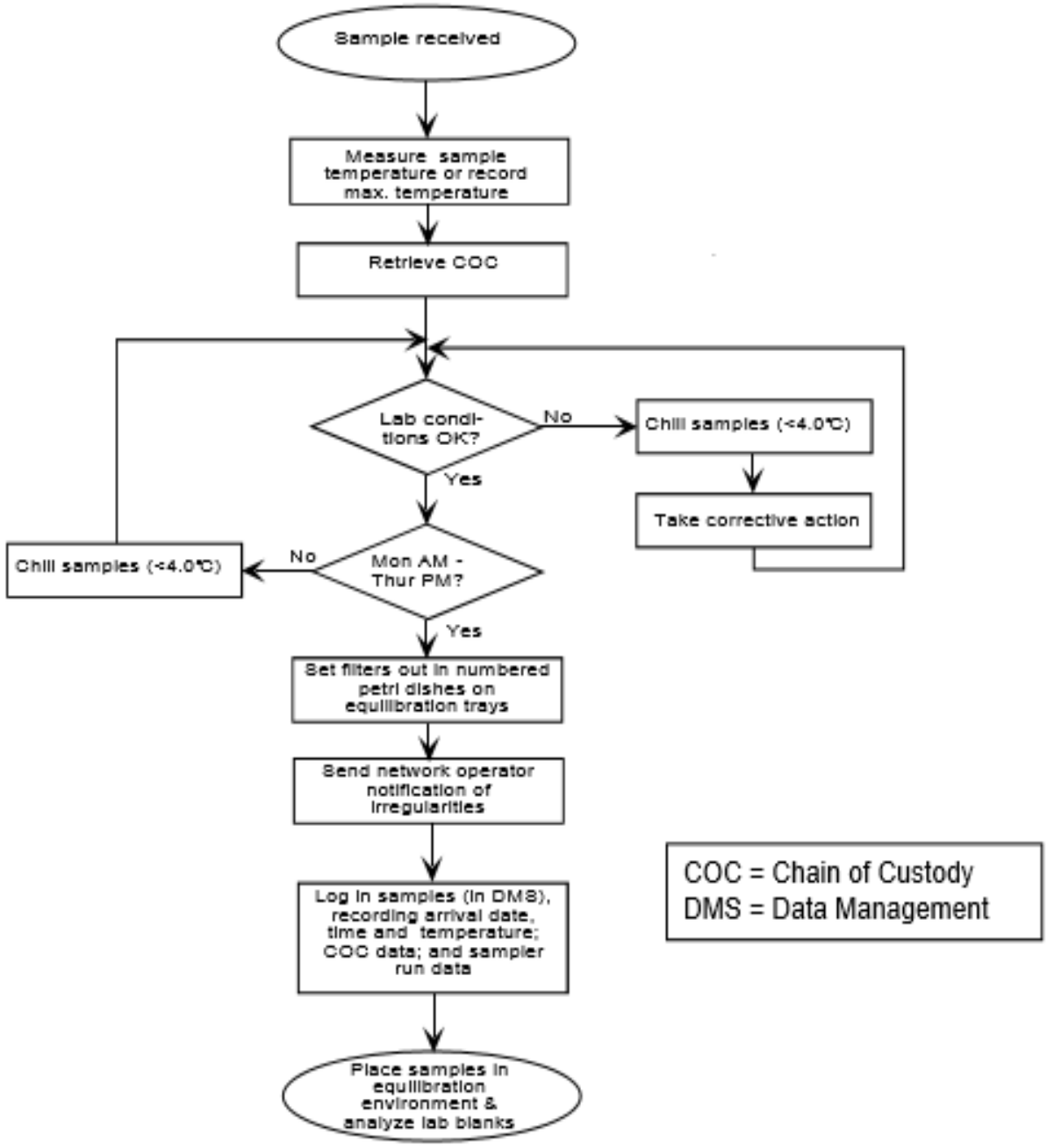
If equipment maintenance is performed by laboratory staff, does a SOP detail the procedures to be followed? Provide the SOP title, date, and revision number where the procedures are found.	☒	☐	SOP for Cleaning and Maintenance of Micrograviметric Laboratory SOP ML-AppL0304-2 January 2017
Is a maintenance log maintained for the balance?	☒	☐	Click or tap here to enter text.
Are service contracts in place for the balance?	☒	☐	Click or tap here to enter text.
If utilizing a weighing room, are service contracts in place for the climate control unit/HVAC?	☐	☒	IML's own employees service the climate control unit/HVAC
Describe static control equipment utilized in the weighing room, if applicable.			Lab designed for static reduction; earth ground with copper rod driven through floor; antistatic mats on top of microbalance table and on floor below table; samples placed on polonium strips before weighing; weighing chamber of microbalance is coated with a static neutralizing substance.
Does the weighing room undergo routine cleaning activities? On what frequency?	☒	☐	Daily, Weekly, and Quarterly **Daily:** brush out weighing chamber, wipe all mats with lint-free cloth and sprayed with antistatic cleaner, clean and dry forceps with alcohol; Record cleaning activities **Weekly:** Cap filters prior to cleaning, wipe all surfaces with lint free cloth and antistatic cleaning solution, wipe down trays the same way, dust mop if needed, then mop with lint free and antistatic solution; Wash cassettes; Peel top layer of tacky material from the floor mat; Record cleaning activities **Quarterly:** Check High efficiency filter and replace if needed; Clean dehumidifier and filter on back and replace filter if needed; Clean air conditioner and filter, replace filter if needed; Clean humidifier; Clean shelves and floor in the archive fridges with lint free cloths and antistatic solution; Make sure grounding wires are connected; Record cleaning activities
Briefly describe the weighing room cleaning regime.			See above

