QA/QC Requirements & Data Editing Procedures

The assessment of air quality information is dependent on the accuracy of the monitoring equipment and validity of the data collected. A major portion of any air monitoring program must be dedicated to QA/QC to ensure the maximum percentage of valid data.

Audits are a independent performance check of instrument operation to the required manufactures specification and designated reference method. A known and verified reference standard is used to check analyzer response. No adjustments are made. A **Calibration** is a check of the instrument response to a known and verified standard. The instrument response and output is adjusted to the known standard.

Sampling equipment such as continuous air monitoring instrumentation, meteorological sensors and non continuous samplers require varying levels of QA/QC. Laboratory services must also meet stringent QA/QC criteria and be accredited as to ensure the validity of analysis and data collected.

System Audit/Performance Audit

A system audit encompasses the entire sampling train from the air sampling inlet manifold to the continuous analyzers, data acquisition system and final data storage and reporting. It some cases it may include, site location criteria. It is important that each component of the system be measured and audited.

Continuous Analyzer Calibration

Today's state of the art instrumentation provides for internal auto Zero/Span calibration function, remote control calibration and auto adjusting zero to compensate for instrument drift. Several levels of response checks, calibration and third party audits are necessary to ensure valid data. QA/QC requirements for continuous analyzers are as follows;

Audit and calibration

- daily internal Zero/Span check (Figure 1)
- monthly External calibration and adjustment
- third party audit

Data editing and reporting

- data correction and editing based on daily calibration and audit reports
- review instrument log reports
- review instrument and data acquisition status reports

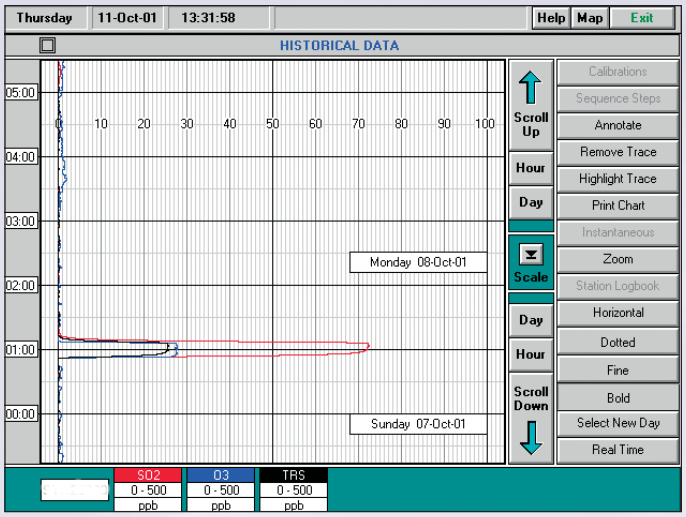

Figure 1 - Calibration Report (courtesy of EMC software)

Several audit and calibration sources are available to perform QA/QC procedures.

Permeation systems are one of the most common calibration sources. These systems can be supplied by the instrument manufacture or purchased from an independent supplier. Permeation tubes can be purchased certified or uncertified. Permeation sources have proven to be very reliable when both the temperature of the oven and the air flow across the tube is constant.

Calibration cylinders provide known concentrations of gas.

Gas Dilution systems are the most versatile method for multi-calibration sources. Based on the dilution rate a multitude of calibration concentrations can be delivered to the analyzer.

Prior to performing an audit or calibration, analyzers require Zeroing to establish a baseline. Several acceptable materials are available such as charcoal scrubbers, zero filters and ultra pure zero compressed air maybe used to obtain a acceptable baseline.

Non-Continuous Samplers

Unlike real-time continuous analyzers, non-continuous samplers (ie HiVols, PAH,VOC) require laboratory analysis to determine the concentration of the sample. Field collection equipment require one level QA/QC, while a second level of QA/QC is required to ensure the accuracy of the analytical method.

When selecting a suitable sampling method such as; US EPA METHOD TO-14A (VOC Monitoring) the following factors must be considered;

- contaminate of concern
- required detection limits
- laboratory analytical methods
- selection of collection medium
- known interferences

Audit Samples

A number of audit samples are required to validate both sampling and analytical methods . The sampling equipment must be operating as per manufactures specifications. Leak , flow checks and required maintenance must be carried out prior to performing Audit sampling. A number of audit samples may be required based on the complexity of the monitoring program. The following audit samples must be collected to ensure accuracy of the data.

- field blanks, travel blank
- duplicate sample
- spike sample
- background or control samples
- upwind/downwind pairings

Laboratory Audit

The laboratory conducting the analytical analysis must perform required QA/QC procedures to demonstrate the accuracy of the analysis.

Rotek Environmental Inc. can provide the required QA/QC procedures for both continuous and non continuous air monitoring instrumentation such as;

- provide required equipment to perform the required audit and calibration
- provide required hardware and software to perform manual and automatic calibrations
- arrange for and carry out third party audit of network instrumentation
- conduct required audits and calibrations in accordance with Provincial and Federal guidelines and U.S. EPA protocols;

Appendix B to Part 50 - Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method)

Appendix C to Part 50 - Measurement Principle and Calibration Procedure for the Measurement of Carbon Monoxide in the Atmosphere (Non-Dispersive Infrared Photometry)

Appendix D to Part 50 - Measurement Principle and Calibration Procedure for the Measurement of Ozone in the Atmosphere

Appendix F to Part 50 - Measurement Principle and Calibration Procedure for the Measurement of Nitrogen Dioxide in the Atmosphere (Gas Phase Chemiluminescence)

Appendix L to Part 50 - Reference Method for the Determination of Fine Particulate Matter as PM2.5 in the Atmosphere

Appendix M to Part 50 - Reference Method for the Determination of Particulate Matter as PM10 in the Atmosphere

Data Editing Procedures

Rotek has over 15 years experience in collecting and reviewing environmental data. Minimizing instrument downtime, flagging questionable data, reviewing monitoring data, calibration and audits status reports is required to ensure the accuracy of the data. A copy of raw data is always maintained. Records of data edits must be recorded for justification and verification of data.