Update on Proposed Revisions to Ambient Air Monitoring Regulations

Changes to $PM_{2.5}$ and Precursor Gas Reporting Procedures

Potential Significance for AQS Users

EPA Air Quality System Conference - 2006

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Drivers for Regulatory Change

-Periodic NAAQS review

-National Monitoring Strategy

Current PM NAAQS Review – Schedule

- Rulemaking on PM NAAQS:
  - ***Proposal*** signed on December 20, 2005 (as required by consent agreement)
  - ***Public comment*** period: 90 days, ended on April 17, 2006
  - ***Public Hearings*** held March 8 in Philadelphia, Chicago and San Francisco
  - ***Final Rule*** to be signed by September 27, 2006 (required by consent agreement)
  - Proposal includes simultaneous rulemakings
    - PM NAAQS, Federal Reference Method, & Data Handling (Part 50)
    - Air Monitoring Regulations: Requirements for Reference and Equivalent Methods, Network Design Requirements (Parts 53 & 58)
  - Related rulemakings:
    - Advance Notice of Proposed Rulemaking on Transition Issues (published 2/9/06)
    - Exceptional & Natural Events (published 3/10/06)

$PM_{2.5}$ – Primary and Secondary Standards

- EPA is proposing to retain the current **annual standard** at ***15 µg/m³***
  - EPA is proposing to retain this standard based on its assessment of several expanded, re-analyzed and new studies that have increased the Agency's confidence in associations between long-term $PM_{2.5}$ exposure and serious health effects, including heart and lung-related death.

- EPA is proposing to revise the level of the **24-hour standard** from the current level of ***65 µg/m³*** to ***35 µg/m³***.
  - EPA is proposing this change based on its assessment of a significantly expanded body of scientific information.
    - Studies show health effects at and below the level of the current standard

- EPA also is considering alternative levels for the annual and 24-hour standards and taking comments on alternative views.

- The proposal would set the **secondary standards** for both the annual and 24-hour standards at levels identical to the primary standards

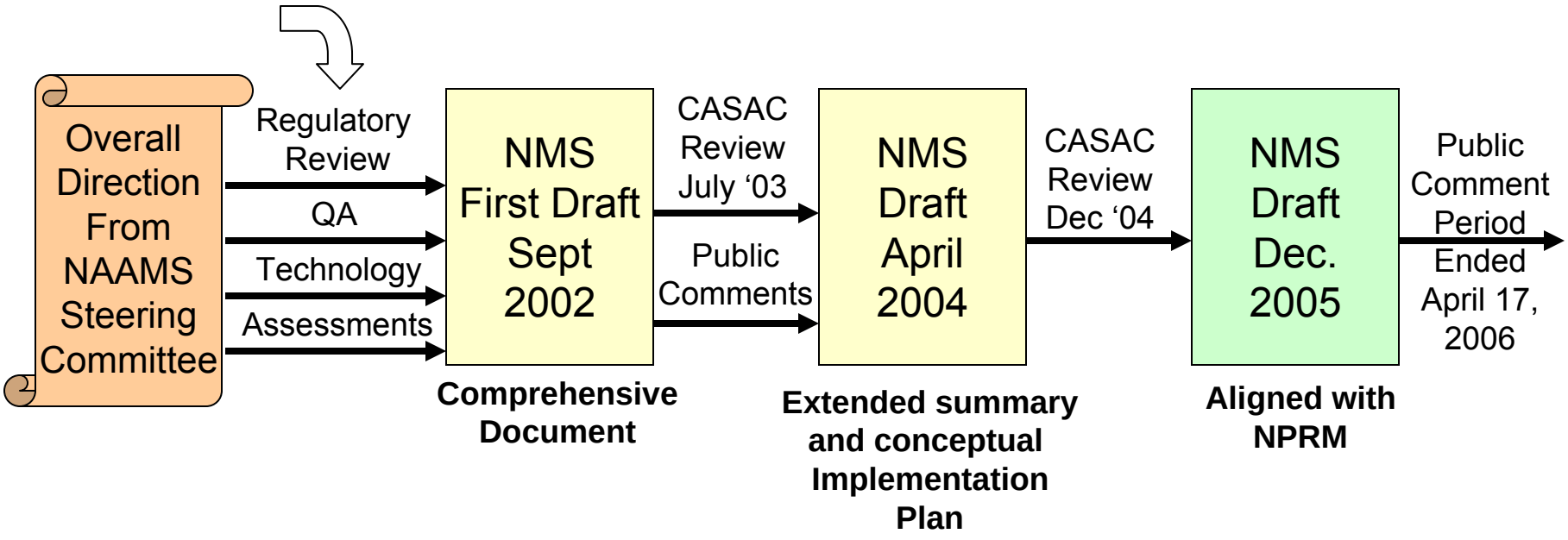
- EPA also is taking comment on whether to set a separate $PM_{2.5}$ standard, designed to address visibility (principally in urban areas)
  - At levels within a range of 20 to 30 µg/m^3, and
  - On averaging times within a range of four to eight daylight hours

