|  |
| --- |
| Appendix A |
| Technical Systems Audit |
| Pre-Audit Questionnaire |

Contents

1. [General 4](#_bookmark0)
   1. [Program Organization 5](#_bookmark1)
      1. [Organizational Chart 5](#_bookmark2)
      2. [Key Position Staffing 6](#_bookmark3)
   2. [Facilities 7](#_bookmark4)
   3. [General Documentation Policies 8](#_bookmark5)
   4. [Training 9](#_bookmark6)
      1. [Training Plan 9](#_bookmark7)
      2. [Training Events 9](#_bookmark8)
   5. [Oversight of Contractors and Supplies 10](#_bookmark9)
      1. [Contractors 10](#_bookmark10)
      2. [Supplies 10](#_bookmark11)
2. [Quality Management 11](#_bookmark12)
   1. [Status of Quality Assurance Program 11](#_bookmark13)
      1. [QA Activities 11](#_bookmark14)
      2. [QC Acceptance Criteria 12](#_bookmark15)
   2. [Internal Performance Evaluation (PE) Audits 13](#_bookmark17)
      1. [Internal Audit Questions 13](#_bookmark18)
      2. [Internal Audit Procedures 13](#_bookmark19)
      3. [Certification of Audit Standards 13](#_bookmark20)
      4. [Audit Equipment 14](#_bookmark21)
      5. [Audit Acceptance Criteria 14](#_bookmark22)
   3. [Planning Documents Including QMP, QAPP, & SOP 15](#_bookmark23)
      1. [QMP Questions 15](#_bookmark24)
      2. [QAPP Questions 15](#_bookmark25)
      3. [SOP Questions 16](#_bookmark26)
   4. [Corrective Action 17](#_bookmark27)
   5. [Quality Improvement 17](#_bookmark28)
   6. [External Performance Audits 18](#_bookmark29)
3. [Network Management 19](#_bookmark30)
   1. [Network Design 19](#_bookmark31)
   2. [Siting 19](#_bookmark32)
      1. [Site Evaluations 19](#_bookmark33)
      2. [Site Non-Conformance 20](#_bookmark34)
   3. [Waivers 20](#_bookmark35)
      1. [Waiver Questions 20](#_bookmark36)
      2. [Waiver Types 20](#_bookmark37)
   4. [Documentation 21](#_bookmark38)
4. [Field Operations 22](#_bookmark39)
   1. [Field Support 22](#_bookmark40)
   2. [Instrument Acceptance 23](#_bookmark41)
      1. [Instrumentation 23](#_bookmark42)
      2. [Instrument Needs 23](#_bookmark43)
   3. [Calibration 23](#_bookmark44)
      1. [Calibration Frequency and Methods 23](#_bookmark45)
      2. [Calibration Questions 24](#_bookmark46)
   4. [Certification 24](#_bookmark47)
      1. [Flow Devices 24](#_bookmark48)
      2. [Certification Questions 25](#_bookmark49)
      3. [Ozone Traceability Diagram 26](#_bookmark50)

[d.3 Calibrator Certification 27](#_bookmark51)

* 1. [Repair 28](#_bookmark52)
  2. [Record Keeping 29](#_bookmark53)

1. [Laboratory Operations 30](#_bookmark54)
   1. [Routine Operation 30](#_bookmark55)
      1. [Methods 30](#_bookmark56)
      2. [Quality System 31](#_bookmark57)
   2. [Laboratory Quality Control 32](#_bookmark58)
      1. [Standards 32](#_bookmark59)
      2. [Laboratory Temperature and Relative Humidity 32](#_bookmark60)
   3. [Laboratory Preventive Maintenance 33](#_bookmark61)
   4. [Laboratory Record Keeping 34](#_bookmark62)
   5. [Laboratory Data Acquisition and Handling 36](#_bookmark63)
   6. [Filter Questions 38](#_bookmark64)
2. [Metals & Other Analyses 39](#_bookmark65)
   1. [Laboratory QA/QC 39](#_bookmark66)
   2. [Chemicals 40](#_bookmark67)
   3. [Pb 41](#_bookmark68)
3. [Data & Data Management 42](#_bookmark69)
   1. [Data Handling 42](#_bookmark70)
   2. [Software Documentation 44](#_bookmark71)
   3. [Data Validation and Correction 45](#_bookmark72)
   4. [Data Processing 45](#_bookmark73)
      1. [Reports 45](#_bookmark74)
      2. [Data Submission 46](#_bookmark75)
   5. [Internal Reporting 47](#_bookmark76)
      1. [Reports 47](#_bookmark77)
      2. [Responsibilities 47](#_bookmark78)

#### General

Monitoring Organization/Agency/PQAO Audited

**Address:**

Street

City, State, Zip Code

**Date of Technical Systems Audit:** Click or tap to enter a date.

**This section of the questionnaire completed by:** Click or tap here to enter name.

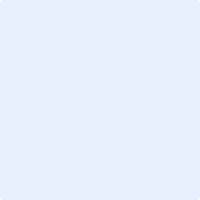
**Key Individuals (e.g., Agency Director, Ambient Air Monitoring Network Manager, QA Manager, etc.):**

|  |  |
| --- | --- |
| **Title/Position** | **Name** |
| Click or tap here to enter text. | Click or tap here to enter text. |

###### Program Organization

* 1. Organizational Chart

Upload an organizational chart, or attach to the form:



* 1. Key Position Staffing

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Program Area** | **Number of People (Primary)** | **Number of People (Backup)** | **Vacancies** |
| Network Management (site setup,  siting, ANP, etc.) | Click or tap here to  enter text. | Click or tap here to  enter text. | Click or tap here to  enter text. |
| Field Operation (QC checks, site visits, site maintenance, etc.) | Click or tap here to enter text. | Click or tap here to enter text. | Click or tap here to enter text. |
| Quality management (audits, QA documentation, certifications etc.) | Click or tap here to enter text. | Click or tap here to enter text. | Click or tap here to enter text. |
| Data and Data Management (data review, validation and acquisition system, AQS, etc.) | Click or tap here to enter text. | Click or tap here to enter text. | Click or tap here to enter text. |
| Technical support (equipment repair  and maintenance) | Click or tap here to  enter text. | Click or tap here to  enter text. | Click or tap here to  enter text. |

Comment on the need for additional personnel, if applicable.

Click or tap here to enter text.

###### 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 | Click or tap here to enter text. | Click or tap here to enter text. |
| Certification of Standards (e.g. gases, flow transfers, MFCs) | Click or tap here to enter text. | Click or tap here to enter text. |
| PM filter weighing | Click or tap here to enter text. | Click or tap here to enter text. |
| Pb analysis | Click or tap here to enter text. | Click or tap here to enter text. |
| Data verification and processing | Click or tap here to enter text. | Click or tap here to enter text. |
| General office space | Click or tap here to enter text. | Click or tap here to enter text. |
| General lab/work space | Click or tap here to enter text. | Click or tap here to enter text. |
| Storage space, short and long term | Click or tap here to enter text. | Click or tap here to enter text. |
| Air Toxics | Click or tap here to enter text. | 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, etc.)

Click or tap here to enter text.

###### General Documentation Policies

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| Does the agency have a documented records management plan? | ☐ | ☐ | Click or tap here to enter text. |
| * If yes, does this include electronic records? | ☐ | ☐ | Click or tap here to enter  text. |
| Does the agency have a method to track files considered official records and their media type (i.e. paper, electronic)? | ☐ | ☐ | Click or tap here to enter text. |
| Does the agency have a schedule for retention and disposition of records? | ☐ | ☐ | Click or tap here to enter text. |
| Are records kept for at least three years? | ☐ | ☐ | Click or tap here to enter  text. |
| Who is responsible for the storage and retrieval of records? | | | Click or tap here to enter text. |
| What security measures are utilized to protect records? | | | Click or tap here to enter text. |
| Where/when does the agency rely on electronic files as primary records? | | | Click or tap here to enter text. |
| What is the system for storage, retrieval and backup of the electronic files? | | | Click or tap here to enter text. |

###### Training

* + 1. Training Plan

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| Does the agency have a training plan? | ☐ | ☐ | Click or tap here to enter  text. |
| Where is it documented? | | | Click or tap here to enter  text. |
| Does it make use of seminars, courses, EPA- sponsored college level courses, etc.? | ☐ | ☐ | Click or tap here to enter text. |
| Are personnel cross-trained for other ambient air monitoring duties? | ☐ | ☐ | Click or tap here to enter text. |
| Are training funds specifically designated in the annual budget? | ☐ | ☐ | Click or tap here to enter text. |
| Does the training plan include: | **Yes** | **No** | **Comment** |
| Training requirements by position? | ☐ | ☐ | Click or tap here to enter  text. |
| Frequency of training? | ☐ | ☐ | Click or tap here to enter  text. |
| Training for contract personnel? | ☐ | ☐ | Click or tap here to enter  text. |
| A list of core QA-related courses? | ☐ | ☐ | Click or tap here to enter  text. |

* + 1. Training Events

Indicate below the most training events since the last TSA and identify the personnel who participated in them.

|  |  |  |
| --- | --- | --- |
| **Event** | **Dates** | **Participant(s)** |
| Click or tap here to enter text. | Click or tap to  enter a date. | Click or tap here to enter  text. |

###### Oversight of Contractors and Supplies

* + 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? | ☐ | ☐ | Click or tap here to enter text. |
| Are contractors providing a service (e.g., PM2.5 lab)  audited? How often? Who is the contractor? | ☐ | ☐ | Click or tap here to enter  text. |
| What steps are taken to ensure contract personnel meet training and experience criteria? | ☐ | ☐ | Click or tap here to enter text. |
| Are contractor Quality Documents reviewed before  procuring a service? | ☐ | ☐ | Click or tap here to enter  text. |
| How often are contracts reviewed and /or renewed? | ☐ | ☐ | Click or tap here to enter text. |

* + 1. Supplies

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Suppliers** | **Yes** | **No** | **Comment** |
| Have specifications been established for consumable supplies and/or for equipment? | ☐ | ☐ | Click or tap here to enter text. |
| What supplies and equipment have established specifications? | | | Click or tap here to enter text. |
| Is equipment from suppliers open for bid? | ☐ | ☐ | Click or tap here to enter text. |

#### Quality Management

**This section of the questionnaire completed by:** Click or tap here to enter name.

**Key Individuals:**

|  |  |
| --- | --- |
| **Title/Position** | **Name** |
| Click or tap here to enter text. | Click or tap here to enter text. |

