

Appendix H - Quality Control (QC) / Quality Assurance (QA)

H.0 Introduction

Several steps were taken to assure the quality or validity of the data in this report. Instruments were checked before deployment or as they were deployed. Their data were given a quick reality check as first received. Audits or calibration checks of the instruments were performed periodically during this study. And a more thorough examination was applied to the data as time permitted. The following sections describe these QC/QA activities.

H.1 Field QA Procedures and Criteria

The field QA procedures and criteria were conducted using an E-BAM Operator Checklist provided by Air Resource Specialists, Inc. The items on the checklist included:

- Alarms,
- Tape thickness,
- Audits of temperature, pressure, and flow
- Leak check
- and data retrieval.

A more detailed description of field QA procedures and criteria can be found in the E-BAM Operation Manual.¹

H.2 Data Validation Procedure Applied to E-BAM Data

The raw data sets from the E-BAM instruments were initially TXT files either directly downloaded from the instrument or downloaded from the web site. These files were opened with MS EXCEL and saved as EXCEL workbooks. The date and time were combined into a single column containing the EXCEL date/time value. The times were adjusted, as needed, to Eastern Daylight Time. The ConcRT and ConcHR values were converted, as needed, to micrograms per cubic meter. Columns containing the temperatures in degrees Fahrenheit were deleted if they were part of the data set. The criteria listed below were applied to the appropriate columns of data by applying conditional formats to the cells marking them conditionally red or yellow. The data were then manually scanned with the red and yellow markings indicating which parameters were outside the criteria. Based on the those indications and considering that the ConcHR values were computed from the past hour's data, a new column was created and filled manually according to the table of "QA Flags in QA Flag Column of E-BAM Data Files."

H.2.1 Data Validation Criteria applied to Evans Road Fire E-BAM Data

Time

The date/time field was marked yellow if the difference from the previous time was greater than the nominal time interval of the data (15, 30, 60 min.) or less than or equal to the previous date/time. This allowed the quick identification of gaps or duplications in the data.

¹ E-BAM Operation Manual. Met One Instruments, Inc. 1600 NW Washington Blvd. Grants Pass, Oregon 97526

To mark gaps in the data a blank line was inserted. Several of these gaps were filled in when directly downloaded data became available.

Particulate Matter (PM) ConcRT and ConcHR

The PM concentrations were marked red if the flow was less than 13.36 or greater than 20.4 or the relative humidity inside (RHi) was greater than 50. The manual suggests that the RHi be kept at or below 45 to prevent tearing of the tape which collects the PM. Some units came to us adjusted to maintain RHi at or below 50 rather than 45. The PM concentration was marked yellow if the flow was less than 15.03 or greater than 18.37 or RHi was greater than 45. ConcRT values when flows are in the red range were flagged as invalid. ConcRT and ConcHR values marked red solely due to RHi or Delta T values were considered acceptable unless there were other factors. Conc values marked yellow are acceptable unless other factors from the site logs or data sheets indicate a problem or interference. Additional ConcHR values were manually marked red and invalid because the flow during the preceding hour when the PM value was being averaged were in the red zone due to improper flow.

Internal Humidity (RHi)

The RHi column was marked yellow if greater than 45 and marked red if greater than 50. The operation manual recommends that the humidity be kept at 45 or less to prevent the tape from tearing. The instrument attempts to keep the internal humidity below a set point by applying heat inside the instrument to the area where the tape is collecting PM. Some of the units appear to have a set point higher than the recommended 45. This may be acceptable as long as the tape did not tear.

Alarm

Any value other than zero is an alarm and was marked red or yellow; the alarm table should be checked for the meaning of the alarm number. Most alarms resulted in data being flagged red or invalid.

Delta T

Delta T is the difference between exterior ambient temperature AT(C) and interior filter temperature FT(C); the operation manual recommends that this difference be 8° C or less. This value can be adjusted in the set-up and apparently had been adjusted higher in some units, probably in an attempt to keep the RHi at or below 45 or 50. The Delta T was marked yellow if greater than 8° C and marked red if greater than 10° C. It probably had little or no effect on the PM data in these units.

Other Data

Other data were manually marked red to indicate invalid data, for example some ambient temperatures below 15° C including negative values were marked red and invalid.

Table H.2 QA Flags in QA Flag Column of E-BAM Data Files

QA Flag	Meaning
Cell is blank or empty	Data is valid
AT invalid	AT value is invalid

AT & Conc invalid	AT and both Conc values are invalid
Conc Invalid	Both Conc values are invalid
ConcHR Invalid	ConcHR value is invalid
ConcRT Invalid	ConcRT value is invalid
Record Invalid	All data in the record is invalid