Regulatory Impacts on Particulate Matter Emissions in the U.S. Chemical Industry: Focus on the HON Rule and Louisiana Air Permitting

Executive Summary

The U.S. Environmental Protection Agency (EPA) regulates air pollutants such as particulate matter (PM_{10} and $PM_{2.5}$) through the National Ambient Air Quality Standards (NAAQS) and the Hazardous Organic National Emission Standards for Hazardous Air Pollutants (HON) rule.[1] The HON rule, finalized in 2024, targets reductions in hazardous air pollutants (HAPs) from chemical manufacturing facilities, but compliance may involve control technologies that could inadvertently increase PM emissions.[2] In July 2025, temporary exemptions were granted to select facilities nationwide, including several in Louisiana, delaying potential PM increases while maintaining existing operations.[3] This white paper reviews PM in Louisiana's air permitting context, current compliance in Southwest Louisiana (e.g., Lake Charles area), unintended PM rises from HON controls, and the exemptions' effects. These insights apply broadly to U.S. industrial operations, highlighting opportunities for optimized compliance strategies. ClearPath Environmental Consulting, Inc. offers expert guidance to navigate these regulatory challenges, ensuring efficient and cost-effective solutions for chemical plants and refineries.

Introduction

Particulate matter (PM) pollution, encompassing PM_{10} (particles ≤10 micrometers) and $PM_{2.5}$ (≤2.5 micrometers), is a key focus of air quality regulations due to its impacts on operational efficiency and compliance. Under the Clean Air Act, the EPA sets NAAQS for PM, with the annual $PM_{2.5}$ standard revised to 9 $\mu g/m^3$ in 2024. The chemical industry faces specific requirements under the HON rule for synthetic organic chemical manufacturing, which can introduce trade-offs in emission controls.[1] Recent exemptions provide short-term flexibility, allowing facilities to assess alternatives without immediate upgrades.[3] This paper examines these dynamics nationally, with emphasis on Louisiana's industrial sector, to support informed decision-making for chemical plants and refineries.

$PM_{2.5}$ and PM_{10} in Louisiana Air Permitting Context

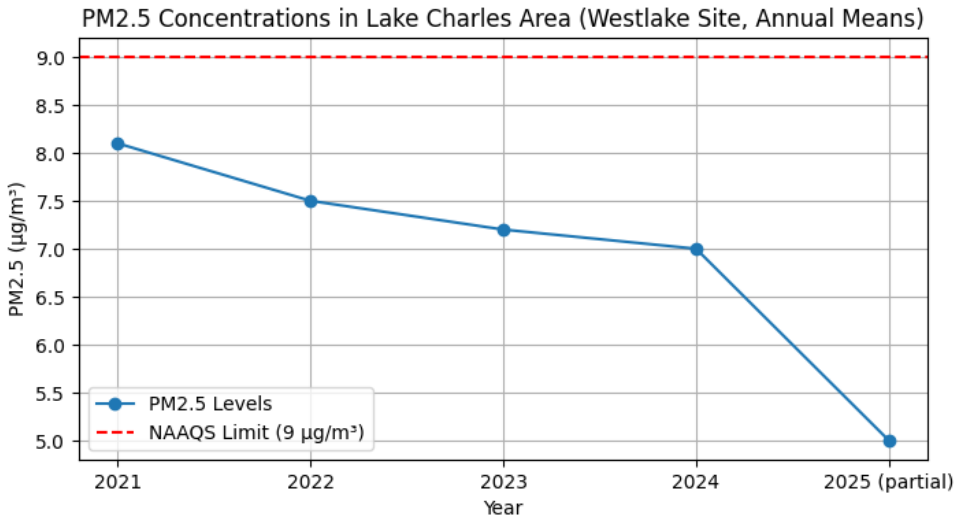
Louisiana's air permitting process, managed by the Louisiana Department of Environmental Quality (LDEQ) under the Clean Air Act, requires facilities to identify and control PM_{10} and $PM_{2.5}$ emissions from combustion sources (e.g., boilers) and material handling activities (e.g., storage piles). Applications must detail emission rates, utilizing EPA's AP-42 factors or dispersion modeling (e.g., AERMOD) to confirm NAAQS

compliance. If exceedances are projected, additional controls like baghouses or scrubbers may be required.[5] LDEQ's guidelines emphasize thorough source inventories and visible emissions standards, aligning with federal requirements.[6]

This framework is consistent across the U.S., but Louisiana's robust industrial base necessitates precise permitting to maintain operational continuity. The revised $PM_{2.5}$ NAAQS prompts updated modeling, with EPA designations expected by December 2025 using 2021-2023 data.[7] Facilities nationwide can benefit from proactive assessments to integrate these changes seamlessly.