d. Laboratory Record Keeping

Complete the following table.

Question	Yes	No	Comment
Are all samples that are received by the laboratory logged in?	☒	☐	Click or tap here to enter text.
Discuss sample routing (or reference the latest SOP which covers this). Attach a flow chart on the next page, if possible.			Click or tap here to enter text.
For the following four questions, select the medium used to document various activities enlisted. If the medium is not listed, select "Other" and list the medium. If the information is not recorded, select "N/A".			
• Environmental conditions, weighing session results, balance checks, and weight checks?			Excel Spreadsheet
• Serial numbers of filters prepared for the field?			Excel Spreadsheet & Field Data Sheets
• Serial numbers of filters returning from the field for analysis?			Field Data Sheets, Excel Spreadsheet
• General information about daily lab activities, preventive maintenance procedures, and/or other significant events in the laboratory that may impact data quality or the data record?			Choose an item.
How are data records from the laboratory archived?			Click or tap here to enter text.
• Where are these records archived?			Click or tap here to enter text.
• Who has this responsibility? (identify person/position)			Click or tap here to enter text.
How long are these records kept? Indicate the number of months/years.			Click or tap here to enter text.
Does the laboratory SOP contain procedures for sample chain-of-custody (COC)?	☒	☐	Lab QAPP has it and a copy of the form
• If yes, indicate the title, date, and revision number, and where it can be found.			Lab QAPP Rev 14 7.1.4 Page 19, Form is in Appendix A
What type of COC record accompanies the samples?			Multicopy. Original goes to IML, copy is retained at the Bureau
Does the laboratory maintain original COCs or copies?	☒	☐	Original is sent to IML
Where are COCs filed?			Notebook in lab where COC, Fed Ex receipt, and any other paperwork are filed by date shipped.

If possible, attach a sample routing flow chart:



See Pre-Exposure and Post-Exposure flow charts that follow on pages 47 and 48.

e. Laboratory Data Acquisition and Handling

Complete the following table.

Question	Yes	No	Comment
Identify those laboratory instruments (e.g., balances, temperature/RH loggers, etc.) which make use of computer interfaces directly to record data.			Laboratory balance and Temperature/RH logger interface directly to computer to database.
Are QC data results readily available to the analyst during a weigh session?	☐	☐	The QC data results are readily available to the analyst during weigh sessions (on the computer screen)
Do RH/temperature loggers record values using paper chart records (chart wheels)? If yes, where are the paper charts maintained? Are they signed and dated?	☐	☐	RH/temperature loggers do not use paper chart records, interface directly with database
What is the laboratory's capability with regards to data recovery? In case of problems, can the laboratory recapture data that may be lost in the event of computer failure? Discuss briefly.			Servers are set to automatically create snapshots. Snapshots are saved every hour for 7 days, daily snapshots are retained for 14 days, then weekly shots are retained for 5 weeks, then monthly for 12 months. The procedure is detailed in the IML QAPP Rev. 14 Appendix B and the SOP ML-AppL0314-2.0
Does the laboratory maintain an SOP that discusses how to use the laboratory's data acquisition instrumentation? If yes, please provide the SOP title, date, and revision number.	☒	☐	Information about the data acquisition instrumentation is within each SOP in the section on procedure. An example: SOP-ML AppL 0306-2.0 January 2017

Please attach a flow chart/diagram which illustrates the transcriptions, verifications, validations, and reporting processes the data goes through before being released by the laboratory.

