**Critical Criteria – PM2.5/PM10 Filter Based Local Conditions**

**Field Activities**

|  |  |  |  |
| --- | --- | --- | --- |
| **Criteria** | **Frequency** | **Acceptable Range** | **Review Comments** |
| **Sampler/Monitor**  | *NA* | *Meets requirements listed in FRM/FEM/ARM designation* | 40 CFR Part 58 App C40 CFR Part 53 & FRM/FEM method list |
| **Sampling Period** |  |  |  |
| *Sampling Period (including multiple power failures)* | *All Filters* | *1380 – 1500 minutes, or if value <1380 and exceedance of NAAQS;**midnight to midnight local std time* | 40 CFR Part 50 App L (throughout) |
| **Filter Holding Times** |  |  |  |
| *Sample Recovery* | *All Filters* | *≤ 7 days 9 hours from sample end time* |  |
| *Pre-sampling* | *All filters* | *≤ 30 days before sampling* |  |
| **Sampling Instrument** |  |  |  |
| *Average Flow Rate* | *Every 24 hours of operation* | *Average within 5% of 16.67 liters/minute* |  |
| *Variability in Flow Rate* | *Every 24 hours of operation* | *CV ≤ 2%;**No flow rate excursions > ± 5% for > 5 minutes* |  |
| *One-point Flow Rate Verification* | *Every 30 days each separated by at least 14 days* | *± 4.1% of transfer standard**± 5.1% of flow rate design value* |  |
| *Design Flow Rate Adjustment* | *After 1-pt or multi-point verification/calibration* | *< ± 2.1 % of design flow rate* |  |
| *External Leak Check* | *Before each flow rate verification/calibration and before and after PM2.5 separator maintenance* | *≤ 8.5” Hg in 30 sec (2000H)**≤ 25 mm Hg in 60 sec (2000i)* |  |
| *Internal Leak Check* | *If failure of external leak check* | *≤ 8.5” Hg in 30 sec (2000H)**≤ 140 mm Hg in 60 sec (2000i)* |  |
| *Filter Temp Sensor* | *Every 24 hrs of operation* | *No excursions > 5° C lasting longer than 30 minutes* |  |

**Laboratory Activities**

|  |  |  |  |
| --- | --- | --- | --- |
| **Criteria** | **Frequency** | **Acceptable Range** | **Review Comments** |
| *Post Sampling Weighing* | *All filters* | *Kept < 25˚ C from sample retrieval to conditioning;**≤ 10 days from sample end date if shipped at ambient temperature, or**≤ 30 days if shipped below avg. ambient (or < 4° C or below for avg. sampling temps < 4 °C) from sample end date* |  |
| *Filter Visual Defect Check (unexposed)* | *All filters* | *Correct type & size and for pinholes, particles or imperfections* |  |

**Filter Conditioning Environment**

|  |  |  |  |
| --- | --- | --- | --- |
| *Equilibration* | *All filters* | *24 hours minimum* |  |
| *Temp. Range* | *All filters* | *24-hr mean 20.0-23.0° C* |  |
| *Temp. Control* | *All filters* | *< 2.1° C Std Dev over 24 hours* |  |
| *Relative Humidity* | *All filters* | *24-hr mean 30.0 – 40.0% RH or**≤ 5.0% sampling RH but ≥ 20.0% RH* |  |
| *Humidity Control* | *All filters* | *< 5.1% Std Dev over 24 hours* |  |
| *Pre/Post Sampling RH* | *All filters* | *Diff in 24-hr means < ± 5.1% RH* |  |
| *Balance* | *All filters* | *Located in filter conditioning environment* |  |
| *Balance auto-calibration* | *Prior to each weighing session* | *Manufacturer’s specs* |  |

**Operational Evaluations Table - PM2.5/PM10 Filter Based Local Conditions**

**Field Activities**

**Routine Verifications**

|  |  |  |  |
| --- | --- | --- | --- |
| **Criteria** | **Frequency** | **Acceptable Range** | **Review Comments** |
| *1-point Temp. Verification* | *Every 30 days* | *< ± 2.1° C* |  |
| *Press. Verification* | *Every 30 days* | *< ± 10.1 mm Hg* |  |

