

ADVENTURES IN PERMITTING...

Establishing Reasonable BACT/BART Limits

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Overview

- ▣ Number of Regulatory Drivers Require That Sources Address PM Emissions and Precursors such as SO₂ and NO_x
 - ▣ NSR No Longer Excludes Precursor Emissions
 - ▣ EGU MACT Could Trigger PSD for PM for Some Units
- ▣ Many Sources/Permitting Authorities Apply “Cookie Cutter” Approach that May Not Be Well Suited for Retrofits:
 - ▣ Various Site Specific Issues Should Be Considered
 - ▣ Measurement Uncertainty and Process Variation Over Time Should Be Reflected in Limits
 - ▣ Compliance Methods/Averaging Periods May Be Important

Overview

- ▣ Recent Elimination of PM_{10} Surrogacy Policy Requires PSD Evaluation for $PM_{2.5}$
- ▣ EPA Requirement to Include Condensable PM (CPM) and to Migrate Away from Startup/Shutdown Exemptions Complicates the Process

Reasonable Emission Limits

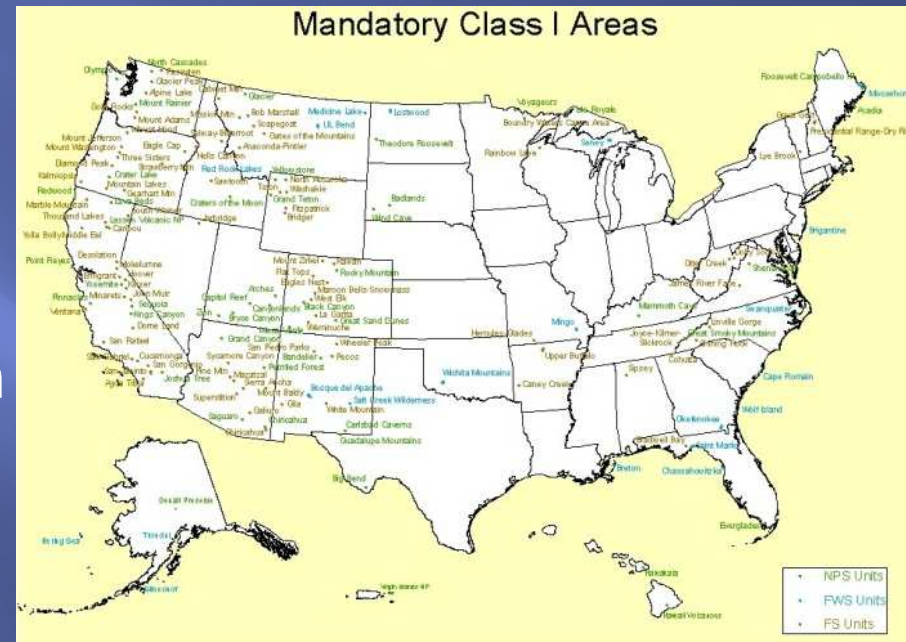
- ▣ Emission Limits Should Reflect:
 - Range of emissions of well-controlled source over time, operating conditions and fuel variation
 - Variability/uncertainty of method used to establish compliance
- ▣ Unit with the Desired Level of Control Should Have a Reasonable Expectation of Demonstrating Compliance
- ▣ If Variability is Not Considered, the Limit Becomes Arbitrary and Capricious

Reasonable Emission Limits

- ▣ Work Practice Standards Should Be Applied As Appropriate
 - Startup/shutdown/malfunction events
 - Measurement-related issues
 - Sources/state agencies tend to overlook this option

