

# QUALITY ASSURANCE PROGRAM

## General Information

In 1981, Ohio established a quality assurance program to detect, evaluate and correct problems in acquiring valid data. This program, which follows the requirements of Appendix A of 40 CFR Part 58, stresses control and assessment of errors in the monitoring process.

Control requirements are met by implementing quality control policies, procedures, and corrective actions. Assessment requirements are met by measuring, calculating and reporting the accuracy and precision of the data.

Quality control starts with the instruments in the network and the organizations which run them. A determination of the precision and accuracy of the instruments is the means by which this is done.

Precision and accuracy measurements are made on all NAMS and SLAMS instruments operated by a local air agency (LAA) or district office (DO). Individual precision and accuracy values are then determined for each LAA or DO and for each pollutant being monitored.

## Discussion of Accuracy and Precision Procedures

Accuracy requirements for TSP, PM10 and Pb samplers include quarterly audits of the flow rate of 25% of the monitoring sites against a known flow rate. Each sampler is audited at least once per year. For SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, and Co, quarterly audits of at least 25% of the analyzers are done. During the audits the analyzers are tested with a gas in three specific concentration ranges.

Precision requirements for TSP, PM10, and Pb are met by selecting two sites in an area of expected highest geometric mean concentration for side-by-side (collocation) sampling. The determination for SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, and Co includes a one point precision check against a gas of known concentration at least once every two weeks for each automated analyzer. The analyzers are operated in the normal sampling mode during this check.

A series of calculations is performed to determine the precision and accuracy of each analyzer and reporting organization. Precision values are calculated from the results of individual precision checks, and accuracy estimates are calculated from the results of individual audits. Both precision results and accuracy results are reported at the end of the calendar quarter.

The precision of the reporting organization is determined from the average of the percentage difference between monitors, the pooled standard deviation and the 95% probability limits. The accuracy of the reporting organization is determined from the average of percentage difference, the standard deviation and the 95% probability limits.

## The Statistics of Accuracy and Precision

Precision is a determination of the repeatability of a measurement. For intermittent samplers this is a measure with replicate monitors. For continuous monitors it is measured by challenging the monitor with a known concentration of gas. This concentration is in the range of 0.08 - 0.10ppm for all monitored pollutants except carbon monoxide, which has precision concentration range of 8 -10ppm. Precision is reported as a percent error in the data report from the monitor. The precision is reported as a range with a lower (LO) and upper (UP) probability limit. The probability limits have a 95% confidence interval, i.e., the true value of the data will be in the stated probability limit range 95% of the

time.

Accuracy is the amount of variation that can be determined between the normal operator with his monitor and an independent auditor using completely independent instrumentation. Accuracy for continuous monitors measured at three different levels or concentration ranges:

- Level 1 0.030 to 0.080ppm  
Carbon monoxide 3 to 8ppm
- Level 2 0.150 to 0.200ppm  
Carbon monoxide 15 to 20ppm
- Level 3 0.350 to 0.450ppm  
Carbon monoxide 35 to 45ppm

Accuracy is reported as a percent error in the data reported from the monitor in each of the calibration ranges. The probability limits have a 95% confidence interval. The interpretation of the confidence intervals is the same as that for precision as stated above.