

Office of Air Quality Planning and Standards

What's Coming in Monitoring Requirements to support NAAQS and NCore









Office of Air Quality Planning and Standards

Current Schedule for Ongoing NAAQS Reviews

MILESTONE	POLLUTANT							
	Lead	NO ₂ Primary	SO ₂ Primary	Ozone Reconsideration	со	РМ	NO₂/SO₂ Secondary	
NPR	New schedule being developed	<u>Jun 26, 2009</u>	<u>Nov 16, 2009</u>	Jan 6, 2010	<u>Oct 28,</u> <u>2010</u>	Nov 2010	<u>July 12, 2011</u>	
NFR	<u>Oct 15, 2008</u>	<u>Jan 22, 2010</u>	<u>Jun 2, 2010</u>	Aug 31, 2010	<u>May 13,</u> <u>2011</u>	July 2011	<u>Mar 20, 2012</u>	

NOTE:

Underlined dates indicate court-ordered or settlement agreement deadlines

Next Ozone Review: Proposal in May 2013 and Final in Feb 2014



Office of Air Quality Planning and Standards

Lead (Pb)



Updating the Lead Monitoring Network 2008 Revisions

United States Environmental Protection

- New source-oriented lead monitors at sources > 1.0 TPY emissions
 - Final rule identified 135 facilities identified in 2002 NEI as >= 1.0 tpy.
 - 100 sources required monitoring following review of emissions and waivers (based on survey of Regional offices)
 - Vast majority of sites are believed to have met January 1, 2010 deadline for sampling
- Operation of a (non-source) lead monitor in every urban area with a population of 500,000 or more, by January 1, 2011

EPA United States Environmental Protection Agency

Office of Air Quality Planning and Standards



EPA Reconsidering Portions of Lead Monitoring Requirements

Separation United States Environmental Protection

- In January 2009, EPA received a petition to reconsider the lead monitoring requirements from the Missouri Coalition for the Environment Foundation, Natural Resources Defense Council, the Coalition to End Childhood Lead Poisoning, and Physicians for Social Responsibility
- On July 22, 2009, EPA granted the petition for reconsideration to:
 - Reconsider the emissions threshold (currently 1 tpy) for sourceoriented monitoring requirements and determine whether it should be lowered, as requested by Petitioners.
 - Reconsider related issues as appropriate, including the requirements for non-source oriented monitoring.
- EPA published proposed revisions to monitoring requirements on December 30, 2009 (74 FR 69050).

Summary of Proposed Revisions

• Source-oriented monitoring

Separation United States Environmental Protection Agency

- Proposed to lower emission threshold from 1.0 tpy to 0.50 tpy
- Requested comment on thresholds greater than 0.50 tpy
- All sources treated in same manner (e.g., airports)
- Non-source-oriented monitoring
 - Proposed to revoke existing requirement for non-source monitoring in each CBSA of 500,000 or more population
 - Proposed to require Pb monitoring at all NCore stations [~80 monitors]
 - Many NCore sites will have low-volume PM₁₀ samplers to meet PM_{10-2.5} requirement
 - Requested comment on "urban-only" requirement for NCore (defined as populations greater than 500,000) [~50 monitors]
 - Proposed to revoke existing requirement for NCore Pb monitoring – each NCore site in most populated MSA/CSA per EPA Region



Impacts of Proposed Requirements on Network Size

	Existing Requirements	Proposed Requirements
Source- Oriented	100	272 (+172)
Non-Source- Oriented	101	80+ (-21)
Total	201	352 <mark>(+151)</mark>

EPA United States Environmental Protection Agency

Office of Air Quality Planning and Standards



Summary of Comments

- Comment period closed February 16, 2010
- Over 600 comments received

Separation United States Environmental Protection Agency

- Strong support to move to new threshold of 0.50 tpy
- Concerns raised over the need for monitoring at airports
- Strong support for monitoring Pb at NCore sites
 - Concerns raised over the need for Pb monitoring at rural NCore sites
- Support for staggering deployment of new monitors over two years
- EPA also dealing with some monitoring implementation issues:
 - new Pb methods for TSP and PM₁₀
 - Precision and bias assessments through QA requirements