Current Compliance in Southwest Louisiana (Lake Charles Area)

The Lake Charles area in Southwest Louisiana, a hub for chemical and refining operations, is designated as attainment for PM_{10} and $PM_{2.5}$ NAAQS as of August 2025.[8] The 3-year design value for 2021-2023 is 7.6 $\mu g/m^3$, with recent monitoring data from the Westlake site indicating $PM_{2.5}$ concentrations around 5 $\mu g/m^3$ in 2025, and Air Quality Index values in the "Good" category (21).[9] *(Note: Continuous $PM_{2.5}$ readings are not NAAQS comparable as they have not been quality reviewed or validated.)*

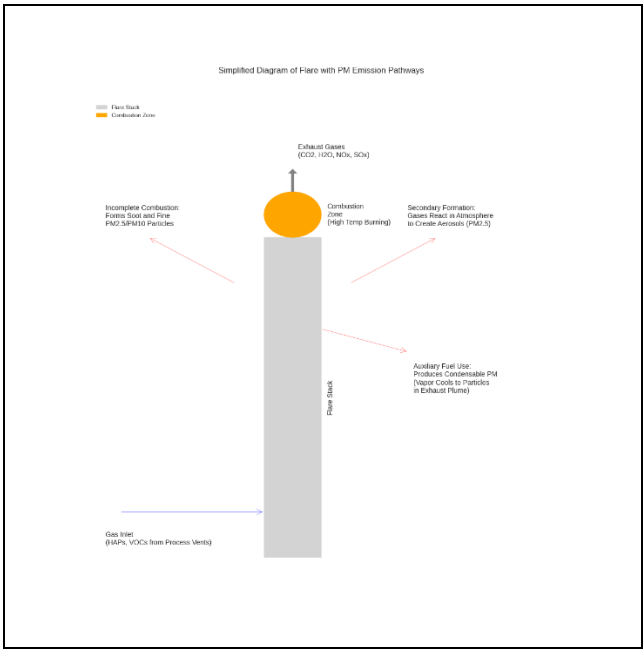


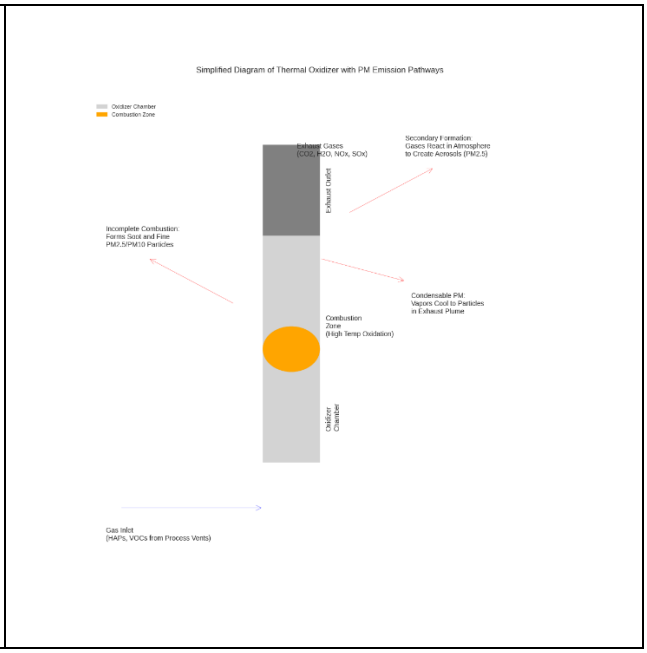
Similar attainment status is observed in other U.S. industrial regions, supporting stable operations.[8] Forecasts suggest continued compliance in Southwest Louisiana, though facilities should monitor for variables like seasonal events.[10] Ongoing EPA reconsiderations of the $PM_{2.5}$ standard may provide additional flexibility.[4]

Potential Unintended Increases in PM_{10} and $PM_{2.5}$ from HON Rule Compliance Controls

To meet HON requirements for HAPs like ethylene oxide and chloroprene, facilities may employ combustion controls such as flares and thermal oxidizers. These can result in secondary PM emissions from combustion byproducts and fuel use, with EPA estimates indicating an increase of approximately 17.4 tons/year nationwide. Factors include incomplete combustion and secondary aerosol formation, with emission rates around 7.6 lb/MMscf for oxidizers.[2]

Applicable to about 218 facilities under the HON rule across the U.S., these effects underscore the need for balanced control strategies.[11] In Louisiana, permit modeling can help mitigate increases through supplemental technologies like filters.[5] Alternatives such as adsorbers may reduce PM risks while achieving compliance.[1]





How Exemptions from the HON Rule May Delay PM Increases

Temporary exemptions granted in July 2025 to 25 facilities nationwide, including 12 in Louisiana (e.g., Sasol Lake Charles, Citgo Lake Charles), provide a two-year deferral of HON upgrades.[3, 12] This delays implementation of controls, postponing associated PM increases while allowing time for alternative evaluations.[1] In Southwest Louisiana, this supports uninterrupted operations under prior standards.[12]

Aspect	Pre-Exemption Standards (Original HON)	New HON Requirements (2024)	Exemption Impact (2025)
Flare Efficiency	Basic destruction efficiency (98%)	Enhanced monitoring and 99% efficiency; no visible emissions	Delayed by 2 years; maintain original
Fenceline Monitoring	None required	Continuous HAP monitoring at facility boundaries	Delayed; no immediate installation
Process Vent Controls	Standard limits for HAPs	Stricter routing to controls (e.g., thermal oxidizers)	Postponed upgrades; continue baseline
Compliance Timeline	Ongoing	Immediate for new/modified sources	2-year waiver for selected facilities

Nationally, the exemptions for approximately 100 facilities could defer up to 17 tons/year of PM emissions, aligning with EPA's ongoing rule reviews.[2, 3]

Conclusion

Navigating PM emissions under the HON rule and NAAQS requires strategic planning to minimize trade-offs and ensure compliance. In Louisiana and beyond, exemptions offer valuable time for facilities to optimize approaches. ClearPath Environmental Consulting, Inc. specializes in air permitting, emissions modeling, and control technology assessments tailored to chemical plants and refineries. Contact us to discuss how we can support your operations with customized consulting services.

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