**Annual Multi-point Verifications/Calibrations**

|  |  |  |  |
| --- | --- | --- | --- |
| *Temp. multi-point verifications/calibrations* | *Upon installation, then 1/yr.* | *< ± 2.1° C* |  |
| *Pressure verification/ calibration* | *Upon installation, and upon 1-pt verification failure* | *< ± 10.1 mm Hg* |  |
| *Flow rate multi-point verification/calibration* | *Upon installation, maintenance or transport, then 1/yr.* | *< ± 2.1% of transfer standard* |  |
| *Other Monitor Calibrations* | *Per manufacturer’s operation manual* | *Per manufacturer’s operation manual* |  |

**Precision**

|  |  |  |  |
| --- | --- | --- | --- |
| *Collocated Samples**SLAMS* | *Every 12 days for 15% of sites by designation* | *CV < 10.1% of samples ≥ 3.0 µg/m3* |  |
| *Collocated Samples**PSD* | *Every 6 days for 15% of sites by designation* | *CV < 10.1% of samples ≥ 3.0 µg/m3* |  |

**Accuracy**

***Note: All equipment and transfer standards used for QA audits must be independent of the equipment used for routine QC activities such as 1-point and multi-point verifications and calibrations***

|  |  |  |  |
| --- | --- | --- | --- |
| *Temp. Audit* | *SLAMS every 180 days**PSD Quarterly.* | *< ± 2.1 °C* |  |
| *Press. Audit* | *SLAMS every 180 days**PSD Quarterly* | *< ± 10.1 mm Hg* |  |
| *Flow Rate Audit* | *SLAMS every 5-7 months**PSD Quarterly* | *< ± 4.1% of audit standard**< ± 5.1% of design flow rate* |  |

**Monitor Maintenance**

|  |  |  |  |
| --- | --- | --- | --- |
| *Very Sharp Cut Cyclone* | *Every 30 days* | *Cleaned/changed* |  |
| *Inlet/downtube cleaning* | *Every 90 days* | *Cleaned* |  |
| *Filter chamber cleaning* | *1/mo.* | *Cleaned* |  |
| *Circulating fan/filter* | *1/mo.* | *Cleaned/changed* |  |
| *Manufacturer’s Recommended Maintenance* | *Per manufacturer’s operations manual* | *Per manufacturer’s operations manual* |  |

**Laboratory Activities**

**Filter Checks**

|  |  |  |  |
| --- | --- | --- | --- |
| **Criteria** | **Frequency** | **Acceptable Range** | **Review Comments** |
| *Lot Blanks* | *9 filters per lot* | *< ± 15.1 µg change between weighings* |  |
| *Exposure Lot Blanks* | *3 filters per lot* | *< ± 15.1 µg change between weighings* |  |
| *Filter Integrity (exposed)* | *Each filter* | *No visual defects* |  |

**Lab QC Checks**

|  |  |  |  |
| --- | --- | --- | --- |
| *Field Filter Blanks* | *10% or 1 per weighing session* | *< ± 30.1 µg change between weighings* |  |
| *Lab Filter Blanks* | *10% or 1 per weighing session* | *< ± 15.1 µg change between weighings* |  |
| *Balance Check (working standards)* | *Beginning, 10th sample, end* | *< ± 3.1 µg* |  |
| *Duplicate Filter Weighing* | *1 per weighing session* | *< ± 15.1 µg change between weighings* |  |
| *Microbalance Audit* | *1/yr.* | *< ± 0.003 mg or manufacturer’s specs, whichever is tighter* |  |

**Verification/Calibrations**

|  |  |  |  |
| --- | --- | --- | --- |
| *Lab Temperature* | *Every 90 days* | *< ± 2.1 °C* |  |
| *Lab Humidity* | *Every 90 days* | *< ± 2.1 %* |  |
| *Microbalance Calibration* | *At Installation &* *1/yr.* | *Manufacturer’s specifications* |  |

