Visibility
- IMPROVE & Regional Haze

Ozone - PAMS

Fine Particles
PM2.5 Mass & Chemical Speciation

Inhalable Particles - PM10

AIRNOW - AQI & Forecasts

Acid Deposition - CASTNet

National Ambient Air Monitoring Strategy
Future Directions

Today

Visibility - IMPROVE & Regional Haze

Ozone - PAMS

Fine Particles - PM2.5 & Chemical Speciation

Inhalable Particles - PM10

AIRNOW - AQI & Forecasts

Acid Deposition - CASTNet

A Comprehensive Re-Examination and Re-configuration of Air Monitoring Networks
Why Do We Need a New Strategy?

**Common sense initiative**
Most criteria measurements (except O3, PM2.5) well Below NAAQS

<table>
<thead>
<tr>
<th>PM 10</th>
<th>Pm Fine/Ozone</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Number of Sites</th>
<th>0</th>
<th>200</th>
<th>400</th>
<th>600</th>
<th>800</th>
<th>1000</th>
<th>1200</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO2 Annual Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO2 2x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO 1-hr</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO 8-hr</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM10 Annual Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM10 2x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM2.5 Annual Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pb Max Q Mean</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O3 1hr 2x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 100%+ of NAAQS
- 80 - 100% of NAAQS
- 60 - 80% of NAAQS
- < 60% of NAAQS
Principal Recommendations

Need insightful measurements to ensure the $$$ allocated for emission reductions are effective.
- Enhanced real-time data delivery to public
- Increase capacity for hazardous air pollutant measurements
  - Future predictions suggest air toxics pose collectively greater risks than criteria pollutants
- Increase in continuous PM measurements
- Support for research grade/technology transfer sites

Multiple pollutant monitoring must be advanced
- Air quality is integrated through atmospheric processes, health/eco effects, emission sources.

Technological advances must be incorporated
- Information transfer technologies
- Continuous PM monitors
- High sensitivity instruments to address today’s (and later) low levels
- Model-monitor integration must advance to effect benefits for both tools
Principal Recommendations

- Reallocate monitoring resources from “low-value” criteria measurements to new priorities (HAPS, Fine Particles, etc).
- Level of realignments
  - Minor (O3, PM2.5) ....Create a sustainable network
  - Substantial (PM10, NO2, CO, SO2)....focus on real environmental benefit.

Principal Recommendations

- Revise National monitoring networks through NCore
  - Emphasis on multi-pollutant monitoring, continuous and information transfer technologies
  - Modest initial $ required to catalyze change
Principal Recommendations

- Ensure stability and flexibility for States, local agencies and Tribes

- Modify monitoring regulations to facilitate change
Why Do We Need a New Strategy?

Progress in science and technology to address this complex work.

New Monitors
Linked to networks
Models & data systems
Why Do We Need a New Strategy?

Need insightful measurements to ensure the $$$ allocated for emission reductions are effective.

- Investment in HAP measurements
- Shift toward multi-pollutant monitoring
- Increase in continuous PM monitoring
- Support for research/technology transfer sites

Measurement challenges (examples)

- Substantial progress in reducing air pollution levels
  - Difficult to attain “accurate” measurements
  - More importance on regional contributions, and
  - Global transport
- Complex non-linear systems...
Key principles

- Partnership...now with Grantees (States, locals, Tribes)
  - Oversight through the National Monitoring Steering Committee (NMSC)
  - Expansion to other agencies, private sector sponsored studies

- Balance between national and local needs
  - Increase/maintain flexibility for S/L/Ts
  - Ensure capable of addressing national level needs

- Near “zero” sum assumption in resources
  - Maintain long term viability of monitoring agencies
  - Near term-work within current resource framework
How & Who does this benefit?

- **State and local agencies**
  - More focused operations, increase relevancy and flexibility and products

- **Tribes**
  - Provides integration/partnering opportunities

- **Public**
  - Faster and more comprehensive data delivery creates a more informed public

- **EPA**
  - Stability/consistency in data for major national programs

- **Science community**
  - Enhanced integration with national networks
  - Increase in continuous and multi-pollutants data sets

- **Other agencies and organizations**
  - Commonality in data needs...
    - Fosters efficient networks and use of data
National Ambient Air Monitoring Strategy

What are the pieces??

- NCore Design
- Network Assessments
- Revised Regulations
- Quality Assurance
- Technology

Current Networks

Reconfigured Networks

Communications
Detailed interactions among Strategy elements
Resource allocations

- Resource realignments are expected to stay within air monitoring programs at state and local agencies.

- Proactively examine air monitoring needs consistent with strategy.
National Assessments examples

Reference or base case concentrations

Identifies areas of site abundance & paucity

Interpolated using inverse distance and declustering and temporal variance weights

Percent Error - 4th highest 8-hr D.Max Avg.
Summary of National Assessment Results

Ozone
- Limited Reductions Nationally (5 - 30%) With an Emphasis on Relocation to Enhance Mapping, Rural/Regional Concentrations, Possible Increases to Assist in Coverage in Southeast and Texas, investment in air toxics.

