

SPECIAL
POINTS OF
INTEREST:

- Save the date for the May 2012 National Ambient Air Monitoring Conference

INSIDE THIS
ISSUE:

National Monitoring Conference	1
TSP Flow Rates	1
Measurement Quality Related to a Secondary PM2.5 Standard	2
PQAO Consolidation Efforts by CA Tribes	4
Chi-Square Explanation	5
Enhanced Precision Reports	6
NO/NO2/NOy QC	8
Dual Purpose PM10 Filters	8
Dichot Particle Loss Test	9
Reporting Pb Analysis Audits	10
Reporting of PM10-2.5 Flow Rate Data	11
Expanded PE Levels	12
Is your Dichot and FEM?	13
Pima County NCore Site	13
Loading 24-Hour Precision data for Hourly FEMs	14

The QA EYE

ISSUE 12

DECEMBER, 2011



National Air Quality Conference Set

The EPA, in conjunction with the National Association of Clean Air Agencies (NACAA), will be holding the National Air Quality Conference the week of May 14-17 in Denver Colorado.

In previous years, there has been a National Ambient Air Monitoring Conference in addition to the annual National Air Quality Conference. To use resources more efficiently, the National Air Quality Conference concept will continue annually, but will alternate its focus to reflect the current priorities of the greater air quality community. For 2012, that focus will be ambient air monitoring.

State, Local, and Tribal air quality staff involved with operating, planning, or managing air monitoring networks and reporting data to AQS, and AIRNOW should think about attending this conference. We also encourage other stakeholders including health researchers, dispersion modelers, data analysts, and air quality policy staff to attend to gain additional perspectives on how air monitoring data are collected and utilized.

The agenda for the conference is currently being developed and should be available for review in December. Once the agenda is approved there will be a call for papers/presentations. Topics will be

very similar to the 2009 meeting but will be updated to reflect new monitoring requirements and emerging monitoring technologies. The conference is being held at the Denver Marriott City Center, located in Downtown Denver, CO. To make your reservation, please call 1-800-266-9432 and reference the group code NAQC and the hotel name to receive the group rate (\$149 + tax). Reservations can also be made online. Visit the AMTIC site for more information. <http://www.epa.gov/ttn/amtic/naamc.html>. All reservations must be made by Monday, April 20, 2012. After this date, reservations are subject to space and rate availability.

High Volume TSP Flow Rate Guidance for Flow Controlled Samplers

We have received questions on the TSP samplers in regards to meeting the maximum flow rates either when the sampler is set up to run at a specific flow rate or when it is calibrated. This guidance provides clarification of the language in 40 CFR Part 50 Appendix B.

There are a few areas in 40 CFR Part 50 Appendix B that describe flow rates: specifications of the sampler (Section 7.2); and the calibration requirements (Sections 9.3 and 9.4). Within Section 7.2 are two flow related statements:

- 7.2.2 Minimum sampler flow rate heavily loaded filter: $1.1 \text{ m}^3/\text{min}$ ($39 \text{ ft}^3/\text{min}$)

- 7.2.3 Maximum sample flow rate, clean filter $1.7 \text{ m}^3/\text{min}$ ($60 \text{ ft}^3/\text{min}$)

The specifications above represent the ranges that EPA requires the samplers to operate within, not a requirement that each sampler be manufactured to meet both the minimum and maximum ranges. A sampler that can achieve a constant flow rate of $1.5 \text{ m}^3/\text{min}$ and maintain a flow rate above $1.1 \text{ m}^3/\text{min}$ when fully loaded is an acceptable sampler (assuming other sampler specifications of 40 CFR part 50 App B are met).

Continued on page 14

CSN and IMPROVE Data Comparability Related to Light Extinction

Table 1. Collocated CSN Sites

Site Name	Site ID	Number of Paired Values
Bakersfield	060290014	127
Rubidoux	060658001	177
New Brunswick	340230006	141
GT Craig	390350060	133
Roxbury	250250042	162
Deer Park	482011039	123

The following article is a summary of a more detailed paper evaluating data comparability of a light extinction indicator derived from data from the Chemical Speciation (CSN) and IMPROVE networks.

EPA, in their review of the PM_{2.5} NAAQS has been evaluating PM_{2.5} visibility. Currently, the CSN and IMPROVE networks collect the appropriate constituents to calculate a reconstructed light extinction, β_{ext} (expressed in units of inverse megameters (Mm⁻¹)), which are derived from the following equation:

$$PM_{2.5} b_{ext} = 3[sulfate]f(RH) + 3[nitrate]f(RH) + 4[OM] + 1[FS] + 10[EC]$$

Where: sulfate=ammonium sulfate, RH= relative humidity, nitrate = ammonium nitrate, OM=organic

mass, FS = fine soil, and EC= elemental carbon are in units of μg/m³. Fine soil is PM_{2.5} crustal material. It is derived from the reported PM_{2.5} concentrations of aluminum (AL), silicon (Si), Calcium (Ca), Iron (Fe), and Titanium (Ti) using the formula: FS = 2.20 × [Al] + 2.49 × [Si] + 1.63 × [Ca] + 2.42 × [Fe] + 1.94 × [Ti]. f(RH) is a hygroscopic factor used to relate a given relative humidity (RH) to its impact on PM_{2.5} light-scattering.

Daily estimates of β_{ext} in units of Mm⁻¹, are converted to visibility index (VI), in units of deciviews, according to the following equation:

$$PM_{2.5} \text{ daily visibility index} = 10 \ln((PM_{2.5} \beta_{ext} + 10)/10)$$

As EPA evaluates standards, the QA Team attempts to assess the measurement uncertainty of the data and set data quality objective (DQO) goals. These DQO

goals are then used to set measurement quality objectives that the monitoring organizations can use to assess and control the quality of its ambient air data. Since the CSN and IMPROVE networks are already collecting data for objectives other than NAAQS decisions, OAQPS needed to assess the measurement uncertainty relative to use in NAAQS decisions.

The best information to assess measurement uncertainty can be derived from the collocated data that are collected at a number of sites in the CSN and IMPROVE networks. One could evaluate measurement uncertainty by two possible approaches:

- Estimate variability of each parameter used in the VI calculation separately and then perform some additive error (propagation of error) assessment.
- Estimate the VI value of the primary sampler and the collocated sampler each day both samplers provide valid results. Estimate variability of the VI pairs and provide some statistically relevant estimate of the average variability.

OAQPS discussed both approaches internally and with QA representatives from the IMPROVE network and there was agreement to proceed with approach #2 and assess precision between light extinction values (VI) at sites with collocated CSN samplers and sites with collocated CSN/IMPROVE samplers. The evaluations are from collocated CSN (see Table 1), and collocated CSN and IMPROVE data (see Table 2).

Table 3 provides the summary results of the 90th percentile upper bound CV for each site separated at 10th percentile visibility index levels. The overall CV results for the collocated CSN

sites and the CSN/IMPROVE sites are very similar with an average CV of around 6%. There was an expectation that the CV results of the CSN/IMPROVE data would be somewhat higher than the collocated CSN/CSN sites due to difference in samplers, analytical methods and laboratories, and the fact that variability in the trace elements were greater in the CSN network, but this does not appear to be the case.

