

Dark Skies Ahead: Modeling the New NAAQS

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Here's the New NAAQS...

... NOT the same as the old NAAQS...

- 1-hour SO₂
- 1-hour NO₂
- 24-hour and Annual PM_{2.5}



1-hour SO₂ and NO₂ NAAQS

EPA established both standards in 2010:

1-hour SO₂ NAAQS:

- 196 µg/m³, 3-year average 99th percentile of 1-hour daily maximum concentrations.

1-hour NO₂ NAAQS:

- 188 µg/m³, 3-year average 98th percentile of 1-hour daily maximum concentrations.



Unlike previous NAAQS, the standards are probabilistic rather than deterministic.

What's the Problem with Probabilistic?

- EPA Appendix W Guidance for short-term modeling requires worst case emissions and continuous operation.
- Designed to capture the worst case scenario: Maximum emissions and worst-case meteorological conditions.
- Modeling maximum emission rates against probabilistic standards yields overly-conservative results.
- Generally no exceptions for short term conditions like startup/shutdown or bypass scenarios.
- Intermittent sources can sometimes be excluded or annualized at the discretion of the regulating agency: case by case determination.



1-hour SO₂ NAAQS

- EPA released intended non-attainment areas to states in February, 2013.
- After months of negotiations, initial designations were released for each state in the form of Technical Support Documents:
 - Specifically identified large sources EPA believed to be responsible for monitored violations.
 - Also identified other sources potentially responsible for monitored violations.
- Meanwhile: Sierra Club's March 2013 comments on proposed SO₂ designations included source-specific modeling assessments of **92 facilities** alleged to be operating in violation of 1-hour SO₂ NAAQS.
- Up Next: SO₂ Data Requirements Rule expected in 2014 to define path towards 2 future rounds of designations.

1-hour NO₂ NAAQS

1-hour standard is very challenging for...

- Combustion operations with short stacks (RICE, small boilers).
- Intermittent operations like emergency/backup sources.
- Fracking.
- Startup and shutdown conditions for combined cycle gas turbines.



Tier 3 refined NO₂ modeling sometimes (but not always) leads to a reasonable solution, but it adds time and effort because it requires...

- Source-specific in-stack NO₂/NO_x ratio.
- Representative hourly ozone data.
- Case-by-case approval from State and/or EPA Region.

24-hour PM_{2.5} (and annual) NAAQS

The PM_{2.5} NAAQS have gone through significant changes in the last 15 months:

- **December 14, 2012:** EPA announces revised annual average PM_{2.5} NAAQS reduced from 15.0 µg/m³ to 12.0 µg/m³.
- **December 21, 2012:** EPA announces final Boiler MACT/GACT, which includes PM emission standards for industrial and utility boilers.
- **January 22, 2013:** DC Circuit Court vacated and remanded PM_{2.5} SILs and SMCs Rule to EPA for further consideration.
- **March 18, 2013:** Revised annual average PM_{2.5} NAAQS becomes effective



What are the current PM_{2.5} NAAQS?

24-hour PM_{2.5} NAAQS:

- 35 µg/m³ as 3-year average of 98th percentile of daily averages.

Annual PM_{2.5} NAAQS:

- 12.0 µg/m³ as 3-year mean of annual average.

New Issues to deal with:

- As of January 22, 2013, PM_{2.5} SILs and SMC are remanded.
- Revised annual NAAQS went into effect in March, 2013, but states have 3 years to identify nonattainment areas.
- 2013 Draft modeling guidance for PM_{2.5} requires consideration of secondary PM_{2.5} impacts



PM_{2.5} SILs/SMC Remand

Results from legal challenge by Sierra Club:

Before action, SILs existed by guidance only as a *de facto de minimis* level.

- Emissions increases causing impacts below SIL exempt from full PSD air quality analysis– **vacated and remanded**.
- Facility impacts below SIL demonstrates that neither causes nor contributes to an exceedance of an ambient standard – **not vacated and remains in effect**.

SMCs used to exempt a project from pre-construction monitoring

- Court found that the **EPA was precluded from using the SMC as a *de minimis* exemption** from the statutory requirement to do preconstruction monitoring .
- EPA must re-consider use of SMCs for other pollutants .

PM_{2.5} Permitting Issues

Annual NAAQS was in effect for permitting immediately on March 18th, 2013, but non-attainment designations are 3 years away:

Consider a major new source or major modification:

- Currently designated as “attainment” so PSD applies, including air quality analyses.
- 2010-2012 PM_{2.5} annual average ambient background value is 12.1 µg/m³.
- PSD NAAQS modeling demonstration requires adding new source impact to background concentration and demonstrating compliance with the NAAQS.
- If background concentration is 12.1 µg/m³, but NAAQS is 12.0 µg/m³, how can any project move forward?



Secondary PM_{2.5} impacts

NACAA PM_{2.5} Modeling Implementation Study's findings that secondary PM_{2.5} concentrations from individual point sources were minimal... but...

Draft Modeling Guidance defines 4 levels of PM_{2.5} analyses depending on the tons/year emissions of PM_{2.5} and combined tons/year emission of NO_x and SO₂. If total NO_x/SO₂ emissions are ≥ 40 tons/year, secondary PM_{2.5} must be evaluated in one of three ways:

- Qualitative
- Hybrid qualitative / quantitative
- Full quantitative: photochemical grid modeling

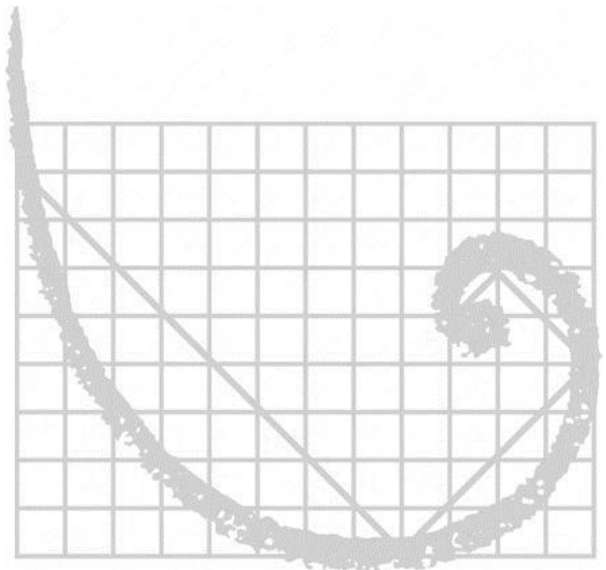


Summary

- The new NAAQS present unprecedented challenges to existing and new fossil fuel power plants.
- Using a worst-case approach to modeling against probabilistic standards yields overly-conservative results.
- Most existing facilities have not modeled the new standards, leading to questions regarding compliance status.
- Most modeling refinements require case-by-case approval, increasing exposure to legal challenges.
- The status of future regulations increases uncertainty about the path to compliance.



Questions? / Contact Information



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