###### Status of Quality Assurance Program

* 1. QA Activities

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| Does the agency perform *all* QA activities with internal personnel (i.e., developing QMPs/QAPPs/SOPs and DQOs, performing systems audits, assessments and performance evaluations, corrective actions, validating data, QA reporting, etc.)? If no, in the comment field, indicate who is responsible and which QA  activities are performed. | ☐ | ☐ | Click or tap here to enter text. |
| 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. | | | Click or tap here to enter text. |
| Does the agency perform *all* QC activities with internal personnel (i.e., zero/span/one-point QC checks, calibrations, flowrate, temperature, pressure and humidity checks, certifying/recertifying standards, lab and field blanks, data collection, balance  checks, leak checks, etc.)? | ☐ | ☐ | Click or tap here to enter text. |

* 1. 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? | Choose an item. | Choose an item. | Click or tap here to enter text. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pollutant** | **Does the agency adhere to the critical QC acceptance criteria for criteria pollutants1 and meteorological**  **measurements**[**1**](#_bookmark16)**?** | **QC Acceptance Criteria**  (if other than validation templates1) | **Action or Warning Limits** | **Corrective Action** |
| Choose an item. | Choose an item. | Click or tap here to enter text. | Click or tap here to enter text. | Click or tap here to enter  text. |

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

###### Internal Performance Evaluation (PE) Audits

* 1. Internal Audit Questions

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Response** |
| Does the agency maintain a laboratory to  support quality assurance activities? | ☐ | ☐ | Click or tap here to enter text. |
| Has the agency documented and implemented specific audit SOPs  separate from monitoring SOPs? | ☐ | ☐ | Click or tap here to enter text. |
| Are the QA personnel organizationally independent from the personnel responsible for generating environmental data? (40 CFR Part 58 Appendix A Section 2.2) If no, please explain in the comment  field. | ☐ | ☐ | Click or tap here to enter text. |
| Are annual performance evaluations (audits) conducted by technician(s) other than the routine site operator(s)? (40 CFR Part 58 Appendix A Section 3.1.2) If no,  please explain in the comment field. | ☐ | ☐ | Click or tap here to enter text. |
| Does the agency have identifiable auditing equipment and standards (specifically intended for sole use) for  audits? | ☐ | ☐ | Click or tap here to enter text. |
| 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. | ☐ | ☐ | Click or tap here to enter text. |

* 1. Internal Audit Procedures

If the agency does not have a performance audit SOP (included as an attachment), please describe the performance audit procedure for each type of pollutant.

|  |  |
| --- | --- |
| **Pollutant** | **Performance Audit Procedure** |
| Choose an item. | Click or tap here to enter text. |

* 1. Certification of Audit Standards

Use the table below to provide information on certification of audit standards (ex. Flowmeters, gas standards, etc.) currently being used.

|  |  |  |  |
| --- | --- | --- | --- |
| **Vendor** | **Audit Standard** | **Certification** | **Certification**  **Frequency** |
| Click or tap here to  enter text. | Click or tap here to  enter text. | Choose an item. | Choose an item. |

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| Does the agency have a separate certified  source of zero air for performance audits? | ☐ | ☐ | Click or tap here to enter text. |
| Does the agency have procedures for auditing and/or validating performance of  meteorological monitoring? | ☐ | ☐ | Click or tap here to enter text. |

* 1. Audit Equipment

Use the table provided below to list the agency’s audit equipment and age of audit equipment.

|  |  |  |
| --- | --- | --- |
| **Manufacturer** | **Make and Model Number** | **Purchase Year or Year Acquired** |
| Click or tap here to enter text. | Click or tap here to enter text. | Choose an item. |

* 1. 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.) | Choose an item. | Choose an item. | Click or tap here to enter text. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pollutant** | **Does the agency adhere to the audit acceptance criteria for criteria pollutants and meteorological measurements1?** | **PE Audit Acceptance Criteria (if other than validation templates1)** | **Do the audit levels (gaseous PE audits only) meet 40 CFR Part 58 Appendix A**  **Section 3.1.2.1**  **criteria?** | **Corrective Action** |
| Choose  an item. | Choose an item. | Click or tap here  to enter text. | Choose an item. | Click or tap here  to enter text. |

###### Planning Documents Including QMP, QAPP, & SOP

* 1. QMP Questions

Complete the following table.

|  |  |
| --- | --- |
| **Question** | **Response** |
| Does the agency have an approved quality management plan (QMP)? | Choose an  item. |
| * If yes, who approves the QMP (EPA, self-approval, PQAO, etc.)? | Click or tap here to enter  text. |
| * Is the QMP multi-media, or air-specific? | Choose an  item. |
| * Does the agency have any QMP revisions still pending EPA approval? | Choose an  item. |
| * Has the QMP been approved by EPA within the last 5 years? | Choose an  item. |
| * What is the approval date of the QMP? | Click or tap to enter a  date. |

* 1. QAPP Questions

Complete the following table.

|  |  |
| --- | --- |
| **Question** | **Response** |
| Does the agency have an EPA-approved quality assurance project plan  (QAPP)? | Choose an item. |
| * If no, has the agency been delegated self-approval? | Choose an item. |
| How often does the air monitoring agency review QAPPs? | Click or tap here to enter  text. |
| Does the agency have any QAPP revisions still pending EPA approval? | Choose an item. |
| How does the agency verify that the QAPP is fully implemented? | Click or tap here to enter  text. |
| How are staff notified and trained when a QAPP is revised? | Click or tap here to enter  text. |
| What personnel regularly receive updates? | Click or tap here to enter  text. |
| Does the agency have any missing QAPPs that need to be developed? | Choose an item. |
| * If yes, list any missing QAPPs. | Click or tap here to enter  text. |

List all QAPPs.

|  |  |  |  |
| --- | --- | --- | --- |
| **QAPP Title** | **Approval**  **Date** | **Pollutants** | **Status** |
| Click or tap here to enter text. | Click or tap to enter a date. | Click or tap here to  enter text. | Choose an item. |

* 1. SOP Questions

Complete the following tables.

|  |  |
| --- | --- |
| **Question** | **Response** |
| Are all standard operating procedures (SOPs) complete, or are some in  development? | Choose an item. |
| Are any monitoring SOPs needed? | Choose an item. |
| * 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? | Choose an item. |
| Are SOPs for “episodic monitoring” prepared and available to field  personnel? Refer to QA Handbook Vol. II, Section 6.0. | Choose an item. |
| Are SOPs based on the framework contained in *Guidance for Preparing*  *Standard Operating Procedures (SOPs) (EPA QA/G-6)*? | Choose an item. |
| Does the agency have SOPs specific to data handling and data  validation? | Choose an item. |
| Who approves SOPs? | Click or tap here to enter  text. |
| How often are SOPs reviewed and updated? | Click or tap here to enter  text. |
| How are staff notified and trained when a SOP is revised? | Click or tap here to enter  text. |

List all SOPs.

|  |  |  |  |
| --- | --- | --- | --- |
| **SOP Title** | **Approval**  **Date** | **Pollutants** | **Status** |
| Click or tap here to enter text. | Click or tap to enter a  date. | Click or tap here to  enter text. | Choose an item. |

###### Corrective Action

|  |  |
| --- | --- |
| **Question** | **Response** |
| Does the agency have an operational, documented, and comprehensive  corrective action program in place? | Choose an item. |
| * As a part of the QAPP? | Choose an item. |
| * As a separate, or part of a, SOP? | Choose an item. |
| Does the agency have established and documented corrective action  limits for QA and QC activities? | Choose an item. |
| Are corrective action procedures based on results of the following that  have exceeded established limits? | Click or tap here to enter  text. |
| * 1-Point QC checks | Choose an item. |
| * Calibrations and zero/span checks | Choose an item. |
| * Flow rate verifications | Choose an item. |
| * Performance evaluations (gaseous audits and semi-annual flow rate audits) | Choose an item. |
| * Precision goals (collocated PM2.5 and PM10) | Choose an item. |
| * Bias goals | Choose an item. |
| * NPAP audits | Choose an item. |
| * PEP audits | Choose an item. |
| * Completeness goals | Choose an item. |
| * Data audits | Choose an item. |
| * Technical Systems Audits | Choose an item. |
| How is responsibility for implementing corrective actions assigned? | Click or tap here to enter  text. |
| How does the agency follow up after corrective actions are  implemented? | Click or tap here to enter  text. |
| Briefly describe recent examples of the ways in which the above  corrective action system was employed to remove problems. | Click or tap here to enter  text. |

###### Quality Improvement

|  |  |
| --- | --- |
| **Question** | **Response** |
| What actions were taken to improve the quality system  since the last TSA? | Click or tap here to enter text. |
| Since the last TSA, do your control charts indicate that the overall data quality for each pollutant is steady or  improving? | Click or tap here to enter text. |
| What was the cause when goals for measurement  uncertainty per 40 CFR Part 58 Appendix A were not met? | Click or tap here to enter text. |
| Have all deficiencies indicated on the previous TSA report  been corrected? If no, please list and explain. | Click or tap here to enter text. |
| What are your agency’s plans for quality improvement? | Click or tap here to enter text. |

###### External Performance Audits

|  |  |  |
| --- | --- | --- |
| **Question** | **Response** | **Comment** |
| Does your agency participate in the following external performance audits? If the agency does not  participate, please explain why. | | Click or tap here to enter text. |
| * NPAP | Choose an  item. | Click or tap here to enter text. |
| * PM2.5 | Choose an  item. | Click or tap here to enter text. |
| * PEP | Choose an  item. | Click or tap here to enter text. |
| * Pb-PEP | Choose an  item. | Click or tap here to enter text. |
| * Pb Strip Audit | Choose an  item. | Click or tap here to enter text. |
| * Ambient Air Protocol Gas Verification Program   (AA\_PGVP) | Choose an item. | Click or tap here to enter text. |
| * Round Robin metal PT | Choose an  item. | 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? | | Click or tap here to enter text. |

#### Network Management

**This section of the questionnaire completed by:** Click or tap here to enter name.

**Key Individuals:**

|  |  |
| --- | --- |
| **Title/Position** | **Name** |
| Click or tap here to enter text. | Click or tap here to enter text. |

###### Network Design

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Site Name** | **AQS Site ID #** | **Pollutants 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. |

###### Siting

* 1. Site Evaluations

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| Does the current level of monitoring effort, station placement, instrumentation, etc., meet requirements imposed by current grant conditions? | ☐ | ☐ | Click or tap here to enter text. |
| Are there any issues? | ☐ | ☐ | Click or tap here to enter  text. |
| How often are site evaluations for 40 CFR Part 58 Appendix E criteria conducted? | Frequency: | | Click or tap here to enter  text. |
| Date of last  review: | | Click or tap to enter a date. |

* 1. Site Non-Conformance

Please list any monitors with siting non-conformances, the AQS 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. |

