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Louisiana Permitting Challenges with Proposed PM_{2.5} NAAQS

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Presentation Agenda

- I. Permitting Challenges in LA with Proposed PM_{2.5} NAAQS
 - A. Immediate Impacts of New PM_{2.5} NAAQS
 - B. Attainment Designation Timing and Likely Designations
 - C. NNSR and PSD Permitting Impacts of Proposed PM_{2.5} NAAQS
- II. Strategies to Mitigate Challenges with Proposed PM_{2.5} NAAQS
 - A. Refining Emission Inventory
 - B. Modeling Considerations



Permitting Challenges in Louisiana



Immediate Impacts of New PM_{2.5} NAAQS



So, what happens after EPA promulgates the new annual PM_{2.5} NAAQS:

- 1st the new PM_{2.5} NAAQS goes into effect on the effective date of the standard (typically 60 days after publication in FR). EPA is not providing any application grandfathering provisions as they have done for past NAAQS due to an August 2019 court ruling that vacated the grandfathering provisions in the PSD rules.
 - So, if you have a pending PSD application for PM_{2.5} that is above the Significant Impact Level (SIL).....you better make sure the permit is issued prior to the effective date or that you can comply with the new NAAQS.
- 2nd until nonattainment designations are approved by EPA facilities in areas that will be designated as nonattainment must comply with PSD requirements.
 - Catch 22 – If you're in an area that's exceeding the new PM_{2.5} NAAQS.....how can you show that you will not cause or contribute to a violation of the NAAQS? While PSD regulations do not specify remedial actions, EPA has historically recognized in regulations and other actions that a source can reduce the impact of its emissions on air quality by obtaining sufficient emission reductions.
 - Following nonattainment designation approval but prior to nonattainment SIP approval sources comply NNSR requirements. 40 CFR 51, Appendix S contains requirements constituting an interim NNSR program. This program allows states to issue NNSR permits prior to SIP approval.



Attainment Designation Timing

- Initial Area Designation is required within 1 year of promulgation of the new standard – Governor Landry must make a recommendation of classification for all areas in the state as either nonattainment, attainment or unclassifiable.
- Attainment designations are based on the most recent 3 years of complete and valid monitoring data...depending on when the rule is promulgated, they will likely be based on data collected between 2021 and 2024.
- EPA has 2 years from promulgation of the new standard to promulgate attainment designations (w/ extension of up to one year if there is “insufficient information” to promulgate designations).



Louisiana PM_{2.5} Monitoring Data

- The following tables present EPA published monitoring data as part of the proposed rule and recent data pulled from LA Federal Reference Monitors (FRM) for most recent 3 years of data.

County	2019-2021 Annual Design Value (ug/m3)
Caddo	9.9
Calcasieu	7.1
East Baton Rouge	8.6
Iberville	7.9
Jefferson	7.6
Lafayette	7.9
Orleans	7.7
Ouachita	7.3
Rapides	7.4
St. Bernard	7.7
Tangipahoa	7.5
Terrebonne	7.2
West Baton Rouge	8.8