Inhalable Coarse PM–Moving from PM_{10} to $PM_{10-2.5}$

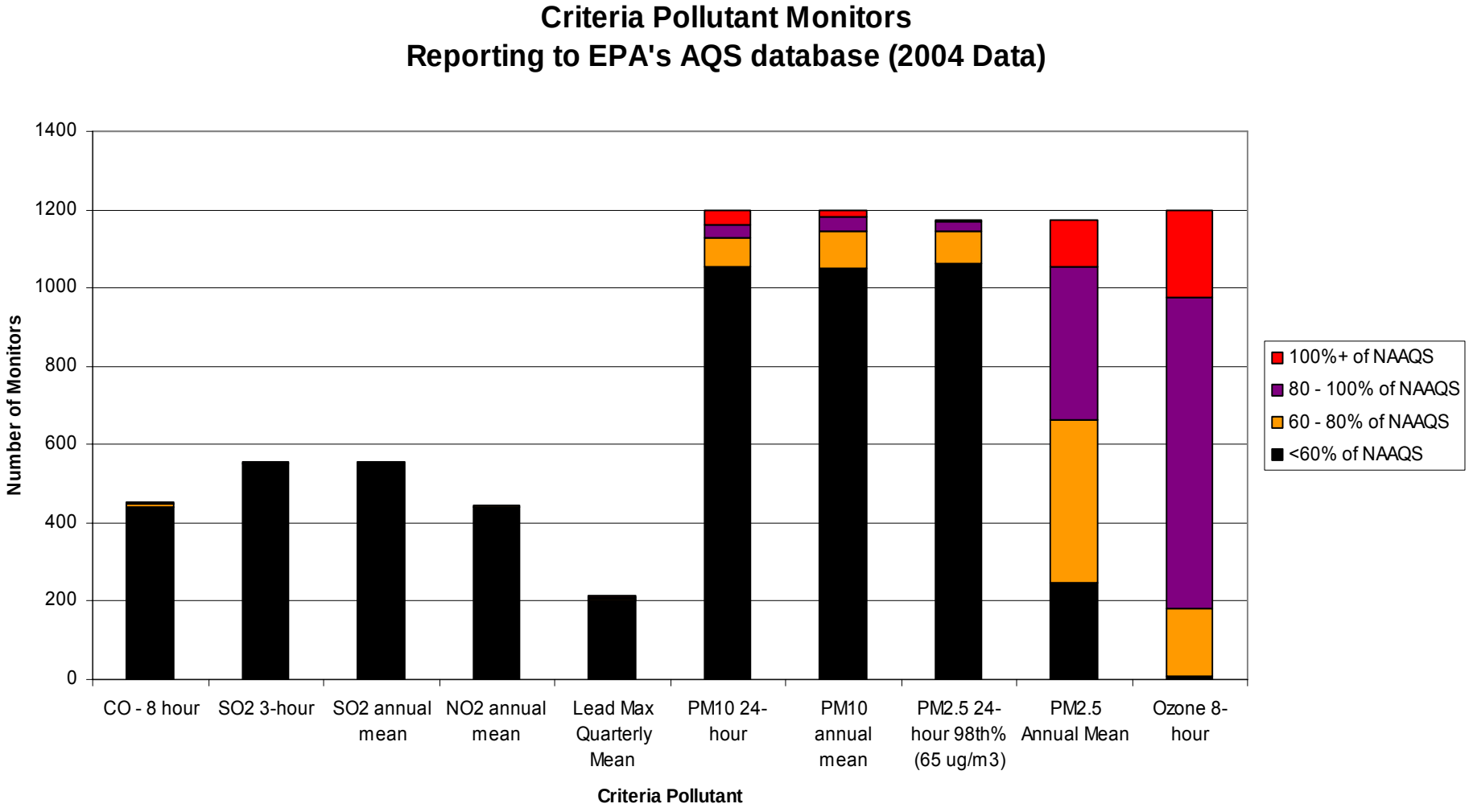
- EPA's current standards for coarse particles (PM_{10}) were set in 1987. These standards – a 24-hour standard of 150 µg/m^3, and an annual standard of 50 µg/m^3 -- apply to particles 10 micrometers in diameter and smaller.
- The proposed revisions would change the definition of standard so that it covers only particles between 10 and 2.5 micrometers in diameter also known as $PM_{10-2.5}$, and "inhalable coarse particles."
- The proposed new $PM_{10-2.5}$ standard would be a 24-hour standard, at 70 µg/m^3.
- Furthermore, EPA proposes to qualify the coarse PM indicator to include:
  - Any ambient mix of $PM_{10-2.5}$ that is dominated by re-suspended dust from high-density traffic on paved roads and PM generated by industrial sources and construction sources.
  - This definition ***excludes*** any ambient mix of $PM_{10-2.5}$ that is dominated by rural windblown dust and soils and PM generated by ***agricultural*** and ***mining*** sources.
  - Agricultural sources, mining sources, and other similar sources of crustal material shall not be subject to control in meeting this standard
- The indicator is not defined or limited to any specific geographic area, but includes a mix of $PM_{10-2.5}$ in any location that is dominated by these sources.
- EPA is not proposing an annual standard for $PM_{10-2.5}$. Under the proposal, the **secondary** 24-hour standard for $PM_{10-2.5}$ would be identical to the primary standard.

What is the National Ambient Air Monitoring Strategy?

- The strategy is an explicit effort to lay down a multiple pollutant measurement infrastructure to drive and support integrated air program management.
- The strategy shifts the nations networks from being a “compliance” dominated orientation toward greater support of public reporting, program accountability, and scientific needs.
- Strategy document reviewed with input from CASAC Ambient Air Methods and Monitoring Subcommittee and former CASAC Subcommittee on the NAAMS



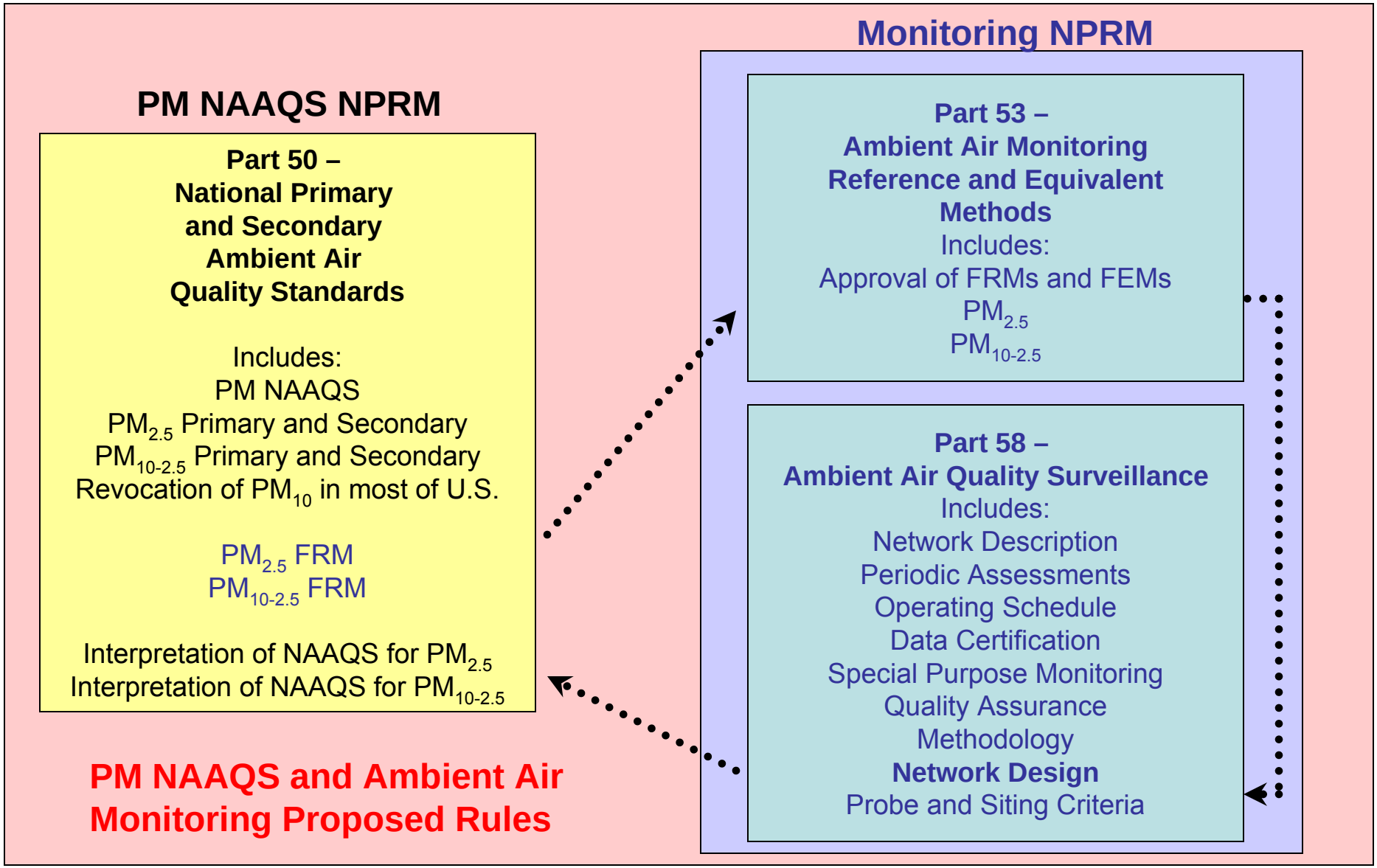
Why are we doing this? Most criteria measurements (except O3, PM) are well below NAAQS