###### Waivers

* 1. Waiver Questions

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| Does your agency have any waivers? | ☐ | ☐ | Click or tap here to enter  text. |
| Does your agency plan to request any waivers?  If yes, identify waivers in the Comment section. | ☐ | ☐ | Click or tap here to enter  text. |
| Has your agency obtained necessary waiver provisions to operate equipment which does not meet the effective reference and equivalency requirements? | ☐ | ☐ | Click or tap here to enter text. |
| Do any sites vary from the required frequency in 40 CFR Part 58.12? | ☐ | ☐ | Click or tap here to enter text. |
| Do any collocated PM2.5 sites exceed the distance requirements in 40 CFR Part 58 Section  3.2.3.4 (c)? Waiver allowances can found in 40 CFR Part 58, Section 3.2.3.4 (c) | ☐ | ☐ | Click or tap here to enter text. |

* 1. Waiver Types

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

|  |  |
| --- | --- |
| **Waiver Type** | **Reason** |
| Choose an item. | Click or tap here to enter text. |

###### 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? | ☐ | ☐ | Click or tap here to enter text. |
| 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? | ☐ | ☐ | Click or tap here to  enter text. |
| Startup and shutdown dates? | ☐ | ☐ | Click or tap here to  enter text. |
| Documentation of instrumentation? | ☐ | ☐ | Click or tap here to  enter text. |
| Who has custody of the current network documents | **Name:** Click or tap here to enter  text. | | Click or tap here to enter text. |
| **Title:**Click or tap here to enter  text. | | Click or tap here to enter text. |

#### Field Operations

**This section of the questionnaire completed by:** Click or tap here to enter name.

**Key Individuals (e.g., Field Manager, Field Supervisor, Field QA Manager, etc.):**

|  |  |
| --- | --- |
| **Title/Position** | **Name** |
| Click or tap here to enter text. | Click or tap here to enter text. |

###### Field Support

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| On average, how often are most of your stations visited  by a field operator? | | | Click or tap here to enter text. |
| Is this visit frequency consistent for all air monitoring data collecting organizations  within your agency? | ☐ | ☐ | Click or tap here to enter text. |
| On average, how many stations does a single operator  have responsibility for? | | | Click or tap here to enter text. |
| How many sites (SLAMS/NCORE/SPM) have sampling  manifold? | | | Click or tap here to enter text. |
| Do the sample inlets and/or manifolds meet the requirements for through-the-  probe audits? | ☐ | ☐ | Click or tap here to enter text. |
| Briefly describe the most common manifold type | | | Click or tap here to enter text. |
| How often are manifolds cleaned? | | | Click or tap here to enter text. |
| Is there a conditioning period for the  manifold cleaning? | ☐ | ☐ | Click or tap here to enter text. |
| Are manifolds equipped with a blower? | ☐ | ☐ | Click or tap here to enter text. |
| Is there sufficient air flow through the  manifold/sampling lines at all times? | ☐ | ☐ | Click or tap here to enter text. |
| How is the air flow through the manifold/sampling line  monitored? | | | Click or tap here to enter text. |
| What is the average residence time? | | | Click or tap here to enter text. |
| How often is the residence time calculated? | | | Click or tap here to enter text. |
| Sampling lines:  1) What material is used for instrument sampling lines? | | | Click or tap here to enter text. |
| 2) How often are sampling lines changed? | | | Click or tap here to enter text. |
| Do you utilize uninterruptable power supplies or backup power sources at your  sites? | ☐ | ☐ | Click or tap here to enter text. |
| What instruments or devices are protected? | | | Click or tap here to enter text. |

###### Instrument Acceptance

* 1. Instrumentation

Please list the instruments in your inventory.

|  |  |  |  |
| --- | --- | --- | --- |
| **Pollutant** | **Number of**  **Instruments** | **Make and Models** | **Reference or**  **Equivalent Number** |
| Choose an item. | Click or tap here to  enter text. | Click or tap here to  enter text. | Click or tap here to  enter text. |

* 1. Instrument Needs

Please list your instrument needs in order of priority.

Click or tap here to enter text.

###### Calibration

* 1. Calibration Frequency and Methods

Please indicate the frequency and method of multi point calibrations.

|  |  |  |  |
| --- | --- | --- | --- |
| **Pollutant** | **Frequency** | **Calibration Method:**  **Back of Instrument** | **Calibration Method:**  **Through the Probe** |
| Choose an item. | Click or tap here to  enter text. | ☐ | ☐ |

* 1. Calibration Questions

Please complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| How are field calibration procedures documented and  how are the results recorded? | | | Click or tap here to enter text. |
| Are calibrations performed in keeping with the guidance in Vol. 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? | ☐ | ☐ | Click or tap here to enter text. |
| Do standards used for calibrations meet the requirements of appendices to 40 CFR 50 (EPA reference methods) and Appendix A to 40 CFR 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. |

###### Certification

* 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)** |
| Choose an item. | Click or tap here  to enter text. | Click or tap here  to enter text. | Click or tap here  to enter text. | Choose an item. |

* 1. Certification Questions

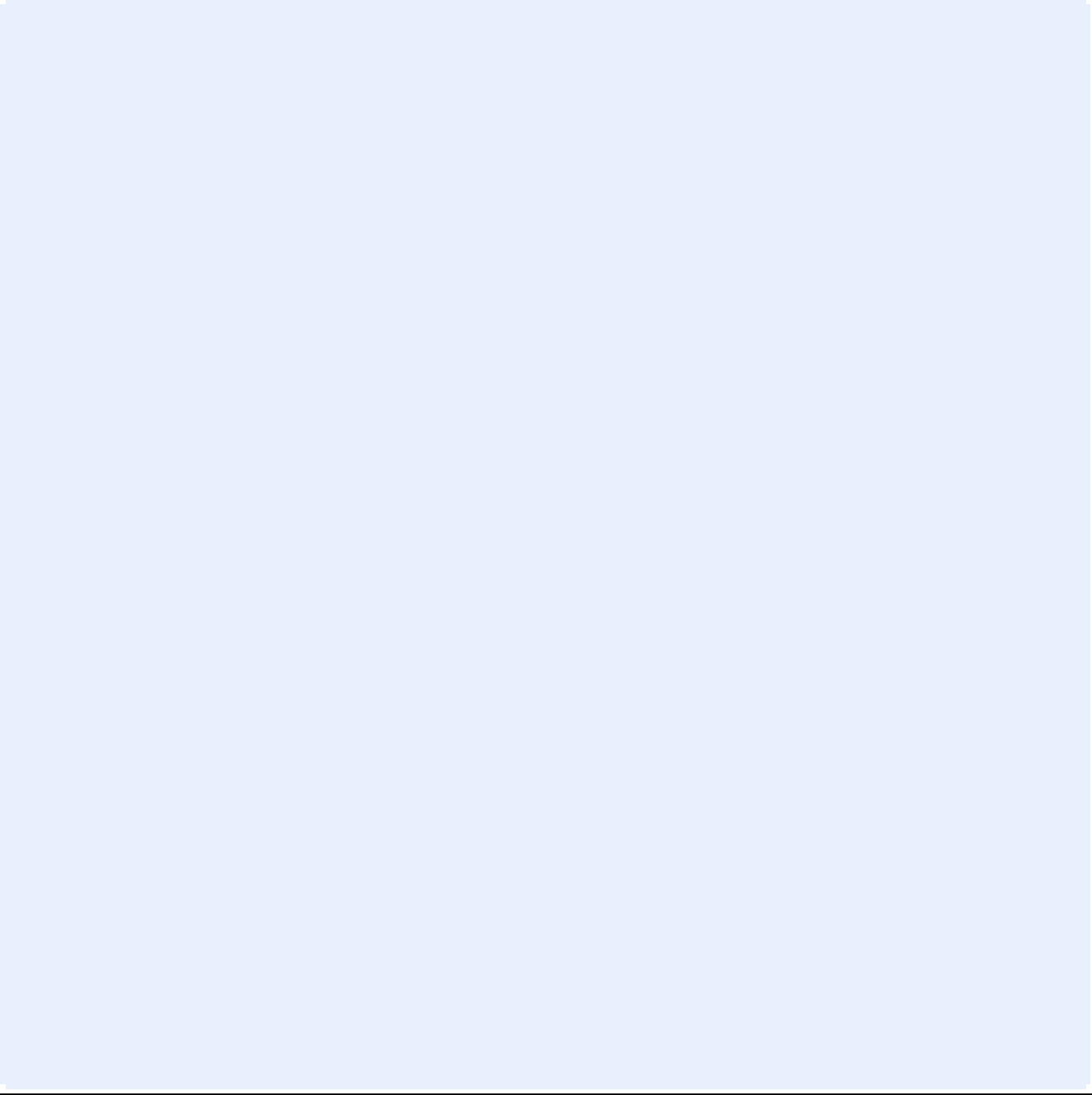
Please complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| How are certifications performed? (internally, by a vendor,  or third party?) | | | Click or tap here to enter text. |
| Where do field operations personnel obtain gas  standards? | | | Click or tap here to enter text. |
| How are the gas standards verified after receipt? | | | Click or tap here to enter text. |
| What equipment is used to perform calibrations (e.g.,  dilution devices) | | | Click or tap here to enter text. |
| Do the dilution air flow control and measurement devices conform to CFR  requirements? | ☐ | ☐ | Click or tap here to enter text. |
| What traceability is used? | | | Click or tap here to enter text. |
| Is calibration equipment maintained at  each station? | ☐ | ☐ | Click or tap here to enter text. |
| How is the functional integrity of this equipment  documented? | | | Click or tap here to enter text. |
| Who has responsibility for maintaining field calibration  standards? | | | Click or tap here to enter text. |

\***Please provide 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).**

* 1. Ozone Traceability Diagram

\***Please provide a flow diagram establishing traceability from the SRP (Level 1) to the ozone transfer standards used in your network.**



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** |
| Choose an item. | Click or tap here to enter text. | Click or tap here to enter text. |

###### Repair

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| Who is responsible for performing preventive  maintenance? | | | Click or tap here to enter text. |
| Is special training provided to them for performing preventive maintenance? Briefly comment on background or  courses. | ☐ | ☐ | Click or tap here to enter text. |
| What is the preventive maintenance schedule for each  type of field instrumentation? | | | Click or tap here to enter text. |
| If preventive maintenance is MINOR, it is performed at (check one or more)   * Field Station ☐Headquarters Facilities ☐Manufacturer * PQAO | | | 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 * PQAO | | | Click or tap here to enter text. |
| 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? | ☐ | ☐ | Click or tap here to enter text. |
| 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. | ☐ | ☐ | Click or tap here to enter text. |

###### Record Keeping

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| What type of station logbooks are maintained at each monitoring station? (maintenance logs, calibration logs,  personal logs, etc.) | | | Click or tap here to enter text. |
| What information is included in the station logbooks? | | | Click or tap here to enter text. |
| Who reviews and verifies the logbooks for adequacy of  station performance? | | | Click or tap here to enter text. |
| How is control of logbook maintained? | | | Click or tap here to enter text. |
| Where is the completed logbook archived? | | | Click or tap here to enter text. |
| What other records are used? (Use drop-down menu below). Comment on the use and storage of these  documents. | | | Click or tap here to enter text. |
| Choose an item. | | | Click or tap here to enter text. |
| 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.**

#### Laboratory Operations

**This section of the questionnaire completed by:** Click or tap here to enter name.

**Laboratory Name:**

Laboratory Name

**Laboratory Address:**

Laboratory Address

**Key Individuals (e.g., Laboratory Manager, Laboratory Supervisor, Laboratory QA Manager, etc.):**

|  |  |
| --- | --- |
| **Title/Position** | **Name** |
| Click or tap here to enter text. | Click or tap here to enter text. |

###### Routine Operation

* 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** |
| Choose an item. | Click or tap here to enter text. |

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.

