

Quality System Training Module 5 Assessment/Reporting

- a. NPEP
- b. MSRs & TSAs
- c. Statistical Data Assessments

Performance Evaluation-What and Why

Performance evaluations (PEs) are a type of audit in which the quantitative data generated in a measurement system are **obtained independently** and compared with routinely obtained data to evaluate the proficiency of an analyst, or a laboratory

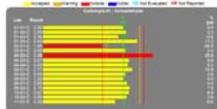
NPAP-TTP



PEP



Protocol Gas



NATTS PT &
ORIA Round Robins



SRP



PAMS Cylinders ²

PE's Can

- Determine data comparability and usability across sites, monitoring networks, instruments and laboratories.
- Ensure monitoring systems are operating within an acceptable level of data quality.
- Verify the precision and bias estimates performed by monitoring organizations.
- Identify where improvements (technology/training) are needed.
- Assure the public of non-biased assessments of data quality.
- Provide a quantitative mechanism to defend the quality of data.

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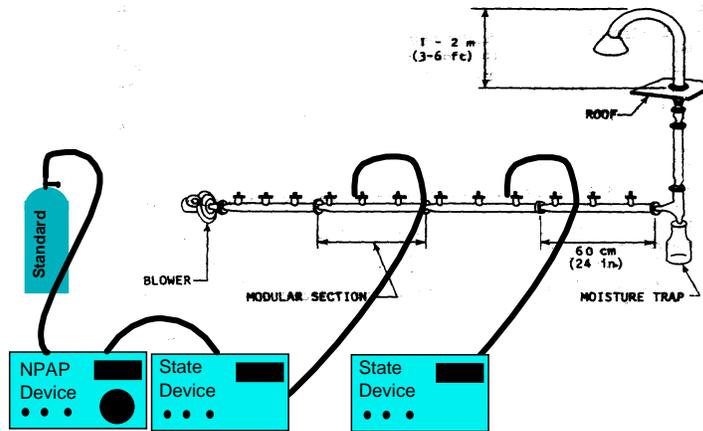
NPEP

EPA's National Performance Evaluation Programs (NPEP) Indicating National Comparability and NIST Traceability, by delivery of independent Proficiency Test samples (PTs), consisting of :

- NPAP: Mailed BOA & TTP; Certification of Calibration Stds vs. NIST (SRP & Protocol Gas); & Air Toxics Programs- Mark Shanis (D Mikel)
- PEP and Speciation PM Programs- Dennis Crumpler

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NPAP-Mailed, Back of the Analyzer(BOA)



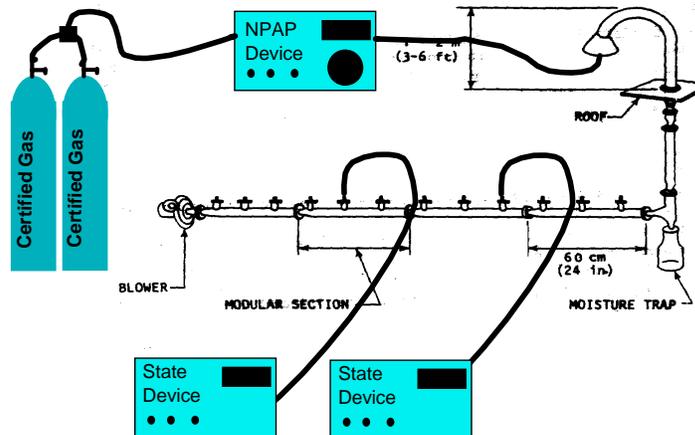
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NPAP Traceability/Comparability Programs

- NPAP 1980-2005 rugged, simple gas & flow altering devices; Pb Strips, PAMS VOCs, HCOR
 - Checked by central EPA RTP contractor against NIST standards, then shipped (“Mailed NPAP”)
 - Used by agency station operator, BackOfAnalyzer
 - Agency results sent to central contractor
 - Contractor’s vs Agency results sent back
 - Time lag could be weeks to a month
 - EPA vs EPA (contractor) Accuracy of 5% vs NIST to ensure EPA ability to measure 10% or > bias of agency calibrations, BOA

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NPAP: Through the Sampling Inlet, or Probe (TTP)



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NPAP TTP

- NPAP TTP Pilot funded, OK'd 2001, purchases in 2002, deliveries in 2003
- Generation and analysis just prior to audit
- Independent, EPA trained and managed auditors bring test gases to sampling sites
- Through the sampling inlet (TTP), not BOA
- Preliminary results to agency operator
- EPA vs EPA TTP bias between 2 and 5%
- Inter-Regional sharing, state implementation

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3 NPAP TTP Mobile Platforms



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NPAP TTP Trailer Platform- Exterior Features



10



11



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NPAP TTP Trailer Platform – Interior Features



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TTP Connection Set-up:

- The steel hose (Top) is from the audit trailer
- The teflon hose (left) goes to the site monitor
- The white hose (right) serves as a vent



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Some Station Access & Connections Are Easier