Issues Currently Under Consideration for Pb Monitoring Final Rule

- The level of the (lower) emissions threshold for source monitoring
- How to treat airports in the context of source monitoring requirements
- Non-source monitoring requirements all NCore or urbanonly
- Addressing Appendix A language issue with regard to collocation (Pb-PM₁₀ problem)
- How to leverage NATTS Pb monitoring and avoid duplication between NCore and NATTS requirements
- Deployment timeline (one or two years)

Separation United States Environmental Protection Agency

- Likely initial deadline for new source monitors will be January 1, 2012 based on projected final rule effective 12/1/2010.
- Anticipate NCore monitoring according to overall NCore deadline January 1, 2011.



* Based on 2005 National Emission Inventory estimates as of October 2009.



Office of Air Quality Planning and Standards

Nitrogen Dioxide (NO₂)





NO₂ NAAQS

- On January 22, 2010 EPA strengthened the primary national ambient air quality standard (NAAQS) for nitrogen dioxide (NO₂) to increase protection of public health by:
 - adding a *1-hour* NO₂ standard at 100 parts per billion (ppb); and
 - retaining the **annual** average NO_2 standard at a level of 53 ppb
- Revised NO₂ standard reflects the maximum allowable NO₂ concentrations anywhere in an area.
 - In many locations, these maximum concentrations are likely to occur around roads
 - Some monitors will be located to focus on vulnerable and susceptible groups

Under a separate review, EPA is considering the need for changes to the secondary NO₂ standard

• For more information go to <u>http://www.epa.gov/air/nitrogenoxides</u>

Current NO₂ Monitoring Network

 The current network was implemented to support an annual standard

Separation United States Environmental Protection

- The existing sites are satisfying multiple objectives including:
 - NAAQS compliance
 - assessment of ozone formation and transport
 - health study support
 - Prevention of
 Significant
 Deterioration (PSD)





Why worry about near-road exposure?

Tens of millions of people live near major roads – their exposure is higher than areas away from roads Multiple articles have reviewed NO_2 behavior in the near road, suggesting general ranges of influence





Office of Air Quality Planning and Standards





What's Key in the Final NO₂ Monitoring Requirements

- Near-road Monitors (126 in 102 CBSAs):
 - One NR monitor in any CBSA with 500,000 or more people (102)
 - A second NR monitor in any CBSA with 2,500,000 or more people OR any CBSA with one or more road segments with 250,000 AADT (24)
 - Rank candidate sites by AADT and <u>consider fleet mix, roadway design,</u> <u>congestion patterns, terrain, and meteorology</u> in determining locations of expected maximum NO₂ concentrations
 - Sites within 50 meters from edge of traffic lane of selected major roads
- Area-wide (53 in 53 CBSAs)
 - One monitor in any CBSA with 1,000,000 or more people (53)
 - These are sited at highest/max concentrations occurring at the neighborhood or larger spatial scale in a CBSA
- Regional Administrator recommended (40)
 - Focused on susceptible and vulnerable populations
- Extended lead-time before new monitors are required to be operational (due to deployment complexity) Deadline for operation is January 1, 2013
- Development of near-road siting guidance and pilot monitoring program during next 18 months in partnership with NACAA/States and CASAC
 - Currently planning a CASAC/AAMMS meeting in August/September 2010 to kickoff process
 - Also waiting for a decision on potential FY2010 funding for the NO_2 pilot effort



CBSAs with Required Near-road NO₂ Sites (126 Sites in 102 CBSAs)





