Summary of Ambient Air Monitoring Topics in PM NAAQS Final Rule

Data Handling, Ambient Air Monitoring, and Quality Assurance to support the $PM_{2.5}$ NAAQS

The PM NAAQS final rule was signed on: December 14, 2012.

For details see: http://www.epa.gov/air/particlepollution/actions.html#dec12

Agenda

- PM NAAQS Final Rule Overview
- Data Handling Issues
- Ambient Air Monitoring Topics addressed in the PM NAAQS Final Rule
- Additional Ambient Air Monitoring Topics addressed in the PM NAAQS Final Rule

Note: This presentation only provides a summary of these topics addressed in the final rule. For a more complete description of these topics, please read the preamble and rule text.

PM NAAQS Final Rule Overview

- On December 14, 2012, the U.S. Environmental Protection Agency (EPA) strengthened the National Ambient Air Quality Standards (NAAQS) for fine particle pollution, also known as fine particulate matter ($PM_{2.5}$).
- For fine particles, the final rule:
  - **Strengthened the annual health standard for $PM_{2.5}$ to 12.0 micrograms per cubic meter (µg/m^3).** The existing annual standard of 15.0 µg/m^3 was set in 1997.
  - **Retained the existing 24-hour $PM_{2.5}$ health standard at 35 µg/m^3.** EPA set the 24-hour standard in 2006.
  - **EPA did not set a separate fine particle standard for visibility as the existing 24-hour secondary NAAQS of 35 µg/m^3 was determined to provide at least as much protection as a visibility level of 30 deciviews.** (A deciview is a yardstick for measuring visibility.)
- For coarse particles, the final rule:
  - **Retained the existing standards for coarse particle pollution (PM_{10}).** This standard, with a level of 150 µg/m^3, has been in place since 1987.
- For existing secondary standards for $PM_{2.5}$ and PM_{10}, the final rule:
  - **Retained the existing secondary standards as identical to the existing primary standards** to provide protection against other effects, such as ecological effects, effects on materials, and climate impacts.

$PM_{2.5}$ Data Handling to Establish "Design Values"
(40 CFR, Part 50, **Appendix N)**

The $PM_{2.5}$ Design Values (as before):

Annual Design Value: 3-year average annual mean concentration

Daily Design Value: 3-year average annual 98th percentile concentration

Data capture requirements for annual and daily DVs

- Nominal requirements (as before): 75% of scheduled samples per quarter
- "Creditable" data from "suitable" monitors: FRMs and appropriate FEM/ARMs
  - ✓ Does not include specific continuous FEMs/ARMs disqualified by the monitoring agency in annual network plan and approved by the EPA Regional Administrator.
  - ✓ $PM_{2.5}$ from scheduled days, valid make-ups and collocated suitable monitors are "creditable" for the annual and daily NAAQS
- Computations are based on a "combined site record":

  $PM_{2.5}$ from the designated "primary" monitor supplemented with the average of daily data from all collocated "suitable" monitors, for the missing primary monitor days

$PM_{2.5}$ Data Handling to Establish "Design Values" (40 CFR, Part 50, **Appendix N)**

Annual design values - for comparison to primary (secondary) NAAQS:

- Based on individual "eligible" sites (with area-wide representativeness)
  - as per criteria specified in §58.11 and §58.30
- "Spatial averaging" is no longer allowed
- When data do not satisfy nominal 75% capture
  - Annual data capture is sufficient with11 daily values per quarter if annual average or 3-year DV is greater than 12.0 ug/m^3 (15.0 ug/m^3)
  - Use conservative "data substitutions" to produce complete "test design values "
    - Using minimum quarterly values (at least 30 days across the three like quarters are needed). *If TDV > 12.0 (15.0) then NAAQS is not met and the DV is valid.*
    - Using maximum quarterly values (at least 50% data capture needed in each quarter). *If TDV ≤ 12.0 (15.0) then NAAQS is met and the DV is valid.*
  - Note: EPA did not finalize the proposed "PM10 colo" test

$PM_{2.5}$ Data Handling to Establish "Design Values" (40 CFR, Part 50, **Appendix N)**

Daily design values - for comparison to primary and secondary NAAQS (35 ug/m^3):

- All sites with suitable monitors are eligible
- "Table lookup" is used for all sites, including those w. seasonal sampling.
  - Using sorted list of daily $PM_{2.5}$ from the "combined site record."
  - No. of "creditable samples" determine the position of the 98th percentile in the list.
  - Note: EPA eliminated the special seasonal sampling formula
- When data capture is less than 75% per quarter:
  - Annual data capture is sufficient if annual 98th %iles or 3-year DV is > 35 ug/m^3
  - Data substitution of max value per quarter produce a complete "test design value,"
    - *If TDV ≤ 35 ug/m3 then NAAQS is met and the DV is valid.*
    - Allowed with at least 50 percent $PM_{2.5}$ data capture in each quarter.