Regional Haze - A Sleeping Dragon

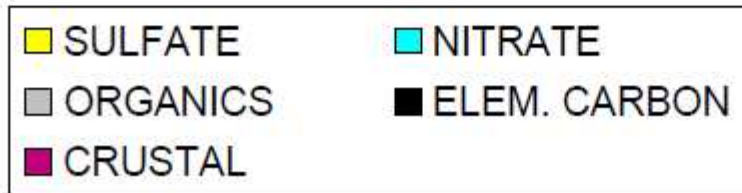
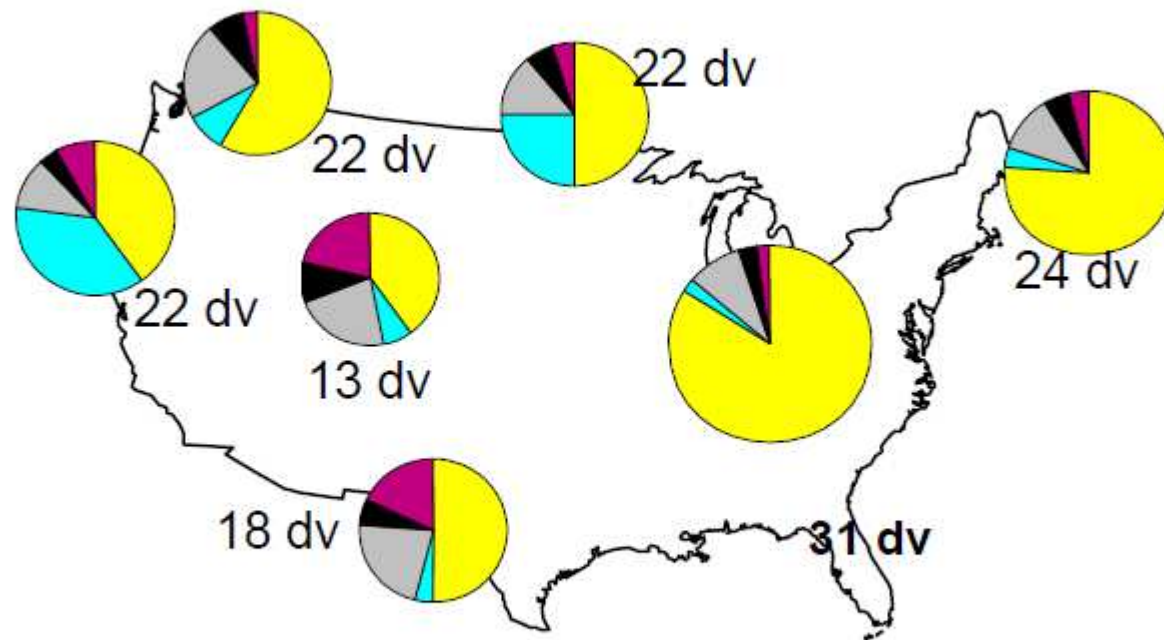
- ▣ Regional Haze Rule
 - Addresses CAA §169A
 - Requires States to Establish “Reasonable Progress Goals to attain “Natural Visibility Conditions” at Class I Areas by 2064



2011-2013	2013	2016-2018	2018	...	2064
Source Specific BART Controls Option	State Progress Reports (Every 5 Years)	Emissions Trading or Alternative Control Measures	Revised State Haze Plans (every 10 years)		Achieve Natural Visibility Conditions