Table 2. Collocated CSN/IMPROVE Sites

Site	AQS Site ID	Number of paired values
Birmingham, AL	010730023	288
Phoenix, AZ	040139997	30
Fresno, CA	060190008	80
New York, NY	360050110	263
Seattle, WA	530330080	254

Table 3. 90 Percentile Upper bound CV at 10 Percentile Concentration Breaks

Site	Site ID	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%	Overall
CSN/CSN Sites												
Bakersfield, CA	06-029-0014	5.08	1.45	14.37	2.53	4.34	1.62	1.83	1.11	1.18	0.54	3.97
Rubidoux, CA	06-065-8001	10.11	3.2	5.76	3.83	3.09	2.62	3.45	1.99	0.89	0.68	3.63
Boston, MA	25-025-0042	8.22	10.4	7.47	3.22	2.91	5.4	12.53	6.46	2.45	4.8	5.77
New Brunswick, N.J.	34-023-0006	10.58	6.73	5.45	4.25	15.12	7.01	3.43	2.83	3.38	3.84	5.89
Cleveland, OH	39-035-0060	5.57	5.09	4.25	4.1	10.57	3.82	1.58	3.1	3.35	2.07	4.03
Houston, TX	48-201-1039	24.77	9.6	8.61	7.08	8.19	3.75	5.79	8.95	10.61	1.43	9.44
All CSN/CSN Average		10.90	1.31	6.45	6.87	6.21	3.42	4.20	2.92	2.20	1.11	5.46
CSN/IMPROVE Sites												
Birmingham, AL	01-073-0023	5.77	3.29	2.18	3.74	2.97	1.8	7.65	1.33	3	5.29	3.69
Phoenix, AZ *	04-013-9997	43.53	27.82	13.79	9.73	7.95	7.12	4.69	6.9	4.83	3.41	6.46
Fresno, CA *	06-019-0008	11.38	4.19	3.17	3.35	16.41	2.47	1.46	1.66	4.57	21.63	7.07
New York, NY	36-005-0010	6.02	3.57	3.34	3.54	2.4	2.05	2.75	6.41	2.45	2.51	3.38
Seattle, WA	53-033-0080	12.93	8.97	7.43	4.71	2.65	7.99	3.54	3.93	3.03	3.14	5.7
All CSN /IMPROVE Average		8.99	4.42	4.65	5.07	3.01	2.75	2.71	4.35	3.18	5.52	5.26

* Conversion to URG 300N sampler occurred in 2009 for Phoenix and Fresno site so CV estimates based on fewer values than other sites

Continued on Page 3

CSN and IMPROVE Data Comparability (continued from Page 2)

The CV results of the Phoenix and Fresno sites are somewhat higher at certain VI percentiles than the other sites but those two sites have the least amount of data (30 and 80 collocated pairs respectively which result in 3 and 8 pairs at each 10th percentile range) which will have an effect on the 90th percentile upper bound CV precision estimate. Even with the complication of sample size for the Phoenix and Fresno sites, it would appear that both networks are within the current 10% precision DQO goals for the primary PM_{2.5} standard.

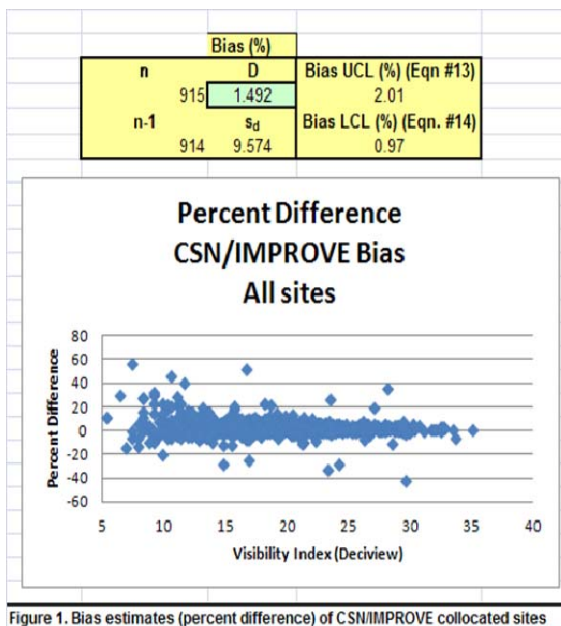
During the evaluation of the collocated CSN/IMPROVE precision, a pattern appeared to emerge. Most of the relative percent differences in the graphs were above zero indicating a bias between the two networks VI estimates. In order to assess this further, EPA ran the current PM_{2.5} bias statistics on the collocated VI values. The bias statistic assumes one value is an audit value (truth) of known concentration. In this

case, we do not have a known value but as long as we identify one network as the “audit value” and we are consistent in applying the statistic, we can determine if there is a bias between the networks. At all CSN/IMPROVE collocated sites we found the CSN VI values are usually higher compared to the IMPROVE values but as Figure 1 indicates, the overall average bias of the 915 collocated CSN/IMPROVE pairs was 1.5% (green highlight in Figure 1).

cated CSN/IMPROVE pairs was 1.5% (green highlight in Figure 1).

There may be a few technical issues that can account for some of the bias. The IMPROVE program reports OC fractions that are blank corrected. CSN is recommending an approach for blank correction but it has not been implemented. Therefore, CSN values for those fractions will be somewhat higher. The magnitude of this affect are unknown at this time but will be evaluated.

It appears that with the current quality systems being implemented in both the CSN and IMPROVE programs, we can expect that measurement uncertainty of the VI measurement can be controlled to the current PM_{2.5} precision data quality objective of 10%. Although we do not have a performance evaluation program in place, both networks are producing comparable VI results with the CSN network producing slightly higher VI values.



Authors Contributing to Issue 12

We thank the following for contributing to Issue 12 of the QA EYE: Robert Vanderpool, EPA NERL who participated in the writing of the flow rate guidance (page 1) and the dichot mass loss test (page 9); Cristopher Lee from the Tribal Air Monitoring Support Center (TAMS) for his help on the tribal PQAO consolidation workshop article on

page 4; Shelly Eberly, as a major contributor to the chi-square distribution guidance on page 5; Angie Shatas and Bill Frietsche from the National Air Data Group who helped write/review the AQS related articles on pages 6, 8, 12 and 14; Joann Rice for the “Are You Sure Your Dichot is an FRM” article on page 13 and Roseanne Sakamoto and Mike Flagg (EPA Region 9) for the

Pima NCore site article on page 14. We are always looking for interesting QA related articles for the QA EYE. If you have something you think would interest the greater QA community, please send your articles to Mike Papp at: papp.michael@epa.gov

California Tribes Make Strides to Consolidate to a Single PQAO



August PQAO
Workshop
Participants

Since the 2006 inclusion of a new definition for a primary quality assurance organization (PQAO) in 40 CFR Part 58 Appendix A, states with many smaller local monitoring organizations have been consolidating to fewer PQAOs. In some cases, tribal monitoring organizations have consolidated with state PQAOs.

In 2010, a number of tribes in southern and central CA started thinking about consolidating to a single PQAO. Syndi Smallwood, the Director of the Environmental Department of the Pechanga Band of Luiseno Indians and a member of the Tribal Air Monitoring Support (TAMS) Center's Steering Committee brought this information to the TAMS Steering Committee and requested assistance. A number of the TAMS members and EPA technical liaisons thought the consolidation was a good idea and were willing to help develop a workshop for those interested tribes.

In early 2011, preparation for the workshop got under way on two fronts:

TAMS Facilitators- Christopher Lee, the TAMS Center Co-director, invited a number of trainers/facilitators knowledgeable in the ambient air QA requirements to assist. This group included:

- Jeremy Howe- Little River Band of Ottawa Indians
- Travis Maki- Inter-Tribal Council of Michigan
- Melinda Ronca- Batista- Northern Arizona University/ TAMS
- Michael Flagg- EPA Region 9 Air Analysis Office
- Mike Papp- EPA, OAQPS

California Tribes- Helen Waquiu Salazar, an Environmental Specialist in the Pechanga Environmental Department, is the catalyst for the Tribes interested in consolidation. Helen worked with the TAMS facilitators to obtain information that she would share with the other interested tribes.