Objectives of the Monitoring Strategy
Old NAMS/SLAMS versus new SLAMS/NCore

Network	Data Uses
NAMS/ SLAMS	Largely a compliance network with other secondary data uses
SLAMS/ NCore	1. **Public Reporting – S/L/T Web Sites, AIRNow…** 2. **Support for development of emission strategies** through air quality model evaluation and other observational methods 3. **Accountability of emission strategy progress** through tracking long term trends of criteria and non-criteria pollutants and their precursors 4. **Support for long term health assessments** that contribute to ongoing reviews of NAAQS 5. **Compliance** through establishing non-attainment/attainment areas through comparison with NAAQS 6. **Support to scientific studies** ranging across technological, health and atmospheric process disciplines 7. **Support to ecosystem assessments** recognizing that national air quality networks benefit ecosystem assessments and, in turn, benefit from data specifically designed to address ecosystem analyses.

How the pieces fit together (and potentially affect AQS)



40 CFR Part 50

National Ambient Air Quality Standards for Particulate Matter; Proposed Rule - PM Federal Reference Methods

PM2.5 Federal Reference Method (FRM)

VSCC

- **High precision, well performing method**
- Minor changes proposed to the $PM_{2.5}$ FRM that are already part of routine operation through equivalent method use or national user modifications**:**
  1. Adopt the **Very Sharp Cut Cyclone (VSCC)** as an approved second stage separator for $PM_{2.5}$. This would be in addition to the WINS
  2. Use of **Dioctyl Sebacate (DOS) oil** as an alternative oil in the WINS
  3. Extend **filter recovery extension time**; 96 hours → **177 hours** (7 days, 9 hours)
- Additional modification proposed based on experiences gained with $PM_{2.5}$ FRM and chemical speciation program
  4. Modify filter transport temperature and post-sampling time requirements for final laboratory analysis; **filter transport temperature maintained at or below average ambient temperature during sampling** allows up to 30 days for post sampling conditioning and weighing.

AQS user impact: Potential changes to method codes or changes to validity flags within internal PM2.5 databases (probably already in place).

Proposed PM10-2.5 FRM: PM10 – PM2.5 = PM10-2.5

- Two concurrently operated low-volume samplers with one measuring PM_{10} and the other $PM_{2.5}$
- Peer Reviewed by Clean Air Scientific Advisory Committee (CASAC)
  - Consensus support for $PM_{10-2.5}$ difference method as the most appropriate choice for an FRM to:
    - Approve continuous FEMs for use in the actual network
    - Quality assurance of network (via collocation)
  - Several strengths and weaknesses noted
  - Support for dichotomous method as possible alternative FRM, pending resolution of issues
  - Support for continuous Federal Equivalent Methods as primary method for use in network.

BGI PM_{10} FRM

BGI $PM_{2.5}$ FRM

R&P PM_{10} FRM Sequential Sampler

R&P $PM_{2.5}$ FRM Sequential Sampler

AQS user impact: PM10-2.5 concentrations will be derived from difference, either directly reported or calculated in databases.

40 CFR Parts 53 & 58

Revisions to Ambient Air Monitoring Regulations; Proposed Rule

Part 53 - Major Components

- Approval of reference and equivalent methods
- New performance based criteria for $PM_{2.5}$ and $PM_{10-2.5}$ equivalent methods

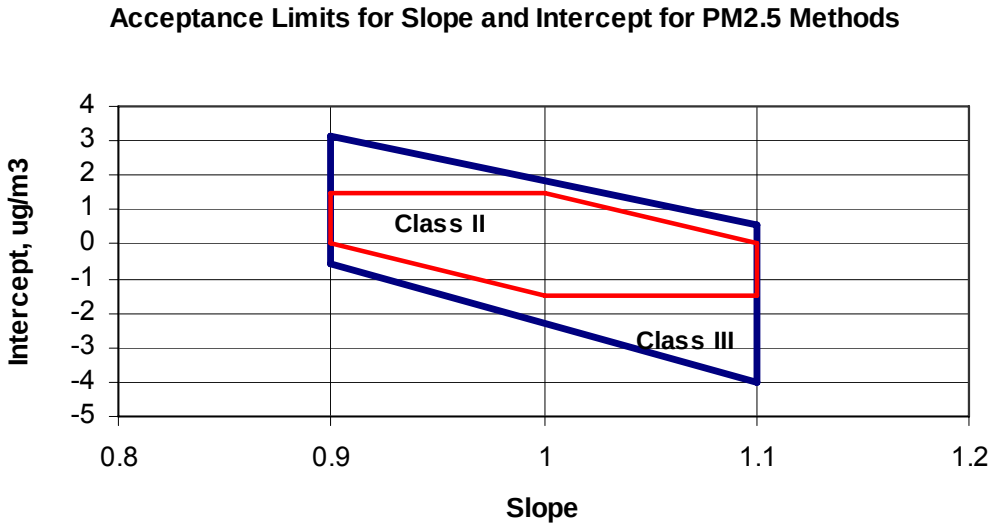
Approval of Reference and Equivalent Methods

