LIFE AFTER THE PM$_{10}$
SURROGATE POLICY

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Overview

- History of the PM$_{2.5}$ NAAQS and PM$_{10}$ surrogate policy
- What are we supposed to do now?
- PM$_{10}$ surrogate demonstration requirements
- PM$_{2.5}$ PSD analysis – steps, challenges, and potential solutions
History of the PM$_{2.5}$ NAAQS

- 4/30/1971 – First PM NAAQS (TSP based indicator)
  - 260 µg/m$^3$ (24-hour arithmetic average)
  - 75 µg/m$^3$ (annual geometric average)
- 7/1/1987 – New PM NAAQS (PM$_{10}$ based indicator)
  - Why change from TSP to PM$_{10}$?
  - 150 µg/m$^3$ (24-hour average not to be exceeded more than once per year)
  - 50 µg/m$^3$ (annual arithmetic average)
History of the PM$_{2.5}$ NAAQS

- 10/1993 – American Lung Assoc. sues EPA
- 7/18/1997 – PM NAAQS Revised (PM$_{10}$ and PM$_{2.5}$ based indicators)
  - Over 50,000 written and oral comments
  - What’s so special about PM$_{2.5}$?
History of the PM$_{2.5}$ NAAQS

- 10/23/1997 – PM$_{10}$ Surrogate Policy
  - Addressed difficulties with PM$_{2.5}$ NSR Implementation
  - Emission calculations
  - Modeling difficulties
  - Insufficient network of PM$_{2.5}$ monitors

- 7/30/2004 – 1997 PM$_{10}$ standard removed, back to 1987 standard

- 10/17/2006 – PM NAAQS Revised
  - PM$_{2.5}$ 24-hour standard was lowered to 35 µg/m$^3$
  - Revoked the PM$_{10}$ annual standard
## History of the PM$_{2.5}$ NAAQS

<table>
<thead>
<tr>
<th>PM NAAQS Revision</th>
<th>PM$_{10}$</th>
<th>PM$_{2.5}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual</strong></td>
<td><strong>24-Hour</strong></td>
<td><strong>Annual</strong></td>
</tr>
<tr>
<td>1987</td>
<td>50 µg/m$^3$ (annual arithmetic average)</td>
<td>150 µg/m$^3$ (24-hour average, not to be exceeded more than once a year)</td>
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<tr>
<td>1997</td>
<td>No Change</td>
<td>150 µg/m$^3$ (24-hour average, 98th percentile)</td>
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<tr>
<td>Vacated</td>
<td></td>
<td>Vacated</td>
</tr>
<tr>
<td>2006</td>
<td>Revoked</td>
<td>No Change</td>
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History of the PM$_{2.5}$ NAAQS

- **4/25/2007** – “Clean Air Fine Particle Implementation Rule” – Non-NSR portion
  - Attainment demonstrations, designations, etc.

- **PM$_{2.5}$ NSR Implementation** – Broken up into 2 parts
  - **5/16/2008** – “Implementation of NSR for PM$_{2.5}$”
    - Major source threshold, Significant Emission Rate (SER), precursor applicability, etc.

- **10/20/2010** – “PM$_{2.5}$ Increments, Significant Impact Levels (SILs) and Significant Monitoring Concentration (SMC)”
  - Proposed 9/21/2007
History of the PM$_{2.5}$ NAAQS

- 8/12/2009 – Louisville Gas & Electric Trimble Generating Station Administrative Order
  - *Policy change* – must now demonstrate PM$_{10}$ is a reasonable surrogate for PM$_{2.5}$
  - Nucor Corporation proposed plant (11/12/2009)
- 2/11/2009 – Proposed rule to repeal grandfathering and end the PM$_{10}$ surrogate policy
- 3/23/2010 – EPA modeling procedures memo
  - PM$_{10}$ surrogacy demonstration
  - PM$_{2.5}$ modeling analyses
What Are We Supposed to do Now?

- PM$_{2.5}$ NSR Implementation Rule transition period ends 1/1/2011
- PSD projects (Now – 1/1/2011)
  - Demonstrate PM$_{10}$ is a reasonable surrogate for PM$_{2.5}$
  - or
  - PM$_{2.5}$ PSD Analysis
Demonstrating $PM_{10}$ as a Surrogate

- Is $PM_{10}$ a reasonable surrogate for $PM_{2.5}$?

- EPA’s suggested guidance
  - Control technology
    - Does the control technology control $PM_{2.5}$ as well as it controls $PM_{10}$?
    - Separate BACT analysis for $PM_{2.5}$ and $PM_{10}$
      - Is the selected BACT the same for both?
      - Or does the selected BACT for $PM_{10}$ control $PM_{2.5}$ as well or better than the BACT selected for $PM_{2.5}$?
  - Long range transport of $PM_{2.5}$ compared to $PM_{10}$
Demonstrating PM$_{10}$ as a Surrogate

- EPA’s suggested guidance (continued)
  - Modeling analyses
    - A PM$_{10}$ analysis should include the annual standard since PM$_{2.5}$ has an annual standard
    - The ratio of Background:PM$_{10}$ is lower than Background:PM$_{2.5}$
      - Compensate by comparing to the PM$_{2.5}$ NAAQS instead of PM$_{10}$ NAAQS
    - The form of the PM$_{2.5}$ NAAQS is different than the PM$_{10}$ NAAQS
      - PM$_{2.5}$: 24-hour average, 98$^{th}$ percentile averaged of 3 years
      - PM$_{10}$: 24-hour average not to be exceeded more than once per year using the H6H