Figure 11.3-1 Pre-Exposure Analysis Flow Diagram

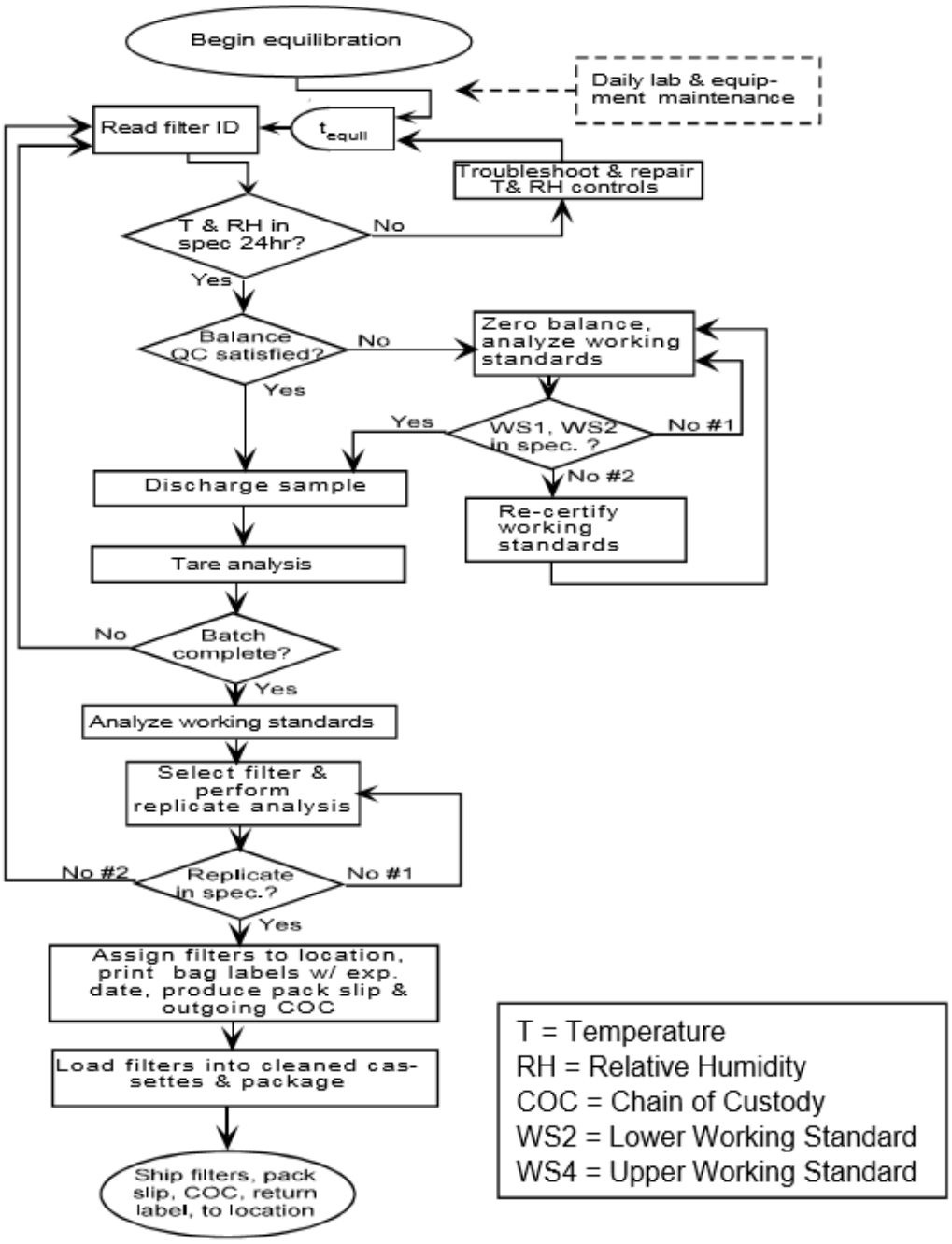
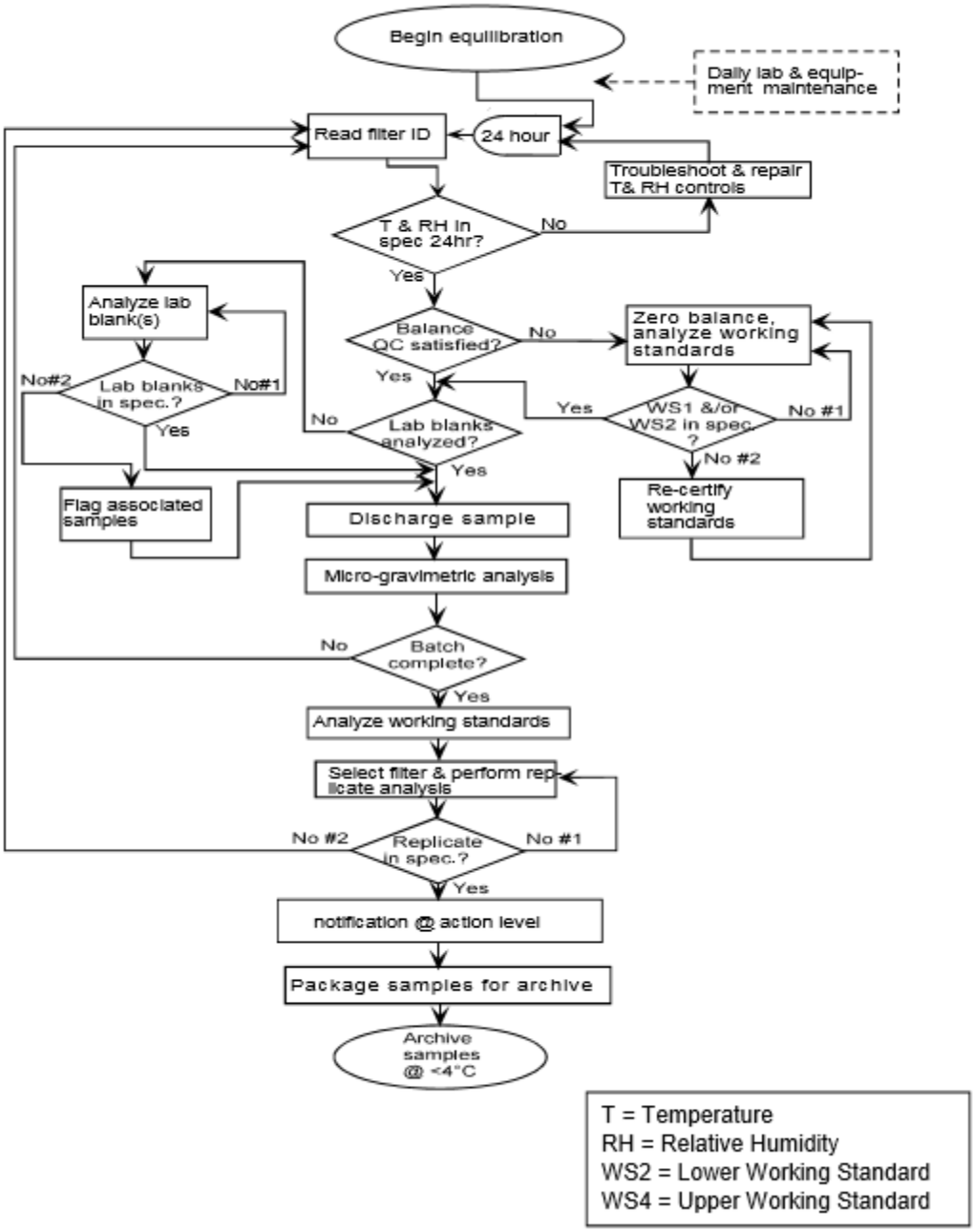