Community-Wide NO₂ Monitors Are Required in 53 Urban Areas





NO₂ NAAQS Implementation Schedule

Milestone	Date
State Designation Recommendations to EPA	January 2011: One year following promulgation (Based on existing network data)
Designations	January 2012: EPA designates all/most areas as "unclassifiable" (because near road monitors not in place)
New NO ₂ Monitoring Network	January 1, 2013: All monitors operating
Next NO ₂ NAAQS Review Completed	January 2015: Anticipated time frame
Nonattainment Re- Designations (discretionary)	January 2016/2017 (depending on date that sites become operational)
Attainment Date	January 2021/2022 (5 years after date of nonattainment designations)



Office of Air Quality Planning and Standards







Proposed Revisions to Ozone Standards

- EPA proposed to strengthen the level of the 8hour primary ozone standard to a level within the range of 0.060-0.070 parts per million (ppm).
- EPA proposed a cumulative, seasonal secondary standard at a level in the range of 7-15 ppmhours.
 - This cumulative standard would add weighted hourly ozone concentrations across all days in a three-month period.

Implementation Considerations for Proposed Ozone Standards

Designations

Separation United States Environmental Protection Agency

- EPA proposed an accelerated schedule for designating areas for the primary ozone standard.
- EPA is taking comment on whether to designate areas for a seasonal secondary standard on an accelerated schedule or a 2-year schedule.
- EPA is reviewing existing designations guidance and will be communicating with States and Tribes if additional guidance is needed.

• Previous Ozone Standards

- The 2008 8-hour ozone NAAQS and the 1997 8-hour ozone NAAQS remain in place.
- Implementation for the 2008 8-hour ozone NAAQS is delayed during the reconsideration.
 - EPA has extended the deadline for area designations for the 2008 ozone standards by one year (until 2011).
 - Any new ozone standards would replace the 2008 ozone standards. Implementation requirements for the 2008 ozone standards, including designations, would no longer apply.
- The 1997 NAAQS remain in effect and implementation of that standard should continue.



Office of Air Quality Planning and Standards

Proposed Accelerated Implementation Timeline

Milestone	Date
Signature—Final Rule	August 31, 2010
State Designation	
Recommendations to EPA	January 2011
Final Designations	Effective no later than August 2011
Attainment Demonstration SIPs Due	December 2013
Attainment Dates	2014-2031 (depends on severity of problem)

• EPA is planning to propose an implementation rule in spring 2010 and issue a final rule as quickly as possible after the final ozone NAAQS.

Overview of Appendix P Revisions – taken from the preamble

- V. Revision of Appendix P—Interpretation of the NAAQS for O₃ and Proposed Revisions to the Exceptional Events Rule
 - A. Background

EPA United States Environmental Protection

- B. Interpretation of the Secondary O₃ Standard
- C. Clarifications Related to the Primary Standard
- D. Revisions to Exceptions From Standard Data Completeness Requirements for the Primary Standard

E. Elimination of the Requirement for 90 Percent Completeness of Daily Data Across Three Years

F. Administrator Discretion To Use Incomplete Data

- G. Truncation Versus Rounding
- H. Data Selection
- I. Exceptional Events Information Submission Schedule

Source: Federal Register / Vol. 75, No. 11 / Tuesday, January 19, 2010 / Proposed Rules, pp. 3027-3033

Available at: <u>http://www.epa.gov/air/ozonepollution/fr/20100119.pdf</u>

Selected Proposed Appendix P Revisions

- Elimination of the Requirement for 90 Percent Completeness of Daily Data Across Three Years
 - App P currently requires 75 percent of days in each of 3 years AND the average of the percent completeness from those years must be at least 90 percent.
 - Proposes to eliminate the 90 percent requirement.
- Truncation Versus Rounding
 - Current Appendix P:
 - When computing the 8-hour average, truncate result to 3 decimal places
 - When computing the 3-year average of the fourth-highest daily maximum 8-hour concentration, truncate to 3 decimals
 - New Appendix P proposes:
 - When computing the 8-hour average, retain all digits to the right of the decimal place
 - When computing the 3-year average of the fourth-highest daily maximum 8-hour concentration, round to 3 decimals