* 1. 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 QA  Project Plan? | ☐ | ☐ | Click or tap here to enter text. |
| Have the laboratory SOPs been reviewed and approved? If yes, in the comment section, indicate by who (EPA, PQAO,  etc.)? | ☐ | ☐ | Click or tap here to enter text. |
| Are SOPs easily and readily accessible for use and reference within the laboratory?  If not, where are the documents stored? | ☐ | ☐ | Click or tap here to enter text. |
| Does the lab have sufficient  instrumentation to conduct the analyses? | ☐ | ☐ | Click or tap here to enter text. |
| 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. | ☐ | ☐ | Click or tap here to enter text. |
| Does your laboratory hold certifications?  (EPA, NIST, State, NELAC, or other) | ☐ | ☐ | Click or tap here to enter text. |
| Does your laboratory operate under a Quality Assurance Manual or equivalent  document? | ☐ | ☐ | Click or tap here to enter text. |
| Does your laboratory participate in  performance evaluation programs? | ☐ | ☐ | Click or tap here to enter text. |
| Does your laboratory have a corrective  action process for non-conforming work? | ☐ | ☐ | Click or tap here to enter text. |
| Does your laboratory have a laboratory staff person assigned the role of Quality  Assurance Officer? | ☐ | ☐ | Click or tap here to enter text. |

Please describe needs for laboratory instrumentation.

Click or tap here to enter text.

###### Laboratory Quality Control

* 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** |
| Choose an item. | Choose an item. | Click or tap here to enter  text. | Click or tap here to enter text. | Click or tap to enter a date. |

\***Please have calibration/certification records available for all laboratory standards.**

* 1. Laboratory Temperature and Relative Humidity

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? | | | Click or tap here to enter text. |
| What is the accuracy specification and recording time (e.g., 5 min. averaging time) of the RH sensor (logger)  used in the gravimetric laboratory? | | | Click or tap here to enter text. |
| What is the accuracy specification for any RH/temp audit  device used in the laboratory, if applicable? | | | Click or tap here to enter text. |
| Does the laboratory utilize an 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 the laboratory does not utilize an IR gun, what device is used to obtain shipment temperature? Please describe its  traceability and provide a certification expiration date. | | | Click or tap here to enter text. |

###### Laboratory Preventive Maintenance

Complete the following table.

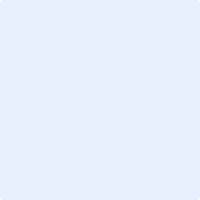
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** | | |
| Is preventive maintenance performed on laboratory equipment? If so, who has the responsibility for performing preventive  maintenance? | ☐ | ☐ |  | Click or tap here to enter text. |  |
|  | | |
| If equipment maintenance is performed by laboratory staff, does the SOP detail the procedures to be followed? Provide the SOP title, date, and revision number  where the procedures are found. | ☐ | ☐ |  | Click or tap here to enter text. |  |
|  | | |
| 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? | ☐ | ☐ |  | Click or tap here to enter text. |  |
|  | | |
| Describe static control equipment utilized in the  weighing room, if applicable. | | |  | Click or tap here to enter text. |  |
|  | | |
| Does the weighing room undergo routine  cleaning activities? On what frequency? | ☐ | ☐ |  | Click or tap here to enter text. |  |
|  | | |
| Briefly describe the weighing room cleaning procedure. | | |  | Click or tap here to enter text. |  |

###### 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 attach a copy of 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 4 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? | | | Choose an item. |
| * Serial numbers of filters prepared for the field? | | | Choose an item. |
| * Serial number of filters returning from the field for analysis? | | | Choose an item. |
| * 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? | | | Click or tap here to enter text. |
| * Who has the responsibility? (identify person/position) | | | Click or tap here to enter text. |
| How long are 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)? | ☐ | ☐ | Click or tap here to enter text. |
| * If yes, indicate the title, date, and revision number, and where it can be found. | | | Click or tap here to enter text. |
| What type of COC record accompanies the samples? | | | Click or tap here to enter text. |
| Does the laboratory maintain original  COCs or copies? | ☐ | ☐ | Click or tap here to enter text. |
| Where are COCs filed? | | | Click or tap here to enter text. |

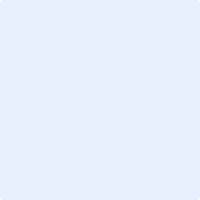
**\*If possible, attach a sample routing flow chart:**



###### Laboratory Data Acquisition and Handling

|  |  |  |  |
| --- | --- | --- | --- |
| **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. | | | Click or tap here to enter text. |
| Are QC data results readily available to the  analyst during a weigh session? | ☐ | ☐ | Click or tap here to enter text. |
| 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? | ☐ | ☐ | Click or tap here to enter text. |
| 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. | | | Click or tap here to enter text. |
| 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. | ☐ | ☐ | Click or tap here to enter text. |

\***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.**



###### Filter Questions

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| Does the agency use filters supplied by  EPA? | ☐ | ☐ | Click or tap here to enter text. |
| If the answer to the above question is 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 visually inspected via strong light from a view box for  pinholes and other imperfections? | ☐ | ☐ | 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. | ☐ | ☐ | Click or tap here to enter text. |
| How long is the conditioning period? | | | Click or tap here to enter text. |
| Briefly describe how exposed filters are prepared for  conditioning. | | | Click or tap here to enter text. |
| Are exposed filters reconditioned in the same conditioning environment as the  unexposed filters? | ☐ | ☐ | Click or tap here to enter text. |
| Are the temperature and relative humidity of the conditioning environment (i.e., weigh room or conditioning chamber) monitored? What is the resolution of the data collected (e.g., 1-minute, 5-minute,  1-hour, etc.)? | ☐ | ☐ | Click or tap here to enter text. |
| How often are balance checks performed? | | | Click or tap here to enter text. |
| Do the weights (mass reference standards) bracket the weights of the filters being utilized? What are the masses of the  weight standards used? | ☐ | ☐ | Click or tap here to enter text. |
| To what sensitivity are filter weights recorded? | | | Click or tap here to enter text. |
| Are filters packaged for protection to and  from the laboratory? | ☐ | ☐ | Click or tap here to enter text. |
| On average, what is the elapsed time in hours between  the end of sampling and laboratory receipt? | | | Click or tap here to enter text. |
| In what medium are field measurements recorded (e.g.,  in a log book, on a filter form, or on standard forms)? | | | Click or tap here to enter text. |
| Briefly describe how and where exposed filters are  stored after being weighed. | | | Click or tap here to enter text. |
| On what frequency are lab blanks utilized? | | | Click or tap here to enter text. |

|  |  |  |  |
| --- | --- | --- | --- |
| Are chemical analyses performed on filters? If yes, which? Where are these  additional analyses performed? | ☐ | ☐ | Click or tap here to enter text. |

###### e. Metals & Other Analyses

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

* 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? | ☐ | ☐ | Click or tap here to enter text. |
| Briefly describe the laboratory’s use of data derived  from blank analyses. | | | Click or tap here to enter text. |
| Are criteria established to determine  whether blank data are acceptable? | ☐ | ☐ | Click or tap here to enter text. |
| How frequently and at what concentration ranges does the lab perform duplicate analyses? What constitutes an  acceptable agreement? | | | Click or tap here to enter text. |
| Please describe how the lab uses data obtained from spiked samples, including the acceptance criteria (e.g.,  acceptable percent recovery). | | | Click or tap here to enter text. |
| Does the laboratory include samples of reference material within an analytical batch? If yes, indicate frequency, level,  and material used. | ☐ | ☐ | Click or tap here to enter text. |
| Are mid-range standards included in analytical batches? If yes, describe the  frequency, level, and compound. | ☐ | ☐ | Click or tap here to enter text. |
| Are criteria for real time quality control 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. | ☐ | ☐ | Click or tap here to enter text. |
| Are appropriate acceptance criteria for  each type of analysis documented? | ☐ | ☐ | Click or tap here to enter text. |

* 1. Chemicals

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| Are all chemicals and solutions clearly  marked with an indication of shelf life? | ☐ | ☐ | Click or tap here to enter text. |
| Are chemicals removed and properly  disposed of when the shelf life expires? | ☐ | ☐ | Click or tap here to enter text. |
| Does the laboratory purchase standard solutions such as those for use with lead  or other metals analyses? | ☐ | ☐ | Click or tap here to enter text. |
| Are only ACS grade chemicals used by the  laboratory? | ☐ | ☐ | Click or tap here to enter text. |
| Comment on the traceability of chemicals used in the  preparation of calibration standards. | | | Click or tap here to enter text. |

* 1. 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. | Click or tap here to enter text. |
| What filter media is used for Pb  analysis? | Choose an item. | Click or tap here to enter text. |
| Are filter samples visually inspected for defects (e.g., pinholes, tears and non-uniform  deposit)? | Choose an item. | Click or tap here to enter text. |
| Are filters invalidated if defects  are found? If no, why not? | Choose an item. | Click or tap here to enter text. |
| Are tweezers used to handle filters? If yes, what material are the tweezers made of (ex.  Teflon, plastic, metal, etc.)? | Choose an item. | Click or tap here to enter text. |
| What extraction method is used  for filters? | Choose an item. | Click or tap here to enter text. |
| What reagents are used to clean glassware? | | Click or tap here to enter text. |
| List standards used for analysis. | | Click or tap here to enter text. |
| 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. | Click or tap here to enter text. |
| How often are MDLs determined? | | Click or tap here to enter text. |
| How many replicates used for MDLs? | | Click or tap here to enter text. |
| Are MDLs calculated in accordance with 40 CFR Part 136, Appendix B? If not, why  not? | Choose an item. | Click or tap here to enter text. |
| Are waste HNO3, 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. | Click or tap here to enter text. |

#### Data & Data Management

**This section of the questionnaire completed by:** Click or tap here to enter name.

**Key Individuals:**

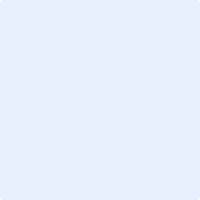
|  |  |
| --- | --- |
| **Title/Position** | **Name** |
| Click or tap here to enter text. | Click or tap here to enter text. |