Ambient Air Monitoring Topics addressed in the PM NAAQS Final rule

Section VIII - Amendments to Ambient Monitoring and Reporting Requirements

Terminology Changes

Community – Oriented

- Issue: The term "community-oriented" is used in network design criteria for $PM_{2.5}$, but is not well defined. Replace this term with **"area-wide"** monitoring sites as this is the language recently adopted in the NO_2 monitoring requirements.
- Final Decision (as proposed): Replaced "community-oriented" with "area-wide".

Community Monitoring Zone

- Issue: The term "community monitoring zone" is associated with spatial averaging which was revoked elsewhere in the final rule.
- Final Decision (as proposed): Revoked this term as it is no longer needed.

Population-Oriented

Issue: $PM_{2.5}$ monitoring language required sites be "Population-Oriented" for comparison to NAAQS

- Inconsistent with other NAAQS and central concept that NAAQS apply everywhere in ambient air
- Concept can't be quantitatively defined; complicates implementation

Final Decision (as proposed):

- Removed provisions that reference "population-oriented" in regulatory text

Background:

- This restriction was in §58.30 (§58.30 was created in 2006) and Appendix D. Language originated in the 1997 $PM_{2.5}$ NAAQS network design criteria (Appendix D).
- With no easily understood way to define receptors that are affirmatively population oriented or not, this was causing problems in supporting SIP modeling.
- Note: There are no operating sites that have been categorized as "non population oriented".

Requirement for Near-Roadway Monitoring

Issue:

- Many stakeholders have provided strong support (even well before proposal) for near road monitoring.
- Potential EJ issue
- Supports multi-pollutant objectives articulated in 2010 primary NO_2 NAAQS
  - "the EPA recognizes that the establishment of near-road monitoring sites will produce certain other advantages, by providing a new data source for public health studies that will support future NAAQS reviews, allowing for the tracking of mobile source emission reductions progress, providing monitoring infrastructure that may be of use for mixtures of pollutants in a multi-pollutant paradigm, and supporting scientific studies of other mobile source pollutants like CO, ultrafine particulate matter, black carbon, and air toxics." – NO_2 NPRM

Final Decisions (as proposed):

- Added $PM_{2.5}$ as a required measurement to the emerging near-road monitoring stations to provide collocation with CO and NO_2. Note: CO could be at another near-road site that does not have $PM_{2.5}$
- Requirement is to site at one near-road NO_2 station in each CBSA over 1M in population (52 total stations)
- Focus on relocation of existing sites (other than design value monitors) to meet new requirement in cost-effective manner (requires R.A. approval)

Continued – Requirement for Near-Roadway Monitoring

The Final Rule was modified in the following ways to accommodate Public Comments:

Schedule: - Consistent with input from several monitoring agencies and multi-State organizations we finalized a phased approach to implementing the required $PM_{2.5}$ near-road monitoring:

- CBSA's over 2.5M in population:
  - Operational by January 1, 2015
  - Plans due to Regional Offices by July 1, 2014
- CBSA's over 1M, but less than 2.5M in population
  - Operational by January 1, 2017.
  - Plans due to Regional offices by July 1, 2016.

$PM_{2.5}$ Network Design:

- Final Rule reaffirms importance of neighborhood scale monitoring sites for $PM_{2.5}$
- Modified requirement that "…at least one site is to be in the "area-wide" location of expected maximum concentration" to "…at least one site is to be in the "area-wide" location of expected maximum concentration at the neighborhood scale or larger".
- Sites at smaller scales (micro- and middle-scale) can still be determined to be "area-wide"

Flexibility on Alternative Locations: - Although these are expected to be very limited, Agencies may recommend siting a $PM_{2.5}$ monitor in an alternative high concentration near-road environment to meet requirement.