PM2.5 FRM
- Moderate Reductions (20-30% to ~ 800 Sites) “After designations” Coinciding With a Shift to Continuous Methods for AQI/Mapping; Eventual 500 Site (or Smaller) Network Following Successful Demonstration of Cont. Methods

PM10
- Major Reductions From 1600 Site Network (1996) Dependent on Regional/State Rqmts; resource shift toward PM$_{(10-2.5)}$. 
Summary of National Assessment Results (Cont)

**CO, NO₂, SO₂**

- **Major Reductions** for NAAQS Purposes; Switch to Representative and High Sensitivity Techniques for Model Evaluation, Build Into New Core Sites, investment in air toxics

**Lead**

- Declare Victory!...Minimal Trends...emphasis as a HAP Metal

**PAMS**

- Restructure. Reduce “Minimum” Requirements.

Regional/local assessments due March/03

- supercede National results

Divestments invested in priority areas (e.g., air toxics)
National Core Network: NCORE

Goal: Move from loosely tied single-pollutant networks to coordinated, highly leveraged multi-pollutant networks with real time reporting capability
Principal Data Objectives of NCore

Public Information
- Real-time Input of Data From Across the Country Using Continuous Technologies
- Spatial Mapping (E.G., AIRNOW), Health Advisories

Health/Exposure Assessment Support
- Input for Periodic NAAQS Reviews

Emissions Strategy Planning
(Emphasis on Initial Timeframe)
- What are the best emission reduction approaches?
  - E.g., Provide for Routine Model Evaluation and Source Attribution
Principal Data Objectives of NCore

Air Quality Trends and Program Accountability
- Does the monitoring confirm strategies are working?
- Major National Initiatives (Acid Rain, Clear Skies, NOx SIPS, FMVCP)
- Including HAPS (National) and Visibility Assessments

Science Support
- Backbone for More Diagnostic Level Work (Same for Local Sips), Health Studies

NAAQS Determinations and Related Regulatory Rqmts.
- Emphasis on More Pervasive Ozone and PM2.5
NCore Measurements

Level 2: ~ 75 Multi-pollutant (MP) Sites, “Core Species” Plus Leveraging From PAMS, Speciation Program, Air Toxics

Level 1. 3-10 Master Sites Comprehensive Measurements, Advance Methods Serving Science and Technology Transfer Needs

Level 3: Single Pollutant Sites (e.g. > 500 sites each for O3 and PM2.5 Mapping Support

Minimum “Core” Level 2 Measurements
Continuous N, SO2, CO, PM2.5, PM10, O3; PM2.5 FRM, Meteorology (T, RH, WS, WD)
Proposed Siting Approach – Level 2

Start With “Reasonable” Coverage From Health/Exposure Perspective

- Population Based (Range of Sizes) With Varying Chemical Composition.
- Assumes Need for Multiple Pollutants to Tease Out Confounding Factors

Add in Desired Rural Coverage for Accountability (Major National Programs Such As 3P, NOx SIP) and “Operational” Model Evaluation

Equitable Resource (and Constrained) Considerations
Determine Ability of Existing Networks to Address, Modify

Supplemental Information
Proposed Siting Approach - Level 2

Suggested Rural Locations for Level 2 Sites

Transport, Corridor, Background and Inflow Locations

Supplemental Information
Today

Air Toxic Monitoring

Visibility – IMPROVE & Regional Haze

Ozone – PAMS

Fine Particles – PM2.5

Chemical Speciation

Inhalable Particles – PM10

Acid Deposition – CASTNet

Future Directions

Core + PM spec

Core Spec Toxics

Core PM Spec PAMS

Core Spec PAMS Toxics
NCore: Further Integration & Optimization

- NOAA/NASA Satellite Data
  - Global/Continental transport
- Other Networks: Deposition, Ecosystems
- Intensive/diagnostic Field Programs

**Longer Term Goal:**

- Integrated Observation-modeling Complex
  - Similar to Meteorological Models (FDDA)
    - Model Adjustments Through Obs.
    - All in Near Real Time
    - Full Delivery of Model Dimensions
      - (Space, Time, Chemistry, Physical Properties)
Communications approach

Goal: describe rationale and benefits, reduce misperceptions, and alleviate concerns associated with change

STAPPA/ALAPCO and EPA communications experts shaping outreach effort

- Notification of final draft and comment period through OAQPS director (Sep. 1, 02)
- Fact sheet......http://www.epa.gov/ttn/amtic/
- Quarterly newsletter (4th qtr - 02)
- Scheduled ALA briefing (OCT 02)
- CASAC review (02-03?)
- STAPPA/ALAPCO communications team (Ongoing)
Issues

Resources
- No identified $ for Level 1 sites .. $2-10M (or >) per year
- Modest initial capital investment~ $12M
  - ITT, new instruments (high sensitivity)
- Training
  - Labor/field orientation to data base/analysis

Network assessments ..removing monitors
- Policy conflicts, e.g.,
  - Prior agreements...SIPS, NSR, other
  - Monitor located in designated nonattainment area

Perception of Impacts on State and Local agencies and Tribes
- Ensuring program stability
- Good government approach
### Schedule

**Document**
- 9/02 Draft Final for public comment
- 9/02 - 11/02 comment period
- 1/03 - 6/03 NMSC review and final document

**CASAC Review**
- 10/02 - 5/03?

**Regional Network Assessments**
- 10/02 - Draft
- 6/03 - final

**Monitoring Regulations Goals**
- 12/02..Proposal to NMSC
- 8/03....to FR
- 2/04......final

**Extended outreach, integration and deployment**
- 2003 - 2007