Figure 11.3-3 Post-Exposure Analysis Flow Diagram



f. Filter Questions

Complete the following table.

Question	Yes	No	Comment
Does the agency use filters supplied by EPA?	☒	☐	EPA ships filters to the Bureau and the Bureau ships to IML. About a 6-month's supply is sent at a time.
• If no, do the filters utilized meet the specifications in 40 CFR Part 50? Who is the vendor? Be prepared to provide documentation to demonstrate acceptance testing results.	☐	☐	Click or tap here to enter text.
Are unexposed filters equilibrated in a controlled conditioning environment which meets or exceeds the requirements of 40 CFR Part 50? Describe the conditioning room/chamber.	☒	☐	Unexposed filters are placed in petri dishes (top removed and placed under the dish) and equilibrated from Friday afternoon until Monday morning in a tray in the lab. Lab has HEPA filtered air and is under slight positive pressure. The door has a sticky mat to pick up tracked-in particles. There is an aggressive cleaning schedule.
How long is the conditioning period?			For a new filter: from Friday afternoon until Monday morning For an exposed filter: 24 hours
Briefly describe how exposed filters are prepared for conditioning.			Upon arrival cassettes are immediately removed from their shipping petri dish, filters are removed from the cassette, and placed in the lab petri dish for equilibration. The lab petri dishes are placed sequentially in trays with each petri lid under the dish. They typically are not set in the trays to equilibrate until Friday after lab cleaning is done. They equilibrate all weekend. They are archived at 4 degrees C or below after receipt until they are equilibrated if not equilibrated immediately.
Briefly describe how and where exposed filters are stored after being weighed.			They are archived for a year in a cooler at 4 degrees C or below. Then they are shipped to the customer.
On what frequency are lab blanks utilized?			10% per client
Are chemical analyses performed on filters? If yes, which? Where are these additional analyses performed?	☐	☒	Click or tap here to enter text.

g. Metals & Other Analyses

If your laboratory completes lead (Pb) and/or other metals analyses, please complete the tables in this section.

g.1 Laboratory QA/QC

Question	Yes	No	Comment
Are at least one duplicate, one blank, and one standard or spike included with a given analytical batch?	☐	☐	NA –I am making the assumption that you are referring to wet chemistry here.
Briefly describe the laboratory's use of data derived from blank analyses.			NA
Are criteria established to determine whether blank data are acceptable?	☐	☐	NA
How frequently and at what concentration ranges does the lab perform duplicate analyses? What constitutes an acceptable agreement?			NA
Please describe how the lab uses data obtained from spiked samples, including the acceptance criteria (e.g., acceptable percent recovery).			NA
Does the laboratory include samples of reference material within an analytical batch? If yes, indicate the frequency, level, and material used.	☐	☐	NA
Are mid-range standards included in analytical batches? If yes, describe the frequency, level, and compound.	☐	☐	NA
Are criteria for real-time QC established that are based on the results obtained for the mid-range standards discussed above? If yes, briefly discuss them below or indicate the document in which they can be found.	☐	☐	NA
Are appropriate acceptance criteria for each type of analysis documented?	☐	☐	NA

