

MQOS

Measurement Quality Objectives

WHERE DO MQOS COME FROM?

- ◉ EPA has set Data Quality Objectives which are statements of DECISION ERROR:
 - Objective that decisions on attainment will be correct at least 95% of the time
 - Ozone, PM_{2.5}, Pmcoarse, and Pb
 - The MQOs are derived from this decision error goal

MQOS

- ⦿ Are PERFORMANCE REQUIREMENTS:
 - PM2.5 (auto and manual) goals for measurement uncertainty are 10% for total precision and $\pm 10\%$ for total bias
 - Ozone precision goal is a 90% conf limit of 15% for the CV, and 95% conf limit for the absolute bias of 7%
 - Transl: 90 times out of 100 the CV is $\leq 15\%$

THEN, THESE MQOS ARE USED IN THE VALIDATION TEMPLATES

- ◉ Validation templates in Appendix D of Redbook
- ◉ Validation templates include instrument/method-specific recommendations as well as MQOs
- ◉ The MQOs are all calculated from the difference between your instrument's indicated value and the known (audit) value = d_i
- ◉ Both precision (wiggle) and bias (jump) from d_i
- ◉ Use the DASC excel file to calculate

VALIDATION TEMPLATES

- 11 separate tables
- All gaseous, PM2.5 auto and manual, PM10 dichot, hi-vol, auto, LTP and STP
- 3 levels of data validation (review):
 - Critical
 - Operational
 - systematic

◎ Critical

- Every point or subset of hourly values must meet each criterion

◎ Operational

- There *might* be a problem, and there must be justification for using these data

◎ Systematic

- Important for interpreting the set of data (e.g., 75% completeness)

Ozone Validation Template

Requirement	Frequency	Acceptance Criteria
CRITICAL CRITERIA-Ozone		
One Point QC Check Single analyzer	1/2 weeks	$\leq \pm 7\%$ (percent difference)
Zero/span check	1/2 weeks	Zero drift $\leq \pm 2\%$ of full scale Span drift $\leq \pm 7\%$

- 1-pt QC checks no longer called precision checks, because the results are used (by YOU) to calculate both precision and bias
- Each check $\leq 7\%$ is the CRITICAL criteria for each set of data since last passing check

O3 OPERATIONAL:

Shelter Temperature	
Temperature range	Daily (hourly values)
Temperature Control	Daily (hourly values)
Temperature Device Check	2/year

Precision(using 1-point QC checks)

90% CL $CV \leq 7\%$

Bias (using 1-point QC checks)

95% CL $\leq \pm 7\%$

MORE O3 OPERATIONAL:

Annual Performance Evaluation		
Single analyzer	Every site 1/year 25 % of sites quarterly	Percent difference of each audit level \leq 15%
Primary QA Organization (PQAO)	annually	95% of audit percent differences fall within the one point QC check 95% probability intervals at PQAO level of aggregation
Federal Audits (NPAP)	1/year at selected sites 20% of sites audited	Mean absolute difference \leq 10%

OZONE SYSTEMATIC:

- ⦿ Completeness
- ⦿ Siting
- ⦿ Sample residence times
- ⦿ That EPA keeps up its end and gets the SRP that you use recertified

2ND EXAMPLE: PM_{2.5} CONTINUOUS:

○ CRITICAL:

- 23-25 hours in daily value
- Flow rate avg $\leq 5\%$ of 16.67
- Flow rate variability CV $\leq 2\%$
- One-point flow rate verification monthly
+/- 4% of transfer standard
 - THIS FR VERIFICATION IS USED TO ESTIMATE BIAS (MQO)
- BAM membrane check

PM2.5 CONTINUOUS OPERATIONAL:

- ◉ Leak checks, cleaning at intervals
- ◉ Temp and pressure checks and calibration
- ◉ Flow Rate verifications and, if needed, calibrations
- ◉ COLLOCATED RESULTS
 - Every 12 days for 15% of sites
 - Results > 3 used to CALCULATE PRECISION (MQO) of a CV of 10%

PM2.5 CONTINUOUS SYSTEMATIC

- ◉ Completeness
- ◉ Detection limits
- ◉ Getting your standards recertified
- ◉ Overall PRECISION for each site and PQAO based on collocated results
- ◉ Overall BIAS for each site and PQAO based on PEP results (+- 10%)