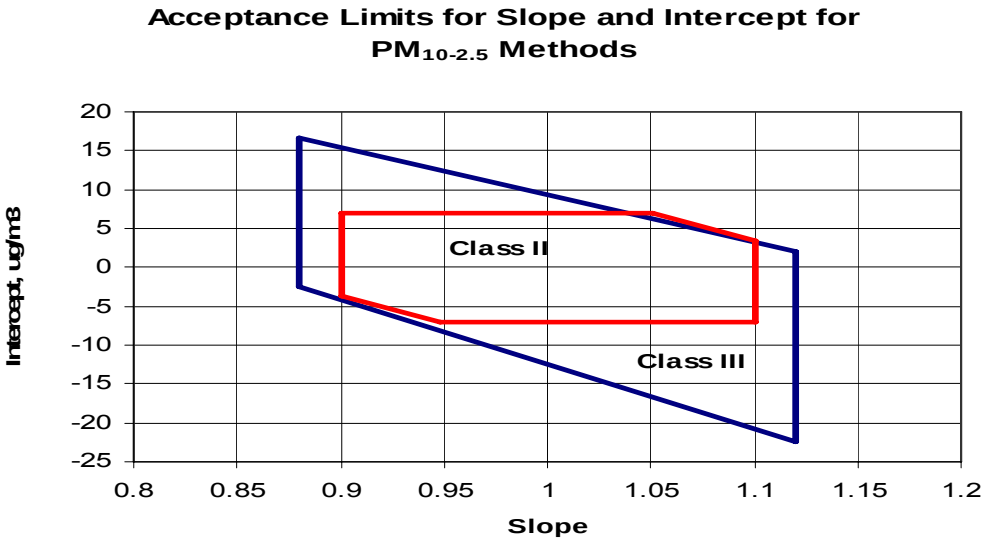
- $PM_{10-2.5}$ FRM
  - PM_{10} and $PM_{2.5}$ low-volume FRMs that are the same make and model
- Federal Equivalent Method's for both $PM_{2.5}$ and $PM_{10-2.5}$
  - Three classes of equivalent methods ranging from method with minor deviations from the FRM as Class I to continuous methods as Class III
    - A filter-based dichotomous method would be categorized as a Class II method
- Proposed Testing for both $PM_{2.5}$ and $PM_{10-2.5}$
  - Class II - at two sites from list below, one east and one west in one season each. Class III – at three sites (two seasons at test sites A & B, winter season only at test site C)
- Test Sites
  - Site A – Los Angeles basin - characterized by high nitrates and semi-volatile organic pollutants
  - Site B – Northeastern to Mid-Atlantic – characterized by high sulfate, high relative humidity and wintertime conditions
  - Site C – Higher elevation Western U.S. city – characterized by cold weather, winds and dust.

AQS user impact: FEM continuous methods will likely become available for PM that may require data system adjustments (hourly data validation and reporting). Some FRM shutdowns possible as a result.

PM Federal Equivalent Methods

- New performance criteria are proposed
  - Based on Data Quality Objective Process
    - Considers tradeoffs between several inputs
    - Advantage of continuous methods (Class III) in this process is that they provide higher sample frequency and completeness
  - Criteria
    - Linear regression slope and intercept as illustrated
    - Sampler precision
      - 10% for $PM_{2.5}$ Class II
      - 15% for $PM_{2.5}$ Class III and $PM_{10-2.5}$ Class II and III
    - Correlation, >0.93 or >0.95 based on sample population





Part 58 – Major Components

- Network Plans and Assessments
- Updated Special Purpose Monitoring (SPM) provisions
- Network minimums go away for CO, SO_2, NO_2, and PM_{10}
- Revised network minimums for Pb
- Revised network minimums for O_3 and $PM_{2.5}$ based on population and design value
- Introduction of NCore multi-pollutant sites
- New monitoring network for $PM_{10\text{-}2.5}$
- AQS data submittal and certification
- Revisions to QA program
- Incentives for “Approved Regional Methods” for $PM_{2.5}$
- PAMS monitoring program

Network Plans and Assessments

- Annual Monitoring Network Plans
  - Basically same as current practice; however, allow opportunity for public comment and formalize approval.
  - First one due July 1, 2007
    - "...must be made available for public inspection at least 30 days prior to submission to EPA."
    - Approved by the EPA Regional Administrator, who shall provide opportunity for public comment and shall approve or disapprove within 120 days
- Air Quality Assessments every five years
  - Comprehensive in scope, more complete evaluation of monitoring objectives, new technologies.
  - First one due July 1, 2009
  - Guidance forthcoming, draft available at:
    - http://www.epa.gov/ttn/amtic/files/ambient/criteria/nettech.pdf

AQS user impact: May be significant if you are also responsible for ambient monitoring network design process in your agency.

Special Purpose Monitors (SPM)

- What is it/isn't it?
  - Site can be used for up to 24 months without being compared to NAAQS, (except may be used for existing NAAQS when States request an existing non-attainment area be designated to attainment)
  - Designated in annual network plan and AQS
  - Cannot be a monitor used to meet the minimum monitoring requirements
  - Cannot be an existing SLAMS monitor
- What applies to it?
  - All NAAQS pollutants
  - QA and methods apply for FRM/FEM/ARM
  - Flexibility for network design, and probe and siting criteria
  - Data submitted to AQS for FRM/FEM/ARM
- Other
  - No prior approval needed to shut down an SPM

AQS user impact: Need to keep close track of SPM operational period in NAAQS compliance situations. Data available for analysis by stakeholders regardless of SPM classification.

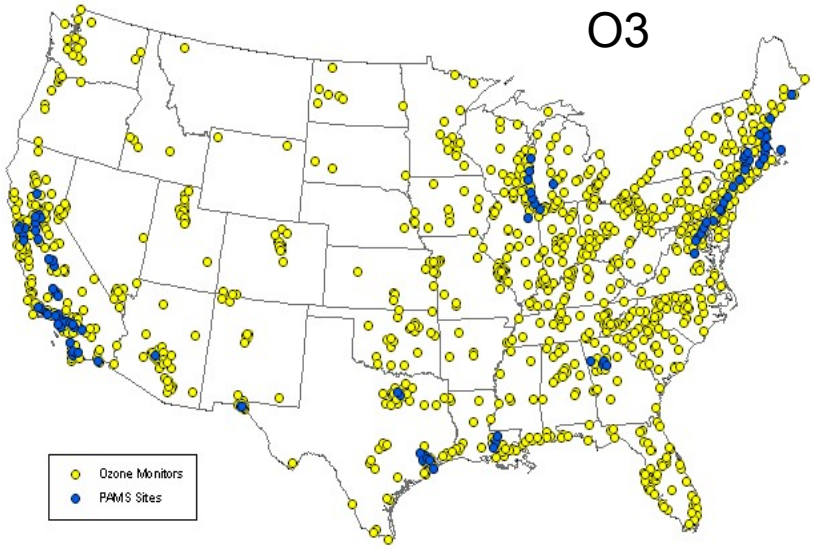
Areas of Divestment: CO, SO2, NO2, PM10, Pb

