**Attachment C. Use of Data Qualifiers for PM2.5 Data**

OAQPS is emphasizing the need to accumulate as much $PM_{2.5}$ data into AIRS as possible in order to perform various data analysis and data quality assessments. Since EPA and the States have gone to the effort to collect this information, it is important that we use it to gain as much knowledge as possible about preliminary concentrations, trends, and ways to improve data quality. OAQPS has developed a set of generic data qualifiers (flags) in order to allow data to be entered in AIRS that the State/locals believe have value, but are unsure of its quality. The approach tries to provide a balance of ease of use and specificity. Due to limitations in the current AIRS network, the only place for flags is in the exceptional event area where most letters are already in use. There are 4 flags already associated with PM2.5. The flags T, W, X and Y are the flags associated with the sampler acceptance criteria identified in Table L-1 of 40 CFR Part 50. The 6 flags listed below can also be used. Applicability of other flags in AIRS pertaining to $PM_{10}$ or other pollutants has not been determined.

**Flag Comments**

1. **Deviation from a CFR requirement**- Data collected did not or may not meet all of the critical criteria for sampling and analysis as specified in CFR and the Validation Template critical criteria table (Table 1). As stated in the Validation Template: *"Criteria that were deemed critical to maintaining the integrity of a sample or group of samples were placed in the* ***Critical Criteria Table*** *(see Table 1). Observations that do not meet each and every criterion on the Critical Criteria Table should be invalidated unless there are compelling reason and justification for not doing so. Basically, the sample or group of samples for which one or more of these criteria are not met is invalid until proven otherwise."* The State/local may use this flag when it is unclear of the effect of the deviation on data quality. This flag should be rarely used, but there may be instances where other QA/QC information tend to validate the sample or changes/updates to the critical criteria table may allow utilization of the data for some purposes.

2. **Operational Deviations** - Data quality may be impacted by sampling and analysis procedures which did not or may not comply with acceptable range or threshold values from either the Validation Template operational evaluations table (see Table 2) or a State/local defined acceptance criteria.

3. **Field Issue**- Data that may have been effected by events occurring in the field that could potentially have compromised the integrity of the sample (oil crystallization, excessive dust etc.)

4. **Lab Issue** - Data that may have been effected by events occurring in the lab that could potentially have compromised the integrity of the sample (cassette off gassing, etc.)

5. **Outlier** - Data value that appears to be invalid either because it is outside the normal/expected range of concentrations or fails various statistical or comparison tests. However, there is no additional information available that would provide a reason to invalidate the value(s).

6. **QAPP Issue** - Data collection prior to QAPP approval per 01/21/99 memo from Bill Hunt

**Flags would be placed only on data for which the State/local was uncertain of its quality, not on data it considers to be invalid, which should not be entered**. Since these flags are generic and AIRS does not have a free form comment field at the individual sampler level, State and locals would have to document, at the local level, the actual problem that occurred with each sample that is flagged. Tables 1 and 2 provide examples of more specific flags that could be associated with the generic flag. For example, each "1" flag could be associated with another flag (1_ _) that would distinguish the actual CFR criteria violated. This way, the State and locals would not have to generate much in the way of free form notes on the flagged data. In addition, there are some acceptance criteria in the Validation Template that would not require a flag. These are designated by "N/A". State and local agencies would have to develop any additional flags not identified in Tables 1 and 2.

Use of flags would allow more data into the system, affording better data analysis and data quality assessments (prior to any official NAAQS assessment) to determine whether or not the flagged data could be used for attainment decisions. These assessments would also help effect changes in acceptance criteria in our regulation and guidance documents. OAQPS plans on using the Data Validation Workgroup, made up of EPA Regions and State and local monitoring representatives who helped develop the PM2.5 Data Validation Template, to assist in evaluation of the usefulness of flagged data.