Status of Ozone Monitoring Rule & Revisions

- Ozone monitoring proposal published July 16, 2009
- Comments received from DOI, 17 states, multi-state organizations (NACAA, MARC, WESTAR), tribes, citizens. Broadly summarized as follows:
 - Supportive of additional monitors in urban areas
 - Mixed support for additional non-urban monitors. Additional specificity in siting requirements and overall flexibility requested
 - Significant concerns with proposed extension of ozone monitoring seasons (technical basis for decisions, logistical difficulties in operating monitors, confusion in key CBSAs that adjoin multiple states)
 - Serious concerns about availability of adequate STAG funding for equipment purchase and additional operation/maintenance costs, states want monitor deployment staggered over two years
- Monitoring comments received from the NAAQS proposal will help inform ozone monitoring final rule
- Proposed schedule for completion of monitoring final rule
 - Submit NFR to OMB (mid July 2010)
 - Rule signature projected November 2010
- <u>Potential</u> timeline for implementation of new requirements
 - Revised ozone seasons effective in 2012
 - Additional ozone monitors staggered in 2013 and 2014 (contingent on funding)



Revising the Ozone Monitoring Seasons



Revising the Ozone Monitoring Seasons





Office of Air Quality Planning and Standards

Sulfur Dioxide (SO₂)





SO₂ NAAQS

- November 16, 2009: EPA proposed to strengthen primary standards for sulfur dioxide (SO₂) to improve public health protection
- EPA proposed:
 - A new 1-hour SO₂ standard to better protect public health by reducing people's exposure to high short-term concentrations of SO₂
 - Level between 50 100 ppb
 - Would replace annual and 24-hour primary SO₂ standards
- Current standards were established in 1971
 - In the last review of the SO₂ standards, completed in 1996, EPA considered, but did not set, a 5minute primary standard to protect asthmatics
 - In 1998, the U.S. Court of Appeals for the District of Columbia Circuit remanded this decision back to EPA for further explanation
 - Evaluation of scientific evidence indicates that a 1-hr standard would better protect public health by reducing people's exposure to high short term concentrations of SO2
- EPA's proposal is consistent with the recommendations of the Clean Air Scientific Advisory Committee
- The final rule will be signed no later than June 2, 2010
- EPA is reviewing secondary SO₂ standard separately
 - Part of a joint review with NO_2 secondary standards -- to be completed in 2012
 - For more information, go to <u>http://www.epa.gov/air/urbanair/so2</u>



Office of Air Quality Planning and Standards



Current SO₂ network is not primarily configured to monitor locations of expected maximum short-term concentrations. Only ~1/3 of the 488 SO₂ monitors operating in 2008 were source-oriented or at high concentration sites

Proposed Monitoring Requirements

- SO₂ emissions are dominated by stationary sources (~95% of total per 2002 NEI)
- The monitoring network is intended to support the revised NAAQS which intends to reduce exposures to short-term, peak concentrations
- Two Prong Network Design:

Separation United States Environmental Protection

- Prong 1: Population Weighted Emissions Index (PWEI)
- Intended to take monitors to areas where there is a higher coincidence of population and emissions
- Calculated by multiplying CBSA population by the total SO2 emissions (tons per year) in that CBSA, then dividing the product by 1 million, providing values with the metric "million persons-tons per year"
- Monitors are required in a CBSA based on the PWEI values:
 - 3 if the PWEI is >1,000,000
 - 2 if the PWEI is 10,000 to 999,999
 - 1 if the PWEI is 5,000 to 9,999



Proposed SO2 Network Design - Prong 1 (PWEI Triggered)

2nd Prong – State Level Emissions

- The 2nd prong of the proposed network design is meant to ensure that monitoring can occur inside or outside of CBSAs wherever peak, short-term ground level concentrations may occur
- The number of monitors required is on a per state basis, where 1 monitor is required for every 1% of anthropogenic SO₂ each state contributes to the total national inventory
- Each state has at least one monitor under Prong 2