###### 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? | ☐ | ☐ | Click or tap here to enter text. |
| Are procedures for data handling (e.g., data reduction, review, etc.) documented? If yes,  comment on where. | ☐ | ☐ | Click or tap here to enter text. |
| In what media (e.g., flash drive, telemetry, wireless, etc.) and formats do data arrive at the data processing  location? | | | Click or tap here to enter text. |
| How often are data received at the processing location  from the field sites and laboratory? | | | Click or tap here to enter text. |
| Are there any activities being done before data is released to agency internal data  processing? | ☐ | ☐ | Click or tap here to enter text. |
| How are data entered to the computer system? (e.g.,  computerized transcription, manual entry, digitization of strip charts, or other)? | | | Click or tap here to enter text. |
| For manual data, is a double-key entry  system used? | ☐ | ☐ | Click or tap here to enter text. |

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



###### Software Documentation

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| Does your agency use an AQS Manual? | ☐ | ☐ | Click or tap here to enter text. |
| Does the agency have information on the reporting of precision and accuracy data  available? | ☐ | ☐ | Click or tap here to enter text. |
| 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. | ☐ | ☐ | Click or tap here to enter text. |
| What is the recovery capability in the event of a significant computer problem (i.e., how much time and data would be  lost)? | ☐ | ☐ | Click or tap here to enter text. |
| 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. |

###### 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? | ☐ | ☐ | Click or tap here to enter text. |
| Please describe what action the data validator will take (e.g., flags, invalidate, etc.) if they find data with  exceeded QC criteria. | | | Click or tap here to enter text. |
| Please describe how changes made to data that were  submitted to AQS and AirNow are documented. | | | Click or tap here to enter text. |
| Who has signature authority for approving corrections? | | | **Name:**Click or tap here to enter text.  **Program Function:**Click or tap here to enter text. |
| What criteria are used to determine a data point be  deleted or invalidated? | | | Click or tap here to enter text. |
| What criteria are used to determine if data need to be  reprocessed? | | | Click or tap here to enter text. |
| Are corrected data resubmitted to the issuing group/record generator for cross-  checking prior to release? | ☐ | ☐ | Click or tap here to enter text. |

###### Data Processing

* 1. Reports

Complete the following table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** | |
| Does the agency generate data  summary reports? | ☐ | ☐ | Click or tap here to enter text. | |
| Please list at least three reports routinely generated, including the information requested  below. | | | Click or tap here to enter text. | |
| **Report Title** | **Distribution** | | | **Period Covered** |
| Click or tap here to enter text. | Click or tap here to enter  text. | | | Click or tap here to enter text. |

* 1. Data Submission

Complete the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Yes** | **No** | **Comment** |
| How often are data submitted to AQS? | | | Click or tap here to enter text. |
| How often are data submitted to AirNow? | | | Click or tap here to enter text. |
| Briefly comment on difficulties the agency may have encountered in coding and submitting data following the  AQS guidelines. | | | Click or tap here to enter text. |
| Does the agency retain a hard copy  printout of submitted data from AQS? | ☐ | ☐ | Click or tap here to enter text. |
| Are records kept by the agency for at least 3 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 | ☐ | ☐ | Click or tap here to enter text. |
| * QC data | ☐ | ☐ | Click or tap here to enter text. |
| * Reports: list which reports are used | ☐ | ☐ | Click or tap here to enter text. |
| Has your agency submitted data (along with the appropriate calibration equations  used) to the processing center? | ☐ | ☐ | Click or tap here to enter text. |
| Are concentrations of PM10 corrected to EPA standard temperature and pressure conditions (i.e., 298 K, 760 mm Hg) before  input to AQS? | ☐ | ☐ | Click or tap here to enter text. |
| Are concentrations of PM2.5 and Pb reported to AQS under actual (volumetric)  conditions? | ☐ | ☐ | Click or tap here to enter text. |
| Are audits on data reduction procedures performed on a routine basis? If yes, at  what frequency? | ☐ | ☐ | Click or tap here to enter text. |
| Are data precision and accuracy checked each time they are calculated, recorded, or transcribed to ensure that incorrect  values are not submitted to EPA? | ☐ | ☐ | Click or tap here to enter text. |

###### Internal Reporting

* 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** |
| Click or tap here to enter text. | Click or tap here to enter text. |

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

|  |  |
| --- | --- |
| **Report Title** | **Frequency** |
| Click or tap here to enter text. | Click or tap here to enter text. |

|  |  |  |  |
| --- | --- | --- | --- |
| **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? | ☐ | ☐ | Click or tap here to enter text. |

* 1. 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** |
| 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. |

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

|  |  |
| --- | --- |
| **Name** | **Program Function** |
| Click or tap here to enter text. | Click or tap here to enter text. |

|  |  |  |  |
| --- | --- | --- | --- |
| **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? | ☐ | ☐ | Click or tap here to enter text. |

Conducting TSAs

Revision 0 Date: 11/2017 Page 101 of 105

**Appendix B Example Field Audit Logbook**

The following example of a field audit logbook consists of a series of tables and checklists to assist an auditor in investigating ambient air monitoring sites. The contents are as follows:

* Monitoring site evaluation form
* Site drawing form
* Comment page
* Photograph log

This logbook may be edited for specific regional use.

**Note:** The siting criteria documented in this template was current as of the published date of this document. Users should verify that the criteria have not been updated in the CFR or other guidance documents before use. If discrepancies exist, please inform the author(s) of this document to recommend revision of this appendix.



**LOGBOOK: Air Monitoring Site Evaluations**

**Technical Systems Audit**

### Agency Name:

**Audit Date:**

### Lead Auditor: \_

##### Audit Team

**Print Name / Signature / Initials**

**1:** (Team Lead)

2:

**3:**

4:

**5:**

Page 1 of 9

# Site Name (AQS ID:

**xx-xxx-xxxx)**

# Insert AMP 390 Report for specific site

Page 2 of 9

**MONITORING SITE EVALUATION FORM (MSEF) (Page 1/5)**

**Local Site Name:**

**Initials:**

**Date:**

**EPA auditor should document in the Site Logbook** – the time / date / purpose of visit / EPA representatives present **[Y/N] Completed**

**Arrival Time: Departure Time: Primary Operator:**

**Observer(s): NETWORK(s): [□Criteria / □NCore / □Near Road / □IMPROVE / □CASTNet / □NATTS / □PAMS / □Toxics**]

**SITE**

[Y/N]-**Security Fence** [Y/N]-**Razor/Barb Wire** [Y / N / NA] **Grass/Shrubs Cut** [Y / N / NA] **Bare Soil Area**

[Y/N] **Vandalism** – [**□Inside** / **□Outside**] **Date:** [Y/N] **Police Report Filed**

**Issues:**

**SHELTER - Interior**

**Arrival Temperature: °C** (from data logger) **Operator Site Visits:** per [week | month | ] [Y/N] **Leaking Roof [Damaged: □Ceiling / □Floor / □Walls]** [Y/N] **Clean / Neat** [Y/N] **Fire Extinguisher** [Y/N] **Insect / Wildlife Issues** [Y/N] **Thermometer** (min/max) [Y/N] **Gasoline** (inside shelter)

**Issues:**

**MONITOR(s): Location:** Exterior Samplers **[□Roof / □Ground / □ Not Present]**

|  |  |  |  |
| --- | --- | --- | --- |
| **Monitor(s)** | **Manufacturer** | **Model** | **Serial Number** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**MET:** [**□**Sonic / **□**Analog] - [**□**WS / **□**WD / **□**Temp / **□**RH / Other: Make: ] **□ Not Present**

**CALIBRATOR(s): □ Not Present** [Y/N] **Are QA/QC Check Gases Vented Outside Shelter?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **QA/QC** | **Make** | **Model** | **Serial Number** | **Certification Date** | **Expiration Date** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Page 3 of 9

**MSEF (Page 2/5): Local Site Name: Initials: Date:**

**Is any analyzer sampling shelter air through its calibration line? [**Y/N**]** If yes, photo, document and notify agency mgr.

**All Gas Standards Pass thru all Filters during:** [Y/N] **Calibrations** [Y/N] **Precision Checks** [Y**/**N] **Audits**

**Issues:**

**CYLINDER GAS STANDARDS: □ Not Present**

**VENDOR: (PSI Reading < 200, tank is empty and should not be in service)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **QA**  **/QC** | **Gas Standard** | **PSI**  **Reading** | **Expiration Date** | **Standard Concentration** | **Serial Number** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Issues:

**SUPPORTING INSTRUMENTATION: Internal**

[Y/N] **Temperature Sensor** [Y/N] **Uninterruptable Power Supply** [Y/N] **On-Site Computer**

**Zero Air System: Commercial System** (Make / Model):

**Cartridge System: [□Silica Gel [□Pink / □Blue] / □Charcoal / □Purafil / □Hopcalite / Other: ]**

[Y/N] **Needs Service Last Service Date: Condition:**

Issues:

**Data Logger:** [**□8816 /□ 8832 / □8872 / Other:** ] Instrument(s) to Logger: [**□Analog / □Digital / □Mixed**] Communications: **[□Cell Modem / □DSL / □Dial up]**

**Strip Chart: [□Electronic / □Paper / □Both / □No Access**] [Y/N] **Operator Proficiency** [Y/N] **Time Accurate**

(Examine on chart: last calibration / precision check / audit – look for stability, concentration level, comments, etc.)

Issues:

**Probe Line(s): [□Replaced / □Cleaned] – Frequency: Last Service Date:**

[Y/N] **Clean** [Y/N] **Heated [**Y/N] **Insulated [**Y/N] **Moisture** [Y/N] **Retractable** [Y/N] **Old / Unused Lines [**Y/N] **Lo Flo Manifold ->** [Y/N] **Any Open Ports? –> How many analyzers using manifold?**

Issues:

**RECORDS – At Site**

**Documents Available: [□Hardcopy / □Electronic] – [□QAPP(s) / □SOP(s) / □Instrument Manual(s)]**

Issues:

**Logbooks: [□Hardcopy / □Electronic] - [□Site Log / □Instrument Log / Other(s): ]**

(Entries well documented?):

**Charts / Papers on Walls: What do they Track, Up-to-date?**

Page 4 of 9

**MSEF (Page 3/5): Local Site Name: Initials: Date:**

**SHELTER – Exterior □ Not Present**

**Type: [□Freezer / □Wood Building / □Brick-Block / Other: ]**

[Y/N] **Needs Maintenance** (specify) [Y/N] **Tied Down** [Y/N] **Electrically Grounded** [Y/N] **Roof Railing**

**Roof Access: [Stairs [Interior/Exterior] / Ladder [attached/removable] / □ Not Present]** [Y/N] **Loose Decking** (Trip Hazard)

**Issues:**

**OUTDOOR SAMPLERS □ Not Present**

[Y/N] **Locked** [Y/N] **Electrically Grounded** [Y/N] **Stabilized** [Y/N] **Clean Inside** [Y/N] **Head/Separator Clean**

**Operator / Log: VSCC/WINS Clean Schedule:**

**PM10 Head Clean Schedule:**

**Issue(s):**

**COLLOCATED SAMPLERS: □ Not Present** (39.4 inches = 1 meter)

|  |  |  |
| --- | --- | --- |
| **Pollutant** | **Flow**  **(Hi / Lo)** | **Separation Distance**  **(meters)** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Collocated monitors **must be within 4 meters of each other** and at least **2 meters apart** for flow rates **greater than 200 liters/min** or at **least 1 meter apart** for samplers having flow rates **less than 200 liters/min** to preclude airflow interference, unless a waiver is in place as approved by the Regional Administrator pursuant to section 3 of Appendix A.