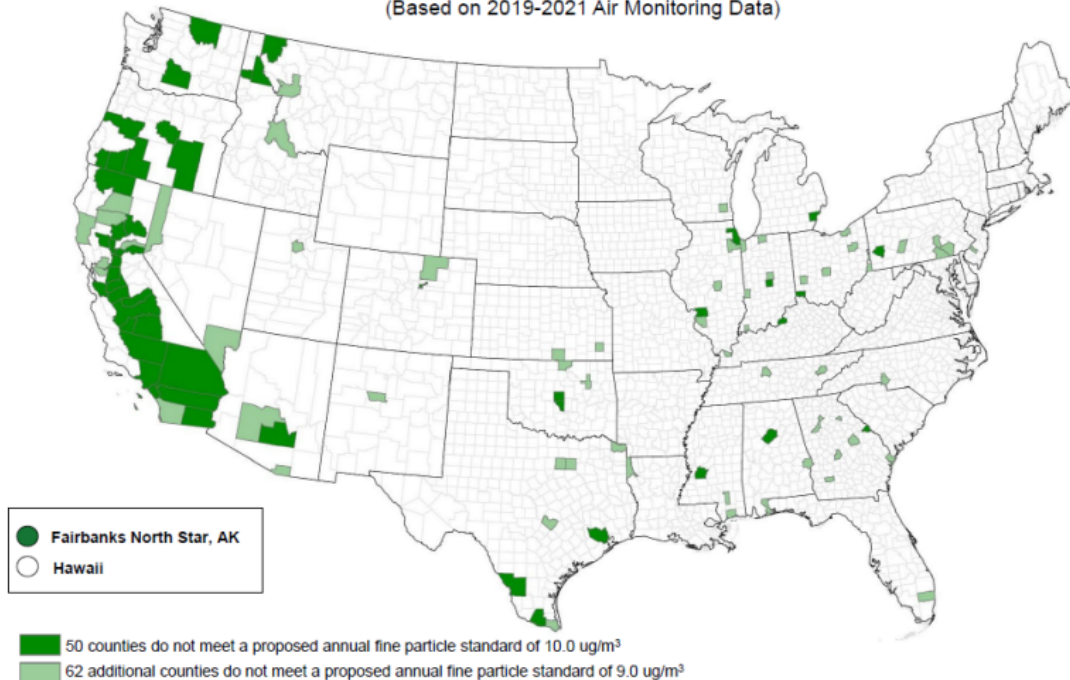
Parish	City	Site ID	POC	2020-2022 Annual Design Value ¹ (ug/m3)
Caddo	Shreveport	220170008	1	9.5
Caddo	Shreveport	220170008	2	9.4
Calcasieu	Westlake	220190008	3	--
Calcasieu	Vinton	220190009	1	--
East Baton Rouge	Baton Rouge	220330009	1	8.5
East Baton Rouge	Baton Rouge	220330009	2	--
East Baton Rouge	Baton Rouge	220330009	3	7.9
Iberville	St. Gabriel	220470005	1	7.6
Jefferson	Kenner	220511001	1	7.2
Jefferson	Kenner	220511001	3	--
Jefferson	Marrero	220512001	1	--
Lafayette	Lafayette	220550007	1	7.9
Orleans	New Orleans	220710021	1	7.8
Ouachita	Monroe	220730004	1	7.5
Rapides	Alexandria	220790002	1	7.4
St. Bernard	Chalmette	220870007	1	7.9
St. Bernard	Chalmette	220870007	3	--
Tangipahoa	Hammond	221050001	1	--
Tangipahoa	Hammond	221050001	2	--
Terrebonne	Gray (Beattievill)	221090001	1	7.2
West Baton Rouge	Port Allen	221210001	1	8.8

<https://www.epa.gov/pm-pollution/proposed-decision-reconsideration-national-ambient-air-quality-standards-particulate>

¹--" - Minimum data completeness criteria not met or monitor didn't exist for the three-year period.
<https://www.epa.gov/outdoor-air-quality-data/monitor-values-report>

Current Air Monitoring Data Show Some Counties Would Not Meet Proposed Primary Fine Particle Standards

(Based on 2019-2021 Air Monitoring Data)



Note: Map reflects monitored counties with complete monitoring data. See accompanying table for more detail. Future area designations (attainment/nonattainment) will not be based on these data, but likely on monitoring data collected between 2021 and 2024. Of the 112 counties with 2019-2021 design values above 9 ug/m³, 24 counties are totally or partially contained in nonattainment areas for the current PM_{2.5} standards.

This information is provided for illustrative purposes only and is not intended to project or predict the outcome of any forthcoming designations process.

<https://www.epa.gov/pm-pollution/proposed-decision-reconsideration-national-ambient-air-quality-standards-particulate>



Nonattainment NSR Requirements

So, assuming the NAAQS is set at $9.0 \mu\text{g}/\text{m}^3$ following EPA designation approval all new major sources and major modifications of $\text{PM}_{2.5}$ or a precursor in Caddo Parish will have to comply with the following NNSR permitting requirements:

- **NNSR vs PSD Applicability Differences** – Major source threshold 100 tpy (even if not one of 28 listed source categories), only subject to NNSR review for modifications or new major sources for pollutants which the source is a major source, and contemporaneous window is 4 vs 5 yrs.
- **Offsets** – Come from existing sources to balance emissions increases from proposed new or modified sources
 - Offset must be at least 1 to 1 (offset ratio dependent of nonattainment status can range from 1.1 to as high as 1.5 to 1)
 - Inter-pollutant offsetting allowed – (i.e., direct $\text{PM}_{2.5}$ or precursors of $\text{PM}_{2.5}$ – Ratio to be established during nonattainment SIP approval)
 - Emissions offset reductions must be:
 - quantifiable, enforceable, permanent and surplus;
 - from actual emissions – real, no “paper” reductions;
 - federally enforceable at the time of permit issuance for new source or major modification; and
 - in effect before the modification or new source can commence operation



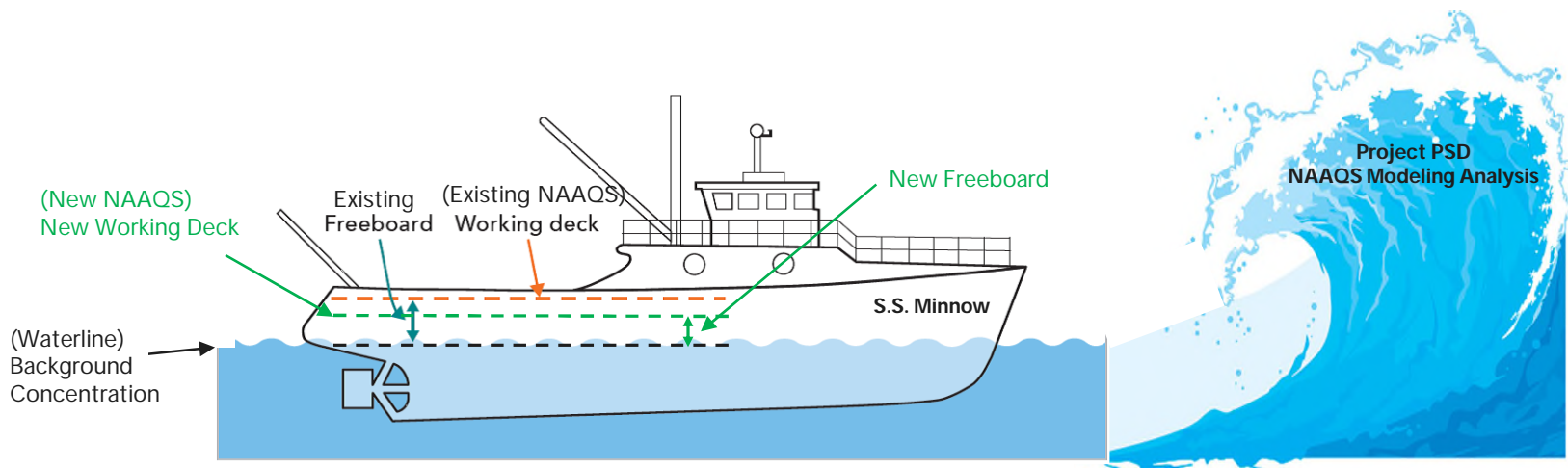
Nonattainment NSR Requirements (cont'd)

- **Lowest Achievable Emission Rate (LAER)** - The most stringent emissions limitation that is achieved in practice by such class or category of stationary source – Does not allow for consideration of costs or environmental impacts as allowed in BACT review.
- **Alternative Siting Analysis** – Siting analysis of alternative sites, sizes, process and environmental controls to demonstrate that the benefits significantly outweigh the environmental impacts and social costs.
 - LDEQ's EAS/"IT Questions" (which is required for any major modification or new major source) meets this requirement.
- **Compliance Certification Statement** - Certification that all major sources in the state owned and operated by the applicant are in compliance with all applicable emission limitations and standards or on a compliance schedule.



Attainment Area NSR Permitting Impacts

- So, you're not in Caddo Parish.....feeling good...well you shouldn't....
 - Given the limited freeboard between the new NAAQS and background level PSD permitting will be a significant challenge.
 - What is freeboard - the distance from the waterline (background concentration) to the working deck level (NAAQS), measured at the lowest point where water can enter the boat or ship.