**Table 1. Critical Criteria Table**

| **CRITICAL CRITERIA TABLE**<br>[a] **S- Single Filter, G- Group of filters (i.e. batch), G1-Group of filters from 1 instrument** | | | | |
|---|---|---|---|---|
| **Criteria** | **Acceptable Range** | **Frequency** | **AIRS FLAG** | **Local FLAG** |
| ***Filter Holding Times*** | | | | |
| Sample Recovery | # 4 days from sample end date | all filters | 1 | SR |
| Post-sampling Weighing | # 10 days at 25E C from sample end date, or<br># 30 days at 4E C from sample end date<br>*See 1/20/00 memo on filter cassette transport http://www.epa.gov/ttn/amtic/pmpolgud.html* | all filters | 1 | FT |
| ***Sampling Period*** (including multiple power failures) | 1380-1500 minutes, or<br>value if < 1380 and exceedance of NAAQS [1/]<br>midnight to midnight | all filters | Y | |
| ***Sampling Instrument*** | | | | |
| Average Flow Rate | average within 5% of 16.67 liters/minute | 24 hours of op | 1 | AF |
| Variability in Flow Rate | CV # 2% | 24 hours of op | 1 | VF |
| ***Filter*** | | | | |
| Visual Defect Check (unexposed) | see reference | all filters | NA | |
| Filter Conditioning Environment | | | | |
| Equilibration | 24 hours minimum | all filters | 1 | EQ |
| Temp. Range | 24-hr mean 20-23E C | all filters | 1 | TR |
| Temp.Control | ± 2E C SD* over 24 hr | all filters | 1 | TC |
| Humidity Range | 24-hr mean 30% - 40% RH or<br># 5% sampling RH but > 20%RH | all filters | 1 | HR |
| Humidity Control | ± 5% SD* over 24 hr. | all filters | 1 | HC |
| Pre/post Sampling RH | difference in 24-hr means # ± 5% RH | all filters | 1 | RH |

| CRITICAL CRITERIA TABLE<br>[a] S- Single Filter, G- Group of filters (i.e. batch), G1-Group of filters from 1 instrument | | | | |
|---|---|---|---|---|
| **Criteria** | **Acceptable Range** | **Frequency** | **AIRS FLAG** | **Local FLAG** |
| Balance | located in filter conditioning environment | all filters | NA | |
| ***Calibration/Verification*** | | | | |
| One-point FR Check | ± 4% of transfer standard | 1/4 weeks | 1 | FR |

**1/ value must be flagged**
***= variability estimate not defined in CFR**
**SD= standard deviation**
**CV= coefficient of variation**
**NA- Not applicable for a flag in AIRS**

**Table 2. Operational Evaluations Table**

| OPERATIONAL EVALUATIONS TABLE<br>[a] S- Single Filter, G- Group of filters (i.e. batch), G1-Group of filters from 1 instrument | | | | | |
|---|---|---|---|---|---|
| **Criteria** | **Acceptance Range** | **Frequency** | **Samples Impacted [a]** | **AIRS FLAG** | **Local FLAG** |
| ***Filter Checks*** | | | | | |
| Lot Blanks | less than 15 Fg change between weighings | 9 filters per lot | G | NA | |
| Exposure Lot Blanks | less than 15 Fg change between weighings | 3 filters per lot | G | NA | |
| Filter Integrity (exposed) | no visual defects | each filter | S | NA | |
| ***Filter Holding Times*** | | | | | |
| Pre-sampling | < 30 days before sampling | all filters | S | 2 | HT |
| ***Lab QC Checks*** | | | | | |
| Field Filter Blank | ± 30 Fg change between weighings | 10% or 1 per weighing session | G/G1 | 2 | FB |
| Lab Filter Blank | ± 15 Fg change between weighings | 10% or 1 per weighing session | G | 2 | LB |
| Balance Check | #3 Fg | beginning, 10th sample, end | G | NA | |
| Duplicate Filter Weighing | ± 15 Fg change between weighings | 1 per weighing session | G | NA | |
| ***Sampling Instrument*** | | | | | |
| Individual Flow Rates | no flow rate excursions > ±5% for > 5 min. 1/ | every 24 hours of op | S | W or T 2/ | |
| Filter Temp Sensor | no excursions of > 5E C lasting longer than 30 min 1/ | every 24 hours of op | S | X or T 2/ | |
| ***Calibration/Verification*** | | | | | |
| External Leak Check | < 80 mL/min | every 5 sampling events* | G1 | 2 | EL |
| Internal Leak Check | < 80 mL/min | every 5 sampling events | G1 | 2 | IL |
| Temperature Calibration | ± 2EC of standard | if multi-point failure | G1 | NA | |
| Temp M-point Verification | ± 2EC of standard | on installation, then 1/yr | G1 | NA | |
| One-point Temp Check | ± 4EC of standard | 1/4 weeks | G1 | 2 | TP |
| Pressure Calibration | ± 10 mm Hg | on installation, then 1/yr | G1 | NA | |
| Pressure Verification | ± 10 mm Hg | 1/4 weeks | G1 | 2 | BP |
| Other Monitor Calibrations | per manufacturers' operating manual | per manufacturers' op manual | G | 2 | ? |
| Lab Temperature | ± 2EC | 1/6 months | G | 2 | LT |
| Lab Humidity | ± 2% | 1/6 months | G | 2 | LH |