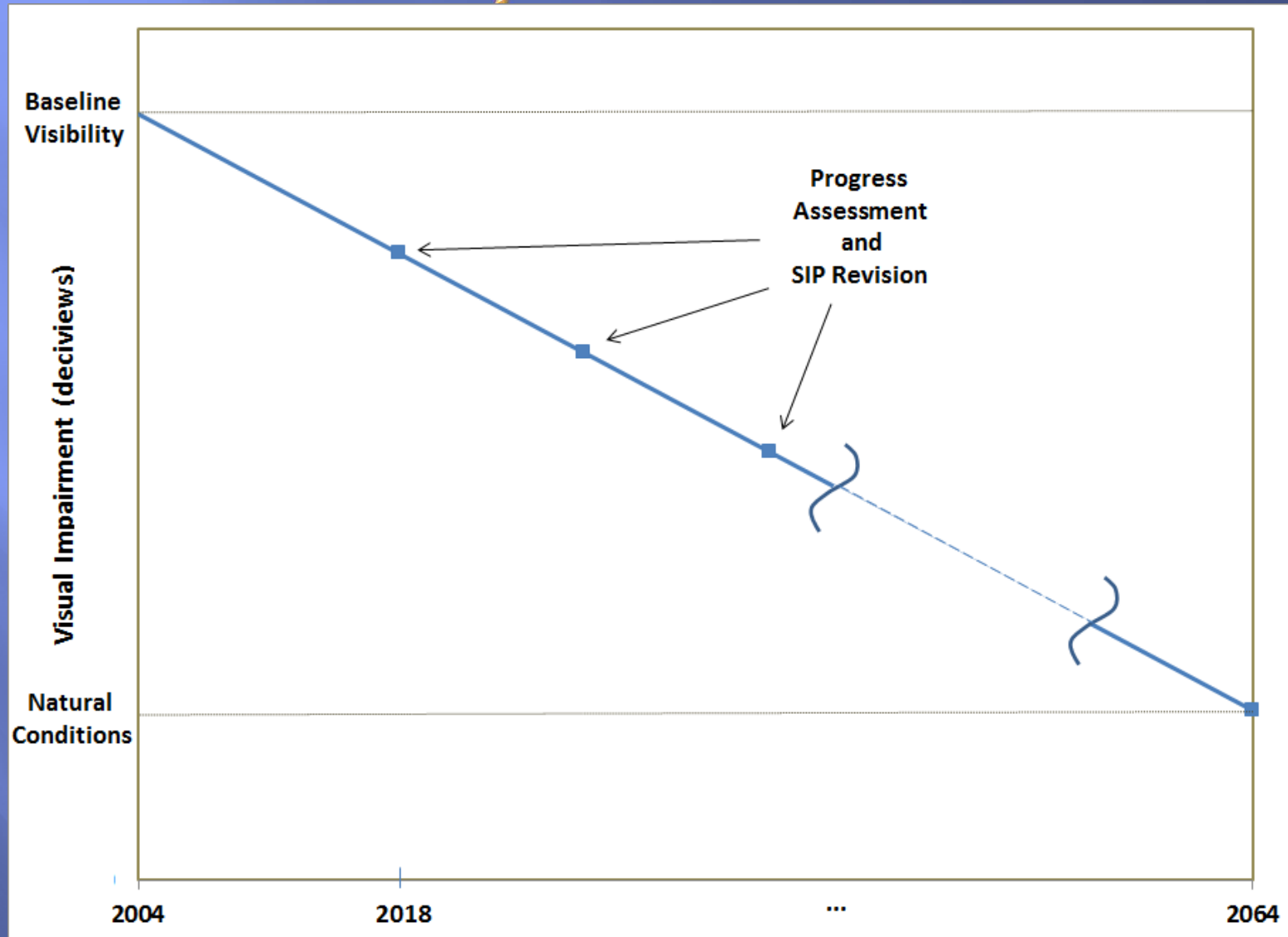
Impact of Precursors on Haze

Regional Variation of Visibility Impairment and Contributing Pollutants on 20% Haziest Days



Source: 2005 EPA
Particulate/Matter/
Regional Haze/Ozone
Modeling Workshop

No Visibility Left Behind Rule



Recent BART NO_x Example

- ▣ Regional Haze FIP - NO_x 0.05 lb/mmBtu
 - Includes startup/shutdown/malfunction
 - Lower than presumptive limit in EPA guidelines and new Subpart Da limit
- ▣ EPA Relied Solely on Previously Issued NO_x Limits (New Units) and Vendor Guarantees
 - Failed to assess the long-term achievability, particularly with respect to startup/shutdown
 - Rejected source's cost estimates because higher than "comparable" sources but failed to consider cost impact of altitude and difficulty of retrofit

Data Averaging Issues

- ▣ Periodic Testing vs. CEMS
- ▣ Averaging Period (e.g., 30-day rolling)
- ▣ Averaging Methodology
 - Block/Rolling
 - Boiler Operating Day
 - Flat vs. Heat Input Weighted Averaging
 - Plant-Wide Averaging
 - Output Standards (lb/mmBtu vs. lb/MW)
- ▣ Startup/Shutdown Consideration

Recent BART NO_x Example

- ▣ RMB Modeling - Not Consistently Achievable even with Lowest Guarantees
- ▣ EPA's "Support" Data Actually Shows Limit Is Not Consistently Achievable
- ▣ Recent Permits Limits Not Equivalent
 - ▣ New vs. retrofit
 - ▣ Different operation/design (e.g., NH₃ slip)
 - ▣ Many not constructed or lack long-term data
 - ▣ Different averaging times or SU/SD requirements
- ▣ Vendor Guarantee Not Long Term - Typically Met via Short Term Test

H₂SO₄ Emission Limits

- ▣ FIP Also Proposed Problematic H₂SO₄ Limit
 - No statutory basis for limit
 - More appropriately handled by imposing design requirements rather than emission limit
 - Superfluous because the visibility impacts will be reflected in the total PM limit proposed by state
 - Flawed - EPA did not take into account the uncertainty in either the model that it used to determine the limit or in the test method that would be used to demonstrate compliance

H₂SO₄ Emission Limits

- ▣ Proposed H₂SO₄ limit ~1/2 Method 8A MDL
 - Any limit must be above where repeatable measurements can be made
 - Any limit below the level of quantification is technically infeasible
- ▣ Limit is Surprising since EPA states “that Emissions of H₂SO₄ Will Not Be a Significant Concern” and “Sorbent Injection Will Not Be Needed”