15



16



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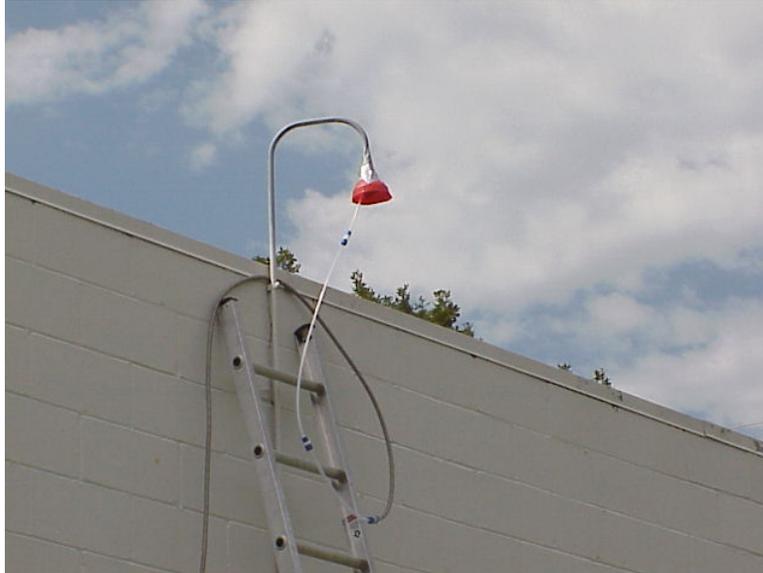
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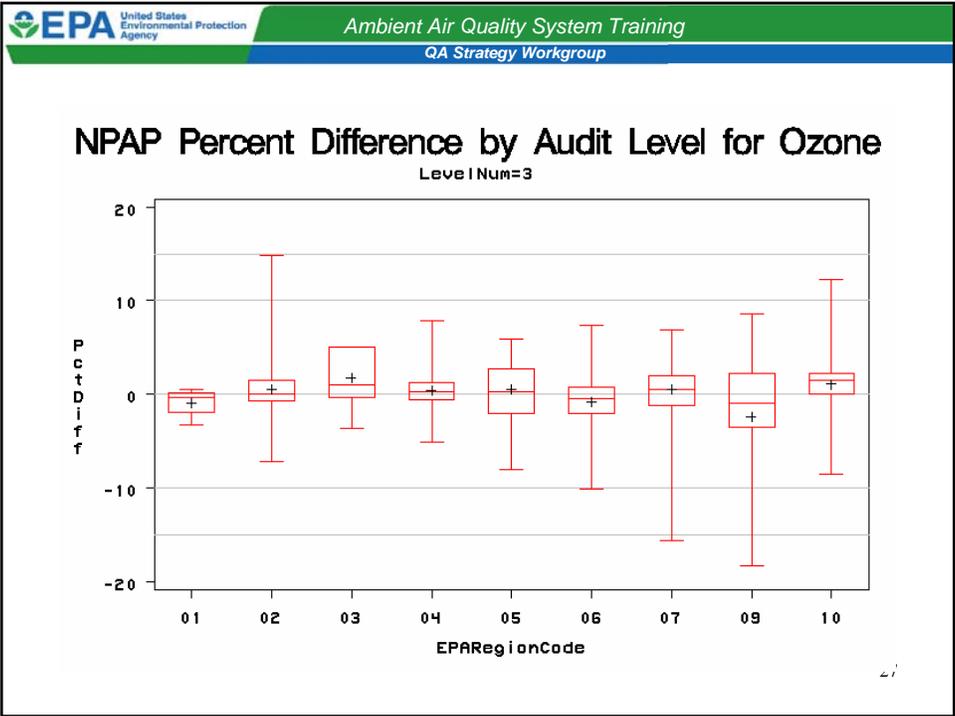
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PROBLEMS NOTED AT SITES

- There have been several findings that could lead to the reduction in significant problems during future audits.
 - dirty manifold
 - dirty connectors
 - leaky joints
 - difficult access
 - dirty sample lines
 - dirty particulate filter holders

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EPA United States Environmental Protection Agency
 Ambient Air Quality System Training
 QA Strategy Workgroup

%Completed TTP PE Out of 100% in 5 Yrs: Expect 60% in 3 Yrs

Region	Total of 05-07	Total # Sites	% Completed
1	13	62	21%
2	53	41	129%
3	45	136	33%
4	84	178	47%
5	117	249	47%
6	87	86	101%
7	99	42	235%
8	24	50	48%
9	92	86	106%
10	35	43	81%
Total	649	973	67%

NPAP-TTP Summary

- Test gases delivered in mobile labs operated by independent EPA auditors
- Delivery platforms are varied, shared and flexible- trucks, trailers, and case-based
- Tests the whole sampling flow path
- Results verified by analysis and provided before leaving the site
- Trouble shooting and follow-up can be same day; help provided coast-to-coast

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Calibration Gas Standard Certification Programs

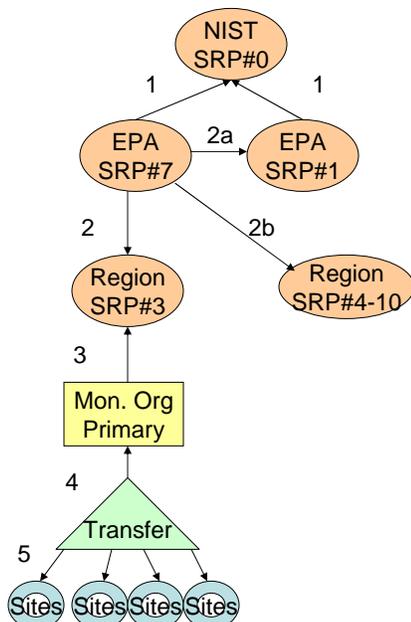
Programs for periodically
comparing gas calibration
standards to NIST –SRP, PGVP

Standard Reference Photometer (SRP)-Certification Program

- We can't keep ozone in a container, so...
- NIST has made ozone SRPs for the world
- EPA has a US network of 2 in RTP & 9 in the Regions 1 EPA RTP SRP is used to link the Regions to the NIST SRPs
- 1 of the 2 NIST SRPs links US to the world

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O3 Traceability Scenario



1. EPA SRP 1 & 7 certified at NIST each year
 - SRP #7 travels to Regions
 - SRP # 1 stays home
2. SRP # 7 certifies Regional SRPs
 - a- Upon completion of one audit SRP #7 gets verified by SRP #1
 - B- before going to next Region
3. Mon. Org. bring it's **local primary standard (LPS)** to Region SRP
 - LPS stays at lab
4. Mon. Org. brings **transfer standard (TS)** in to certify against LPS and then takes TS to site; some also bring TS to Regional SRP
5. TS certifies site's **working standard**

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Protocol Gas Verification Program

- EPA requires gas calibration standards to be of the EPA Protocol grade
- The Protocol is on an EPA website; has parts G1 and G2; can use for purchases
- Reactive NAAQS gases (and others) should be rechecked using the G1(direct) or G2(by dilution), as appropriate
- EPA did a Verification audit program in the 90's; stopped late 90's; looking at alternatives; try to resurrect or provide options agencies can use

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National Air Toxics Trends Sites (NATTS)-Proficiency Test (PT) Samples

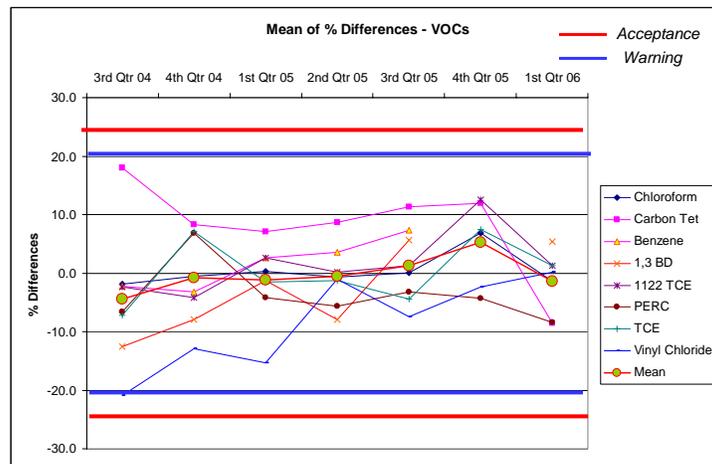
From Dennis Mikel:
What and Why

Type of Assessments-VOC Canisters



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Type of Assessment-VOC PT Study by Quarter