Attainment Area NSR Permitting Impacts (cont'd)

- Based on a review of issued PSD permits and pending PSD permit applications submitted from January 2021 to September 2023 with modeled project impacts above the SIL:
 - If NAAQS set at $9 \mu\text{g}/\text{m}^3$ - **88%** of these projects would fail NAAQS modeling.
 - If NAAQS set at $10 \mu\text{g}/\text{m}^3$ - **38%** of these projects would fail NAAQS modeling.

Facility Type	Max Modeled Impact including Secondary ($\mu\text{g}/\text{m}^3$)	Background Concentrations ($\mu\text{g}/\text{m}^3$)	Total Impact ($\mu\text{g}/\text{m}^3$)	If PM _{2.5} NAAQS = $9 \mu\text{g}/\text{m}^3$ (Pass/Fail)	If PM _{2.5} NAAQS = $10 \mu\text{g}/\text{m}^3$ (Pass/Fail)
Refinery	2.49	7.32	9.81	Fail	Pass
Liquefied Natural Gas Plant	0.7	8.7	9.4	Fail	Pass
Liquefied Natural Gas Plant	0.7	8.7	9.4	Fail	Pass
Liquefied Natural Gas Plant	0.9	7.4	8.3	Pass	Pass
Petrochemical	3.49	8.02	11.51	Fail	Fail
Petrochemical	1.9	9.8	11.7	Fail	Fail
Wood Products	3.55	8.07	11.62	Fail	Fail
Wood Products	1.71	8.07	9.78	Fail	Pass



Strategies to Mitigate Permitting Challenges





Refining Emission Inventory



Direct and PM_{2.5} Precursor Emissions

■ 2017 US NEI Emissions Data:

- Industry/Utilities responsible for less than 20% of direct PM_{2.5}; fires responsible for 43%
- Industry/Utilities responsible for over 90% of SO₂ and a little less than 40% of NO_x

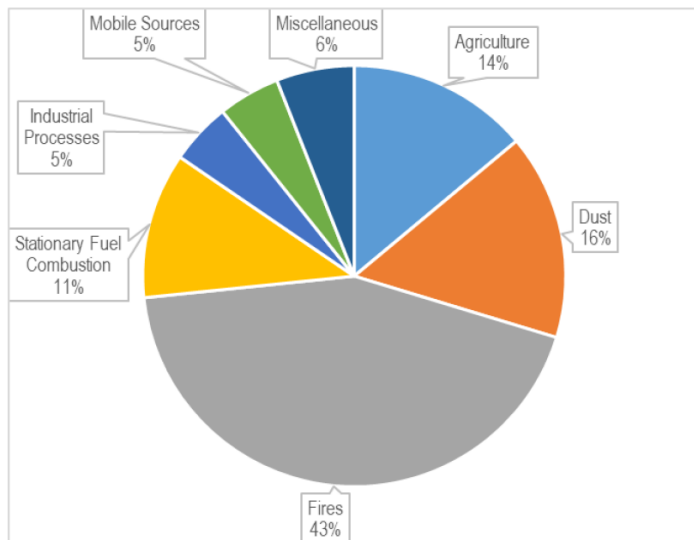


Figure 2-2. Percent contribution of PM_{2.5} national emissions by source sectors. (Source: 2017 NEI)

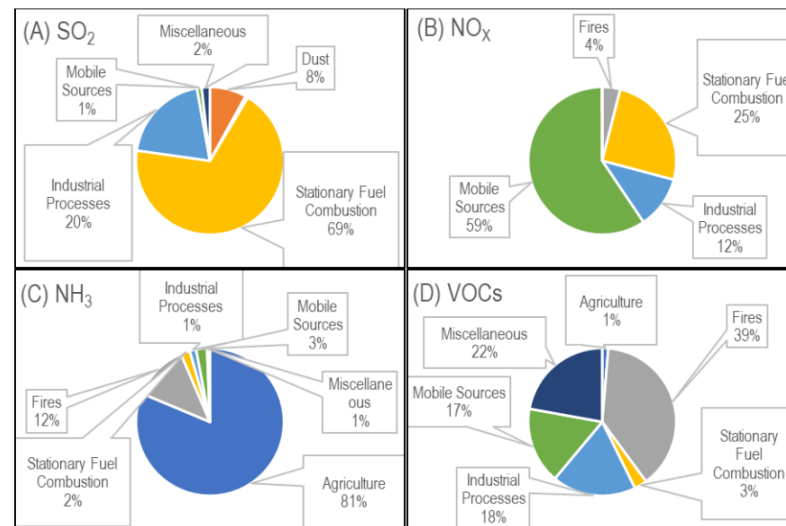


Figure 2-8. Percent contribution to sulfur dioxide (panel A), oxides of nitrogen (panel B), ammonia (panel C), and volatile organic compounds (panel D) national emissions by source sectors. (Source: 2017 NEI). All graphics only show anthropogenic contributions.