After months of discussion, conference calls, and information exchanges, a date of Aug 30, 2011 was set for a 3-day workshop which was hosted by Pechanga at the Pechanga Casino in Temecula CA.

The TAMS Center usually puts on structured training workshops where the trainers do most of the talking. The PQAO workshop was different. The TAMS facilitators set the groundwork the first morning by providing the tribal participants with brief overviews of the EPA's quality system and ambient air QA requirements, more or less just to "get the ball rolling". The real work fell on the shoulders of the par-

ticipants. The major efforts in this consolidation would involve the tribes developing a organizational structure to develop and implement a consolidated quality system which would be documented in a quality management plan (QMP) approved by EPA Region 9.

Personnel attending the workshop and representing their Tribes included:

- Bernice Paipa and Jaymie Taylor—La Posta Band of Mission Indians
- Darlene Coombs—Cabazon Band of Mission Indians
- Frank Spurgeon—Pala Band of Mission Indians
- Helen Waquiu Salazar—Pechanga Band of Luiseno Indians
- James Payne and Pamela Atcitty— Morongo Band of Mission Indians
- Jonathan Chapmen—Torres Martinez Desert Cahuilla Indians
- Michael Wynn—Picayune Rancheria of the Chukchansi Indians

Other Tribes interested in consolidation but not attending include:

- Campo Kumeyaay Nation
- La Jolla Band of Luiseno Indians
- Los Coyotes Band of Cahuilla and Cupeno Indians
- Manzanita Band of Diegueno Indians
- Rincon Band of Luiseno Indians
- Lipay Nation of Santa Ysabel

The workshop started slow, but momentum and enthusiasm for the process seemed to build over the three day session. Items that were either accomplished at the meeting or agreed to as action items included the development of:

- An approved name for the consolidated PQAO
- A briefing package to inform tribal leaders and to gain approval for participation
- A quality management plan
- By-laws and conflict resolution procedures
- A mission statement for the PQAO
- A memorandum of agreement among participating tribes
- A Quality Management Board and structure
- QA project plans (QAPPs) and use of QAPPs already approved
- Standard operating procedures for PQAO implementation
- License agreements for borrowing audit equipment
- A timeline for the completion and approval of the QMP

Continued on Page 7

Which Tail is Which for the Chi-Square Distribution

In the 2006 40 CFR Part 58 Appendix A QA regulations, a number of statistics used to estimate precision were revised. In particular, the statistics involve the use of the chi-squared distribution. Over the years since the revision, we infrequently but regularly receive questions about these statistics, especially questions about which “tail” of the chi-square distribution was intended for use. This document was developed to address these questions and is comprised of two parts. The first part provides step-by-step instructions for how to calculate the chi-square component of a precision statistic. The second part provides a brief derivation of the statistic and therefore an explanation for the apparent inconsistency in using lower percentiles of the chi-square distribution even though the statistic in CFR represents an upper bound for precision.

First, we present an example to make the calculations more intuitive. Suppose two collocated monitors have operated for 3 years and have 134 valid pairs of measurements. Using these 134 valid pairs, we estimate precision to be 12.4%. Are we really certain that the true precision is 12.4%? Probably not due to things like measurement error in one or more of the observations. The true precision might be a little larger or it might be a little smaller. Could the precision be as large as 80%? Probably not since there are so many pairs going into the estimate. Could it be as large as 20%? That seems more possible but still seems pretty large. Using the equations in CFR, we can calculate that value such that we are 90% sure that the true precision is no larger than it, specifically 13.5 % for our example. We could also calculate a lower bound such that we are 90% sure that the true precision is no smaller than it, specifically 11.5% for our example. However, from a quality assurance perspective, we are interested in assuring that the observations from the instruments are sufficiently precise for making good decisions, meaning we only need to know how large the precision might be.

PART I. Calculating the Upper Bound of Precision Statistics

The upper bound estimate for precision is listed in CFR as follows.

$$CV = \sqrt{\frac{n \sum_{i=1}^n d_i^2 - (\sum_{i=1}^n d_i)^2}{n(n-1)}} \sqrt{\frac{n-1}{\chi_{0.1, n-1}^2}}$$

if an auditing instrument (where the audit value is a known concentration) is the collocated instrument, or

$$CV = \sqrt{\frac{n \sum_{i=1}^n d_i^2 - (\sum_{i=1}^n d_i)^2}{2n(n-1)}} \sqrt{\frac{n-1}{\chi_{0.1, n-1}^2}}$$

if the collocated instrument is simply a second, regularly operated instrument (where the concentrations in both samplers are unknown). In both cases, n is the number of valid data pairs being aggregated, and $\chi_{0.1, n-1}^2$ is the **10th percentile of a chi-squared distribution with $n-1$ degrees of freedom**. The d_i values represent percent differences and are calculated in one of two ways, depending on whether the collocated instrument is an auditing instrument or a regularly-operated instrument (see 40 CFR Part 58 App A).

The components under the first square root are straight-forward to calculate, although they can be cumbersome. It is the $\chi_{0.1, n-1}^2$ under the second square root that one takes care to calculate correctly.

First, determine the value of $n-1$. This is the total number of pairs of measurements used

in the precision calculation minus 1. For our example, there are 134 pairs, thus $n-1$ is $134-1=133$.

Second, determine the 10th percentile of a chi-square distribution with $n-1$ degrees of freedom. For our example, $n-1$ is 133 so the chi-square distribution looks like Figure 1. The 10th percentile is defined as that value for which 10% of the distribution is less than it and therefore 90% is greater than it. For our example with 133 degrees of freedom, the 10th percentile is 112.

How does one determine the 10th percentile of a chi-square distribution with $n-1$ degrees of freedom? Most spreadsheets include a function that provides these values; statistics books include tables for chi-square distributions; and there are several online calculators for chi-square distributions. In all cases, both the degrees of freedom and the percentile of interest must be specified.

Here is where things get confusing. For the equations in CFR, the probability (0.1 or 10% in the above equations) associated with the chi-square represents the area to the LEFT of the percentile. That is, $\chi_{0.1, n-1}^2$ represents the value such that 10% of distribution is to the LEFT. Unfortunately, most statistics books, calculators, and spreadsheets would say that $\chi_{0.1, n-1}^2$ represents the value such that 10% of the distribution is to the RIGHT. So, before proceeding, make sure you know which side, or “tail,” of the distribution is represented by the table, calculator, or spreadsheet you are using.

The good thing is that any table, calculator, or spreadsheet provides the information needed. We just have to ask for it correctly. If the percentiles in the table, calculator, or spreadsheet represent the area to the LEFT, great. Proceed without any adjustments. If the percentiles in the table, calculator, or spreadsheet represent the area to the RIGHT, then calculate 1 minus the probability EPA specifies ($1-0.1=0.9$ for the above case), and look up the chi-square value for this adjusted probability.