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Type of Assessment- Carbonyl Spiking



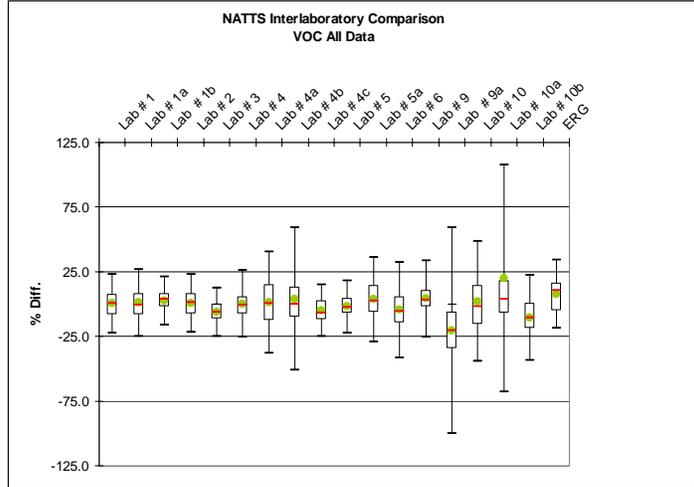
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NAATS Program Summary

- ✓ The mean data completeness is below the required 85% for the 3rd year in a row, with the exception of the VOCs. Improvement has been seen in this area;
- ✓ The detectability for the 4 DQO compounds does not meet the MDLs stated in the DQOs, although there are improvement;
- ✓ The CV data from the collocated/duplicate data illustrates that we are meeting CV of less than 15% with the exception of Benzene;
- ✓ The laboratories are meeting the 25% Bias requirement
- ✓ Acrolein by TO-15 method needs more work
- ✓ The SVOCs are dominated by Naphthalene but overall, Precision is below 25% CV

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Type of Assessments- Interlaboratory VOC Comparison



PM_{2.5} QA Programs



The PEP (PM_{2.5} FRM/FEM Performance Evaluation Program)

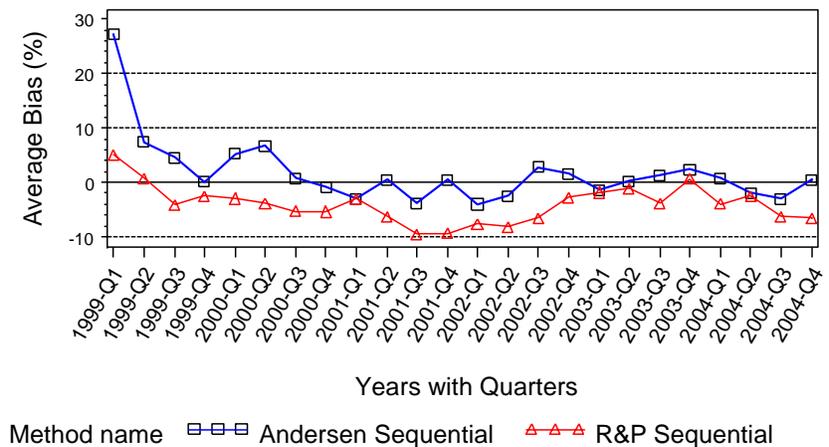
- **Collocates** a audit sampler **beside a FRM/FEM**
 - Provides **independent assessment** of **network sampler bias**
 - Applies the **most rigorous performance and QA/QC requirements** to field and laboratory operations
 - Provides **independent audits** of State/local/Tribal FRM measurements
- **PEP Requirements a/o Jan 07 for Each PQAQ:**
 - **15% of all sites audited per year;** all sites in 6 years
 - **If 5 sites or less-----5 audits per year**
 - **If >5 sites-----8 sites per year**
 - **At least one of each "type" audited each year**

Why is the PEP Program the “Gold Standard”

- Trained and certified field personnel; + annual recertifications
- Rigorous QA/QC procedures:
- Annual TSA of field and Lab operations + Lab Performance Trials
- Rigorous Data verification/validation before posting in AQS
- Data analysis by OAQPS, Regions, and State and locals
- Follow-up on equipment and operational issues

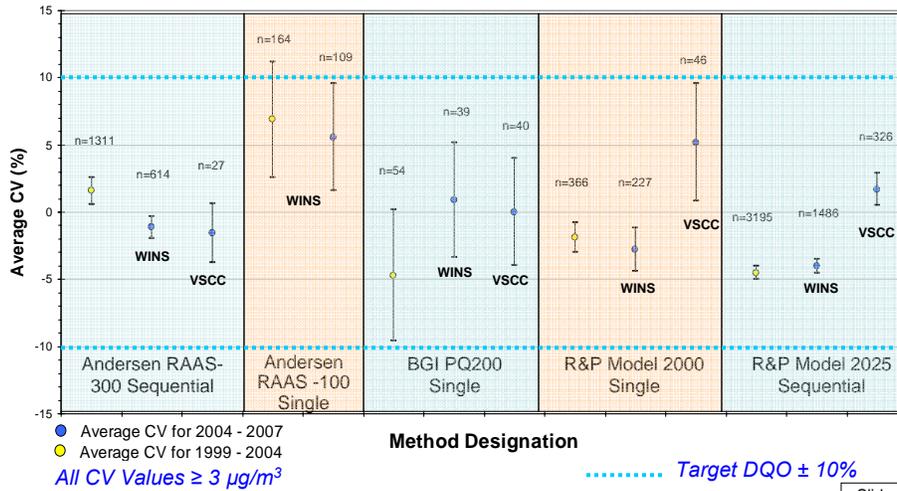
Slide 3

Mean Bias to PEP Samplers by Method Designation with Concentrations > 3 ug/m3



Slide 4

Comparison of 95% Confidence Intervals for 1999 thru 2007 National Bias Estimates



Slide 5

QA for Chemical Speciation and IMPROVE Networks

- **Goal 1: Minimize and quantify uncertainty**
 - Perform field TSAs of programs, sites and samplers
 - Laboratory TSAs and performance trials
 - Accuracy by monthly sampler performance verifications and quarterly audits by SLT auditors
- **Goal 2: Publish consistent QA data**
 - Promoting uniform verification and audit procedures,
 - Promoting uniform reporting of results in AQS and AMTIC

Slide 6

QA for Chemical Speciation and IMPROVE Networks

- **Goal 1: Minimize and quantify uncertainty**
 - Bias minimized through Consolidation of samplers
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Slide 6

Chemical Speciation Network
Performance Audit Worksheet
URG 3000N

US Environmental Protection Agency
Office of Air and Radiation

Clock Test:
If Local Time is under daylight savings, convert Ref Std to Local Standard Time. Daylight Saving Time begins for most of the United States at 2:00 a.m. on the first Sunday of April. Time reverts to standard time at 2:00 a.m. on the last Sunday of October.