United States Environmental Protection

> In all, the 2nd Prong will require a total of 117 monitors, which includes all 5 U.S. territories (U.S. V.I., Puerto Rico, Guam, American Samoa, and the Northern Mariana Islands)



Summary of Comments

- Use of the NEI
 - Indications are that states are not satisfied with the NEI data
- Waivers
 - Requests on stakeholder calls and in public comments are requesting increased flexibility for states, particularly via the ability to waive out of minimum requirements
- Re-evaluation of PWEI and/or its breakpoints
 - Several states have suggested alternative PWEI breakpoints and some have offered wholly alternative ways to require monitors in CBSAs
- Concerns from some stakeholders about leaving large numbers of sources unmonitored
- Final rule (NAAQS and monitoring) to be signed by June 2, 2010

NOx/SOx Secondary Standard: Monitoring Implications

$$AAPI = g(\cdot) - \frac{1}{Q}L(NHx) - \frac{1}{Q}\left[V_{NOy} \cdot NOy + V_{SOx} \cdot SOx\right]$$

United States Environmental Protection

AAPI = Atmospheric acidification potential index

- Ambient observations of sulfur dioxide, particulate sulfate and NOy will be required to assess compliance. Note that SOx is the sum of SO₂ and SO₄.
- Implies FRM/FEM status will be required for sulfate and NOy. EPA considering alternate scenarios for standardization of methods
- Network design discussions to be addressed in second draft of the PAD (July – September 2010)
 - Leaning toward "representative" area wide monitoring
- Desire for reduced nitrogen (ammonia and ammonium ion) observations, but they would not be reference level.
 - Relying on modeled estimates of reduced nitrogen deposition
- Proposal on NAAQS and monitoring due July 2011

PM NAAQS – Secondary standard monitoring issues

- As part of its PM NAAQS review, EPA is considering a secondary standard to protect against visibility based welfare effects that is different from the primary standard.
- Light extinction (i.e. fractional loss of light per unit distance caused by scattering and absorption by particles and gases) is more closely tied visibility effects than PM mass concentration.
 - PM light extinction (component of light extinction caused by PM) is the largest contributor to light extinction during hazy conditions and it is directly measurable
- EPA is considering several approaches for implementing a possible PM secondary NAAQS
 - Light extinction monitoring (direct measurement)
 - Use of continuous PM_{2.5} mass (direct measurement)
 - Continuous PM_{2.5} mass with algorithm involving other factors such as RH and speciation data to estimate light extinction
- Choosing direct measurement of light extinction would require the establishment of a specific FRM, specifications and procedures for approval of a FRM and candidates FEMs, and network design and probe siting criteria
 - February 2010 CASAC AAMMS very helpful in framing challenges with respect to methods and availability of associated technology
 - http://yosemite.epa.gov/sab/sabproduct.nsf/bf498bd32a1c7fdf85257242006dd6cb/72b081422dc870 02852576a900517480!OpenDocument&Date=2010-03-26



Office of Air Quality Planning and Standards

National Core (NCore) Network



Implementation

- Most monitoring stations are operational for several measurements, others coming on-line this year.
- Plans received last year with almost all approvals completed.
- Stations to be fully operational by January 1, 2011

Network Size - 80 proposed stations

- urban (about 63 sites)
- rural (about 17 sites)
- May achieve additional rural coverage with National Parks and CASTNET

Urban/Suburban NCore - Population Coverage

• 63 Urban NCore Stations

Separation United States Environmental Protection

- Total population coverage of Urban/Suburban NCore (from 2005 census bureau estimate) for CSA's and CBSA's in the U.S.
 - 158 million people
- 27 Largest CSA/CBSA's are covered by NCore. This includes all metro areas with a population over:
 - 2 million people

6,000,000 All MSA's 4,000,000 4,000,000 2,000,000 1,000,000 0 1 14 27 40 53 66 79 92 105 118 131 144 157 170 183 196 209 222 235 248 261 274 287 300 313 326 339 322 MSA's across the country