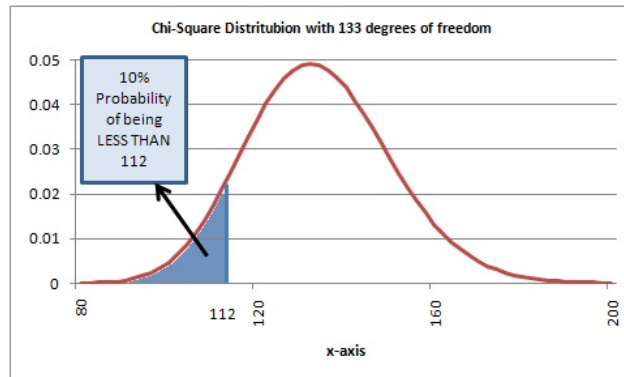


Figure 1. Chi-Square Distribution with 133 Degrees of Freedom

Continued on Page 7

Enhanced Precision Reports in AQS

Previous practice was that users loading raw data (RD) transactions automatically had the corresponding precision data (RP) transactions inserted. The POST process was actually generating these records and inserting them into the PRECISION_DATA table, but this often encountered errors and caused the POST process to fail.

1) Precision data will be created on demand as needed.

Since July 2011, precision data is created “on-the-fly” for collocated monitors as needed for a report. A custom database view automatically generates the precision data, and the view looks at both collocated precision data generated from RD transactions and precision data generated from RP transactions. As before, precision data can still be loaded by a user via the RP transactions.

2) Precision data is automatically generated for collocated monitors.

In order to have AQS automatically generate precision data, you must create a Monitor Collocation record (Maintain Monitor—Collocation tab) which defines the collocated pair. Once this is done, AQS will automatically generate the precision data for these collocated monitors using the submitted raw data for the same date-time and precision id.

The primary monitor of the collocated pair is labeled:

The secondary monitor of the collocated pair is labeled:

The distance from the primary sampler is in meters.

The changes affect the following AQS reports: the 255 Data Quality Indicator Report, the 246 Precision Report and the 250 P/A Raw Data Report

Whenever one of these reports is run, the custom database view automatically generates the precision data to populate the report. The new precision data view looks at both collocated precision data generated from RD transactions and precision data generated from RP transactions.

255 Data Quality Indicator Report – Since July 2011, this report already includes both submitted precision data and automatically-generated precision data. The 255 does not separate data into generated vs non-generated precision data, but uses both in its calculations without making a distinction.

Collocation Summary

Pollutant: PM2.5		PQAO: ██████████								App A?: Yes		
Year	Method	Region	State	# Sites	# Collocated Required	# Actually Collocated	% Req. Sites Collocated	# Req	# Obs	# Valid Obs	% Complete	CV
2010	118	04	NC	1	1	1	100	30	47	47	100	7.06
2010	SUMMARY	04	NC				100			47	100	7.06
SUMMARY		04	NC				100			47	100	7.06

Continued on page 8

Which Tail is Which for the Chi-Square Distribution *(continued from page 5)*

As an example, consider Excel's function CHIINV. To use this function, the user provides a probability and degrees of freedom, such as CHIINV(0.1,133). In Excel, the probability represents the RIGHT tail. That is, CHIINV(0.1, 133) = 154 meaning that 10% of the distribution is GREATER THAN 154 and 90% is LESS THAN 154. Looking at Figure 1, this seems plausible because 154 is pretty far to the right of the distribution. To get the value such that 10% is less, we use CHIINV(0.9,133) which equals 112.

If you are unsure which tail is represented in a specific table, calculator, or spreadsheet, simply look up the values associated with 0.1 and 0.9 and take the smaller of the two before plugging it into the CFR equation.

PART 2. Brief Derivation of Statistic for Upper Bound of Precision

From whence came the equation for the upper bound on precision? Here are the statistical details.

Consider the percent differences d_i in the equations above for the case with the collocated instrument being an auditing instrument. The wiggle or variation in these percent differences is a measure of the precision of the primary instrument. (Note that the mean percent difference is a measure of bias, whereas the variation in the percent differences is a measure of precision.) An estimate of variation is

the standard deviation, s , specifically,

$$s = \sqrt{\frac{\sum_{i=1}^n (d_i - \bar{d})^2}{n-1}} = \sqrt{\frac{n \sum_{i=1}^n d_i^2 - (\sum_{i=1}^n d_i)^2}{n(n-1)}}$$

For our example above with 134 collocated pairs, we have seen that the value for s is 12.4%. Now that we have an estimate for the precision, the next step is develop an estimate for how large the precision might truly be, that is, we next develop an upper bound for s .

It is known in statistics that if d_1, d_2, \dots, d_n are a random sample from a distribution with variance σ^2 , then

$$\frac{(n-1)s^2}{\sigma^2} \sim \chi^2_{(n-1)} \text{ (Equation 1)}$$

That is, the estimate of the sample variance (s^2) divided by the true variance (σ^2) is distributed as a chi-square random variable with $(n-1)$ degrees of freedom.

This relationship between s^2 and σ^2 allows us to develop upper (and lower) bounds for σ^2 , the true variance of d . Since σ^2 is in the denominator of equation 1, developing an upper bound for σ^2 is the same as developing a lower bound for $(1/\sigma^2)$. That is, an upper bound for σ^2 with only 10% probability of exceeding is the same as a lower bound for $(1/\sigma^2)$ with only 10% probability of being less than. This lower bound for $(1/$

$\sigma^2)$ is found by setting

$$\chi^2_{0.1, n-1} < \frac{(n-1)s^2}{\sigma^2}$$

where $\chi^2_{0.1, n-1}$ is the 10th percentile of a chi-square distribution with $(n-1)$ degrees of freedom. This equation implies that

$$\sigma^2 < \frac{(n-1)s^2}{\chi^2_{0.1, n-1}}$$

which implies that

$$\sigma < \sqrt{\frac{(n-1)s^2}{\chi^2_{0.1, n-1}}}$$

Rearranging terms, we have

$$\sigma < \sqrt{s^2} \sqrt{\frac{(n-1)}{\chi^2_{0.1, n-1}}} = \sqrt{\frac{n \sum_{i=1}^n d_i^2 - (\sum_{i=1}^n d_i)^2}{n(n-1)}} \sqrt{\frac{(n-1)}{\chi^2_{0.1, n-1}}}$$

which is the equation in CFR for the upper bound estimate for precision when an auditing instrument is used!

When the collocated instrument is not an auditing instrument, then there needs to be a "2" included in the estimate of precision since concentrations from both instruments are considered random and unknown values.

California Tribes PQAO Consolidation Efforts *(Continued from page 4)*

Quite a bit of healthy discussion went into the topics listed above but those at the workshop seemed very committed to take on this challenging task. The first step will be for each participating tribe to brief their tribal council in order to get approval to work on the consolidation. From there it's a question of time and effort to get the QMP and the organization in place. The participants were anticipating the process taking about one

year. The TAMS facilitators have committed to working with the PQAO over the next year to help out where they can be of service.

All participants were very engaged at the workshop and the ambient air monitoring technical information that was shared among the tribes was of great benefit to all involved. The participants made more progress than anticipated by the facilitators and

although there is plenty of work ahead to make this consolidation a success, the participants have laid out a good plan to get there. The workshop and the next steps should benefit other tribes thinking about consolidation.

AQS Enhanced Precision Report (continued from page 6)

For the 255 report, the “# Collocation Required” and the “# Actually Collocated” show compliance with Appendix A requirements for the number of collocated monitors in the network. This report already used the collocated precision view. The “# Actually Collocated” would reflect collocated monitors, set up as described earlier.