**Calibrations & Check Standards**

|  |  |  |  |
| --- | --- | --- | --- |
| *Working Mass Standards (compared to primary standards)**Primary Standards* | *Every 90 days**1/yr.* | *< ± 2.1 µg**0.025 mg* |  |

**SYSTEMATIC CRITERIA – PM2.5/PM10 Filter Based Local Conditions**

|  |  |  |  |
| --- | --- | --- | --- |
| **Criteria** | **Frequency** | **Acceptable Range** | **Review Comments** |
| *Siting* | *1/yr.* | *SLAMS Meets siting criteria* *or waiver documented**PSD as per approved QAPP* |  |
| *Data Completeness SLAMS**(3-year averaging period to calculate NAAQS compliance)* | *Annual Standard**24-hour Standard* | *≥ 75% scheduled sampling days per quarter**≥ 75% scheduled sampling days per quarter* |  |
| *Data Completeness PSD (typically a 1-year monitoring period)* | *Annual Standard**24-hour Standard* | *≥ 80% of scheduled sampling days per quarter**≥ 80% of scheduled sampling days per quarter* |  |
| *Reporting Units* | *All filters* | *µg/m3 at ambient temp/press (PM2.5)* |  |
| *Rounding convention for DV calculation and data reported to AQS* | *All filters* | *To one decimal, with additional digits to the right being truncated* |  |
| *Annual 3-yr average* | *All concentrations* | *Nearest 0.1 µg/m3 (≥0.05 round up)* |  |
| *24-hour, 3-yr average* | *All concentrations* | *Nearest 1 µg/m3 (≥0.5 round up)* |  |
| **Detection Limit** |  |  |  |
| *Lower detection limit* | *All filters* | *≤ 2 µg/m3* |  |
| *Upper concentration limit* | *All filters* | *≥ 200 µg/m3* |  |
| **Precision** |  |  |  |
| *Single analyzer (collocated monitors)* | *Every 90 days* | *Coefficient of variation (CV) < 10.1% for values ≥ 3.0 µg/m3* |  |
| *Primary Quality Assurance Organization (PQAO)* | *Annual and 3 year estimates* | *90% confidence level (CL) of CV < 10.1% for values ≥ 3.0 µg/m3* |  |
| **Bias** |  |  |  |
| *Performance Evaluation Program (PEP) SLAMS* | *5 audits for PQAOs with ≤ 5 sites**8 audits for PQAOs with > 5 sites* | *< ± 10.1% for values ≥ 3.0 µg/m3* |  |
| *Performance Evaluation Program (PEP) PSD* | *1/yr.* | *< ± 10.1% for values ≥ 3.0 µg/m3* |  |
| *Technical Systems Audit**SLAMS* | *1/3 yr.* | *Review of entire field, lab, and data reporting process for comparison to QC/QA requirements* |  |
| *Technical Systems Audit**PSD* | *1/project, if extended 1/yr.* | *Review of entire field, lab, and data reporting process for comparison to QC/QA requirements* |  |

**Field Activities**

**Verification/Calibration Standards Recertification – All standards should have multi-point certifications against NIST traceable standards**

|  |  |  |  |
| --- | --- | --- | --- |
| **Criteria** | **Frequency** | **Acceptable Range** | **Review Comments** |
| *Flow Rate Transfer Standard* | *Every 365 days* | *< ± 2.1% of NIST Traceable Standard* |  |
| *Field thermometer* | *Every 365 days* | *± 0.1° C resolution**± 0.5° C accuracy* |  |
| *Field barometer* | *Every 365 days* | *± 1 mm Hg resolution**± 5 mm Hg accuracy* |  |
| *Clock/timer verification* | *Every 30 days* | *± 1 min NIST AST* |  |

**Laboratory Activities**

|  |  |  |  |
| --- | --- | --- | --- |
| **Criteria** | **Frequency** | **Acceptable Range** | **Review Comments** |
| *Microbalance Readability* | *At purchase* | *1µg* |  |
| *Microbalance Repeatability* | *At purchase* | *1µg* |  |
| *Primary mass/Working mass Verification/Calibration Standards Recertification* | *1/yr* | *0.025 mg tolerance* |  |