Audit Recalibrated Date	Time (h:mm)		Difference Minutes	5 minutes or less?	
	Ref Std	URG		Pass	Fail

Leak Test

Channel 1	Initial Audit	Channel 1	After Correction	225 mm Hg drop or higher fails	
	A, mm Hg		B, mm Hg	Fail A	Fail B

Flow Test

For the reference standard, enter "UR" for under range and "OR" for over range flow readings.

Calibration

Channel 1	Ref Std	L/min	URG	% Difference	Less than 10%?	
					Pass	Fail

Retest after Calibration

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Reference Standard vs Design Flow

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Ambient Temperature Test

Retest After Recalibration	Ref Std	Degrees C	URG	Difference	Less than 2 degrees?	
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Pressure Test

Retest after recalibration	Ref Std	mm Hg	URG	Difference	Less than 10 mm Hg?	
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Slide 7a

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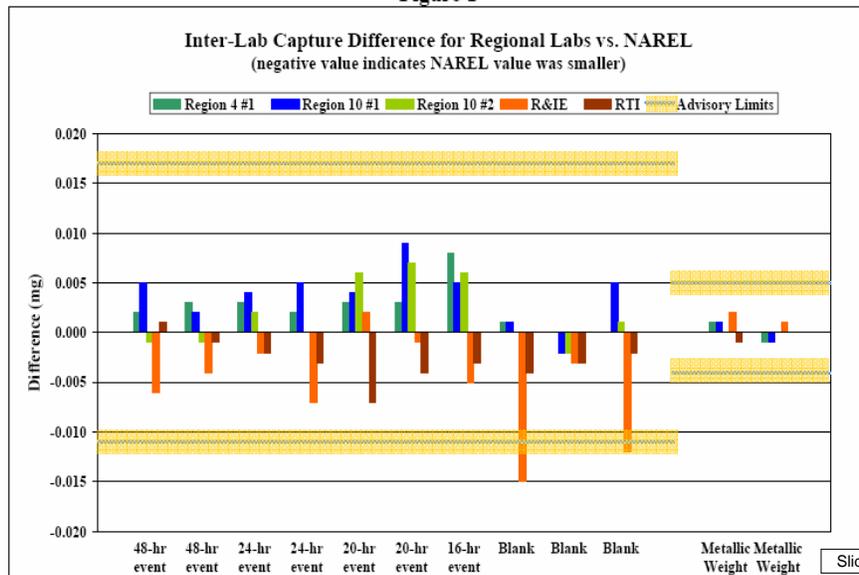
Slide 7a

PM2.5 Support Laboratory QA Performance Evaluations

- Administered by Office of Radiation and Indoor Air Laboratory in Montgomery, AL
- Provides clean, pristine filters to participating labs for initial tare weight
 - PTFE, Nylon, Quartz
- Creates replicate filters with PM_{2.5} aerosol from Montgomery ambient air
- Determines: Total mass, ions and elemental and organic carbon on specified filters; XRF analyses performed by ORD-RTP
- Distributes replicates and or single blind filters to participating labs
- Gathers participating lab results and surviving filters for post analysis
- Generates reports for OAQPS, participants and public
 - posted on AMTIC

Slide 8

Figure 1



Slide 9

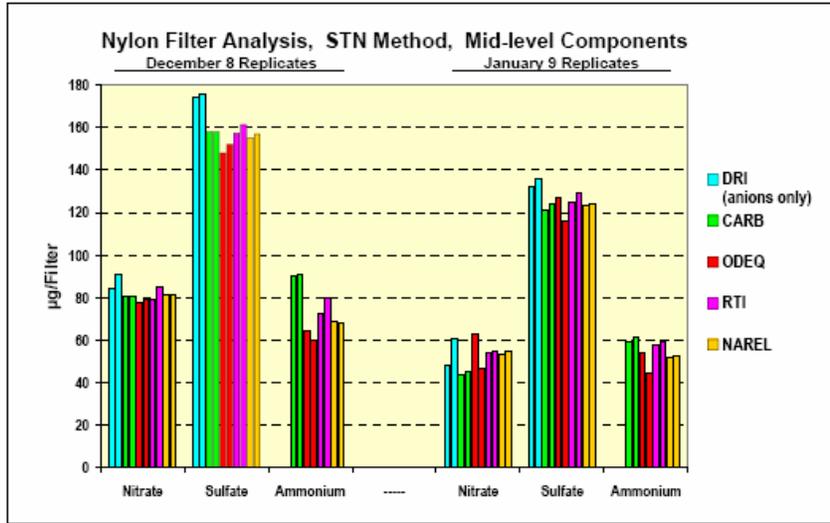


Figure 3

Slide 10

Management Systems Reviews (MSRs) and Technical System Audits (TSAs) for Air Monitoring Programs

*Mathew C. Plate
USEPA – Region 9
Quality Assurance
Office*

*Gordon E. Jones
USEPA – Region 5
Air and Radiation
Division*

Summary of Presentation

- **General Audit Concepts**
- **Management System Reviews**
- **Technical Systems Audits**



Auditors/Vultures

General Audit Concepts

- Plan / Identify Audit Team
- Contact Organization
- Review Data and Reports
- Schedule Audit
- Conduct Audit
- Issue Report
- Agree on a Corrective Action Plan if needed



3

MSRs and TSAs Entrance Briefing

- Meet with senior management
- Describe:
 - What will be done
 - How it will be done
 - What will/will not be done with results
- Emphasize:
 - Focus on fact-finding/understanding process
 - “No surprises” style



4

MSRs and TSAs Exit Briefing

- Plan ahead with review team
- Be objective
 - Describe what you did
 - Tell them what you found (no surprises)
- Don't speculate
- Provide estimate of when Findings Report will be available



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What is the MSR?

- A MSR is a Quality Management System assessment tool
 - A process to identify strengths and opportunities for improvements in Agency Quality Systems
- A MSR is not the same as a Data Quality and Regulatory Compliance Assessment
 - i.e., it does not evaluate programmatic details

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Types of MSRs

- Institutional MSRs:
 - Focus on the entire Quality System of the organization
 - Measure effectiveness of QA/QC of all environmental programs
- Programmatic MSRs:
 - Focus on a single environmental program
 - Measure effectiveness of quality systems of the program by multiple organizations

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Questions MSR Should Answer

An assessment of a quality management system is a systematic, independent, and documented examination that uses specified assessment criteria to answer one or more of the following questions about an organization's quality system:

- Is the organization's quality system documented?
- Do the activities that are being performed follow the quality system's documentation, particularly the QMP?
- Are the quality system's procedures being implemented effectively?

