PM2.5 Monitoring and Network Optimization Options

Presentation by:
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For:
State Air Monitoring Working Group
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Why do we need PM2.5 Monitoring and Network Optimization?

- Despite many obstacles overcome, operation of PM2.5 monitoring network remains a resource intensive program.
- Do not expect new resources to become available.
- With robust data-set now available for PM2.5 there is lots of opportunity to use the data to tell us how to do things better.
- As the need to implement Speciation and other pollutant measurement programs (e.g. Toxics) increases, efficiencies must be created.
- Monitoring Strategy provides opportunity to modify regulations.
- Our partners (State and local agencies) keep telling us we need to do a better job in how we run this network!
Options to consider in PM2.5 Monitoring and Network Optimization?

- Eliminate/reduce requirements in Federal Reference Method
- Revisit criteria for Federal Equivalent Methods (FEMs)
- Reduce sample frequency requirements where possible
- Retire sampling sites that are redundant or are not needed to protect public health (substantially below the NAAQS)
- Reinvent Correlated Acceptable Continuous (CAC) or site specific equivalent monitors so that PM continuous monitors can be used in place of some but not all FRM's
PM2.5 FRM
Performance Evaluation Program
Validation Matrix
(Incorporating Generic Continuous Monitoring Validation)

Laboratory Data
- Pre-sample weigh session
  - visual defect
  - min 24 hour equilibration
  - Mean T 20 - 23 C
  - Temp SD control +/- 2 C
  - Mean RH 30 - 40%
  - RH SD control 5%
  - 100 mg bal check <= 3 ug
  - 200 mg bal check <= 3 ug
  - Duplicate filter +/- 15 ug
- Pre/post sampling RH +/- 5%
- Lab Blanks < 15 ug
- Field Blanks +/- 30 ug

Post-sample weigh session
- Batch stability test <15 ug between minimum 24 hour equilibration
- Mean temp 20 - 23 C
- Temp SD control +/- 2 C
- Mean RH 30 - 40%
- RH SD control 5%
- 100 ug bal check <= 3 ug
- 200 ug bal check <= 3 ug
- Duplicate filter weight +/- 15 ug

Field Data
- Pre to post weigh session comparisons
  - Pre/post sampling RH +/- 5%
- Lab Blanks < 15 ug
- Field Blanks +/- 30 ug

Pre-sample weigh session
- Batch stability test <15 ug between minimum 24 hour equilibration
- Mean temp 20 - 23 C
- Temp SD control +/- 2 C
- Mean RH 30 - 40%
- RH SD control 5%
- 100 ug bal check <= 3 ug
- 200 ug bal check <= 3 ug
- Duplicate filter weight +/- 15 ug

Pre-sample
- Filter <= 30 days from pre-weigh
- Visual defect
- Passed External Leak Test
- Temp Verification +/- 2 degrees C
- BP Verification +/- 10 mm Hg
- Flow rate verification +/- 4%

Sampler Operation
- Sample Period 1380 - 1500 min
- Flow Rate <= 5% of 16.67 Lpm
- Visual defect
- Passed External Leak Test
- Temp Verification +/- 2 degrees C
- BP Verification +/- 10 mm Hg
- Flow rate verification +/- 4%

Sample Recovery
- <= 4 days from sample end date
  - Sample Period 1380 - 1500 min
  - Flow Rate <= 5% of 16.67 Lpm
  - Visual defect
  - Passed External Leak Test
  - Temp Verification +/- 2 degrees C
  - BP Verification +/- 10 mm Hg
  - Flow rate verification +/- 4%

Sample Transport
- <= 4 deg C and post-weighed <= 30 days (or)
  - <= 25 deg C and Post-weighed <= 10 days

Systematic Issues
- Concentration checks
  - Lower DL <= 2 ug/m3
  - Upper conc limit >= 200 ug/m3
  - Collocated CV <= 10%

Critical Criteria
- Sample Batch Validation with major and minor flags
- Operational Evaluation Criteria
- Undefined Check

May apply to both FRM and Continuous
Eliminate/reduce requirements in Federal Reference Method

- Already Competed:
  - Eliminated requirement for use of metal containers during transport of filter cassettes
  - Increased tolerance of flow rate verifications from 2% to 4%
  - Memo directing to operate samplers on Standard time year round
  - Memo on filter transport temperature requirement - providing validation flexibility by use of a sliding scale

- Ongoing Field Study - Filter Recovery Extension Study:
  - Designed to determine if sample recovery of exposed filters after 7 days does not result in a violation of the PM2.5 data quality objectives.
  - Field Study Progress
    - RTP, NC site. Field Study complete.
    - Athens, GA.
    - Maine
    - Texas
    - Seattle
    - California

- Future:
  - AIRS reporting requirements from Table L-1.
    - Can one or more of these reporting requirements be eliminated?
  - Other(s)
<table>
<thead>
<tr>
<th>Specification</th>
<th>PM10</th>
<th>PM2.5 Class I</th>
<th>PM2.5 Class II</th>
<th>PM2.5 Class III</th>
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</thead>
<tbody>
<tr>
<td>Acceptable concentration range (ug/m^3)</td>
<td>30-300</td>
<td>10-200</td>
<td>10-200</td>
<td>5-200</td>
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<tr>
<td>Minimum number of test sites</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>4</td>
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<tr>
<td>Number of candidate method samplers</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Number of reference method samplers</td>
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<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Minimum number of sample sets, each site</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>30 per quarter (120 total)</td>
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<tr>
<td>Precision</td>
<td>5 ug/M^3 or 7%</td>
<td>2 ug/M^3 or 5%</td>
<td>2 ug/M^3 or 5%</td>
<td>1 ug/M^3 or 5%</td>
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<tr>
<td>Slope of regression</td>
<td>1 +/- 0.1</td>
<td>1 +/- 0.05</td>
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<td>Intercept of regression</td>
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<td>0 +/- 1</td>
<td>0 +/- 1</td>
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<tr>
<td>Correlation of FRM and candidate method</td>
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<td>&gt;= 0.97</td>
<td>&gt;= 0.97</td>
<td>&gt;= 0.97</td>
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Revisit Equivalency Criteria for FEM's

- Suggested as option at January 2000 CASAC meeting:
  - Some support for relaxation of these criteria
  - Others expressed concern about whether any continuous monitor could meet FEM requirements in all seasons everywhere in the country
  - May not want to give perception that we are compromising data quality.
Initial Summary of
1999 Fine Particulate Matter (PM2.5) Monitoring Data

1999 98th Percentile 24-hour average PM2.5 Concentrations

1999 Annual mean PM2.5 concentrations
(calculated as the mean of each quarterly mean)

1999 98th Percentile 24-hour average PM2.5 Concentrations
Reduce Sample Frequency where applicable

- OAQPS has drafted a memo outlining current available relief for sample frequency
- Sample frequency relief centers on two major areas of relief:
  - Reducing sample frequency in Priority 1 monitoring areas that areas (>80% of the NAAQS) from daily to 1 in 3 if a CAC monitor is approved.
  - Reducing sample frequency in Priority 2 monitoring areas (<80% of the NAAQS) from daily and 1 in 3 to 1 in 6.