g.2 Chemicals

Question	Yes	No	Comment
Are all chemicals and solutions clearly marked with an indication of shelf life?	☐	☐	NA
Are chemicals removed and properly disposed of when the shelf life expires?	☐	☐	NA
Does the laboratory purchase standard solutions, such as those for use with Pb or other metals analyses?	☐	☐	NA
Are only ACS grade chemicals used by the laboratory?	☐	☐	NA
Comment on the traceability of chemicals used in the preparation of calibration standards.			NA

g.3 Pb

Question	Response	Comments
Is Pb analysis performed by a contract laboratory? If yes, provide the laboratory name in the comment section.	Choose an item.	NA
What filter media is used for Pb analysis?	Choose an item.	NA
Are filter samples visually inspected for defects (e.g., pinholes, tears and non-uniform deposit)?	Choose an item.	NA
Are filters invalidated if defects are found? If no, why not?	Choose an item.	NA
Are tweezers used to handle filters? If yes, what material are the tweezers made of (e.g., Teflon, plastic, metal, etc.)?	Choose an item.	NA
What extraction method is used for filters?	Choose an item.	NA
What reagents are used to clean glassware?		NA
List standards used for analysis.		NA
Are filter lot blanks analyzed for Pb content at a rate of 20 to 30 random filters per batch of 500 or greater? ***Only for filters not provided by EPA.***	Choose an item.	NA
How often are MDLs determined?		NA
How many replicates are used for MDLs?		NA
Are MDLs calculated in accordance with 40 CFR Part 136, Appendix B? If not, why not?	Choose an item.	NA
Are waste HNO_3, HCL, and solutions containing these reagents and/or Pb placed in labeled bottles and delivered to a commercial firm that specializes in removal of hazardous waste?	Choose an item.	NA

6. Data & Data Management

This section of the questionnaire completed by: Kathy Jones

Key Individual(s):

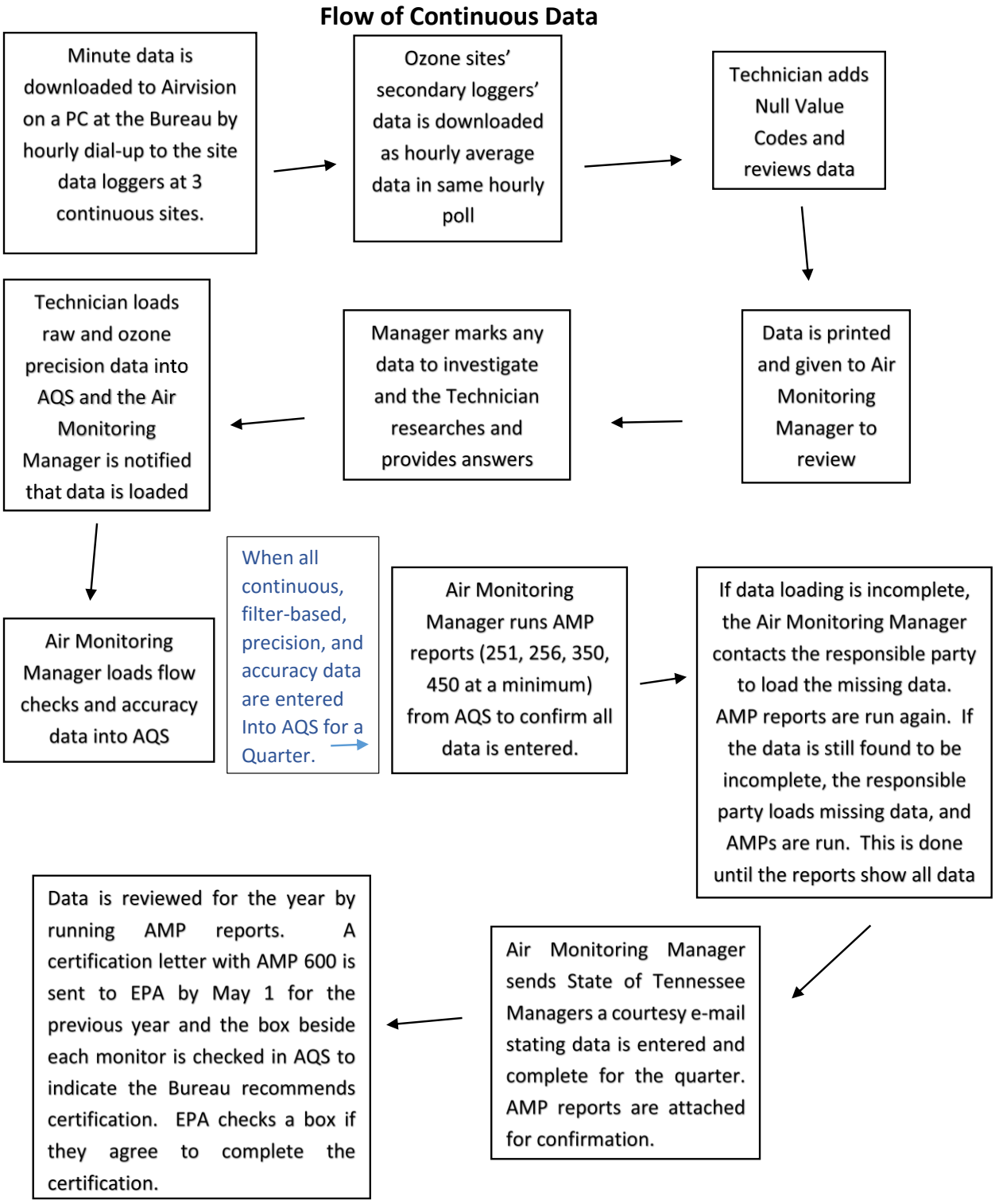
Title/Position	Name
Air Monitoring Manager	Kathy Jones