Proposal to Clarify language used to determine when $PM_{2.5}$ monitoring sites at micro- and middle-scale locations are comparable to the Annual $PM_{2.5}$ NAAQS

Issue:

- Absence of consistent language across monitoring rule and appendices on the applicability of micro- and middle-scale locations to the annual $PM_{2.5}$ NAAQS.

Recommendation:

- Clarify language to explicitly state that measuring $PM_{2.5}$ in micro- and middle-scale environments near emissions of mobile sources, such as a highway, does not constitute being impacted by a "unique" source.

Continued - Proposal to Clarify language used to determine when $PM_{2.5}$ monitoring sites at micro- and middle-scale locations are comparable to the Annual $PM_{2.5}$ NAAQS

Final Decision:

- In light of public comments pointing out that there are cases where near-road environments can be considered a unique location; EPA is **not** finalizing this part of the rule language.
  - From preamble to final rule: examples of locations not applicable to the annual NAAQS "…characterization of a microscale environment that is not considered area-wide for $PM_{2.5}$; for example, due to proximity to a unique source like a tunnel entrance, nearby major point source, or other relatively unique microscale hot spot."
  - Air agencies and the EPA will use the annual monitoring network plan described in 40 CFR 58.10 for identification and approval of sites that are suitable and sites that are not suitable for comparison with the annual $PM_{2.5}$ NAAQS

Additional Notes:

- However, we do expect that in most cases near-road stations will be considered area-wide for $PM_{2.5}$
- From preamble: "Thus, the EPA has made a determination to protect all area-wide locations, including those locations with populations living near major roads that are representative of many such locations throughout an area."

Use of Continuous FEMs at SLAMS

Issue: $PM_{2.5}$ continuous FEMs with poor comparability to collocated FRMs and the 24 month window for not using continuous $PM_{2.5}$ FEM data in design value calculations has expired (identified in AQS as monitor types “non-regulatory” and “SPM”).

Recommendations:

- Provide flexibility for monitoring agencies to declare in their annual monitoring network plans when data from $PM_{2.5}$ continuous FEMs are of insufficient comparability to collocated FRMs such that they should not be used in design value calculations, even if operating for more than 24 months.
- In first year, address all existing data and data expected for length of plan (i.e., next 18 months)
- Took comment on whether to allow prospective only or both prospective and retrospective.

Continued - Use of Continuous FEMs at SLAMS

Final Decisions:

- The provision for prospective exclusion of data has been included in the final rule, including addressing all existing data in first year.
- The provision for continued retrospective exclusion of data has also been included; an example is provided in the preamble:
  - Note: All public comments were supportive of allowing continued retrospective assessments to recommend exclusion of data
  - However, **EPA does not believe small changes in assessments should be cause for a change in use of the data**. From the Preamble: *"An agency finds that the bias between a collocated $PM_{2.5}$ continuous FEM and FRM are acceptable, but near the limit of that acceptability and then finds a year later that the assessment indicates that the bias is just outside the limit of that acceptability. Such relatively small changes where an assessment indicates flipping in or out of the acceptable bias are in themselves acceptable since the overall Data Quality Objectives (DQOs) can still be met."*
  - So what would be cause for allowing a retrospective assessment to recommend exclusion of data?
    - If there has been **a significant change in the assessment of that data from the previous year**
    - From the preamble*: "A significant shift in the comparability would be noticeable by comparing assessments for a site from one year to the next and seeing a significant and unacceptable change in one of the key statistical metrics used in the evaluation (i.e., additive or multiplicative bias)."*

Continued - Use of Continuous FEMs at SLAMS

Final Rule and Preamble also Include the Following:

Flexibility:

- Provides flexibility for excluding continuous FEMs at locations that are not collocated with an FRM to be grouped with a similar location that is collocated with an FRM.
- $PM_{2.5}$ continuous FEM data not to be used in design value calculations will be stored separately in AQS (i.e., not under parameter code 88101), but could be used in AQI reports
- Preamble describes that it can be acceptable for two adjacent States using the same continuous FEM method to have one State use the method for comparison to the NAAQS and the other not use it. Preamble cites several reason (e.g., differences in training, set-up, operations…)

Requirements and Process:

- Requires that SLAMS would still need an operating FRM (or other continuous FEM with acceptable data comparability) to ensure a design value is still calculated for required stations.
- The absence of an air agency statement specifying a position on use of data from a continuous $PM_{2.5}$ FEM for comparison to the NAAQS will be interpreted as meaning that all such data are applicable for comparison to the NAAQS; unless SPM in first 24 months.
- The EPA's approval of an annual monitoring network plan as a whole, or in part, will constitute concurrence with an air agency's recommendation to use or not use data from continuous $PM_{2.5}$ FEMs as eligible for comparison to the NAAQS, unless otherwise noted in the approval of the plan.