**PROBE SYSTEM(s): External □ Not Present**

**Inlet Type:** [**□**Single Line / **□**Dual Line / **□**Bell Type (CAS design)]

**Funnel(s):** [**□**Rain Shield / **□**Part of Probe] **Funnel Material**: [**□**Teflon® / **□**Glass / **□**Stainless Steel / Other: ]

**Probe Line(s)**: [**□**Teflon® / Other: ] **Probe Fitting(s)**: [**□**Teflon® / Other: / □ Not Present]

**Residence Time:** (20 sec. max)

**Issue(s):**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Pollutant(s)** | **Inlet Height (meters)** | **Inlet Location**  **(Side of Shelter, Ground, Roof)** | **Horizontal Distance (meters)**  If Applicable | **Vertical Distance (meters)**  If Applicable | **Monitoring SCALE** | |
| **AQS** | **Annual Network**  **Plan** |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

**FOR Horizontal and Vertical Distances: Separation Distance = (1 meter for O3, CO, SO2, NO2) & (2 meters for PM, Pb)**

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

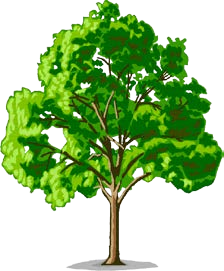
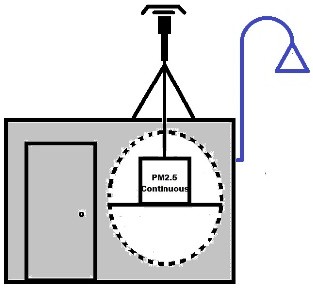
**Height of Roof: meters Roofing Material**:

**Issues:**

Page 5 of 9

**MSEF (Page 4/5): Local Site Name: Initials: Date:**

**OBSTRUCTION(s): Distance from** sampler, **probe** to obstacle, such as a building, **must be at least twice the height the obstacle protrudes above the sampler and probe**.



**Obstacle Distance(s) (OD)**

**Sampler Inlet Height (IH)**

**Probe Inlet Height (IH)**

**Obstacle Height (OH)**

**All distances in meters OD MUST be ≥ [2\*(OH-IH)]**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Obstacle(s)** | **Obstacle Height (OH)** | **Sampler/Probe**  **Inlet Height (IH)** | **[2\*(OH-IH)]** | **Obstacle Distance (OD)** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

**Please identify each of these obstacles in the SITE DRAWING** (next page)

**TREE DRIPLINE(s)**: \_ inches = \_ **meters** (nearest inlet to dripline) **□ No Trees Present**

(39.4 inches = 1 meter)

inches = **meters** (nearest inlet to dripline) **□** Not Present

inches = **meters** (nearest inlet to dripline) **□** Not Present

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

**Issues:**

**UNRESTRICTED AIR FLOW**: **° Estimated Degrees of Clearance**

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



20 meters

10 meters

Page 6 of 9

**MSEF (Page 5/5): Local Site Name: Initials:**

**SITE DRAWING - Please Indicate:** (relevant distance / height measurements)

□ Direction NORTH □ Monitoring Shelter □ Nearby Trees/Shrubs □ Possible Sources

**Date:**

□ Primary Wind Dir □ Probe Position(s) □ Roadways □ Paved / Unpaved Areas

□ Security Issues □ Exterior Samplers □ Buildings □ Nearby Construction

□ Sloping Areas □ Met Tower □ Walls □ Flues, Vents, Boilers

□ Railroad Tracks □ Security Fencing □ Other Obstructions □ Meat Cooking

Page 7 of 9

**Local Site Name:**

**Initials:**

**Date:**

Additional Comments:

Page 8 of 9

**PHOTO LOG: Local Site Name:**

**Initials:**

**Date:**

**Camera [□ EPA / □ Personal – Owner: ] Make/Model:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

**Filename: Date: Time: Photographer:**

**Description:**

Page 9 of 9

Conducting TSAs

Revision 0 Date: 11/2017 Page 102 of 105

**Appendix C**

**Low-Volume Weighing Laboratory Audit Checklist**

The following checklist incorporates the requirements of the 40 CFR Part 58, the Appendix L method, and the guidance contained in Quality Assurance Guidance Document 2.12. This checklist is intended to be used as guide to aid auditors in auditing low-volume PM10 or PM2.5 gravimetric laboratories.

**Note:** The criteria documented in this template was current as of the published date of this document. Users should verify that the criteria have not been updated in the CFR or other guidance documents, such as the QAGD 2.12, before use. If discrepancies exist, please inform the author(s) of this document to recommend revision of this appendix.

**LOW-VOLUME GRAVIMETRIC WEIGH LAB SYSTEMS REVIEW**

**Analyst:**

**Location:**

**Audit Date:**

**Auditor:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Audit Questions** | **Response** | | | **Comments** |
| **Yes** | **No** | **N/A** |
| **I. Routine Operations & Site Housekeeping** | | | | |
| List any visible sources that may impact the weigh lab.  Is the room access restricted? Is the equipment located inside the weigh room only that which is required for daily weighing operations? |  |  |  |  |
| Is there an anteroom? Describe its condition. |  |  |  |  |
| What is being done to control drafts in the weigh room? Is the microbalance located so that it is not impacted by drafts? |  |  |  |  |
| Is the weighing table stable so vibrations do not affect the balance? |  |  |  |  |
| Is the balance checked to determine if it is in fact leveled? If so, at what frequency? Visually inspect balance to determine if level. |  |  |  |  |
| Is the balance grounded? |  |  |  |  |
| Is the balance left in the "On" position at all times? |  |  |  |  |
| Is the autocalibration feature on the microbalance on or off? |  |  |  |  |
| What is the readability and repeatability of the balance? |  |  |  |  |
| Is the balance certified annually by an outside source? When was the balance last certified? Where are the records of this maintained? Request copy of documentation. |  |  |  |  |
| What anti-static prevention device(s) is in place? |  |  |  |  |
| Are polonium strips used to eliminate static? Are they purchased in advance? If so, how far in advance?  How often are they replaced? What is the date stamped on the current strips? |  |  |  |  |
| What device (LIMS, datalogger, etc) is used to monitor temperature and RH readings? What is the resolution of data collected? What procedure is utilized to verify these readings and at what frequency? |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Is the datalogger calibrated/certified annually? When was the last certification? Where are the records maintained? Request copy. |  |  |  |  |
| At what frequency are the temperature and humidity sensors certified by an outside source? When was the most recent certification? Where are these records maintained? Request copies of documentation. |  |  |  |  |
| Is the temperature maintained at 20-23°C, with a temperature control range of ≤ 2°C over a 24-hour period? How is control demonstrated? |  |  |  |  |
| Is the relative humidity maintained at 30-40%, with a standard deviation of ≤5% over a 24-hour period?  How is control demonstrated? |  |  |  |  |
| How and where is temperature & RH data review documented? Frequency? |  |  |  |  |
| Are pre & post sampling RH differences calculated? Where is this documented? |  |  |  |  |
| If the temperature or RH is found to be out of specification, what corrective action is taken? Are weigh sessions halted? |  |  |  |  |
| Are maintenance/service contracts in place for climate control unit, sensors, and software in the lab? |  |  |  |  |
| Is electronic data backed-up at a defined frequency? How long? Where is it stored? |  |  |  |  |
| Print and review temperature and RH graphs for three prior weigh sessions (one for each year under review). Obtain the 24-hr means and SDs for temp and RH for those sessions. |  |  |  |  |
| Are there two sets of weights being used: a primary set and a working set? Are they at least Class 2 weights? |  |  |  |  |
| Do the weights bracket the weight of the filters being utilized? |  |  |  |  |
| How frequently are the weights recertified by an outside source? Where is this documented? Request copies of documentation. |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| At what frequency are the working weights verified against the primary weights? Where is this documented? Request copies of documentation. |  |  |  |  |
| Who is responsible for ensuring that all standards are certified at their required frequencies? How is this tracked? |  |  |  |  |
| Is a logbook used to document environmental conditions, weighing sessions, balance checks, weight checks, lot blank stability test results, etc, as well as lab maintenance activities? If not, how and where is this information documented? Are entries signed and dated? |  |  |  |  |
| On what frequency and how is the weigh lab cleaned? Describe daily, monthly, & yearly cleaning regimes. |  |  |  |  |
| How are sample cassettes, including stainless steel backing screens, cleaned? At what frequency are they cleaned? Are they inspected for cracks or other damage? Do both halves fit tightly together when assembled? |  |  |  |  |
| Is there a separate location designated specifically for cooler packing/unpacking? If so, describe its location and condition. |  |  |  |  |
| **II. Sample Conditioning** | | | | |
| Where are new lots of filters stored once they are received from EPA? |  |  |  |  |
| Describe the lot blank test procedure. |  |  |  |  |
| What were the results of the most recent lot stability test? Request copy of documentation. |  |  |  |  |
| Are all filters visually inspected for defects both pre and post-sampling? What technique is used to inspect the filters? What criteria would cause a filter to be rejected? Give examples. |  |  |  |  |
| Are all filters pre-conditioned prior to both the **initial** and **final** weighing sessions? How long is the conditioning period? Where are they conditioned? If on a metallic shelf, is it grounded? |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| How is the conditioning period affected if the weigh  room conditions are out of tolerance? |  | | |  |
| Are the filters conditioned in petri dishes or slides? Are the lids on the slides or are they slightly ajar? |  | | |  |
| **III. Sample Weighing** | | | | |
| Is one person designated to weigh all sample filters? Is there a back-up analyst? Does the same analyst weigh the same filters pre- and post-? |  |  |  |  |
| Are filters sampled within 30 days of the initial (tare) weigh? How is this tracked? |  |  |  |  |
| Are samples pre-assigned to a site? Or, is a site assigned after a filter is deployed? Elaborate on how filters are requested and distributed. |  |  |  |  |
| How are filters prepared for field deployment (i.e., loaded into sample bags or a magazine)? Where does this activity occur? |  |  |  |  |
| Are samples maintained in a secure area at all times after being delivered to the laboratory? |  |  |  |  |
| How are filters packed for shipment back to the laboratory? What happens if a shipment (package and/or individual filters) is damaged in transit? |  |  |  |  |
| Where are samples unloaded from the transport containers? Is this area clean and secure? |  |  |  |  |
| Is the temperature of the cooler recorded at receipt in the laboratory? Is the temperature device NIST- traceable? Where is the temperature reading recorded? |  |  |  |  |
| Describe the post sample weigh time limits (i.e., 10 days/30 days) established for the lab and supporting rationale. |  |  |  |  |
| If samples are refrigerated, is the temperature of the refrigerator monitored? How is this accomplished? Is the monitoring equipment verified/certified? |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Is a LIMS systems used to record the weighing results? If not, describe how each weighing session is documented. |  |  |  |  |
| Are anti-static, powder-free gloves and lab coats worn while handling sample filters? |  |  |  |  |
| Are teflon forceps used to handle the sample filters? How are they cleaned and at what frequency? |  |  |  |  |
| Are the same forceps used for handling the mass standards used in handling sample filters? |  |  |  |  |
| How often are balance checks performed? What is the tolerance (µg) for balance checks? How and where is this documented? |  |  |  |  |
| If balance checks do not agree within ±3 µg, what corrective action is taken? |  |  |  |  |
| How often are lab blanks weighed? If the lab blanks are not within ±15 µg, what corrective action is taken? |  |  |  |  |
| Are lab blanks used more than once? |  |  |  |  |
| Are field blanks weighed with each session? Are final weigh results within ± 30 µg of the initial weigh? How is this tracked? What corrective action is taken when FBs are out of limits? |  |  |  |  |
| Are duplicate filters weighed with each session? What is the acceptance limit (i.e., ± 15 µg)? Are sampled filters or blanks used? |  |  |  |  |
| What happens if a weighed filter appears to be an outlier? How is it handled? |  |  |  |  |
| How are re-weighs documented? |  |  |  |  |
| Are trip blanks utilized? If so, at what frequency? What is the acceptance limits for trip blanks (i.e., ± 15 µg)? |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Following each manual weigh session, is the weighing (batch) audited? If so, who does the audit? What percentage of filters are reweighed? What limits are used to determine good agreement? |  |  |  |  |
| Who does the lab analyst notify when discrepancies are found and/or corrective actions are needed? |  |  |  |  |
| After the final weighing has been completed, how are samples stored, and for what period of time are they retained? |  |  |  |  |
| **IV. Data Handling** | | | | |
| Are chain of custody (COC) forms submitted by the  field technician for each sample? Are they signed by all parties within the chain? Where are they maintained? Who reviews the COC forms? |  |  |  |  |
| How are field flags/notes linked to the filter data? How are these notes communicated to the data reviewer? |  |  |  |  |
| Once filter weighing is complete, is a report listing the sample concentrations generated for QA review? Does it list any void/flagged sample(s) and the reason for invalidating the sample(s)? Who is responsible for generating this report? How is responsbile for reviewing it? |  |  |  |  |
| Are concentrations verified to ensure data entry & computations are correct? How many samples are reviewed per batch? Describe the verification procedure that is utilized. |  |  |  |  |
| Are control charts used? If so, detail the types of control charts developed & how they are maintained. At what frequency are the charts reviewed & by whom? Where are these charts located? |  |  |  |  |
| During the data review process, does the reviewer differentiate between critical and non-critical criteria when flagging data? Describe this process. |  |  |  |  |
| During the data review process, are sampler maintenance results, precision checks, and audit results reviewed to determine if any samples should be invalidated or flagged based on the results of these activities? |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Are the filter, summary data, and interval data downloaded from the instrument for each sample run? Where is this data stored? Is the data reviewed as part of the QA audit process? |  |  |  |  |
| How are corrective actions addressed? Are forms filled out for corrective actions? Who reviews them in the data validation chain? If corrections are made to data as a result of corrective actions, how is this  documented & verified? Who is responsible for follow- up? |  |  |  |  |
| Are exceptional events or impacts from nearby sources documented? Where? |  |  |  |  |
| Once the data has been audited, are null codes and any qualifiers applied to the sample reviewed? If so, who is responsible for applying the codes/flags? Is this prior to the data being uploaded to AQS? |  |  |  |  |
| Are internal performance & systems audits of the weigh lab and supporting equipment (loggers, balances, etc) performed? Who conducts these audits? Describe the review process and how the results are documented. How are staff notified of the audit results? Where are the audit reports filed? |  |  |  |  |
| **V. Other** | | | | |
| Does the laboratory operate under an approved QMP,  QAPP, and SOP? What are the approval dates for the current revisions? |  |  |  |  |
| What is the size of the particulate matter network for which this weigh lab is in operation? Describe the number of samplers and their operational frequency. Approximate number of samples weighed per month/year. |  |  |  |  |
| Does this weigh lab gravimetrically analyze samples collected for PM10 and/or lead? If yes, then describe any notable differences in procedures for the PM10 and/or lead samples. |  |  |  |  |
| Describe in detail the training the lab analyst has received. Who trained the analyst? Which courses have been taken? Has the analyst been trained on both QC operation of the lab, as well as data verification/validation procedures? |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| Describe in detail the training the back-up weigh lab analyst has received. How often do they weigh filters? |  |  |
|  | | |
| **Additional Comments on Audit:** | | |