a. Data Handling

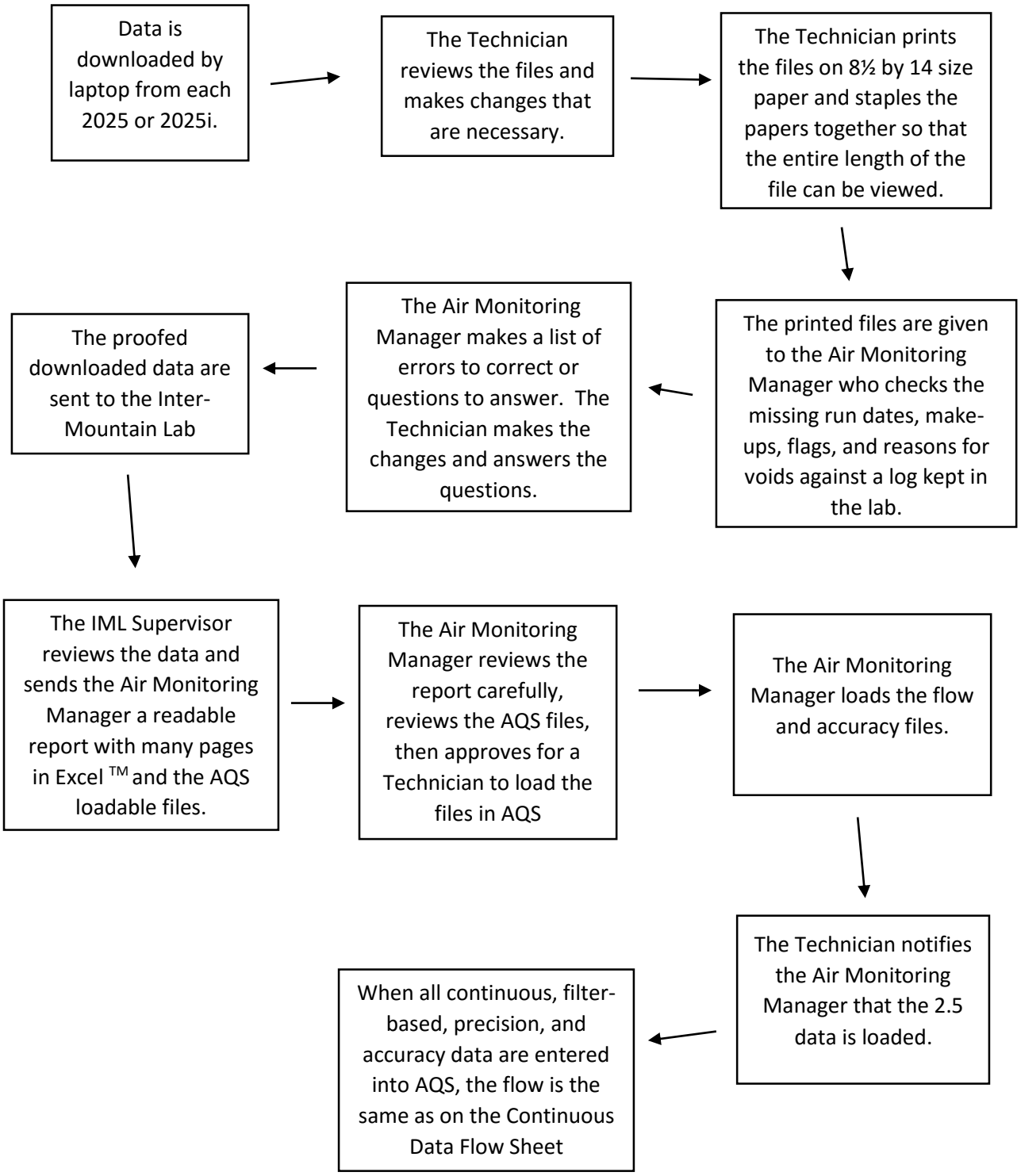
Complete the following table.