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Questions MSR Should Answer

- Are the quality system's procedures being implemented effectively?
- Has the organization effectively implemented external quality specifications?
- Does the quality system support environmental making?
- Does the quality system ensure that data are sufficient in quantity and quality appropriate for their intended purpose?
- How can assessors assist in developing and implementing this quality system?

9

What is a Technical System Audit?

- **A systematic and objective examination to determine:**
 - whether environmental data collection activities comply with the project's QA Project Plan,
 - whether QAPP procedures are implemented effectively,
 - and whether they are sufficient and adequate to achieve the Project's data quality goals

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Types of TSAs

- Organizational TSA:
 - Comprehensive evaluation of all ambient air monitoring programs that report data funded by EPA or used to support EPA decisions.
 - Focus on ambient air data used to support NAAQS decisions
- Program Specific TSA:
 - Focus on a single environmental program at a single organization
 - Conducted on non-NAAQS monitoring programs (Toxics/PAMS/PM Speciation)

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Frequency of TSAs

- NAAQS pollutants – Regulation requires EPA to conduct an Organizational TSA of each monitoring organization at least every 3 years
- Non-NAAQS - Program specific TSAs audits are conducted every 1 – 3 years
- Internal TSAs – (State, Local, and Tribal) QA Manager or QAPP defines the frequency

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Guidelines for TSAs

- Quality Assurance *Handbook for Air Pollution Measurement Systems Volume II* (Redbook)
- EPA QA/G-7
- Air Monitoring Audit Checklists and guidelines developed by Air QA Workgroup and OAQPS
- Updated Audit Checklists being developed by the Air QA Workgroup

Checklists can be filled out by the organization prior to audits or can be used by the auditors to guide the TSA.

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Technical System Audit Recommendations

- Auditors need to know general QA/QC practices and the technical requirements of the specific methods being evaluated.
- Auditors should evaluate
 - Technical aspects of monitoring method implementation
 - Quality Assurance and Quality Control
 - Organizations providing contract support (i.e., laboratories)

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Evaluations Should Include

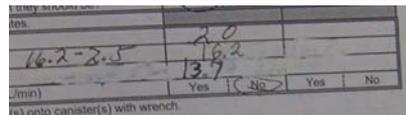
- Documentation
- Specific data points
- Sample collection, analysis
- Data transfer
- Validation
- Reporting
- Previous audit findings
- Performance evaluations
- Corrective actions

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Examples of TSA Findings



QA Plans/SOPs used not current



Not legally defensible



Sampler damaged



Probe inlet not mounted and dirty

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Outline for the New TSA Form

- **General / Quality Management**
 - Program Organization
 - Facilities
 - Independent Quality Assurance
 - Planning Documents (including QMP, QAPPs, & SOPs)
 - General Documentation Policies
 - Training
 - Internal Audits
 - Oversight of Contractors and Suppliers
 - Corrective Action
 - Quality Improvement
 - External Performance Audits

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Outline for the New TSA Form

- **Network Management / Field Operations**
 - Network Design
 - Changes to the Network since the last audit
 - Proposed changes to the Network
 - Field Support
 - Field Sites (Done for Each Site Audited)

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Outline for the New TSA Form

- **Laboratory Operations**
 - Laboratory Quality Management
 - Management Structure
 - Data Review and Validation
 - Audits and Performance Evaluations
 - Corrective Actions
 - Laboratory Data Management
 - PM2.5/PM10 & PM10-2.5
 - Lead

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Outline for the New TSA Form

- **Data and Data Management**
 - Data Handling
 - Software Documentation and Validation
 - Data Validation and Correction
 - Data Processing
 - Data Reports
 - Reporting to AQS
- **Appendices**
 - STN & IMPROVE TSA audits
 - Toxic TSA audits
 - PAMS TSA audits



EPA Audit of the CA ARB

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Statistical Data Assessments

Ambient Air QA 101
April 21, 2008

Louise Camalier & Jonathan Miller
EPA - Office of Air Quality Planning and Standards

What We Will Cover

- Data Quality Indicators (DQI's)
 - The Statistics
 - Proper Aggregation of the Data
- Tools
 - Data Assessment Statistical Calculator (DASC)
 - AQS Report (AMP255)
 - Annual Box and Whisker Plots
- What to Look For
- Reconciliation with the DQO's

 United States Environmental Protection Agency

Ambient Air Quality System Training
QA Strategy Workgroup

What is Performed

Method	Pollutants	Frequency	MQO	
One-Point QC	SO ₂ , NO ₂ , O ₃ , CO	Every 2 Weeks	O ₃ : Precision = 7% Bias = 7%	SO ₂ , NO ₂ , CO : Precision = 10% Bias = 10%
Annual Performance Evaluation	SO ₂ , NO ₂ , O ₃ , CO	Once per Year	<= 15% for each audit concentration	
Flow Rate Verification	PM ₁₀ , PM _{2.5} , PM _c	Once per Month	<= 4% of Standard & 5% of Design Value	
Semi-Annual Flow Rate Audit	PM ₁₀ , PM _{2.5} , PM _c	Every 6 Months	<= 4% of Standard & 5% of Design Value	
Collocated Sampling	PM ₁₀ , TSP, PM _{2.5} , PM _c	15% of Network Every 12 Days	PM _{2.5} , TSP, PM ₁₀ : Precision = 10%	PM _c : Precision = 15%
PM PEP Program	PM _{2.5} , PM _c		PM _{2.5} : Precision = 10%	PM _c : Precision = 15%

3

 United States Environmental Protection Agency

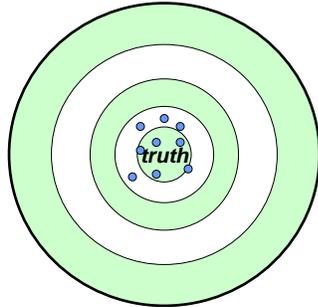
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Using What Was Acquired

Method	Pollutants	What is Assessed	How?
One-Point QC	SO ₂ , NO ₂ , O ₃ , CO	Precision & Bias	Annual @ Site Level
Annual Performance Evaluation	SO ₂ , NO ₂ , O ₃ , CO	Validation of Bias	Annual @ Site Level or 3-Years @ PQAQO Level
Flow Rate Verification	PM ₁₀ , PM _{2.5} , PM _c	Bias	Annual/3-Year @ Site/PQAQO Level
Semi-Annual Flow Rate Audit	PM ₁₀ , PM _{2.5} , PM _c	Bias	Annual/3-Year @ PQAQO Level
Collocated Sampling	PM ₁₀ , TSP, PM _{2.5} , PM _c	Precision	Quarterly/Annual/3-Year @ PQAQO Level
PM PEP Program	PM _{2.5} , PM _c	Bias	Annual/3-Year @ Site/PQAQO Level

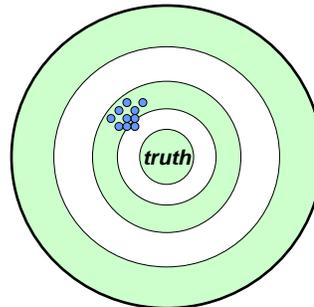
4

What Are We Trying to Determine?