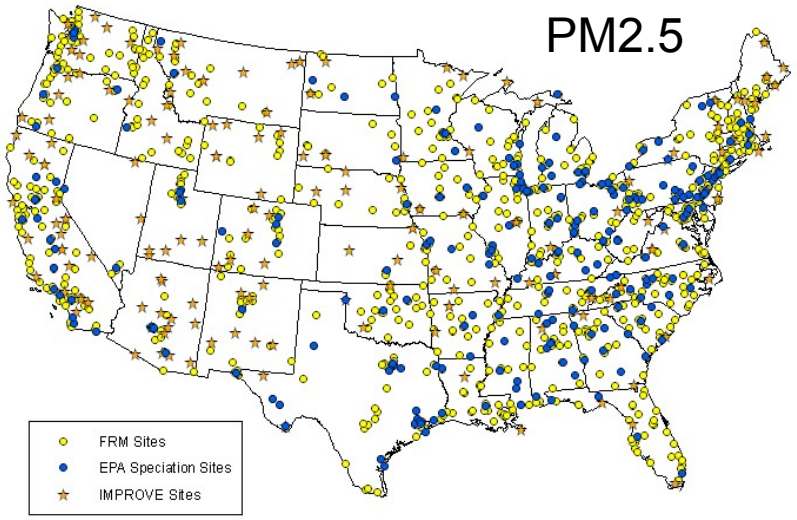
- Generally, for all of these pollutants the EPA Region can approve the shutdown of a monitor as part of the annual network review
  - See 58.14 for specific provisions on discontinuing monitors
- No minimums would apply for CO, SO_2, NO_2
- PM_{10} - No requirement for continuation in any area where the PM_{10} NAAQS would be revoked
- Pb – required in areas where levels are still a concern
  - 2 sites required in areas above the NAAQS
    - 1 maximum exposure site
  - 10 Pb sites at NCore or urban air toxics sites for long-term trends; one per Region in most populated MSA/CSA

AQS user impact: May be significant if you are also responsible for ambient monitoring network design process in your agency.

Ozone and PM2.5

- Network minimums proposed to be based on combination of:
  - Population of an area
  - Design value
- **Overall, expect about the same number of ozone sites, although some may move for better spatial coverage**
- Continuous $PM_{2.5}$ monitors required at one half (round up) the sites identified above
- Background and transport sites still apply for each State
- Speciation Trends Network required (~54 sites)
- **Overall, expect most FRM/FEM sites to continue; however, some redundant urban sites to be eliminated and some sites relocated based on final status of revised NAAQS**





Area of Investment: PM10-2.5 Monitoring Program

$PM_{10-2.5}$ Network

- Network Plan
  - Due January 1, 2008
  - Can be extended to July 1, 2008
- Implementation by January 1, 2009
- Methods
  - Daily PM_{10} methods can be used to demonstrate attainment through 12/31/2012 – subject to network design criteria
  - Planning for continuous FEMs as primary method in network to best support daily NAAQS
  - FRM intended as basis of comparison for candidate FEM's and quality assurance

AQS user impact: Potential new monitoring network requirements. Measurement, quality assurance. and network design requirements will need consideration in submitted plan.

PM10-2.5 Network Sizing and Siting

- Minimum $PM_{10-2.5}$ monitoring requirements based on MSA population (at least 100,000) and estimated design value. Zero to five required sites per MSA.
  - Approximately 228 monitors required in 150 MSAs based on 2002-2004 estimated design values and proposed $PM_{10-2.5}$ daily NAAQS of 70 ug/m3.
- Required sites must meet five part suitability test for comparison to NAAQS and to insure consistency with qualified $PM_{10-2.5}$ indicator.
  - Within boundaries of urbanized area $\geq$ 100,000.
  - Must be in census block group of population density $\geq$ 500 people per square mile (or within enclave of < 5 square miles area if population density < 500).
  - Must be population-oriented.
  - May not be in a source-influenced microenvironment such as a microscale or localized hot spot location.
  - PM10-2.5 concentrations at the site must be dominated by re-suspended dust from high-density traffic on paved roads and PM generated by industrial sources and construction sources, and must not be dominated by rural windblown dust and soils and PM generated by agricultural and mining sources, as determined by the State (and approved by the Regional Administrator) in a site-specific assessment*.