Question	Yes	No	Comment
Is there a procedure, description, or a chart which shows a complete data sequence from point of acquisition to point of submission of data to EPA?	☒	☐	EPA approved a Data Handling SOP. Data Handling at IML is covered by their QAPP March 2017
Are procedures for data handling (e.g., data reduction, review, etc.) documented? If yes, comment on where.	☒	☐	EPA approved Data Handling SOP
In what media (e.g., flash drive, telemetry, wireless, etc.) and formats do data arrive at the data processing location?			Both telemetry and emailed report from Inter-Mountain Laboratory
How often are data received at the processing location from the field sites and laboratory?			Hourly for continuous data received by telemetry, quarterly for filter based
Are there any activities being done before data is released to agency internal data processing?	☐	☒	No. It is a very small agency.
How are data entered into the computer system? (e.g., computerized transcription, manual entry, digitization of strip charts, or other)?			Telemetry downloads data hourly into Airvision. Technician must manually add Null Value Codes for voids.
For manual data, is a double-key entry system used?	☐	☒	Very little manual data entry is done.

Please provide a data flow diagram indicating the data flow within the reporting organization.



Flow of Filter-based FRM Data



b. Software Documentation

Complete the following table.

Question	Yes	No	Comment
Does your agency use an AQS Manual? If yes, list the title of the manual used including the version number and date published.	☐	☒	The entire department is trained. If use is required the latest manual posted online at www.epa.gov/aqs (at AMTIC) is used
Does your agency use an AirNow Manual? If yes, list the title of the manual used including the version number and date published.	☐	☒	The connection to AirNow is set up and working properly.
Does the agency have information on the reporting of precision and accuracy data available?	☒	☐	Accuracy data is in the bound log and electronic Messages or Log on the loggers. A precision/span data report is generated automatically by Airvision every time a precision or span is run. Paper copies are kept. That information can be retrieved from Airvision if no paper record exists. Graphs can be run of the audit.
What software is used to prepare air monitoring data for release into the AQS and AirNow databases? Include the names of the software packages, vendor or author, revision numbers, and the revision dates of the software.			We are using Airvision and AV Trends, Both revision 3.6.119
What is the recovery capability in the event of a significant computer problem (i.e., how much time and data would be lost)?			We believe we would lose no data on the continuous ozone monitors except for a power failure. The 49I series monitors have internal loggers, we are using external loggers, we are putting the data on PCs at the ozone sites using AV Trends, we are using a second logger at each ozone site that is independently connected to the monitoring instrument, we have a UPS at each site for each logger, our office server is being backed up every two weeks. The only way we would lose significant data would be a power failure that lasted days. We watch the status updates that show red if the ozone loggers are not being polled properly. Except for weekends and holidays, we should catch a major power failure fairly fast. We could lose data on our continuous $PM_{2.5}$ monitor. At the present we are operating collocated FRMs at the same site as the continuous $PM_{2.5}$ instrument. POC 2 data can be used if the primary FRM monitor fails. Again, the

			main problem would be a lengthy power failure.
Has your agency tested the data processing software to ensure its performance of the intended function are consistent with the *QA Handbook Volume II, Section 14.0*?	☒	☐	Click or tap here to enter text.
Does your agency document software tests? **If yes, provide the documentation.**	☐	☒	Click or tap here to enter text.

c. Data Validation and Correction

Complete the following table.

Question	Yes	No	Comment
Is there documentation in regards to data that has been identified as suspect and subsequently flagged?	☒	☐	Yes. For Exceptional Events data are flagged in AQS and an explanation is provided. There is a log in the lab for PM2.5 samples where notes are to be made in the log. If data are seriously suspect, it is either not loaded in AQS or removed from AQS rather than be flagged in AQS.
Please describe what action the data validator will take (e.g., flags, invalidate, etc.) if they find data with exceeded QC criteria.			Each incident of exceeded criteria is investigated on a case by case basis. Data is scrutinized and a decision is made whether to flag the data or void it.
Please describe how changes made to data that were submitted to AQS and AirNow are documented.			Changes made to data in AQS are usually voiding data and removing data that was entered. If the data is voided, a Null code is placed in the location where the data was in the AQS file. There is a log in the lab where voids for PM2.5 are to be notated and the reason for the void.
Who has signature authority for approving corrections?			**Name:** Kathy Jones **Program Function:** Air Monitoring Manager
What criteria are used to determine a data point be deleted or invalidated?			Critical Criteria Tables. Data is not automatically invalidated if the data does not meet critical criteria tables. Data is scrutinized and a decision is made.
What criteria are used to determine if data need to be reprocessed?			Not sure of the circumstances that would require data reprocessing. Since data is downloaded hourly to Airvision and data is provided from IML for filter-based, there is not a need for reprocessing.
Are corrected data resubmitted to the issuing group/record generator for cross-checking prior to release?	☐	☒	Any incorrect data that is entered into AQS is removed by the Air Monitoring Manager and shown as voided or are reloaded as the correct data. Small agencies do not have a QA department or an issuing group. AMP reports are run from AQS and the reports are scrutinized before the state is notified that the data is entered. The reports are run again and scrutinized before certification.

d. Data Processing

d.1 Reports

Complete the following table.