246 Precision Report - displays precision data submitted using the RP (Precision Data) transaction and the automatically generated precision data. The report has a column labeled “GENERATED” that will distinguish these. Submitted precision data would have “GENERATED” = “N” and the automatically generated precision data would have “GENERATED” = “Y”

COLLOCATED PRECISION CHECKS

PARAMETER	STATE	PQAO	MONITOR ID	DATE	PREC ID	PRIMARY	METH CODE	DUPLICATE	METH CODE	UNIT	%DIFF	GENERATED
PM2.5 - Local Cor	NC	Eastern Band Of Cherokee In	37-099-0006-88101-1	2010/07/31		15.6	118	17.0	118	Micrograms/cubi	-8.6	Y

250 P/A Raw Data Report –shows all precision data with a “GENERATED” flag to indicate the source of the data. Submitted precision data would have “GENERATED” = “N” and the automatically generated precision data would have “GENERATED” = “Y”

***** PRECISION DATA *****												
Duration:	24 HOUR	Actual Method:	118 R & P Model 2025 PM2.5 Sequential w/WINS/GRAVIMETRIC	Units:	Micrograms/cubic meter							
Date	Prec ID	Actual	Indicated	Indicated Method								GENERATED
20070118		6.5	7.0	118 R & P Model 2025 PM2.5 Sequential w/WINS/GRAVIMETRIC								Y

The 502 Extract P/A Data has not been modified.

This report’s purpose is to extract data in RP transaction format from the precision data table (PRECISION_DATA) which is populated via the load of precision data (RP). This is the data that users have submitted through the RP (precision data) transactions. It is not appropriate to show the system-generated precision data.

Reporting QC Data to AQS for NO₂, NO_y and NO

We have had a number of questions on what QC data to report for SLAMS and NCore for NO₂, NO_y, and NO pollutants. The following are our best suggestions and would be considered acceptable to reporting what is considered the I-point QC check to AQS. There has been some different information in the NCore Technical Assistance Document, training slides and measurement quality objectives tables related to the frequency and gasses to use in these checks. This guidance will clear up some of these discrepancies and provide our current thinking as it relates to NO₂, NO and NO_y QC checks and reporting to AQS.

SLAMS NO₂ Criteria Pollutant (parameter code 42602)-

The appropriate gas for the I-point QC check is NO₂ and the minimum frequency is every two weeks.

NCore –

NO (parameter code 42601)

For NO the guidance has been to perform a daily zero/span and I-point QC check. Monitoring organizations can report the I-point QC every day to AQS but we will accept one value every two weeks (similar to criteria pollutant requirements). The appropriate gas for the I-point QC check is NO. Report the check only for the NO parameter (42601).

NO_y (parameter code 42600)

For NO_y the guidance has been to perform a daily zero/span and I-point QC check. Our TAD suggested NO could be used for the I-point QC check gas for NO_y. This may be acceptable for the daily I-point QC check (not

reported to AQS) but for the data reported to AQS for the I-point QC check, the appropriate gas is NPN or IPN. Since this gas may be in short supply and/or expensive, we recommend the check be performed every two weeks (similar to criteria pollutant requirements). NO should not be reported to AQS for the bi-weekly QC check for the NO_y parameter.

Converter Efficiency Check

In the NCore TAD we recommended a monthly converter efficiency check which was different than what we had included in our measurement quality objective tables (every two weeks). Since we are suggesting that the biweekly I-point QC check be run with IPN or NPN, we believe that the monthly converter efficiency check requirement, as written in the TAD, is adequate.

“EPA does suggest that mass analysis be conducted (pre and post filter weighing) first followed by Pb analysis”

“..uncertainties associated with PM10-2.5 particle loss from dichot filters is probably minimal compared to other measurement uncertainties”

PM₁₀ Filters Serving Dual Purposes at NCore ...Mass First, Pb Second

Some of the NCore sites will be monitoring for PM_{10-2.5} as well as Pb and in some cases the monitoring agencies are planning on using the PM₁₀ low volume FRM sampler filter from the one instrument to measure PM₁₀ mass and Pb. This is an acceptable technique and will help reduce the number of instruments at the site. However, extra care is necessary since monitoring

organizations may be contracting out the analysis of mass and Pb to different laboratories.

Some have expressed concern about this process and the uncertainties that might result from dual use of filters. The “Mass Loss Test” article below should provide some comfort that particulate losses should be minimal with careful filter treatment

EPA does suggest that mass analysis

be conducted (pre and post filter weighing) first followed by Pb analysis. Since any destructive Pb analysis (e.g., ICP-MS) would obviously preclude mass analysis, this makes sense. However, the XRF analysis process creates a vacuum which could volatilize nitrates which would effect the mass concentration.

EPA ORD Dichot Coarse Channel Shipping Mass Loss Test

Technical memo written by B. Vanderpool (EPA, ORD, NERL) in 2005

In a collected PM₁₀ FRM sample, all the collected PM_{2.5} particles are well mixed with the collected PM_{10-2.5} particles. It is the presence of these fine particles which helps bind the PM_{10-2.5} particles to the filter's surface. Any particle on a filter will only become detached when the applied inertial force (e.g., during shipping or handling) exceeds the local adhesive force which binds the particle to the filter. During ORD's field tests conducted during the last several years, no appreciable particle loss was measured from either PM_{2.5} or PM₁₀ FRM filters, regardless of site, season, or particle size distribution. It was the uncertainty in potential PM_{10-2.5} particle loss from dichot filters that was partially responsible for EPA's selection of the difference method for the 2006 PM_{10-2.5} FRM rather than using a dichotomous sampling approach.

ORD's shipping loss tests of the Thermo dichot were conducted in January 2004 in Phoenix. For these types of tests, Phoenix could be considered a worse-case scenario be-

cause of the relatively high PM_{10-2.5} concentrations coupled with the low PM_{2.5}/PM₁₀ ratios. Also, the PM_{10-2.5} particles at the site which originate from wind-blown sand, might be considered to be harder, bouncier, and inherently less "sticky" that might exist at some other sites (e.g., Birmingham).

The January 2004 Phoenix tests were conducted using a PM_{2.5} FRM, a PM₁₀ FRM, and a two Thermo sequential dichots. The dichots were operated in manual mode and the sequential samplers' exchange mechanism was not used to transfer the post-sampling cassette into the take-up magazine.

During the ORD study, daily 22-hour tests were conducted for 15 days. 47-mm diameter Teflon filters were preweighed at RTP, shipped to Phoenix, and preweighed there. The level of agreement between the Phoenix and RTP preweigh values was high. At the completion of sampling, filters were post-weighed in Phoenix then shipped back to

RTP for post-weighing. Differences in RTP/Phoenix post-weigh values were thus attributed to post-sampling handling and shipping activities.

ORD's control method of sampler shipment was identical to that used during previous PM_{10-2.5} field studies. Filters were stored in sampling cassettes and the top and bottom of each cassette was capped with stainless steel (SS) end caps manufactured by BGI. The capped cassettes were then placed in SS canisters manufactured by Andersen. Each of the 8 cassettes per canister was firmly held in place. The canisters were then placed vertically in a large cooler and cushioned by styrofoam. Blue ice packs kept the sample temperature below the PM_{2.5} FRM requirements. For the FRM filters, no particle loss during shipping was measured as determined by mean RTP/Phoenix PM_{2.5}, PM_{10-2.5}, and PM₁₀ concentration ratios of 1.00, 1.00, and 1.01.

(continued on Page 10)

EPA ORD Dichot Coarse Channel Shipping Mass Loss Test *(continued from page 9)*

Using the control method of shipping filters, the dichot filters did not show evidence of particle loss. For the dichots, mean RTP/Phoenix PM_{2.5}, PM_{10-2.5}, and PM₁₀ concentration ratios were 0.99, 1.01, and 1.02.

Prior to the tests, it was assumed that the large, heavy shipping coolers were not being inverted during their shipment by FedEx. As indicated by the tilt indicators that were affixed to the containers, however, every cooler was inverted at least once during shipment.