*Indicator for thoracic coarse particles as described in NAAQS proposal

Proposal for Minimum Required PM10-2.5 Network

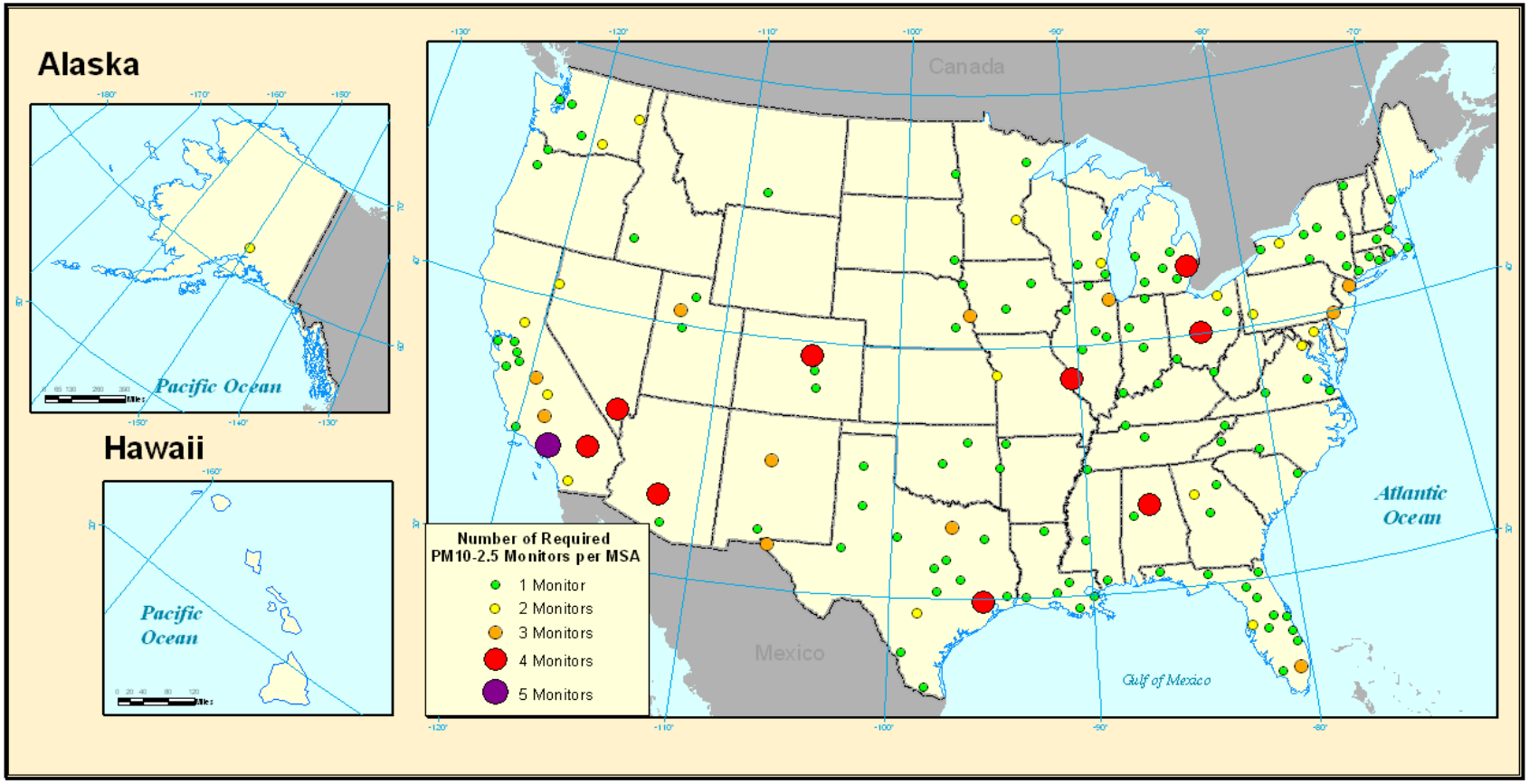
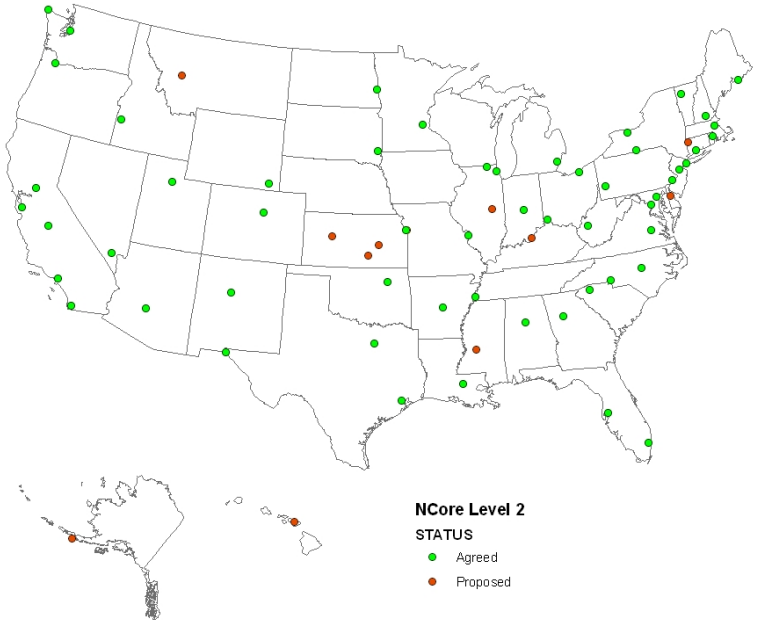


Illustration of $PM_{10\text{-}2.5}$ monitors that could be required by the proposed requirements in the monitoring NPRM. The circles, which are sized to indicate the number of required monitors, appear at the centroid of MSAs and do not imply the actual placement of any of the required monitors at particular locations within the MSA.

Area of Investment: National Core (NCore) Multi-pollutant Sites

- NCore Multi-Pollutant Network
  - Pilot network ramping up now with about 35 sites in operation
  - Network plans due July 1, 2009
  - Full network operational by January 1, 2011
    - ~75 Sites Nationally
    - ~55 Urban Sites at Neighborhood to Urban Scale
    - ~20 Rural Sites at Regional Scale
    - 1-3 sites per State
- Pollutants
  - Particles
    - $PM_{2.5}$ filter-based and continuous, speciated $PM_{2.5}$, continuous $PM_{10-2.5}$
  - Gases
    - O_3; high-sensitivity - CO, SO_2, NO/NO_y
  - Meteorology
    - Amb. Temp, WS, WD, RH
  - Long-term plan to include
    - NH_3, HNO_3

Working Draft of NCore Multi-pollutant Sites



AQS user impact: Potential new monitoring network requirements. Pilot sites are beginning to report data. Gaseous methods modified for improved performance at lower ambient concentrations – reporting challenges.

AQS Data Submittal – What are the changes?

- Quarterly data reporting remains the same – within 90 days past the end of the quarter for SO2, CO, O3, NO2, NO, NOy, Pb, PM10, PM2.5, PM10-2.5, chemical speciation (RTI).
- Reduced (!) requirements for supplemental PM2.5 records – only sampler-generated average temperature and barometric pressure. QAPP's may still require storage of all supplemental records.
- New requirement for reporting field blank mass for PM2.5 filter based FRM/FEMs
  - Field blanks typically run at 10% of a monitor's sampling frequency
  - Report actual mass change (typically 10-15 micrograms)
  - Intended as a QC metric to help evaluate the performance of the entire sampling and analysis system and to understand material balance of PM2.5 components.

AQS user impact: Reporting requirements extended to additional parameters in NCore program. Agency procedures for reporting PM2.5 field blank from existing databases will need to be developed.

Data Certification

- Propose to move up certification deadline from July 1st to May 1st, beginning in 2009 (for data collected in calendar year 2008).
- Explicit reference to quality assurance data in certification statement

> "The senior air pollution control officer in each agency, or their designee, shall certify that the previous year of ambient concentration and quality assurance data are completely submitted to AQS and that the ambient concentration data are accurate to the best of her or his knowledge, taking into consideration the quality assurance findings."