Question	Yes	No	Comment
Does the agency generate data summary reports?	☒	☐	The agency uses the AQS AMP reports for data summaries.
Please list at least three reports routinely generated, including the information requested below.			
Report Title	**Distribution**		**Period Covered**
AMP350 from AQS	Air Monitoring Manager; Director looks at yearly; Technician may be shown report		Quarterly and Yearly
AMP450 from AQS	Air Monitoring Manager; Director looks at yearly; Technician may be shown report		Quarterly and Yearly
AMP251 from AQS	Air Monitoring Manager; Director looks at yearly; Technician may be shown report		Quarterly and Yearly
AMP600 from AQS	Air Monitoring Manager; Director looks at yearly; EPA Technician may be shown report		Quarterly and Yearly
Reports generated from continuous data from Airvision	Technician and Air Monitoring Manager		Quarterly reviewed before loading into AQS

d.2 Data Submission

Complete the following table.

Question	Yes	No	Comment
How often are data submitted to AQS?			Quarterly
How often are data submitted to AirNow?			Hourly
Briefly comment on difficulties the agency may have encountered in coding and submitting data following the AQS guidelines.			AQS is always submitted on time and an attempt is made to code properly. No difficulties. All Air Monitoring employees are trained in AQS.
Does the agency retain a hard copy printout or an electronic copy of submitted data from AQS?	☒	☐	Electronic copies of files are retained.
Are records kept by the agency for at least three years in an orderly, accessible form? If yes, does this include:	☒	☐	Click or tap here to enter text.
• Raw data	☒	☐	Click or tap here to enter text.
• Calculations	☒	☐	AMP calculations are checked approximately yearly to make sure they are correct. Design values are checked on the design value report to make sure they are accurate. Design values are checked before designations to make sure AQS and the state have calculated them correctly.
• QC data	☒	☐	Click or tap here to enter text.
• Reports: list which reports are used	☒	☐	AQS AMP reports do not have to be kept outside of AQS since they can be run "at will".
Has your agency submitted data (along with the appropriate calibration equations used) to the processing center?	☐	☒	The Bureau does not have a processing center nor does CHC submit equations to AQS .
Are concentrations of PM_{10} corrected to EPA standard temperature and pressure conditions (i.e., 298 K, 760 mm Hg) before input to AQS?	☐	☒	NA- We are collecting PM10 data at local conditions from our T640 (regular model)
Are concentrations of $PM_{2.5}$ and Pb reported to AQS under actual (volumetric) conditions?	☒	☐	PM2.5 data both from the continuous T640 and the filter based FRMs are collected at local conditions. NA for Lead
Are audits on data reduction procedures performed on a routine basis? If yes, at what frequency?	☒	☐	Data is reviewed multiple times quarterly, then again at certification time. Every quarter some of the filter based weigh data is multiplied to confirm that IML is still multiplying correctly in their spreadsheet. Airvision is not calculation-compared on a routine basis. We will begin checking it after software updates.

			There is not an independent audit of data reduction activities.
Are precision and accuracy data checked each time they are calculated, recorded, or transcribed to ensure that incorrect values are not submitted to EPA?	☒	☐	Precision and accuracy data are inspected quarterly and yearly during the certification procedures. The data are checked multiple times before submittal to AQS.

e. Internal Reporting

e.1 Reports

What internal reports are prepared and submitted as a result of the audits required under 40 CFR Part 58, Appendix A?

Report Title	Frequency
State Audit	Sent to the Director quarterly from state auditor
Contractor Audit	Air Monitoring Manager & Director

What internal reports are prepared and submitted as a result of the precision checks required under 40 CFR Part 58, Appendix A?

Report Title	Frequency
Electronic Precision Check Report and Electronic Scan Report	Precision Checks and Span Checks are generaled automatically and sent to the Air Monitoring Manager the morning after they are electronically completed. The Manager runs and reviews AMP reports quarterly that list all the precision checks. The precision checks are also reviewed yearly at certification time.

Question	Yes	No	Comment
Do either the audit or precision check reports indicated include a discussion of corrective actions initiated based on audit or precision check results?	☐	☒	If the precision check is high or low by 3 ppb, action is taken. If audit levels are more than 7%, actions will be taken immediately and the audit will be rerun to make sure the action was effective. The precision reports are autogenerated so they have no discussions.

e.2 Responsibilities

Who has the responsibility for the calculation and preparation of data summaries? To whom are such summaries delivered?

Name	Title	Type of Report	Recipient
Kathy Jones	**Air Monitoring Manager**	**AMP Reports**	**Director**

Identify the individuals within the agency responsible for reviewing and releasing the data.

Name	Program Function
Jim Long, Steve Langston	Technicians (first reviewers)
Kathy Jones	Air Monitoring Manager

Question	Yes	No	Comment
Does your agency report to the Air Quality Index (AQI)?	☒	☐	Click or tap here to enter text.
Is data certification signed by a senior officer of your agency?	☒	☐	Signed by the Director