**Auditor's Signature:**

Conducting TSAs

Revision 0 Date: 11/2017 Page 103 of 105

**Appendix D**

**Laboratory Systems Review: Lead in Air Audit Checklist**

The following audit checklist is designed to aid the auditor in performing an audit of a Pb laboratory. To use the checklist effectively, the auditor must be familiar with the requirements of the specific FRM or FEM that is currently in use in the laboratory and supplement this checklist with its specific method criteria. The checklist does not include specific QC criteria or detailed procedural steps that will be unique to each method. The checklist includes commonalities that exist in all of the Pb methods, as well as laboratory best practices. This is a compilation of these method consistencies that the auditor can use to assist in auditing the laboratory. This checklist should be tailored to the needs of the specific Pb analytical method implemented in the laboratory under audit.

**Note:** The criteria documented in this template was current as of the published date of this document. Users should verify that the criteria have not been updated in the CFR or other guidance documents before use. If discrepancies exist, please inform the author(s) of this document to recommend revision of this appendix.

|  |  |  |
| --- | --- | --- |
| **LABORATORY SYSTEMS REVIEW: Lead in Air** | | |
|  | **Laboratory:** |  |
|  | **Air Monitoring**  **Agency:** |  |
| **Reference or Equivalent Method :** | | |
|  | **Audit Questions** | **Response** |
| **I. Document Control** | |
| a) Is there an official, documented Operating  Procedure (SOP) for this method? Is this a controlled document? Describe how it is controlled. |  |
| b) Who is responsible for the updates to the SOP? At what frequency is the SOP updated? Describe the review process. |  |
| c) Are changes allowed to the SOP outside of a review cycle? Describe this process and how the changes are documented and staff are notified of any pertinent  changes. |  |
| d) Do changes to the SOP ever require updates of the Laboratory Information Management System(LIMS)? If so what is the procedure for LIMS updates? |  |
| e) How are SOP updates communicated to staff? |  |
| f) When SOPs are updated for air analysis is the Air Monitoring Unit notified of the changes? |  |
| **II. Training and Demonstrations of Competency** | |
| a) Are all analyst involved with Lead in air sample  preparation and analysis properly trained? Review available training records |  |

|  |  |
| --- | --- |
| b) Are Initial and Continuing Demonstrations of Competency (DOC) required for each analyst? Describe the DOC process. |  |
| c) Who maintains records of acceptable competency demonstrations? Ask to review these records. |  |
| d) Are Method Detection Limit (MDL) Studies performed? At what frequency? Describe the MDL determination procedure. Ask to review records of MDL studies performed for the audit time period. |  |
| e) Are Linear Dynamic Range (LDR) studies performed? At what frequency? Describe the procedure. |  |
| f) Who maintains documentation of LDR studies? Ask to review records of studies performed during the audit time period. |  |
| g) What is the Reporting Limit for Lead in Air? How is the reporting Limit determined? |  |
| **III. Sample Receiving, Sample Log-in and Sample Custody** | |
| a) Describe how samples are received by the laboratory  (Are they shipped, are they in folders or envelopes, who receives them, etc.) |  |
| b) Are samples received as a group (all samples collected for one month) or are individual samples submitted? |  |
| c) Is a COC form submitted for each sample? (Request copies of COC form for review) |  |

|  |  |
| --- | --- |
| d) Are samples logged in as received? If not where are samples stored prior to sample log-in? Following sample log-in, where are samples stored? |  |
| e) Describe the sample storage location (are there any sources of potential contamination). |  |
| f) Is access restricted to the custody , storage and analytical labs? How is it restricted? |  |
| g) Following sample preparation, where are the extracts stored? Where are the unused portions of the filters stored? |  |
| **IV. Sample Preparation** | |
| a) Describe the sample preparation location, are there  any sources of contamination present, is there sufficient room to perform all activities? |  |
| b) Preparation of the filter requires a strip to be cut from the 8 X 10 filter. What size filter strip is used for preparation? Ask for a demonstration of the cutting procedure. |  |
| c) Are instruments (cutters, cutting boards, etc. ) cleaned in between fitters? Describe this procedure. |  |
| d) What type of glassware/labware is used for sample extraction? Is it acid washed? Is it certified clean by the vendor (if so is there a certificate available) How is cleanliness of the labware determined? |  |
| e) What ancillary equipment is utilized for sample prep (Hotblock, Hotplate, Ultrasonic Bath) Describe the condition of the equipment and any checks utilized to verify proper operations. |  |
| f) Describe the sample preparation procedure. |  |
| g) Are duplicate samples prepared? Describe this process. |  |