EPA's New PM Focus

- ▣ EPA Now Pushing States to Include CPM in Permits/Source Inventories
- ▣ Different Concerns - NSPS vs. PSD/SIP
- ▣ CPM Always Considered for NAAQS but Less Concern Prior to $PM_{2.5}$ Focus
- ▣ CPM Not Usually Considered for NSPS
- ▣ NSPS Reflects Most Effective Control in Use when Promulgated - If Not Intended to Control CPM then Limit Should Only Be Filterable PM

EPA PM Definitions

- ▣ Primary PM - Sum of Filterable and CPM
“All primary particles are emitted directly from a stack.”
- ▣ Secondary PM – Not Considered for BACT/BART PM Evaluation
“Particles that form through chemical reactions in the ambient air after dilution and condensation has occurred. Secondary PM is formed downwind of the source.”

PM_{2.5} NSR Rule (May 2008)

- Effective 1/1/2011, Condensable PM Must Be Included in NSR Applicability and Modeling:

§51.166 (b)(49)(vi) - Particulate matter (PM) emissions, PM_{2.5} emissions, and PM₁₀ emissions shall include gaseous emissions from a source or activity which condense to form particulate matter at ambient temperatures. On or after January 1, 2011 (or any earlier date established in the upcoming rulemaking codifying test methods), such condensable particulate matter shall be accounted for in applicability determinations and in establishing emissions limitations for PM, PM_{2.5} and PM₁₀ in PSD permits.

PM_{2.5} NSR Rule (May 2008)

- ▣ “Sunset Period” Exempted CPM through 2011 in NSR Permitting (“Fixing” Method 202)
- ▣ EPA to Treat Existing Permit Limits as Not Requiring CPM
- ▣ PM_{2.5} “Precursors” Requirements
 - Regulated: SO₂ and NO_x*
 - Not Regulated: VOC * and NH₃*
- ▣ Ends PM₁₀ Surrogacy Policy
- ▣ Sets PM_{2.5} NSR Thresholds

Method 202 Uncertainty/MDL

- ▣ High Blank/MDL Values
 - MDL (and σ) Much Higher than Method 5
 - High Blanks (> 3 mg/dscm) – EPRI & EPA Studies
- ▣ Low SO₂ Study (Wien, et. al. 2001)
 - 1-hour ~80%
 - 6-hour ~60% Purge Effective
- ▣ Dry Impinger Study (Richards, et. al. 2005)
 - 1- hour ~70% Purge Effective
- ▣ Remaining Artifact Significant at Low PM
- ▣ “Catch 22” – Longer Sampling Times for Lower MDL = Higher Artifact Formation