Refining Emission Inventory

- Historically, most have assumed all PM was PM_{2.5}. With 2012 PM NAAQS rule industry has had to sharpen the pencil some...with this new NAAQS it's time to sharpen the pencil...a little more.
- Prioritize Efforts - Focus on those sources with higher emissions and those with poor modeling characteristics.
 - Recommend reviewing published data to help speciate direct PM_{2.5} or developing your own data (sampling or stack testing) as soon as possible.
 - Also, it may be time to do a little permit hygiene/cleanup – I've seen a few permits with PM_{2.5} limits still based on the process weight rate equation or where PM_{2.5} = PM.
 - Be warned that “sharpening the pencil” can result in discovering higher emissions...not lower.
- Also, don't forget about PM_{2.5} precursors (NO_x, SO₂, - Currently not VOC and NH₃) – Given challenges w/ short term NO_x and SO₂ NAAQS...these have likely already been refined!



Refining Emission Inventory

▪ Haul Roads (Paved and Unpaved)

- Obviously pave them or apply water or dust suppressant, if possible, but even if not gather site specific silt loading data or review published silt loading data to develop more accurate $PM_{2.5}$ emission factors.
- For additional information regarding sampling, analysis, and published silt loading data see: <https://www.epa.gov/air-emissions-inventories/volume-9-particulate-emissions>

▪ Baghouses

- Use vendor-specified exhaust grain loading and source-specific particle size data to develop $PM_{2.5}$ emissions or use stack test data.

▪ Storage Piles and Material Transfer Operations

- Apply water or dust suppressant to storage piles and enclose or partially enclose drop points.
- Use site-specific silt content and $PM_{2.5}$ fraction data or use other published data.



Refining Emission Inventory (Cont'd)

■ Fuel Gas Combustion Devices (Heaters and Boilers)

- AP-42 Section - 1.4 Natural Gas Combustion factors overestimate PM_{2.5} emissions. Recommend using Region V/NEI published emission factors; you can cut PM_{2.5} emissions by 95% - 0.0075 lbs/MMBtu to 0.0004 lbs/MMBtu.
 - For additional information on Region V Emissions Factors/Updated NEI Factors see:
https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.epa.gov%2Fsites%2Fdefault%2Ffiles%2F2018-11%2Fnatgas_procgas_lpg_pm_efs_not_ap42_032012_revisions.xlsx&wdOrigin=BROWSELINK

■ Cooling Water Towers

- Install drift eliminators to minimize PM emissions.
- Get accurate Total Dissolved Solids (TDS) concentration data.

■ Emergency Engines

- Natural Gas and Liquified Petroleum Gas (LPG) fired use above Region V Emissions Factors/Updated NEI Factors



PM_{2.5} Stack Testing

■ EPA Reference Methods

- EPA Method 201A – Determination of PM₁₀ and PM_{2.5} Emissions from Stationary Sources (Constant Sampling Rate Procedure) – EPA Reference Method for Filterable PM
- EPA Method 202 – Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources - EPA Reference Method for Condensable PM

■ Alternative Testing for Stacks with Low Concentrations and Water Droplets - All of these require agency approval

- Conditional Test Method – 039 (CTM-039) Measurement of PM_{2.5} and PM₁₀ Emissions by Dilution Sampling (Constant Sampling Rate Procedure) – Captures condensable and filterable.
- Other Test Method – 37 (OTM-37) - Measurement of Direct PM_{2.5} and PM₁₀ Emissions at Low Concentrations Dilution Sampling (Constant Sampling Rate Procedure) - Captures condensable and filterable.
 - Can also be used where formation of PM occurs in sample train (i.e., Sulfur Unit stacks with NH₃ and Sulfur in exhaust gas form ammonium sulfates and shows up as PM emissions)
- Method 5 combined with Scanning Electron Microscopy (SEM) to avoid long testing periods or for stacks with high moisture content/water droplets present in exhaust. Not aware of any agency approval of this method. Only captures Filterable so Method 202 required to capture condensable fractions.