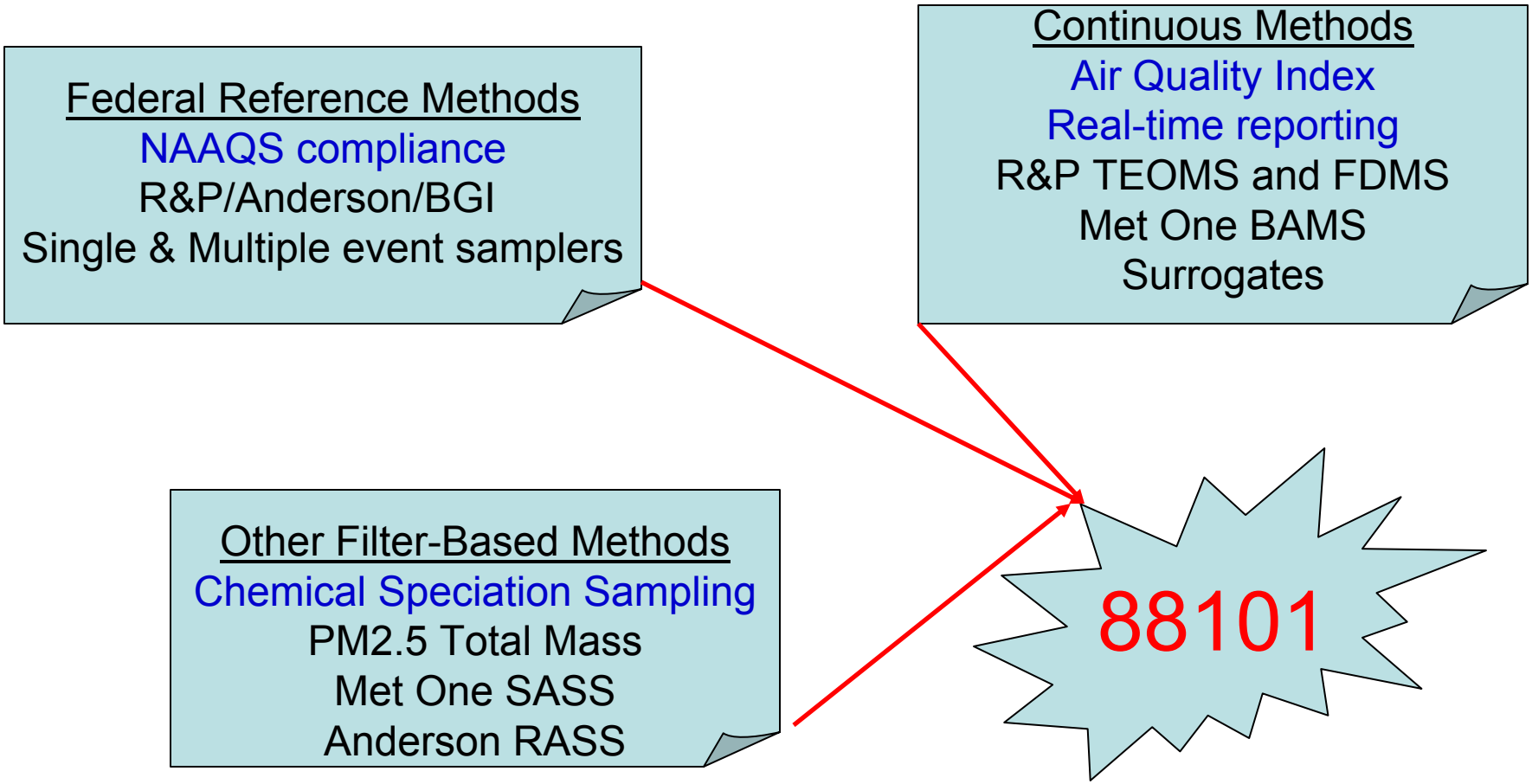
AQS user impact:
Shortened timeframe for completing review of ambient and quality assurance data prior to requesting signature from your certifying official.

Other Monitoring Rule Changes

- Revisions to the Quality Assurance Program
- Approved Regional Methods (ARMs) for $PM_{2.5}$
  - $PM_{2.5}$ continuous method approved for use within a State, local, or Tribal agency used to meet multiple monitoring objectives such as NAAQS, AQI.
- PAMS Monitoring Program
  - Currently 109 stations in 25 Ozone non-attainment areas
  - Represents a reduction to about half the existing requirements
  - Allows PAMS programs to be more customized to local data needs
    - Recommend keeping Air toxics data users in mind if there are any reductions

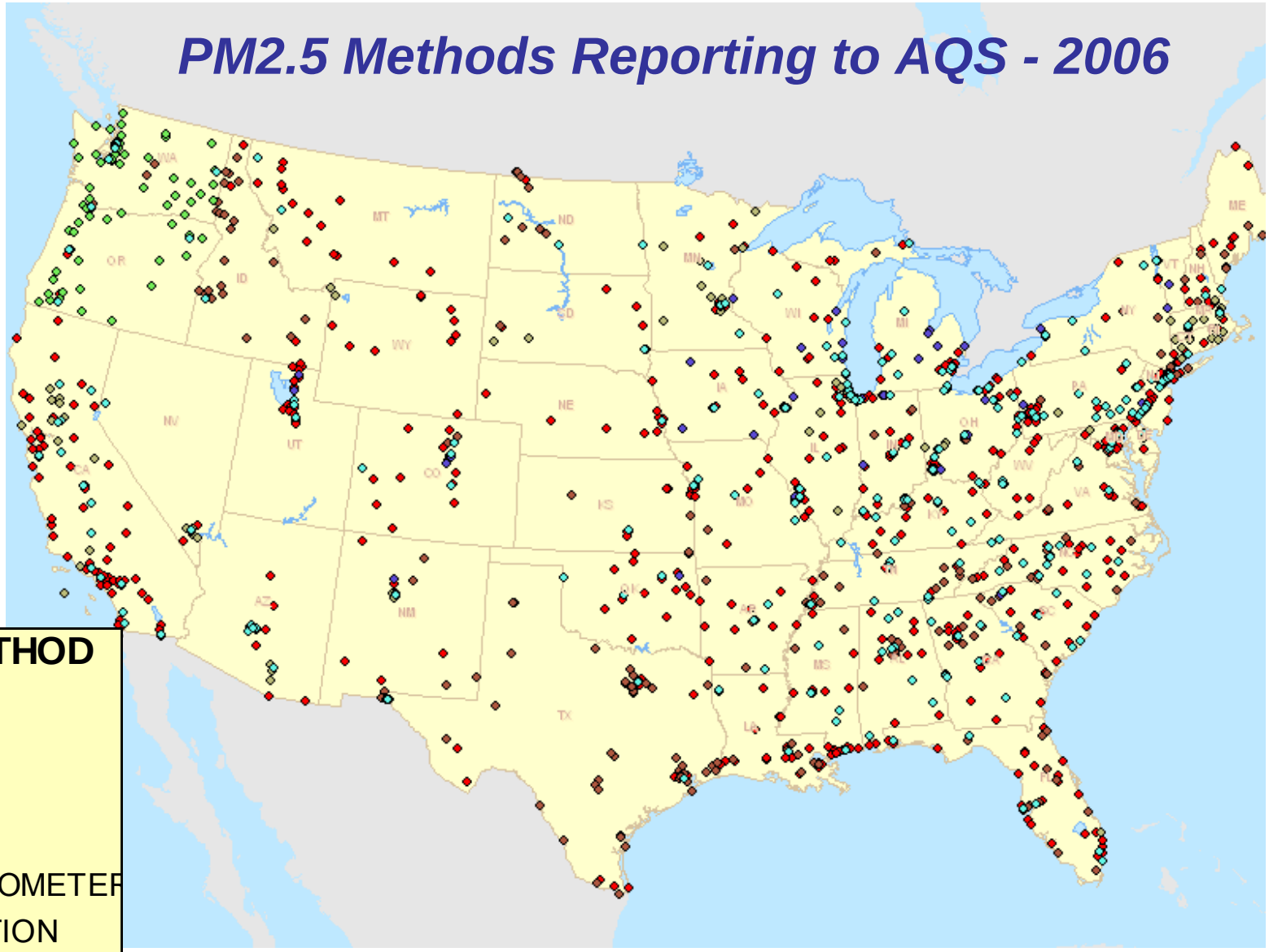
Updated AQS Reporting Procedures for PM2.5