| OPERATIONAL EVALUATIONS TABLE<br>[a] S- Single Filter, G- Group of filters (i.e. batch), G1-Group of filters from 1 instrument | | | | | |
|---|---|---|---|---|---|
| **Criteria** | **Acceptance Range** | **Frequency** | **Samples Impacted [a]** | **AIRS FLAG** | **Local FLAG** |
| Flow Rate (FR) Calibration | ± 2% of transfer standard | if multi-point failure | G1 | NA | |
| FR Multi-point Verification | ± 2% of transfer standard | 1/yr | G1 | NA | |
| Design Flow Rate Adjustment | ± 2% of design flow rate | at one-point or multi-point | G1 | 2 | DF |
| Mirobalance Calibration | Manufacturer's specification | 1/yr | G | NA | |
| ***Precision*** | | | | | |
| Collocated Samples | CV ≤ 10% of samples > 6 Fg/m$^3$ | every 6 days for 25% of sites | G | NA | |
| ***Accuracy*** | | | | | |
| Temperature Audit | ± 2EC | 4/yr | G1 | NA | |
| Pressure Audit | ±10 mm Hg | 4/yr | G1 | NA | |
| Balance Audit | ± 0.050 mg or manufacturers specs, whichever is tighter | 1/yr | G | NA | |
| Flow Rate Audit | ± 4% of audit standard<br>± 5% of design flow rate | 1/2wk (automated)<br>4/yr (manual) | G1 | 2 | FA |
| ***Calibration & Check Standards*** (working standards) | | | | | |
| Field Thermometer | ± 0.1E C resolution, ± 0.5E C accuracy | 1/yr | G/G1 | NA | |
| Field Barometer | ± 1 mm Hg resolution, ± 5 mm Hg accuracy | 1/yr | G/G1 | NA | |
| Working Mass Stds. (compare to primary standards) | 0.025 mg | 1/3 mo. | G | NA | |
| ***Monitor Maintenance*** | | | | | |
| Impactor | cleaned/changed | every 5 sampling events | G1 | NA | |
| Inlet/downtube Cleaning | cleaned | every 15 sampling event | G1 | NA | |
| Filter Chamber Cleaning | cleaned | monthly | G1 | NA | |
| Leak Check [@] | see ***Calibration/Verification*** | | | | |
| Circulating Fan Filter Cleaning | cleaned/changed | monthly | G1 | NA | |
| Manufacturer-Recommended Maintenance | per manufacturers' SOP | per manufacturers' SOP | G1 | NA | |

**1/ value must be flagged**

**2/ These are sampler defined flags. If only one sampler defined flag is generated the first flag is used , if there are multiples the "T" is used**

***= variability estimate not defined in CFR**

[@] = **Scheduled to occur immediately after impactor cleaned/changed.**

**SD= standard deviation**

**CV= coefficient of variation**

**NA- Not applicable for a flag in AIRS**