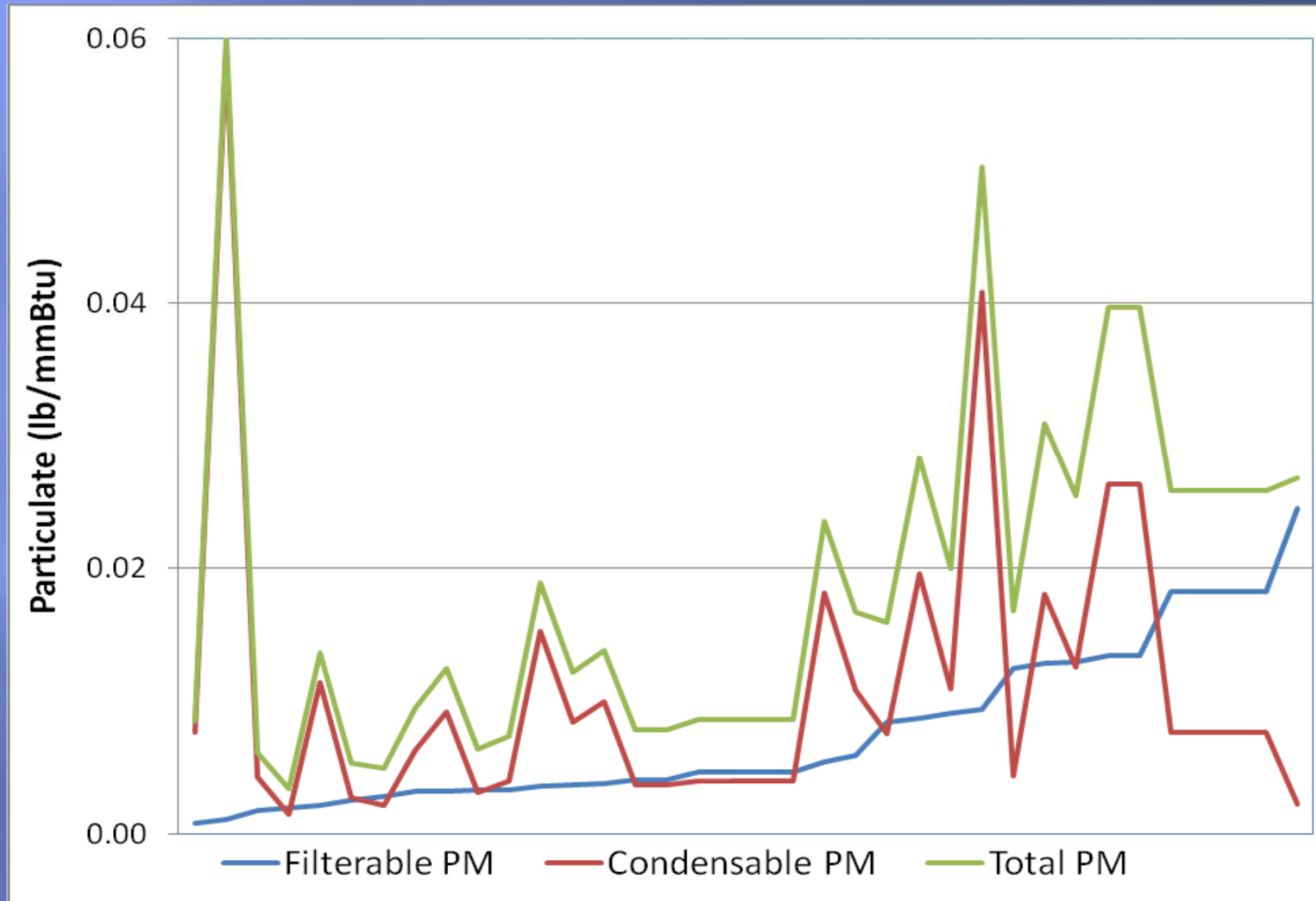
CPM Emission Limits

- ▣ State Agencies Requesting New CPM or Total PM Permit Limits
- ▣ In spite of EPA's focus on fine PM, CPM limits are unnecessary since:
 - Limits or emission controls are already in place that address CPM components
 - Pose “double jeopardy” since Agency is regulating the same pollutants in two ways
 - New CPM limit could pose a significant constraint—especially given uncertainty and bias associated with CPM measurement

CPM Emission Limits

- ▣ New EPA Requirements to Address CPM Are Only Triggered for New and Modified Sources
- ▣ Notwithstanding, State Cannot Just Add CPM to Existing Filterable PM Limit and Total PM Limit - Must Address Variability Issues
- ▣ Impact of Potential Addition of SCR or SNCR Must Also Be Considered Since Oxidation and Ammonia Slip Can Increase CPM

Site-to-Site CPM Variability



Utility MACT ICR Data PM Data for Sources with
SCR (or SNCR) and Wet Scrubbers

Conclusions

- ▣ EPA's Revised PM_{2.5} Policy Will Have Significant Impact as Sources Upgrade Existing Equipment
- ▣ Traditional Methods of Determining BACT/BART Limits Are Insufficient
- ▣ Sources Should Consider Unit Operating Variability and Measurement Related Issues in Determining Permit Limits

Recommendations

- ▣ Carefully Evaluate Other BACT/LAER/BART Limits
 - Compare averaging times and compliance methods
 - Look for unit-specific design differences (i.e., new vs. retrofit)
 - Has the limit been demonstrated long-term?
- ▣ Evaluate Performance of Similar Sources
 - Consider the quality of the data!
 - EGU MACT ICR data may be useful

Recommendations

- ▣ Consider Vendor Guarantees with Caution Particularly for Ultra-Low PM Applications
 - Guarantee usually does not cover long-term performance
 - Source is ultimately responsible for meeting limit!
- ▣ Specify Total $PM_{2.5}/PM_{10}/PM$ Limits Not Separate FPM/CPM Limits
 - Consistent with statutory requirements
 - May provide additional compliance margin

Recommendations

- ▣ Minimize Impact of SSM
 - Specify work practice standards for SSM
 - Alternatively, consider secondary limit that includes SU/SD with long averaging period
- ▣ Specify WPS for Ultra-Low PM Applications
 - Gas turbines & boilers

Recommendations

- ▣ Read Draft Permit Carefully!
 - Monitoring/Testing Details Important
 - Make sure CPM is not included for pre-existing limits either directly or by compliance method
 - Review SSM conditions
 - ▣ State agencies may add language such as “applies at all times” or “includes SSM” to a limit that wasn’t intended to include SSM