Precision

"A measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions"



Bias

"A systematic or persistent distortion of a measurement process which causes errors in one direction"

5

Percent Difference & Relative Percent Difference

Basis for All Statistical Calculations

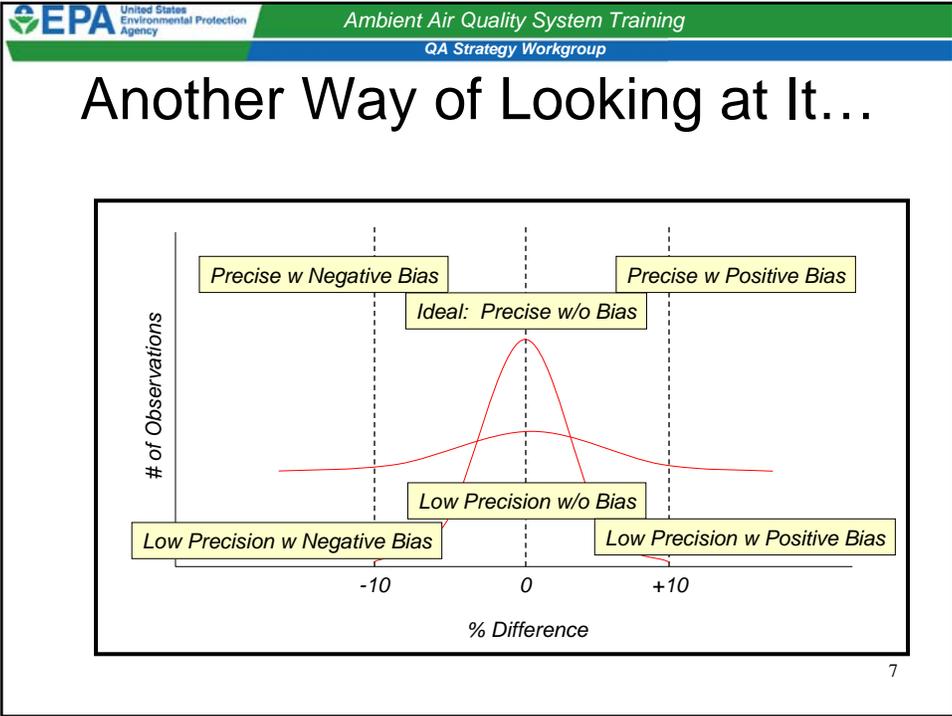
- For standard gas

$$d_i = \frac{meas - audit}{audit} \times 100$$

- For Collocated Samples,

$$d_i = \frac{X_i - Y_i}{\frac{(X_i + Y_i)}{2}} \bullet 100$$

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Precision

Defines the "Width" of the Bell Curve

90th Percentile of a Chi-Squared Distribution → **More Conservative**

Gaseous Estimate

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

Collocated Estimate

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

Denominator changes because we do not have "truth"

Precision is more conservative when evaluated at the 90% one-sided upper confidence level

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Bias

$$\text{Bias_Estimate} = |AB| = AB + t_{0.95, n-1} \cdot \frac{AS}{\sqrt{n}}$$

Central Tendency

$$AB = \frac{1}{n} \cdot \sum_{i=1}^n |d_i|$$

Standard Error

$$AS = \sqrt{\frac{n \cdot \sum_{i=1}^n |d_i|^2 - (\sum_{i=1}^n |d_i|)^2}{n(n-1)}}$$

95th Quartile of a Student-t Distribution w/ n-1 df

9

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Assigning a Sign to Bias

The graph shows a normal distribution curve with the y-axis labeled '# of Observations' and the x-axis labeled '% Difference'. The x-axis has markers at -10, 0, and +10. A vertical dashed line is at 0. Two other vertical dashed lines are at -10 and +10. The area between -10 and 0 is shaded. Three boxes above the curve indicate sign assignments: a box between -10 and 0 labeled '25th %tile 75th %tile '-' (negative sign)', a box between 0 and +10 labeled '25th %tile 75th %tile '+' (positive sign)', and a box above 0 labeled '25th %tile 75th %tile '+/-' (no sign)'. Arrows point from the labels '25th Percentile' and '75th Percentile' to the corresponding vertical lines on the x-axis.

25th < 0 < 75th → "+/-"

25th Percentile is >0 → "+"

75th Percentile is <0 → "-"

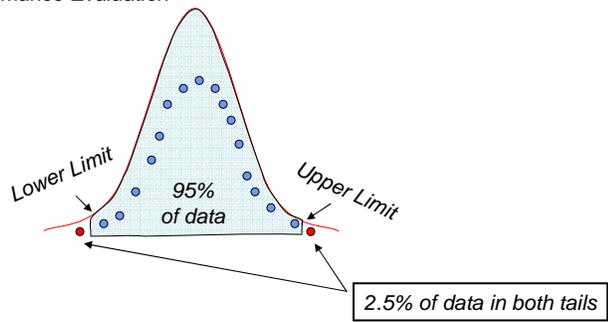
10

Validation of Bias

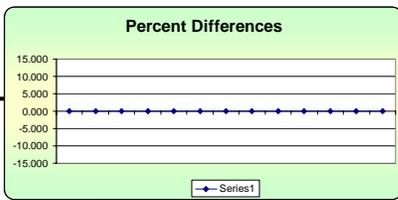
Upper Probability Limit = $m + 1.96 * S$

Lower Probability Limit = $m - 1.96 * S$

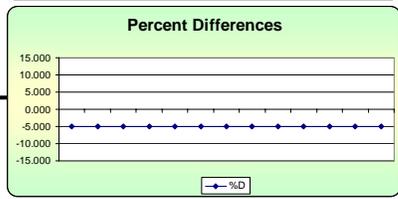
- “d”s for the Results of the Annual Performance Evaluation