In addition to this control shipment protocol, ORD also shipped a limited number of samples (3 tests each) in the following manner:

- Large cooler, Andersen canister, cassettes deliberately inverted during installation into the canisters
- Large cooler, filters in petri slides
- Small cooler, Andersen canister, cassettes installed normally
- Large cooler, cassettes stored in Thermo takeup magazines. Magazines were oriented vertically in cooler
- Large cooler, cassettes stored in Thermo takeup magazines. Magazines were oriented horizontally in cooler

Result: None of these shipping variations had any measurable effect on shipping loss. The notable exception was with the Thermo magazines oriented vertically where loss of PM_{10-2.5} and PM₁₀ aerosols was 32% and 23%, respectively. This loss did not occur when the Thermo magazines had been installed horizontally in the cooler.

It should be noted that the stacked cassettes within the Thermo magazine are designed to be uncapped and are pushed to the top of the magazine by a rather heavy aluminum piston. Upon receiving these canisters in RTP, however, ORD noted that the piston had moved downwards during shipment - sometimes up to 1". As a result, the uncapped cassettes were no longer held in place and could thus move around within the magazine. This was apparently the cause of the up to 32% loss of PM_{10-2.5} particles. ORD has subsequently recommended to Thermo that dichot users fill in any gaps with blank cassettes prior to shipping the magazines, to prevent movement of the cylinders during the shipping process.

During 30 days of Phoenix testing in 2005, the RTP/Site ratios for the FRM (standard shipping method) PM_{2.5}, PM_{10-2.5}, and PM₁₀

concentration ratios were 0.97, 0.99, and 0.97, respectively. Values for the manual dichots were 0.99, 0.97, and 0.97, respectively.

During 30 days of Birmingham testing in 2006, the RTP/Site ratios for the FRM (standard shipping method) PM_{2.5}, PM_{10-2.5}, and PM₁₀ concentration ratios were 0.99, 0.99, and 0.99, respectively. Values for the manual dichots were 0.99, 1.00, and 0.99, respectively

From the information provided above, it can be concluded that uncertainties associated with PM_{10-2.5} particle loss from dichot filters is probably minimal compared to other measurement uncertainties. While it is possible that some PM_{10-2.5} particle loss can occur with the right combination of parameters (e.g., aerosol type, size distribution, shipping conditions), the probability of the event and its magnitude is probably not an appreciable source of measurement bias.

Reporting the Pb Analysis Audits to AQS for TSP and Low Volume PM10 Samplers

AQS continues to update and revise its reporting procedures for QA data. The National Air Data Group was recently reviewing the Pb analysis audit information and looking for ways to evaluate that the correct concentration ranges (revised with the promulgation of the new Pb standard) are reported. 40 CFR Part 58 Appendix A requires re-

porting the Pb analysis audits using unit code 077 in µg/strip or µg/filter. In order to be consistent in reporting and evaluating data with the AMP255 report, use µg/strip for the TSP glass fiber filters (no calculation back to the full filter is needed) and µg/filter for the Teflon low volume PM10 filters. The concentrations for the TSP and Teflon filter should be

developed and therefore reported, in the ranges highlighted (green) in the table below. QA Issue number 9 discussed how to report the data over the quarters. Also, for those monitoring organization that ordered strips from EPA for 2012, we are on track for a January delivery.

Reporting Concentrations for Pb TSP and Teflon Analysis Audits				
Level	Pb Conc TSP (µg/strip)	Pb Conc PM ₁₀ Teflon (µg/filter)	Ambient Air Conc (µg/m ³)	Conc Percentage of NAAQS
1	9 - 30	0.96-3.6	0.04 - 0.15	30-100%
2	60 - 90	7.2-10.8	0.30 - 0.45	200-300%

Reporting of Semi-Annual Flow Rate Audit Data from PM_{10-2.5}

Due to various reporting requirements in AQS there has been some confusion on how to report PM_{10-2.5} flow rate data to AQS. Flow rate data can come from single instruments (dichot) as well as multiple FRMs or FEMs (including BAMs). The following provides guidance on each of these.

PM10-2.5 Flow Rate Data Reported from Multiple Samplers/Monitors FRMs/FEMs-

A PM_{2.5} (Local Condition) and a PM₁₀ (Local Condition) instrument of the same method designation must be used for the PM_{10-2.5} estimate. In theory a monitoring agency could internally calculate the difference between PM₁₀ and PM_{2.5} and report a PM_{10-2.5} measurement to AQS without reporting the individual PM₁₀ and PM_{2.5} estimates. In this scenario the flow rate audits of the PM₁₀ and PM_{2.5} instruments can be reported as an accuracy transaction under the PM_{10-2.5} parameter code (86101). Although it will be difficult to distinguish which instrument (PM₁₀ or PM_{2.5}) is reported in each audit level, we suggest reporting the PM₁₀ flow audit in level 1 and PM_{2.5} flow audit in the level 2. If the samplers used to report PM_{10-2.5} are also required to report PM_{2.5} and PM₁₀, the same audit can be used but it must be reported a second time in the appropriate PM_{2.5} and PM₁₀ accuracy transaction. In summary, if a site is required to monitor and report for PM_{10-2.5}, PM_{2.5}, and PM₁₀

- Report the flow rate audit data for both the PM₁₀ and PM_{2.5} samplers under parameter code 86101 (PM_{10-2.5} LC). Report as an RA transaction with PM₁₀ flow values in level 1 and PM_{2.5} flow values in level 2
- Report the flow rate audit data for the PM_{2.5} under parameter code 88101 (PM_{2.5} LC). Report as an RA transaction
- Report the flow rate audit data for the PM₁₀ under parameter code

85101 (PM₁₀-LC). Report as an RA transaction

Appendix A also requires that flow rate verifications be performed every month. The verifications are not required to be reported to AQS, however if an agency wishes to report this data, the following guidance applies:

- Report the flow rate verification data for both the PM₁₀ and PM_{2.5} samplers under parameter code 86101 (PM_{10-2.5} LC). Report as a pair of RP transactions, using precision id 1 and precision id 2.
- The first transaction with precision id = 1 will report the flow verification data from the PM₁₀ monitor. The Precision Sample ID field should be populated with the value "PM10 flow".
- The second transaction with precision id = 2 will report the flow verification data from the PM_{2.5} monitor. The Precision Sample ID field should be populated with the value "PM2.5 flow".

PM10-2.5 Data Reported from Single Samplers/Monitors

FEM- Dichot

At present there is only a dichot sampler for PM_{10-2.5} that can report flow on the PM coarse channel. A dichot can have 4 flow rates: total flow, PM_{2.5}, PM coarse channel (PMc) and the bypass flow. At a minimum the PMc is to be reported. However the RA contains enough levels to report as many of the flows as desired and it is suggested that PM_{2.5} and total flow be reported. It is suggested that the PMc flow be placed in audit Level 1 (since it is mandatory) and then PM_{2.5} and total flow be placed in audit levels 2 and level 3 respectively. In summary:

- Report the PMc flow rate audit data for the PM_{10-2.5} under parameter code 86101 in level 1 (PM_{10-2.5} LC). Re-

port as a RA transaction. Optionally report PM_{2.5} in level 2 and total flow in level 3.

For monthly flow rate verifications using the precision transaction (which is not required reporting for manual samplers) use one precision transaction for each flow being reported. Always use parameter code 86101 and report the flows as follows:

- Report the PMc flow rate verification data using precision id = 1. The Precision Sample ID field should also be populated with the value "PMc flow".
- Report the PM_{2.5} flow rate verification data using precision id = 2. The Precision Sample ID field should also be populated with the value "PM2.5 flow".
- Report the total flow rate verification data using precision id = 3. The Precision Sample ID field should also be populated with the value "Total flow".