PM_{2.5} Stack Testing (cont'd)

- Limitations/Challenges of Test Methods
 - Physical constraints of source may not accommodate testing equipment (sample cyclones too large for stack/port)
 - Flue gas upper temperature limitations that may affect sampling equipment by causing sampling equipment threads to fail.
 - Certain test methods cannot be used in stacks with water droplets present (i.e., Can't use Method 201A, CTM-039, and OTM-37) – Left with Method 5 and assuming all PM is PM_{2.5} or request agency approval to use Method 5 with SEM.
 - Sources with low particulate loading may require excessive sample volumes/sampling time to collect adequate sample



Modeling Considerations



From Bad to Worse

- Based on monitor design values for 2020-2022 from Louisiana FRM monitors:
 - Currently have 2.5-4.8 $\mu\text{g}/\text{m}^3$ available under the 12 $\mu\text{g}/\text{m}^3$ NAAQS
 - Drops to 0.5-2.8 $\mu\text{g}/\text{m}^3$ if the NAAQS is reduced to 10 $\mu\text{g}/\text{m}^3$
 - Left with only 0.2-1.8 $\mu\text{g}/\text{m}^3$ if the NAAQS is reduced to 9 $\mu\text{g}/\text{m}^3$
- Lowering the NAAQS will present modeling challenges for most facilities, but particularly those with fugitive sources and/or minimal distances between sources and ambient air.
- Typical facility's modeled impact is in the range of 1-3 $\mu\text{g}/\text{m}^3$



Common Challenges

- Sources located in close proximity to ambient boundary
- Fugitive sources
- Start-up/shutdown for combustion sources
- Horizontal and capped stacks
- Stack heights at or below an adjacent building or structure



Best Case Scenario – Avoid PSD Review

- Project Design – Implement controls or improve process designs wherever possible to minimize $PM_{2.5}$ emissions increases and stay below SER (10 tpy)
 - Pave all roadways and areas with vehicle traffic
 - Water/sweep or apply dust suppressant
 - Store material in silos rather than piles whenever possible
 - Use wind breaks
 - Enclose conveyors or transfer points
 - Install additional or more effective controls
 - Construct sources away from the ambient boundary whenever possible
 - Purchase additional property



Best Case Scenario – Avoid PSD Review

- Also need to consider increases of PM_{2.5} precursors (SO₂ and NO_x)
- Modeling for PM_{2.5} is required if emissions of one or more precursors are above the SER (40 tpy) even if direct PM_{2.5} emissions increase is < SER
- Note, if a state demonstrates that VOC is also a significant contributor to PM_{2.5} concentrations under 40 CFR 51.166(b)(49)(i)(b)(4), it would be required to adopt the 40 tpy SER for VOC as a PM_{2.5} precursor unless it demonstrates that a more stringent SER is more appropriate.



Get Below the Significant Impact Level (SIL)

- Current EPA recommended SIL value is $0.2 \mu\text{g}/\text{m}^3$ for annual $\text{PM}_{2.5}$
- Apply emission reduction and design strategies where possible to keep modeled concentrations resulting from project increases below the $\text{PM}_{2.5}$ SIL
- Don't forget to include secondary emissions!
- If staying below the SIL is not possible, you will need to proceed to the cumulative impact analysis and assess compliance with the NAAQS



Hour of Day Restrictions

- Often see high modeled concentrations during overnight hours due to stable atmospheric conditions
- For specific sources or operations that don't occur 24/7, can exclude these hours in AERMOD
- Will result in corresponding permit conditions restricting hours of operation



EPA Historical Interpretation of Ambient Boundary

- As defined in 40 CFR 50.1(e), ambient air is “that portion of the atmosphere, external to buildings, to which the general public has access.”
- In a 2007 memo, EPA expressed that their longstanding interpretation has been that “exemption from ambient air is available only for the atmosphere over land owned or controlled by the source and to which public access is **precluded** by a **fence or other physical barrier**.”
- The source is required to take the “necessary steps to preclude the general public from accessing the property by relying on some type of **physical barrier** (such as a fence, wall, or a natural obstruction.)”
- EPA clarifies further that “preclude” doesn’t necessarily imply that public access is absolutely impossible, but that the **likelihood of public access is small**.