Use of CSN/IMPROVE Data to Support a New Secondary Standard for $PM_{2.5}$ to Address PM-related Visibility Impairment

Issue:

- As explained in Section VI of the preamble to the final rule EPA did not set a separate secondary standard for $PM_{2.5}$ to address PM-related visibility impairment.

Final Decisions:

- The EPA did not finalize use of CSN/IMPROVE in any aspect of the proposal **(i.e., methods, network design, quality assurance, probe and siting criteria, or data certification)** in the final rule.

Quality Assurance Requirements

Quality Assurance Weight of Evidence

Issue: Should monitoring data that has *not* met "all quality assurance requirements" necessarily be considered *ineligible* for comparison to the NAAQS?

Final Decision (as proposed):

- EPA has adopted the weight of evidence approach in the final rule.
- This provision covers all criteria pollutants.

Continued - Quality Assurance

Waivers for Maximum Allowable Separation of Collocated $PM_{2.5}$ samplers and Monitors

Issue: Difficulty meeting collocated siting requirements for $PM_{2.5}$ continuous FEMs that may need to be inside a shelter with FRMs that are located on platform or roof.

Recommendations:

- Maintain 1 – 4 meters where practical
- Allow flexibility where the air drawn through the collocated samplers is well within the operational precision of the instruments.
  - i.e., neighborhood and larger scales
  - Existing network design guidance already describes “collocated scale” as 1 to 10 meters
- Allow monitoring agencies to request waivers for up to 10 meters at neighborhood and larger scales.

Final Decisions:

- The EPA has adopted the proposed approach of allowing up to 10 meters for collocation at sites at neighborhood scale and larger in the final rule; subject to Regional Administrator approval.
- The EPA also added a provision to allow up to 3 meters vertical spacing which may be approved by the Regional Administrator for sites at a neighborhood or larger scale of representation.

Probe and Monitoring Path Siting Criteria

Near –Road $PM_{2.5}$ Monitoring

Recommendation

- Follow the same probe and siting criteria as NO_2 near-road requirement:
  - *"as near as practicable to the outside nearest edge of the traffic lanes of the target road segments; but shall not be located at a distance greater than 50 meters, in the horizontal, from the outside nearest edge of the traffic lanes of the target road segments"*

Final Decisions:

- Finalized as proposed; however:
- Per public comments maintained PM siting criteria for distance from vertical wall or obstruction (>2 meters)

Additional Notes:

- No other constraints on siting; however, response to comments does offer some additional insights on optimal siting distance.
- Preamble discusses that the scale of representation may be different across pollutants at the same site in the near-road environment.

Additional Ambient Air Monitoring Topics in the Final Rule

Final Decisions (as proposed):

- Included Administrative change to 53.9 – Conditions of Designations
  - Section is now linked to performance criteria from Table C-4 to subpart C of Part 53.
- Revoked requirement for $PM_{10-2.5}$ speciation at NCore stations
  - method research is on-going and per CASAC Subcommittee advice, more flexibility in network design is needed to support health studies and research.
- Longer filter archive. Five years of storage with at least the first year in cold storage.
  - Filters very important to support health and epi studies, source apportionment.
  - Destructive techniques are acceptable; i.e., may result in loss of filter.
- Updated sampling schedule requirements providing some additional flexibility when the annual standard is the driver.
- Reinserted Table E-1 (had been previously inadvertently deleted)

Next Steps

Final Rulemaking:

- PM NAAQS Final Rule will be published in the Federal Register in the next few weeks.
- The final rule is effective 60 days after date of publication in the Federal Register.

Topics where more information may be needed?

- We will work to answer questions on all topics. Two topics we expect will be on many monitoring agencies minds:
  - Continuous FEM areas to work on:
    - We know we need to set up the method codes in AQS for continuous FEMs in parameter codes that will be an alternative to 88101.
    - A template or similar to help efficiently guide process of requesting exclusion of data.
    - Are there other things needed?
  - $PM_{2.5}$ monitors at Near-Road Stations – Agencies may use grant funds for near-road stations on $PM_{2.5}$ FRMs or FEMs.
- Post call - Please communicate questions though each applicable EPA Regional Office.