PM$_{2.5}$ and Pb Performance Evaluation Programs
Current Events

MARAMA Annual Monitoring Committee Training Workshop
February 23-24, 2010
At a glance

- Update on Pb-PEP
  - What it is and “ain’t”
  - Schedule
- PM$_{2.5}$-PEP Recent results
  - Completeness concerns with new metric
  - Bias trend is thought-provoking
Lead (Pb) FRM/FEM Performance Evaluation Program

- Same philosophy as PM$_{2.5}$—Bias is primary
- Analytical method will be ICP-MS FEM due to sensitivity for lower concentrations
- Samplers will be “state-of-the-art” Hi-vol FRMs

**PEP Requirements Per PQAO:**
- 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 “monitor type” audited each year, including “regulatory” FEMs and SPMS
Lead (Pb) FRM/FEM Performance Evaluation Program

PEP Requirements Per PQAO:

- 5 audits per year
  - 1 collocation with a PEP sampler
  - 4 filters collected from network precision samplers; sent to PEP Lab

- 8 sites per year
  - 2 collocations with a PEP Sampler
  - 6 filters collected from network precision samplers; sent to PEP Lab
Pb-PEP Implementation Schedule

- SLTs can begin collecting and storing collocated site filters and storing
  - EPA will provide shipping instructions and labels as soon as Lab gains FEM approval
- PEP Lab should get FEM approval for ICP-MS via hot block extraction soon
- Deployment of PEP samplers is expected in second half of 2010
- We & Regions need a good count of Hi Vol sites
Recent PM2.5 National FRM Network BIAS Trends Based on 2008 Performance Evaluation Program Findings
Completeness Goals

Prior to 2007

- Each sampler in the selected 25% was audited 4 times each year,
- Generated about 1200 PEP audits per year.
- Completeness criteria—at least 75% of the audits had to be valid.
- PEP Audit presumed valid if both the primary monitor and PEP audit concentration measurements were not invalidated for operational or other reasons, and
- The measured concentrations of both samplers > 6 μg/m³ for bias statistic
- PEP audits at 25% of every State, local or tribal (SLT) “Reporting Organization’s” network of FRMS,

Beginning January 2007

- 15% of all sites in a PQAO are to be audited per year;
- All sites in 6 years
- Some seasonal representation should be scheduled
- All FRM/FEM Monitor types are to be audited
- If PQAO network is ≥5 sites-5 audits per year
- If PQAO network is >5 sites-8 sites per year
- Retained valid operational and measurement requirements
- The lower concentration limit for use in precision and bias calculations was lowered to 3 μg/m³.
2008 Completeness for All PQAOs

PQAOs in No Particular Order

National Average was 71%
PM$_{2.5}$ Network Bias Jan 08-Mar 09

2004-2007 AVG PD = -2.86%
2008 AVG PD = -7.3%

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Average Bias (%)</th>
<th>Standard Deviation</th>
<th>Upper Confidence Limit %</th>
<th>Lower Confidence Limit %</th>
<th>Fraction &lt; -30%</th>
<th>Fraction &gt; 30%</th>
<th>Fraction &lt; -50%</th>
<th>Fraction &lt; 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘04 – ‘07</td>
<td>-2.86</td>
<td>16.35</td>
<td>-2.36</td>
<td>-3.35</td>
<td>3.67 %</td>
<td>3.64 %</td>
<td>0.58 %</td>
<td>1.23 %</td>
</tr>
<tr>
<td>‘08 – 03/09</td>
<td>-7.28</td>
<td>19.82</td>
<td>-5.87</td>
<td>-8.70</td>
<td>8.08 %</td>
<td>2.07 %</td>
<td>0.75 %</td>
<td>0.94 %</td>
</tr>
</tbody>
</table>
Comparison of Historical Sampler Bias to 2008

-15 -10 -5 0 5 10

Avg Bias (%)

R&P 2000 VSCC
04-07 Avg Bias

WINS

2008 Avg Bias

R&P 2025

VSCC

WINS

VSCC

BGI PQ200

RAAS100 w/WINS

WAAS300
Conclusions:

1. Bias of the PM2.5 Network is exhibiting a downward trend that is approaching the DQO of -10%.
2. Numerous Primary Quality Assurance Organizations experienced a significant excursion beyond the DQO in 2008, and most were in the negative direction indicating the PEP samplers were more often measuring higher concentrations that the Network FRMs.
3. The variability of the individual bias values is significantly higher in 2008 and most were in the negative direction indicating the PEP samplers were more often measuring higher concentrations that the Network FRMs.
Conclusions:

4. The PM2.5 PEP experienced a 20% loss of data in 2008, which is consistent with historical performance; however, it may have a more profound impact on the variability of bias, since the number of PEP audits has dropped by over 50%.
Conclusions:

5. Much work needs to be done to understand the trend in bias and to determine if the loss of PEP data is crucial to bias assessment