Revised EPA Ambient Boundary Policy

- In a 2019 memo, EPA issued a revised ambient air policy, consistent with its discretion available under the regulatory definition of ambient air which states that “the atmosphere over land owned or controlled by the stationary source may be excluded from ambient air where the source employs measures, which **may** include physical barriers, that are effective in precluding access to the land by the general public.” [emphasis added]
- EPA explained in the 2007 memo that it uses “controlled” to mean that the owner or operator of the source has the **legal right** to use the land, and that its land-use right includes the “power to control public access” and “the power to exclude the general public.” [emphasis added]



Factors to Consider in Ambient Air Determination

- Per the 2019 memo, for an area to be excluded from ambient air, consideration must be given to whether:
 - General public has access in a legal sense (i.e., whether the owner or controller of the land has the right to preclude the general public's access), and
 - General public has access in a “practical or physical” sense (i.e., whether the general public is physically able to enter).
- The memo clarifies that EPA also recognizes that some persons that have both legal and practical access to a source's property are not necessarily considered members of the general public (e.g., employees, contractors, delivery persons, etc).



Maximize Your Ambient Boundary

- Some ways to preclude access:
 - Fence
 - Wall
 - Presence of natural physical barriers such as water, dense tree lines, swamp
 - Security guards
 - No trespassing signs



New Draft EPA Guidance on Developing Background Concentrations

- Draft Guidance on Developing Background Concentrations for Use in PSD Modeling Demonstrations (EPA-454/P-23-001) released on October 23, 2023
- Section 8.3.3 of Appendix W emphasizes the importance of professional judgment in the identification of nearby and other sources “that are not adequately represented by ambient monitoring data”
- Eliminates reliance on the concept of “significant concentration gradient” because this term has never been comprehensively defined and thus has been difficult to practically implement



New Draft EPA Guidance on Developing Background Concentrations

- Closely evaluate what nearby sources are already captured in the background monitoring data and can potentially be excluded from the regional inventory for cumulative impact analysis
- Reminder, background air quality shouldn't include the ambient impacts of the project source
- EPA is recommending a framework composed of the following steps:
 1. Define scope of cumulative impact analysis for isolated or multi-source areas
 2. Identify relevant and available emissions, air quality and environmental data (e.g., terrain, meteorological data, land use data)
 3. Determine representativeness of ambient monitoring data (start by mapping available monitor data, project source, other sources within 10-20 km of project site, and review in combination with terrain data and wind roses)
 4. Determine nearby sources to be explicitly modeled



New Draft EPA Guidance on Developing Background Concentrations

- Concentration gradients will generally be smaller and more spatially uniform for annual averages compared with short-term averages
- Spatial distribution of annual impacts around a source will often have a single peak downwind of the source based on prevailing wind direction (assuming no complex terrain or other geographic effects)
- Per draft guidance, "Selecting a representative monitor for annual averaging times may be similar to the monitor selection in isolated source situations that reflect the uniform background contributions from other sources outside the modeling domain, with some account for those smaller point and non-point sources within the project area."



Proposed Appendix W Updates

- Proposed rule published in the Federal Register on Monday, October 23, 2023 for revisions to Appendix W
- Comments must be received on or before December 22, 2023
- The public hearing for this action and the Thirteenth Conference on Air Quality Modeling will be held November 14-15, 2023 in RTP.

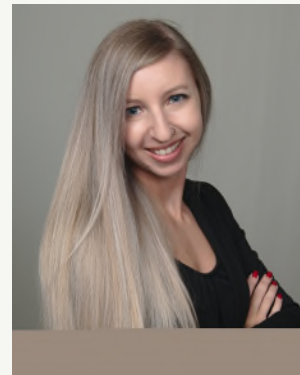


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Do you
have any
questions?