|  |  |
| --- | --- |
| h) Are blank filters prepared and assessed for background concentration? What level of background is acceptable? Is this value used in the determination of the final lead concentrations reported? |  |
| i) Are matrix spikes prepared? Describe spike preparation procedures. At what frequency are spikes prepared? |  |
| j) Is a quality control check sample from a second source prepared? Is there a COA provided for the QCS? (Request copy(s) for review) At what frequency is the QCS prepared/analyzed? |  |
| **V. Standards Preparation** | |
| a) Are stock standards prepared in-house or purchased  as certified standards from a vendor? If purchased is a Certificate of Analysis provided? (Request copies of CoAs for review). How/where are CoAs maintained? |  |
| b) How are expiration dates of the stock standards established? Are stock standards ever utilized outside of the expiration date. If so, describe the process for verifying the standards and how this is documented. |  |
| c) At what frequency are working and/or calibration standards prepared? How are expiration dates for these standards established? |  |
| d) How is the traceability of the standard preparation documented? (logbooks, controlled prep forms, LIMS). Request copies of standard prep records for review. |  |
| e) Are all standards prepared in a matrix comparable to the matrix of the samples following extraction? |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | f) Are air displacement pipettes utilized for preparing standards? Are they certified? At what frequency? Ask to review certification records. |  |  |
| **VI. Audit Strips** | |
| a) Are audit test strips spiked at 30-100% and 200-300  % of the lead NAAQS, analyzed? Are these strips prepared in-house or provided by an EPA contract laboratory? At what levels of the NAAQS are the strips analyzed((if prepared in house)? |  |
|  | b) Describe the preparation of the audit strips if prepared in -house. Review documentation of audit strip preparation. Are standards and reagents independent of the calibration standards utilized in the preparation procedure? |  |  |
| c) At what frequency are the strips analyzed? Are dilutions required to produce results for audit strips within the calibration curve? |  |
| d) How are the results of the audit strips reported to the air monitoring unit (Spreadsheet, Sample Report)? In what units are the results reported?Is the true value for the audit strips reported with the results? |  |
| e) What criteria must be met for the audit strip results to be considered acceptable? If the criteria is not met, what corrective action is performed? |  |
| **VII. Instrument Calibration/Quality Control** | |
| a) What instrumentation is utilized for analysis  (Make/Model)? Is the instrument capable of meeting the method requirements? |  |
| b) How often is the instrument calibrated? How many standards are used to calibrate the instrument? |  |

|  |  |
| --- | --- |
| c) What is the requirement for the correlation coefficient ? What curve fit is used? |  |
| d) Is an initial check standard analyzed to verify the calibration stability is ±5%? Describe what corrective action is taken if the calibration stability check exceeds acceptance criteria. Is the standard prepared from the same source as the calibration standards? |  |
| e) Are continuing calibration standards analyzed? At what frequency? At what level(s) ? What is the acceptance criteria? Describe what corrective actions are taken if the criteria is not met. Are the continuing check standards prepared from the same source as the calibration standards? |  |
| f) Describe the type(s) of blanks utilized in the analysis. What is the acceptance criteria for each type of blank? What corrective action is performed if blanks exceeded the acceptance criteria? |  |
| g) If duplicates are prepared and analyzed, what is the acceptance criteria for duplicate analyses? What corrective action is performed in the event the duplicate results do not meet this criteria? |  |
| h) Describe how matrix spikes are assessed? What are the acceptance criteria? |  |
| i) Are dilutions performed for samples that exceed the calibration? If dilutions are performed, is a dilution check standard included in the analytical batch. What criteria is utilized to assess dilutions? |  |
| **VIII. Lab Data Review** | |
| a) Following analysis, who is responsible for review  and uploading data into the LIMS system. Describe this process. How is the review documented? |  |
| b) Is the data reviewed by a secondary reviewer? What does the secondary review process entail? How is this process documented. |  |

|  |  |
| --- | --- |
| c) If corrections to data are required as a result of secondary review, who makes the corrections and how is this documented? |  |
| c) Is data ever qualified? Who determines the appropriate qualifiers? Are the qualifications reviewed as part of the review process? |  |
| d) Does a list of qualifiers and their definition accompany the data? |  |
| e) Are the results of method QC reported with the sample results? |  |
| f) Is an assessment of measurement uncertainty provide with the final results? |  |
| g) What units are the results reported in? |  |
| h) How are final reports generated and disseminated to the sample submitter? |  |
| **Additional Comments on Audit:** | |

Conducting TSAs

Revision 0 Date: 11/2017 Page 104 of 105

**Appendix E**

**Example Technical Systems Audit Report Template**

The following Technical Systems Audit report template is designed to include the desired elements that each Technical Systems Audit report should include, and serves as an aid for Regional auditors to use in preparing the TSA report. This template may be edited for specific regional use.

**2017 Technical Systems Audit Report – Draft or**

**Final**

## Agency Name: Agency Location:

**Project Date:**



##### Project Leader: NAME

ADDRESS

PROJECT ID: Draft OR Final Report Page **1** of **9**

Approvals: Project Leader:

|  |  |  |
| --- | --- | --- |
| NAME  Section |  | Date |

Approving Official:

|  |  |  |
| --- | --- | --- |
| NAME, TITLE  Section |  | Date |

##### Table of Contents

[1.0 Executive Summary 4](#_bookmark79)

[2.0 Introduction 5](#_bookmark80)

[3.0 Commendations 6](#_bookmark81)

* 1. [Findings and Recommendations 6](#_bookmark82)
  2. [*FIELD OPERATIONS* 7](#_bookmark83)
  3. [*LABORATORY OPERATIONS* 7](#_bookmark84)
  4. [*RECORDS MANAGEMENT* 8](#_bookmark85)
  5. [*DATA MANAGEMENT* 8](#_bookmark86)
  6. [*QUALITY ASSURANCE* 9](#_bookmark87)

[5.0 Conclusions 9](#_bookmark88)

Appendix A: Response – Technical Systems Audit Questionnaire 10

**1.0 Executive Summary**

Enter language here, followed by page break

##### 2.0 Introduction

On , 2017, EPA Region personnel conducted a TSA of the ambient air monitoring program. The audit team included \_ (lead auditor), and

.

Pursuant to 40 CFR Part 58, Appendix A, §2.5, TSAs of each Primary Quality Assurance Organization (PQAO) are required to be conducted every three years; monitoring organizations within a PQAO should be audited within 6 years (2 TSA cycles). operates its ambient air monitoring program under the PQAO, utilizing the quality assurance project plans (QAPPs) and standard operating procedures (SOPs) established by . The purpose of this TSA was to assess ’s compliance with established regulations governing the collection, analysis, validation, and reporting of ambient air quality data. Data reviewed as part of this TSA included that generated during the 2014-2016 calendar years. Data was queried from EPA’s Air Quality System (AQS) database prior to the on-site audit. SESD’s Ambient Air Monitoring Technical Systems Audit Form (i.e., questionnaire) was completed by staff prior to the on-site audit and is included as Appendix A of this report.

The audit included a review of data, recordkeeping, documentation, and support facilities housed at the office complex, located at , (City, State). The (PM10/PM2.5 gravimetric, or toxics/analytical) laboratory was audited as well. \_#\_ air monitoring stations were inspected during the audit. The sites visited are listed below.

**Common Site Name AQS Identification**

NAME XX-XXX-XXXX

NAME XX-XXX-XXXX

During the audit, the following personnel were interviewed.

* NAME, Title
* NAME, Title

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

* AMP 251: QA Raw Assessment Report (2014-2016)
* AMP 256: QA Data Quality Indicator Report (2014-2016)
* AMP 350: Raw Data Report (2014-2016)
* AMP 350MX: Raw Data Max Values Report (2014-2016)
* AMP 360: Raw Data Qualifier Report (2014-2016)
* AMP 380: Site Description Report (2014-2016)
* AMP 390: Monitor Description Report (2014-2016)
* AMP 430: Data Completeness Report (2014-2016)
* AMP 480: Design Value Report (2016)
* AMP 503: Extract Sample Blank Data (2014-2016)
* AMP 504: Extract QA Data (2014-2016)
* AMP 600: Certification Evaluation and Concurrence (2014-2016) Additionally, the following quality documents were reviewed.
* *NAME, Control Number, Revision Number, Date*
* *NAME, Control Number, Revision Number, Date*
* *NAME, Control Number, Revision Number, Date*

##### 3.0 Commendations

Enter text here

##### Findings and Recommendations

The observations from this TSA were compared to EPA regulations, technical policies and guidance, and the monitoring organization’s 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**: | Departure from or absence of a specified requirement (regulatory, QMP, QAPP, SOP, etc.) or guidance deviation which could significantly impact data quality. |
| **Concern**: | Practices thought to have potential detrimental effect on the ambient air monitoring program’s operational effectiveness or the quality of sampling or measurement results. |
| **Observation**: | An infrequent deviation, error, or omission which does not impact the output of the quality of the work product, but may impact the record for future reference. |

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 submitted to EPA. **Observations** do not require corrective actions.

* 1. **FIELD OPERATIONS**
     1. **Finding:**

Discussion:

**Recommendation:**

* + 1. Concern:

**Discussion**:

Recommendation:

* + 1. **Observation:**

Discussion:

**Recommendation**:

* 1. LABORATORY OPERATIONS
     1. **Finding:**

Discussion:

**Recommendation**:

* + 1. Concern:

**Discussion:**

Recommendation:

* + 1. **Observation**:

Discussion:

**Recommendation:**

* 1. RECORDS MANAGEMENT
     1. **Finding**:

Discussion:

**Recommendation**:

* + 1. Concern:

**Discussion**:

Recommendation:

* + 1. **Observation**:

Discussion:

**Recommendation:**

* 1. DATA MANAGEMENT
     1. **Finding:**

Discussion:

**Recommendation:**

* + 1. Concern:

**Discussion:**

Recommendation:

* + 1. **Observation**:

Discussion:

**Recommendation:**

* 1. QUALITY ASSURANCE
     1. **Finding:**

Discussion:

**Recommendation:**

* + 1. Concern:

**Discussion:**

Recommendation:

* + 1. **Observation**:

Discussion:

**Recommendation:**

##### 5.0 Conclusions

Enter text here

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 corrective action and, therefore, do not need to be addressed. If anticipates that the development of the corrective action plan will not be completed within 30 days after the receipt of the final TSA report, please contact EPA to request an extension.

Page Break, then attach Appendix A

Conducting TSAs

Revision 0 Date: 11/2017 Page 105 of 105

**Appendix F**

**Example Technical Systems Audit Close-Out Letter**

The following Technical Systems Audit Close-Out letter is designed to include the desired elements that each TSA Close-Out letter may include, and serves as an aid for Regional auditors to use in closing out the TSA. This template may be edited for specific regional use.

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**



August 1, 2017

Mr. John Smith, Director ACME Agency

200 North Monitoring Street Anywhere, US 12345

Project ID: 01-1234 Dear Mr. Smith:

On May 20, 2016, a corrective action plan (CAP) was submitted by the ACME Agency to the EPA Region X, which addressed the findings identified in the ACME 2016 Technical Systems Audit (TSA). During this past year, ACME has implemented corrective action measures as described in the 2016 CAP, providing EPA with both verbal and written progress updates at routine intervals. As of July 28, 2017, all issues identified in the 2016 TSA report have been successfully resolved by your agency.

I appreciate your agency’s participation in the TSA, as well as the diligence of your staff to address the issues that were identified. EPA has finalized this TSA in the EPA Air Quality System (AQS) database, entering the date of this letter as the official close-out date. If you have any questions or concerns about this correspondence, please contact Joe Auditor of my staff at (123) 456-7890.

Sincerely,

Jane Supervisor, Chief Air Protection Branch

|  |  |  |
| --- | --- | --- |
| United States Environmental Protection Agency | Office of Air Quality Planning and Standards Air Quality Assessment Division  Research Triangle Park, NC | Publication No. EPA-454/B-17-004  November 2017 |