Problem: PM2.5 methods of varying quality all loading into one AQS parameter code……



…complicates data utilization and is potentially confusing to the general public.

PM2.5 Methods Reporting to AQS - 2006



Solution: New Parameter Codes for Reporting PM2.5 Data to AQS

Parameter Name	Parameter Code	Purpose
PM2.5 LOCAL CONDITIONS	88101	Appropriate code for all FRM/FEM/ARMs
PM2.5 TOTAL ATMOSPHERIC	88500	Valid data from methods measuring total $PM_{2.5}$ aerosols in the atmosphere, including those that can be volatilized from the FRM
PM2.5 RAW DATA	88501	Valid uncorrected data that does not reasonably match the FRM
ACCEPTABLE PM2.5 AQI & SPECIATION MASS (new 2006)	88502	Valid data that does reasonably match the FRM with or without correction, but not to be used in NAAQS decisions
PM2.5 VOLATILE CHANNEL (new 2006)	88503	Store important related data such as the FDMS reference channel

88101 only for methods eligible for NAAQS decision-making

(OAQPS Technical Note dated 6/1/06)

- Memo has been sent to all AQS contacts.
- Implementation begins in 2006 with goal of completion by January 1, 2007.
  - EPA in conjunction with RTI will update the speciation reporting procedures and migrate historical PM2.5 total mass speciation records.
  - EPA will assist agencies with the migration of other historical PM2.5 data.
- Agencies are expected to report "Acceptable" PM2.5 continuous data (88502) to AQS (and continue reporting to AIRNow if already doing so). Also consider updating related AIRNowTech fields.
- Agencies are encouraged to report the underlying raw data (88501) to AQS to support the ongoing analysis of continuous method performance.

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AQS Questions:

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New Gaseous Method Codes for Precursor Gas Monitors

Precursor Gas Monitoring at NCore Multi-Pollutant Sites

- A new generation of gaseous monitors has been developed to support monitoring at NCore sites.
  - EPA has been supported in this effort by manufacturers including Thermo Electron, Teledyne/API, and Ecotech.
  - OAQPS' Precursor Gas Team has been actively evaluating these new methods and providing training for operators of the NCore pilot sites.
    - http://www.epa.gov/ttn/amtic/precur.html
- These new monitors can reliably detect ambient concentrations at lower levels than older configurations.
- S/L/T agencies are actively purchasing these monitors, developing operating procedures, and beginning to report data to AQS.
- There is value in segregating ambient and QA data collected by precursor gas monitors from older, less sensitive methodologies.
  - Most new monitors are not yet FRM/FEM.
  - Current DQO process benefits from access to precursor gas-specific QA precision and bias records.

Comparing Performance of a Conventional vs. Trace-level SO2 Monitor (one example of several available brands)

Model	**Thermo 43C (Specifications)**	**Thermo 43C-TLE (results of EPA testing)**
Averaging Time	60 seconds	60 seconds
Conc. Range	Various	0-100 ppb
Zero Drift	(24 hour) Less than 1 ppb	12 hour (0.199 ppb) 24 hour (0.200 ppb)
Span Drift	(24 hour) +/- 1%	20% FS (0.06%) 80% FS (0.27%)
Precision (Coefficient of Variance)	1% of reading or 1 ppb (whichever is greater)	0.91%
LDL	1.0 ppb	0.112 ppb
Noise	0.5 ppb	0.029 ppb
MDL Observed	N/A	0.055 ppb (0.038 – 0.148 ppb CL)

Method code 560 has been set up specifically for the TECO 43C-TLE. Other AQS codes are needed for currently available trace-level monitors.

Method Codes available in AQS (old code+500)

Existing | New (6-1-06)

Parameter Description	Method Code	Sample Analysis Description	Fed Mdl (ppm)	Reference Method Id
Carbon Monoxide	**554 (was 055)**	GAS FILTER CORRELATION-THERMO ELECTRON 48C-TL	0.02	
Carbon Monoxide	**593**	GAS FILTER CORRELATION-TELEDYNE API 300 EU	0.02	
Carbon Monoxide	**588**	GAS FILTER CORRELATION-ECOTECH EC9830T	0.02	
Sulfur Dioxide	**560**	PULSED FLUORESCENT	0.0002	EQSA-0486-060
Sulfur Dioxide	**600**	ULTRAVIOLET FLUORESCENCE-TELEDYNE API 100 EU	0.0002	
Sulfur Dioxide	**592**	ULTRAVIOLET FLUORESCENCE-ECOTECH EC9850T	0.0002	
Reactive Oxides Of Nitrogen	**075**	TECO 42S CHEMILUMINESCENCE	0.00005	
Reactive Oxides Of Nitrogen	**574**	CHEMILUMINESCENCE-THERMO ELECTRON 42C-Y	0.00005	
Reactive Oxides Of Nitrogen	**599**	CHEMILUMINESCENCE-TELEDYNE API 200 EU/501	0.00005	
Reactive Oxides Of Nitrogen	**590**	CHEMILUMINESCENCE-ECOTECH EC9841T	0.00005	
Nitric Oxide	**075**	TECO 42S CHEMILUMINESCENCE	0.00005	
Nitric Oxide	**574**	CHEMILUMINESCENCE-THERMO ELECTRON 42C-Y	0.00005	
Nitric Oxide	**599**	CHEMILUMINESCENCE-TELEDYNE API 200 EU/501	0.00005	
Nitric Oxide	**590**	CHEMILUMINESCENCE-ECOTECH EC9841T	0.00005	
Nitrogen Dioxide	**075**	TECO 42S CHEMILUMINESCENCE	0.00005	

AQS user impact:

Update data acquisition systems with new method codes for precursor gas monitors.