Are any of EPA’s suggested comparisons possible?
PM$_{2.5}$ PSD Analysis

- **PM$_{2.5}$ PSD Elements (Now – 1/1/2011)**
  - Only look at filterable PM – condensable is not required (unless required by your state already)
  - Indirect PM$_{2.5}$ is not required
  - **Applicability:**
    - Major Source: 100/250 tons/yr (Direct Filterable PM$_{2.5}$ Only)
    - SER: 10 tons/yr (Direct Filterable PM$_{2.5}$ Only)
  - **BACT:** Analysis based on direct filterable PM$_{2.5}$
PM$_{2.5}$ PSD Analysis

- PM$_{2.5}$ PSD Elements (Now – 1/1/2011)
  - Modeling:
    - NAAQS = 15 µg/m$^3$ (annual) and 35 µg/m$^3$ (24-hour)
    - SIL, SMC, and PSD Increment (discussed later)

- After 1/1/2011
  - Indirect still not required
  - Condensable PM$_{2.5}$ will be required in
    - Applicability determinations
    - BACT analysis
    - Modeling analysis
By May 16, 2011
- Indirect PM$_{2.5}$ will be included (precursors will be assessed for each area)
  - SO$_2$ – Always a precursor
  - NO$_x$ – Precursor by default with the option to prove that it is not a precursor
  - VOC and NH$_3$ – By default are not precursors

Applicability
- SER: SO$_2$, NO$_x$, and VOC have the same SER as existing
- PM$_{2.5}$ PSD review can be triggered by a precursor emission increase > the SER, but precursors are not triggered by an increase in direct PM$_{2.5}$ > than the SER
Do states have the authority to administer a PM$_{2.5}$ PSD program?
- Is PM$_{2.5}$ listed as a regulated pollutant in your states’ regulations?
- Does your state define “regulated NSR pollutant” the same as 40 CFR 51 and 52?

Has your state established an SER for PM$_{2.5}$?
- If not, any increase in PM$_{2.5}$ could trigger PSD review
- Will this really happen?
PM$_{2.5}$ PSD Analysis

- Emission calculations
  - Insufficient commonly accepted emission factors for PM$_{2.5}$ quantification
  - AP-42
    - Use the most closely related emission factor for PM$_{2.5}$
    - Representative average to establish a PM$_{2.5}$:PM$_{10}$ ratio
  - SCAQMD PM$_{2.5}$ Emission Calculation Guidance
- Particle size distribution
  - Anderson impactor
  - Computer controlled scanning electron microscope (CCSEM) or other microscopic analysis of particles
  - Other research type instruments
PM$_{2.5}$ PSD Analysis

- Emission calculations (continued)
  - Vendor supplied data
  - Stack test results from similar units
  - Site specific stack testing
    - Modified Methods 201 and 201A – Filterable PM
    - Method 202 – Condensable PM

- BACT
  - Filterable and condensable PM control devices
  - Indirect PM$_{2.5}$ BACT analysis
PM$_{2.5}$ PSD Analysis

- **Air Quality Analysis**
  - **Significant Impact Levels (SIL)**
    
    | Averaging Period | Class I (µg/m$^3$) | Class II (µg/m$^3$) | Class III (µg/m$^3$) |
    |------------------|---------------------|---------------------|----------------------|
    | Annual           | 0.06                | 0.3                 | 0.3                  |
    | 24-hour          | 0.07                | 1.2                 | 1.2                  |

- **PSD Increments**

<table>
<thead>
<tr>
<th>Averaging Period</th>
<th>Class I (µg/m$^3$)</th>
<th>Class II (µg/m$^3$)</th>
<th>Class III (µg/m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>1</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>24-hour</td>
<td>2</td>
<td>9</td>
<td>18</td>
</tr>
</tbody>
</table>

- **Significant Monitoring Concentrations (SMC)**
  - 24-hour = 4 µg/m$^3$
PM$_{2.5}$ PSD Analysis

- **Air Quality Analysis (continued)**
  - Emission inventories – poor quality PM$_{2.5}$ data
  - 24-hour PM$_{2.5}$ NAAQS is very low (35 µg/m$^3$)
    - Background concentration in many areas is 50% or more of the standard

![24-hour PM$_{2.5}$ NAAQS](chart.png)
PM$_{2.5}$ PSD Analysis

- Air Quality Analysis (continued)
  - Emission inventories – poor quality PM$_{2.5}$ data
  - 24-hour PM$_{2.5}$ NAAQS is very low (35 µg/m$^3$)
    - Background concentration in many areas is 50% or more of the standard
  - EPA NAAQS comparison approach – seasonal or quarterly monitoring results in combination with modeled impact
  - MPCA NAAQS comparison – paired sums approach takes advantage of the form of the NAAQS to pair monitoring data with modeling data in space and time for comparison

- Air quality models and the PM$_{2.5}$ NAAQS form
  - 24-hour PM$_{2.5}$ NAAQS form – 98th percentile daily value averaged over 3 years (8th highest based on 365 day year, top 2% corresponds to approximately 7 days)
Conclusion

- $\text{PM}_{10}$ Surrogate Policy grace period is over
  - Demonstrate $\text{PM}_{10}$ is a reasonable surrogate for $\text{PM}_{2.5}$

- $\text{PM}_{2.5}$ PSD Analysis
  - Direct $\text{PM}_{2.5}$ – Filterable and Condensable
  - Indirect $\text{PM}_{2.5}$ – Precursor ($\text{SO}_2$, $\text{NO}_x$, VOC, $\text{NH}_3$)
  - Significant challenges
    - Emission rate quantification
    - $\text{PM}_{2.5}$ modeling
QUESTIONS?