AMP255 Data Reporting

Currently, an AMP255 report for PM_{10-2.5} is not available. This should not be a deterrent to reporting flow rate audit data to AQS. When available, the AMP255 report will be structured to report an average percent difference for each audit level but as currently designed, values for the multiple audits within an audit level (required two per year) will be averaged for each year. Therefore, it is important to consistently report audit data for the PM₁₀ and PM_{2.5} samplers in the same level each time in order to provide meaningful estimates of flow for each sampler.

AQS Performance Evaluation Audit Levels Expanded 10

A Nov 10, 2010 technical memo from EPA allowed an expansion of the Annual Performance Evaluation audit levels from 5 to 10 and modified the concentration ranges (see QA EYE Issue 10). However, due to the quickness of this decision, the National Air Data Group had not been given the time to implement the change in AQS and so developed a workaround until the change could be properly implemented. The following information is from a Dec 12 AQS software release note.

The RA accuracy transaction continues to have 5 audit level slots (actual and indicated values) only.

It has not been modified in order to prevent a need for redesign of State/Local/Tribal Agency data systems.

Audit levels are now assigned in one of two ways:

1. For **flow audits**, the value of audit_class is FLOW, and the reported units must be units of flow. The audit level number is determined from the position on the transaction (no change from past practice). Up to five flow audit pairs can be reported for one audit using one transaction. For any parameters that do not have audit level ranges defined on the audit_levels table (such as flow audits), the position of the values on the transaction determine the audit level number.
2. For **performance evaluations**, the audit_class is ANALYTICAL and the reported units are units of concentration. The audit level number is determined from the actual value for each audit level pair on the transaction. This means that the audit level numbers will not necessarily correspond to the position on the transaction, and that you can now report the same level multiple times on one transaction without generating an error. 40CFR Part 58 App A does not define audit level ranges for non-criteria parameters. For these parameters that do not have audit level ranges defined on the audit_levels table, the position of the values on the transaction are used to determine the audit level number, which was the previous behavior for all parameters.

The ability to report the same level more than once for a performance evaluation results in two changes to the way AQS processes accuracy data:

1. You can now store many audit pairs. Multiple transactions for the same monitor for the same date and accuracy audit id number can be successfully submitted. AQS no longer rejects duplicate level numbers for the same audit... so even though we do not anticipate that more than 4 different levels will be needed, this enhancement allows duplicate levels to be reported.
2. Update transactions can be considered to be a delete transaction followed by an insert transaction. When an update transaction is submitted, all of the existing audit pairs for the monitor for the date and the audit id will be deleted. Then the new audit pair data on the transaction will be inserted.

The Accuracy Report (AMP247) has been enhanced to show the Accuracy Audit ID and the Audit Level/Concentration Level for each Actual Value and Indicated Value.

Accuracy Type	Monitor ID	Accuracy Audit ID	Conc Level	Date	Above Criteria	Unit Desc	Actual Value	Indicated Value	Relative % Diff
PE	37-099-0006-88101-1	1	2	20100203	N	Liters/minute LC	16.42	16.65	1.4

The P/A Raw Data Report (AMP250) has been enhanced to show the Accuracy Audit ID and the Actual and Indicated Values for up to 10 levels.

```

***** ACCURACY DATA *****
Duration: 24 HOUR                               Method: 118 R & P Model 2025 PM2.5 Sequential w/WINS\GRAVIMETRIC           Units: Liters/minute LC
Audit Type: AUDIT BY REP ORG                    Audit Class: FLOW                                     Acc Type: PE                               LPS: CERTIFIED ORIFICE DEVICE
Date      Aud ID  Zero Span  Year  Qtr  **** LEVEL 16 ****  **** LEVEL 27 ****  **** LEVEL 38 ****  **** LEVEL 49 ****  **** LEVEL 51 ****
        ID      Rep      Rep      Rep  Actual  Indicated  Actual  Indicated  Actual  Indicated  Actual  Indicated
20070523  1          2007    2    ----  ----    16.62  16.69    ----  ----    ----  ----
20070820  1          2007    3    ----  ----    16.58  16.66    ----  ----    ----  ----
20071128  1          2007    4    ----  ----    16.52  16.65    ----  ----    ----  ----
    
```

Continued on page 13

Are You Sure Your Dichot is an FEM?



Thermo Partisol 2025-D Sequential Sampler

Thermo Scientific Dichotomous Partisol Plus 2025-D sequential samplers have recently been approved as FEMs for PM₁₀, PM_{2.5} and PM_{10-2.5} mass. Before using your 2025-D sequential dichot sampler for any of these pollutants, make sure that it is and FEM. How do you confirm this? FEM samplers should have an FEM sticker supplied by the ven-

dor. If you cannot find the sticker, there is something else you can do. You can contact the vendor. Also, dichot FEMs must be operated with the modified filter shuttle mechanism and have firmware version 1.500 or greater for the Partisol Plus 2025-D and version 2.0 for the Partisol 2025i-D. For more information, please refer to our list of designated reference

and equivalent methods at: <http://epa.gov/ttn/amtic/files/ambient/criteria/reference-equivalent-methods-list.pdf>

NOTE This instrument can not be used for PM₁₀ Pb sampling. It is not considered a PM₁₀C sampler as described in 40 CFR Part 50 Appendix O.

Pima Counties NCore Site



Pima County NCore Site

Pima Ambient Air Monitoring Program's (AAMP) Children's Park NCore station came to the attention of Region 9 months before a Technical System Audit took place in September 2011, when a question was posted by a Primary Quality Assurance Organization (PQAO) on how to

properly install a remote NOy converter box. Several PQAOs including Pima AAMP responded with recommendations and photos on their experience installing the remote converter. Pima's was not just a recommendation, but an example that made one pause and take notes on what is possible. Region 9 found Pima's AAMP NCore station equally impressive during the TSA conducted.

Undeterred by resource limitations, very dedicated Pima AAMP personnel creatively repurposed material and recrafted them to create a well designed custom monitoring station. Like Pima AAMP staff, the NCore station is first rate, and serves a great example to other agencies around the nation.

AQS Audit Levels (continued from page 12)

Annual Performance Evaluations																				
Pollutant: SO2																				
PQAO: Pima County Health Department																				
App A?: Yes																				
Year	Region	State	Site ID	POC	MT	Begin Date	End Date	Avg %D / Level					Obs / Q	Criteria Met?	1-Point Conf. Limits	% Bwn Conf. Limits				
								L1/6	L2/7	L3/8	L4/9	L5/10	Q1	Q2	Q3	Q4	Lower	Upper	Limits	
2011	07	IA	[REDACTED]	1	SP	01-JAN-11	13-DEC-11													
								(Levels 6 thru 10)	-3.25		-3.04									
2011	07	IA	[REDACTED]	1	SP	01-JAN-11	13-DEC-11													
								(Levels 6 thru 10)	-1.89		-2.31									
2011	07	IA	SUMMARY																	
								(Levels 6 thru 10)	-2.57		-2.68									
SUMMARY	07	IA																		
								(Levels 6 thru 10)	-2.57		-2.68									

The Data Quality Assessment Report (AMP255) has been enhanced to show data for 10 levels.

The increased audit levels apply to the criteria gases, so you would see these 10 levels in the 255 under the Annual Performance Evaluations section for O₃, CO, NO₂, and SO₂.