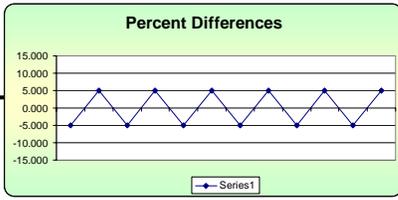
CV= 0%
 Signed Bias= 0%
 Upper Probability Limit= 0%
 Lower Probability Limit= 0%



CV= 0%
 Signed Bias= -5%
 Upper Probability Limit= -5%
 Lower Probability Limit= -5%



CV= 7.3%
 Signed Bias= +/- 5%
 Upper Probability Limit= 10.24
 Lower Probability Limit= -10.24



The DQI's

- The Statistics
 - Gaseous Precision & Bias Assessments
 - Precision Estimate from Collocated Samples
 - PM_{2.5} Bias Assessment
 - PM_{2.5} & PM_c Absolute Bias Assessment
 - One-Point Flow Rate Bias Estimate
 - Semi-Annual Flow Rate Audits
 - Lead Bias Assessments

DASC Tool

PM_{2.5} Absolute Bias

Site No. (C44)	Mean Val (Y)	Std Val (Q)	25th Percentile	75th Percentile	d (Eqn 1)	MI	MI'	Bias (%)
2	5.05	5.55	-9.009	-7.509	81.162	9.009	81.162	
5	12.35	13	-5.000	2.230	25.000	5.000	25.000	
6	14.67	14.35	-2.230	2.230	4.973	2.230	4.973	26
7	9.59	7.68	-24.970	618.507	24.970	618.507	1	284
8	10.51	11.2	-5.991	48.076	5.991	48.076	25	-51.502
9	12.44	13.45	-7.509	56.389	7.509	56.389		2660.956
10	3.78	4.51	-16.186	261.995				
11	18.56	16.99	9.241					
12	12.56	13.32	-5.706					
13	7.88	7.89	-2.662					
14	14.56	15.32	-4.961					
15	17.45	16.76	4.117					
16	12.34	13.44	-8.185					
17	5.05	5.55	-9.009					
18	12.35	13	-5.000					
19	14.67	14.35	-2.230					
20	9.59	7.68	-24.970					
21	10.51	11.2	-5.991					
22	12.44	13.45	-7.509					
23	3.78	4.51	-16.186					
24	18.56	16.99	9.241					
25	12.56	13.32	-5.706					
26	7.88	7.89	-2.662					
27	14.56	15.32	-4.961					
28	17.45	16.76	4.117					
29	12.34	13.44	-8.185					

Percent Differences

Graphs & Stats Automatically Updated

Holds Up to 500 Pairs of Values

References Equations in Appendix A

Buttons: Return to Main Menu, Print Worksheet

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DASC Tool (Cont'd)

Easy to Use Navigation to Find the Stats You Need

Please Note
If you wish to print a worksheet, click on the "Print Worksheet" button on the appropriate worksheet. If you wish to print the entire workbook, please return to this worksheet prior to printing.

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AMP255 Features

Statistics Shown on a per Site and Per PQA0 Level as Appropriate

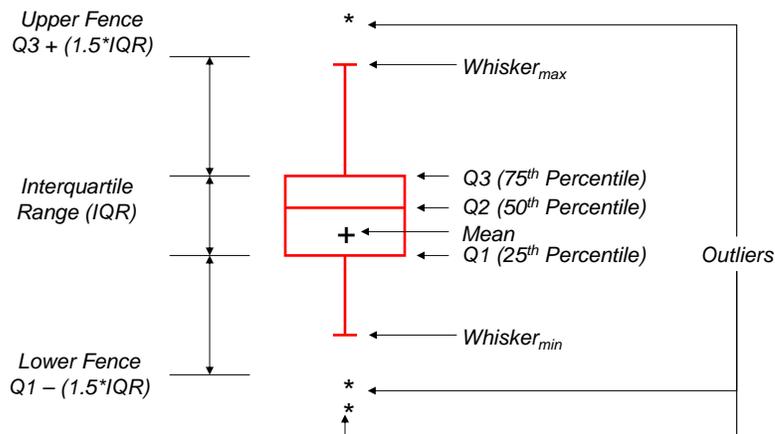
Region	State	PQA0	Site	CFR Lower Limit	CFR Upper Limit	Bias UB	CV UB
6	TX	1035	480290046	NA	NA	2.07	1.49
6	TX	1035	481410002	NA	NA	4.06	1.79
6	TX	1035	481410055	NA	NA	2.75	0.88
6	TX	1035	482010024	NA	NA	5.56	3.01
6	TX	1035	482010047	NA	NA	0.9	0.82
6	TX	1035	482010075	NA	NA	3.43	3.82
6	TX	1035	482011039	NA	NA	-1.59	1.59
6	TX	1035	482451035	NA	NA	2.86	4.39
6	TX	1035	483091037	NA	NA	-2.53	2.61
6	TX	1035	484391002	NA	NA	2.02	2.38
6	TX	1035	484393011	NA	NA	-0.74	0.6
6	TX	1035	All - NSP	-4.24	6.44	-2.32	2.86