Urban/Suburban NCore Station Population Coverage



Office of Air Quality Planning and Standards

Urban Coverage by County



Urban – Good geographical coverage across the country



Office of Air Quality Planning and Standards

Rural NCore Coverage



- Good rural coverage in East and Midwest Recent Addition
- Additional rural coverage needed in:
 - in: to Rural NCore
 - West, Mountain West, Southwest, Plains

Tools used for NCore Approval Review

- Annual Monitoring Plan submitted by each monitoring agency
- ✓ Regional Recommendations

Separation United States Environmental Protection Agency

- ✓ NCore Site Characterization Reports from Sonoma Technology Inc.
 - <u>http://ncore.sonomatechdata.com/#</u>
 <u>map</u>
- ✓ AirExplorer/Google Earth kml files of PM_{2.5} mass, CSN, and ozone monitoring stations
 - http://www.epa.gov/airexplorer/







Map Monitoring Sites

Explore monitoring locations with Google Earth. Download annual and daily data.

Interne

NCore Site Characterization Reports

- Google Earth Site views
- Local topography
- Land cover

Separation United States Environmental Protection

- Population densities
- Traffic volumes
- Emissions data
- Pollution trajectories
- Wind roses
- Fuel use
- Climate summaries

NCORE MULTI-POLLUTANT MONITORING NETWORK

NCore is a multi-pollutant monitoring program that will consist of 83 stations. The sites will be equipped with several advanced measurement systems to monitor particulate matter ($PM_{2.5}$ and $PM_{10-2.5}$), ozone, carbon monoxide (CO), sulfur dioxide (SO_2), total reactive nitrogen (NO_2), and meteorological parameters (temperature, wind speed, wind direction, and relative humidity). Mouse over and click a proposed site location in the map (red stars) to access the site reports.



Further information on the NCore network can be found at http://www.epa.gov/ttnamti1/nco

Aerial Site Views



Image from Google Earth



Image from Google Earth

Population Density

Population data were collected at the block-group level from the 2007 Census population projection estimates. Population density was mapped for the following population/socioeconomic parameters: total population and sensitive population (under the age of 5 and over the age of 65).



NCore Site Location
 NCore Site Location
 Interstate
 State Highway
 Other Highway

 County Boundary

People'sq. kilometer







3 6

Facility Emissions

Major point source emissions data for VOCs, $PM_{2.5'}$ $NO_{x'}$ and SO_2 were collected from EPA's Air Quality System (AQS). Point source locations were mapped in graduated symbols depicting the 2005 annual emissions estimates. More information on facility emissions can be found at http://www.epa.gov/air/emissions/where.htm.



Wind Patterns



Wind Speed Units: miles per hour





NCore Leveraging

- NCore Stations leveraged with other networks
 - 9 rural sites are IMPROVE sites (may increase)
 - 16 sites are National Air Toxics Trends Stations (NATTS)
 - 11 sites are PAMS sites
 - 4 sites are CASTNET
- 71 sites are either Chemical Speciation Network STN or Supplemental Speciation sites



PM_{10-2.5} Speciation monitoring important for

- improved characterization of coarse particles
- Some measurement issues not yet resolved
- Prior to future implementation, a small pilot • monitoring project is commencing in 2010 at two locations (Phoenix and St. Louis)
 - Primarily using PM_{10-2.5} FRMs and dichot **FEMs**
 - Goal to identify key target species
 - Further develop analysis methods and **SOPs**
- CASAC consultation on pilot February 2009
 - Supported pilot monitoring to further develop methods and procedures
 - Strongly recommended use of dichot samplers
 - Recommended analysis of pilot data prior to further deployment in NCore or other networks



Phoenix Test site

Additional NCore Implementation Activities

- Funding recently distributed to support final equipment needs
- Assessing state plans for PM_{10-2.5} mass measurement
- Planning for proposed Pb monitoring requirement

See PA United States Environmental Protection

- Development of trace gas validation criteria
- Querying AQS to identify NCore monitors and establishing monitor type