Note: The term "audit" is used here to describe the data associated with a unique occurrence of monitor + accuracy_audit_id + accuracy_date. One audit can be associated with up to 5 pairs of values. (One value is the true actual reference value; the other is the indicated value from the monitor being audited.) By incrementing the accuracy_audit_id, more than one audit can be reported on the same day for the same monitor.

Note that the column headers refer to two different levels, ie, level 1 or level 6. Data for levels 6 through 10 would appear on the second line of the appropriate column.

Updated AQS P&A transaction generator files have been posted to the AQS website. We have run a data correction script to assign the correct audit level numbers to accuracy data that had been previously submitted with an incorrect level number. During the last 5 years, data could have been submitted with an incorrect level number, since the validation "errors" were relaxed to "warnings" and the data was allowed into AQS.

The data correction script only affected parameters with defined audit levels (i.e., criteria gases and lead strip audits). The data correction script used the actual value, compared the actual value to the audit levels table, and returned the proper level number to the accuracy_audit records table. If audit levels had not been defined, then no action was taken.

High Volume TSP Flow Rate Guidance for Flow Controlled Samplers *(continued from Page 1)*

There are two calibration procedures described in 40 CFR Part 50 Appendix B:

Section 9.3 Procedure

This procedure applies to a conventional orifice-type flow transfer standard and an orifice-type flow indicator in the sampler, the most common type at the time the method was written. Section 9.3 describes the first method and says the following:

9.3.8 Repeat steps 9.3.5, 9.3.6, and 9.3.7 for several additional flow rates distributed over a range that includes 1.1 to 1.7 std m³/min

This implies that the instrument must be tested at 1.7 std m³/min which has been problematic with some instruments.

Section 9.4 Procedure

Section 9.4 provides for an alternate calibration procedure for flow controlled samplers as described below.

9.4 Alternate calibration of flow-controlled samplers. A flow-controlled sampler may be calibrated solely at its controlled flow rate, provided that previous operating history of the sampler demonstrates that the flow

rate is stable and reliable. In this case, the flow indicator may remain uncalibrated but should be used to indicate any relative change between initial and final flows, and the sampler should be recalibrated more often to minimize potential loss of samples because of controller malfunction.

9.4.1 Set the flow controller for a flow near the lower limit of the flow range to allow maximum control range.

9.4.2 Install a clean filter in the sampler and carry out steps 9.3.2, 9.3.3, 9.3.4, 9.3.6, and 9.3.7.

9.4.3 Following calibration, add one or two additional clean filters to the sampler, reconnect the transfer standard, and operate the sampler to verify that the controller maintains the same calibrated flow rate; this is particularly important at high altitudes where the flow control range may be reduced.

The instruments that EPA has heard as having problems meeting the high flow rates are flow-controlled samplers with brushless motors and therefore can use the alternate technique to achieve the calibration requirements. These newer models are developed to achieve a constant flow no matter what

loadings occur and from that standpoint are superior to the older technology where there was a possibility of flow variations within a sampling activity due to particulate loading. We suggest continuing to use 5 calibration points in the calibration/verification procedure but it is not necessary to challenge the sampler at the higher range (1.7 m³/min).

We believe it is important that flow rates be maintained within the required range listed in Section 7.2 and be stable during sampling events but it will not invalidate samplers for use if they cannot be calibrated at the highest calibration range. Calibration should include 5 points but it is acceptable to have flow rate "set-point" within the required calibration range and select the five calibrations points between $\pm 10\%$ of the calibration set point where the lowest point is not below 1.1 m³/min and the highest point is not above 1.7 m³/min. For example, if an operator wants to establish the sampler's flow rate set point at 1.4 m³/min, the operator would perform a 5 point calibration over the range of 1.26 and 1.54 m³/min.

Loading 24-Hour Precision Data for Hourly PM_{2.5} FEMs to AQS

The collocated precision requirement for PM_{2.5} FEMS requires that the first collocated sampler be a manual FRM. The routine FEM produces hourly results and the FRM provides a 24-hour value. The following is the procedure for loading the precision data to AQS.

- Create a monitor collocation record specifying the FEM as the primary sampler. Specify the FRM as primary sampler = 'N'. This can be done via the AQS Maintain Monitor screens, or by using batch transaction M.
- Load the hourly averages from the FEMs as raw data.
- Load the daily averages from the FRMs as raw data.

AQS has been enhanced to "system generate" the precision data when raw data is reported for collocated monitors, and when the monitor collocation record exists for those monitors, even when the sampling durations are different (hourly vs daily).

All of the reports will now show this data, namely AMP246, AMP250, and AMP255.

Note - AMP502 will not extract generated data, you will only get out data that was loaded via the RP precision transaction.

If the RP precision transaction is used for reporting precision data when instruments with different sample durations are collocated, then the sample durations cannot be compared, and the precision transactions for this situation will not load to AQS, and there will not be precision records created for the FEM - FRM collocated monitors. So it is better to create the monitor collocation record, and then report the raw data from the collocated monitor when collocating continuous and manual instruments.

The National Air Data Group sent out a user notification about this in December.



EPA

EPA-OAQPS
C304-02
RTP, NC 27711

E-mail: papp.michael@epa.gov

The Office of Air Quality Planning and Standards is dedicated to developing a quality system to ensure that the Nation’s ambient air data is of appropriate quality for informed decision making. We realize that it is only through the efforts of our EPA partners and the monitoring organizations that this data quality goal will be met. This newsletter is intended to provide up-to-date communications on changes or improvements to our quality system. Please pass a copy of this along to your peers and e–mail us with any issues you’d like discussed.

Mike Papp

Important People and Websites

Since 1998, the OAQPS QA Team has been working with the Office of Radiation and Indoor Air in Montgomery and Las Vegas and ORD in order to accomplish it’s QA mission. The following personnel are listed by the major programs they implement. Since all are EPA employees, their e-mail address is: last.name.first.name@epa.gov.

The **EPA Regions** are the primary contacts for the monitoring organizations and should always be informed of QA issues.

Program

- STN/IMPROVE Lab Performance Evaluations
- Tribal Air Monitoring
- Statistics, DQOs, DQA, precision and bias
- Speciation Trends Network QA Lead
- OAQPS QA Manager
- Standard Reference Photometer Lead
- Speciation Trends Network/IMPROVE Field Audits
- National Air Toxics Trend Sites QA Lead
- Criteria Pollutant QA Lead
- NPAP Lead
- PM2.5 and Pb PEP Lead
- STN/IMPROVE Lab PE/TSA/Special Studies
- STN/IMPROVE Lab PE/TSA/Special Studies

Person

- Eric Bozwell
- Emilio Braganza
- Rhonda Thompson
- Dennis Crumpler
- Joe Elkins
- Scott Moore
- Jeff Lantz
- Dennis Mikel
- Mike Papp
- Mark Shanis
- Dennis Crumpler
- Jewell Smiley
- Steve Taylor

Affiliation

- ORIA- Montgomery
- ORIA-LV
- OAQPS
- OAQPS
- OAQPS
- ORD-APPCD
- ORIA -LV
- OAQPS
- OAQPS
- OAQPS
- OAQPS
- ORIA-Montgomery
- ORIA-Montgomery

Websites

Website

EPA Quality Staff
AMTIC
AMTIC QA Page

URL

[EPA Quality System](http://www.epa.gov)
<http://www.epa.gov/ttn/amtic/>
<http://www.epa.gov/ttn/amtic/quality.html>

Description

Overall EPA QA policy and guidance
Ambient air monitoring and QA
Direct access to QA programs