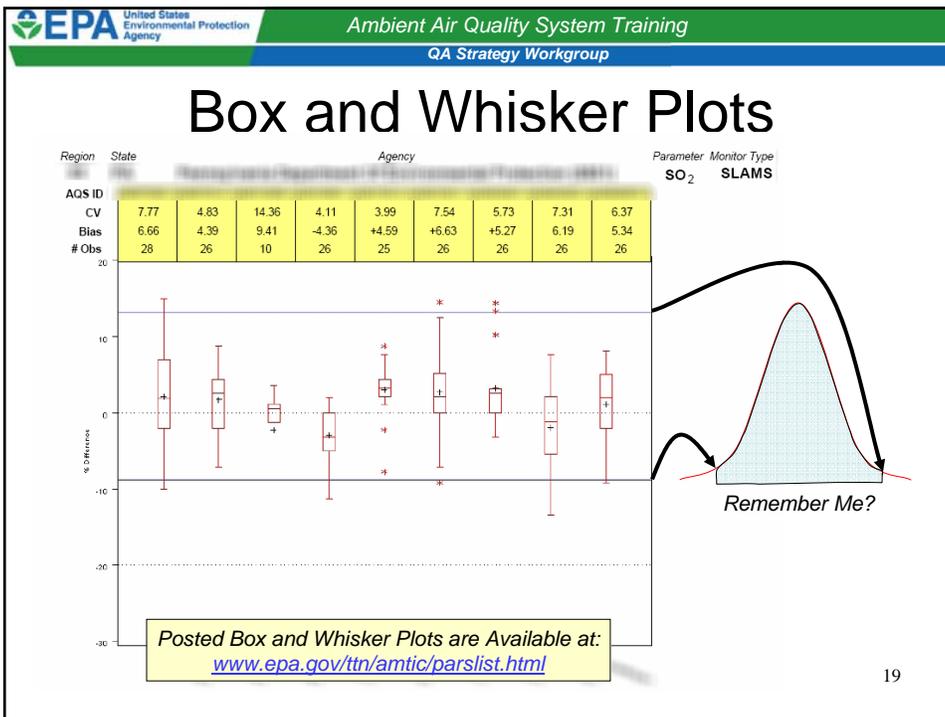
16

AMP255 Features

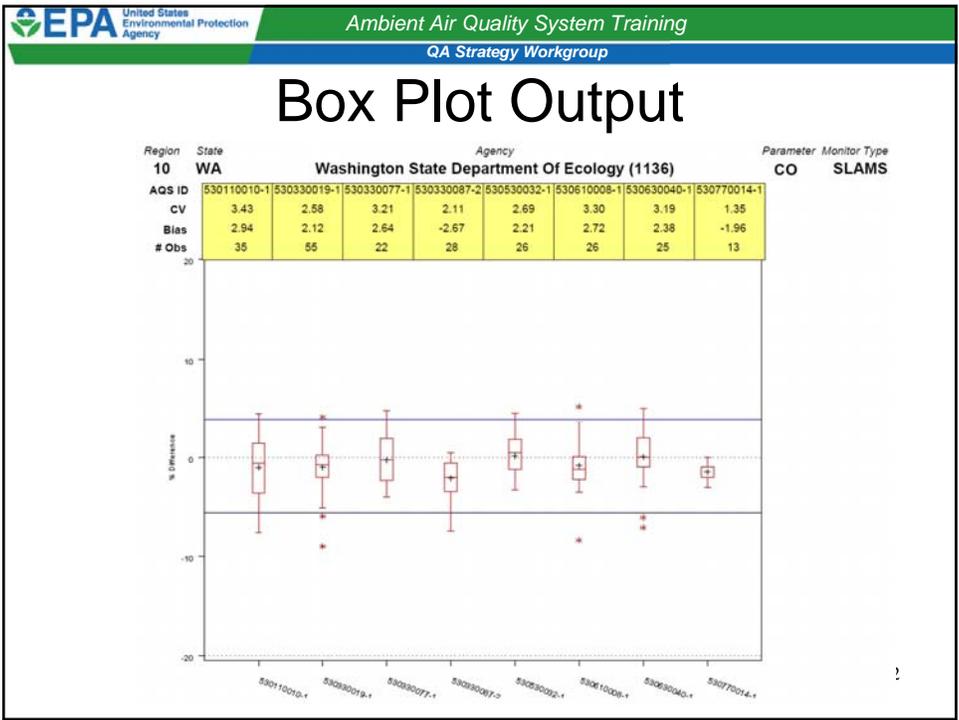
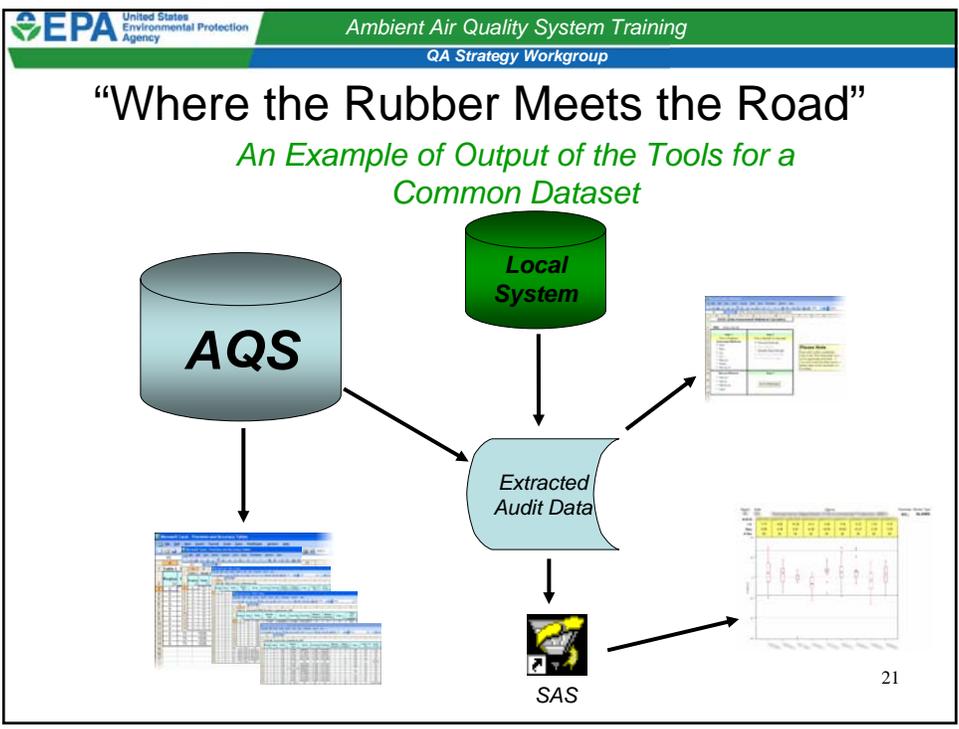
The screenshot displays a Microsoft Excel spreadsheet with several tables. The main table is titled 'Table I. Single' and has columns for 'Region' and 'State'. Below it are 'Table II. Automated PM10 Precision Completion, 2007' and 'Table III. Automated PM10 Precision Completion, 2007'. There are also 'Table IV. PM10 Flow Rate Completion, 2007' and 'Table V. PM2.5 Tables'. The bottom of the screen shows a taskbar with buttons for 'Agencies', 'Gaseous OJ Complete...', 'Lead Tables', 'PM10 Tables', 'PM2.5 Tables', and 'Precision and Accurac...'.

Box and Whisker Plots





- EPA United States Environmental Protection Agency Ambient Air Quality System Training QA Strategy Workgroup
- ## What Data is in AQS?
- Collocated Data
 - Flow Data
 - Annual Performance Audits
 - NPAP Data
 - *Technical Systems Audit Information???*
- 20



What Did We Learn Today?

- What do the terms “Precision” and “Bias” represent?
- What do we use as the basis for all statistical calculations?
- How do you determine the sign for the Bias calculation?
- What tools are available to calculate and analyze the Appendix A assessments?
Where do you find these tools?