Jessica Spiegel

Please find, attached the WSPA comment letter on the rulemaking for Chapters 173-476 & 173-400 WAC.

Please let me know if you have any questions or would like to discuss further.

Thank you,

Jessica

WSPA
Jessica Spiegel
Vice President, Northwest Region

November 17, 2026

Sent via email to: linda.kildahl@ecy.wa.gov

Linda Kildahl
Rulemaking Lead
Washington State Department of Ecology
Air Quality Program
P.O. Box 47696
Olympia, WA 98504-7696

Re: WSPA Comments on Rulemaking (WSR-25-23-111) – Amendments to Chapter 173-400 and 173-476 WAC – Air Quality Standards and Impact Levels

Dear Ms. Kildahl:

The Western States Petroleum Association (WSPA) appreciates the opportunity to provide the Washington State Department of Ecology (Ecology) with our comments on the agency's proposed rulemaking, amending Chapter 173-400 and Chapter 173-476 of the Washington Administrative Code (WAC), Air Quality Standards and Impact Levels. Ecology proposed amendments to Chapter 173-476 WAC to align with the National Ambient Air Quality Standards (NAAQS) under 40 CFR Part 50 for $PM_{2.5}$ and SO_2, and amendments to Chapter 173-400 WAC to align with updated EPA recommended values. WSPA provided comments during the informal public comment periods. Based on the proposal issued September 24, 2026, we identified additional comments that we believe are important for Ecology to consider in this phase.

WSPA is a non-profit trade association that represents companies that safely explore for, produce, refine, transport and market petroleum, petroleum products, natural gas, and other energy supplies in California, Washington, Oregon, Nevada, and Arizona.

We support Ecology's objective of maintaining alignment with federal Clean Air Act requirements. The comments below are offered to help ensure the rule remains consistent, workable, and effective.

Alignment with Federal Standards
Ecology proposed to update Washington's ambient air quality standards to reflect recent EPA changes, including the $PM_{2.5}$ annual standard of 9 µg/m³. WSPA understands the goal of maintaining consistency with federal standards. However, EPA has already signaled that federal standards may be revisited in response to evolving policy priorities. If the federal standard were to revert to 12 µg/m³, Washington would retain a more stringent state-only standard, contrary to the stated goal of alignment.

This potential outcome would result in regulatory inconsistency, implementation complexity, and a potential competitive disadvantage for Washington facilities relative to other states.

We had recommended the following considerations to support long-term alignment, and Ecology indicated that neither of the following will be implemented. However, we believe that alignment is critical to avoiding confusion and preventing a competitive disadvantage for Washington facilities, particularly with respect to $PM_{2.5}$. Therefore, WSPA urges Ecology to reconsider one or both of

these recommendations to maintain long-term consistency with federal standards.

- Including provisions that automatically track federal NAAQS updates, or
- Establishing a mechanism to promptly revisit state standards in the event of federal changes.

In addition, we identified a difference between the proposed language for the SO_2 standard and the NAAQS related to averaging periods: The proposed rule specifies calendar year while the NAAQS specifies the average over three years. The federal language is copied below for refence:

> *The annual secondary standard is met when the 3-year average of the annual SO_2 concentration is less than or equal to 10 ppb, as determined in accordance with appendix T of this part.*[1]

This difference appears to be an unintentional carryover from the existing rule. The rule language be updated to reflect the averaging period consistent with the federal NAAQS.

Chapter 173-476 WAC – Ambient Air Quality Standards
Ecology proposed the more stringent $PM_{2.5}$ standard of 9 µg/m^3. However, we urge Ecology to reconsider. A more stringent $PM_{2.5}$ standard will result in narrow compliance margins in areas where ambient levels are influenced by regional and background sources, such as wildfire smoke, wood combustion, and commercial cooking. In these settings, small increases from individual projects can appear significant, even when those projects are not meaningful contributors to overall air quality conditions.

Chapter 173-400 WAC – "Cause or Contribute" Thresholds (SILs)
Ecology proposed the more stringent $PM_{2.5}$ significant impact level (SIL) / "cause or contribute" threshold value. However, we urge Ecology to reconsider. The proposed updates to SILs warrant careful consideration given their central role in the permitting process. SILs are intended to function as screening tools to identify projects with negligible impacts. If thresholds are set too low, however, they can trigger detailed modeling requirements for projects that have minimal real-world impact.

There is a concern that the proposed thresholds may capture relatively small projects, resulting in increased reliance on cumulative modeling without a corresponding environmental benefit. This effect is magnified when combined with a more stringent $PM_{2.5}$ standard.

In a cumulative modeling context, even a small increase that slightly exceeds a low screening threshold may be difficult to reconcile with the ambient standard in areas where background concentrations are already elevated due to regional sources. In such cases, modeling outcomes may be driven primarily by background conditions rather than the project itself, making it challenging to demonstrate compliance even for minor emission increases.

Taken together, these factors could complicate permitting for routine projects. Maintaining SILs at levels that preserve their intended role as effective screening tools is therefore important to ensuring a workable and appropriately focused permitting program.

Revised SIL Applicability Language
Ecology made changes to the language related to "cause or contribute" between the first and

[1] 40 CFR 50.21(b)
https://www.ecfr.gov/current/title-40/part-50/section-50.21#p-50.21(b)

second draft and made further updates in the proposed rule. We appreciate Ecology's updates to indicate that a modeled result exactly equal to the SIL can also be considered not to "cause or contribute" to a violation of the air quality standard and to provide additional clarification that exceeding the SIL does not indicate the project causes or contributes to a violation if there is no predicted exceedance the standard itself.

Cumulative Impact Analysis

In addition to the threshold levels themselves, other proposed revisions remain in place related to the applicability language governing "cause or contribute" determinations and remain problematic. The proposed rule still states that a permitting authority may require a cumulative impact analysis even when modeled concentrations are below the SIL values if there is information suggesting that impacts, when combined with nearby sources or background concentrations, could contribute to a violation. This language gives vague and overly broad discretion to the permitting authority and risks undermining the intended role of SILs as a clear and predictable screening tool. Ecology communicated that they believed the latter half of the sentence would limit a permitting authority's ability to request a cumulative analysis in questionable situation. However, we still believe it is important to add some bounds to this authority.

As WSPA noted in its comments on Ecology's overburdened communities rulemaking[2], source-apportionment analysis provides a scientific basis for evaluating relative contributions to ambient pollution and focusing regulatory requirements on sources that meaningfully affect air quality, rather than simply those that are easier to regulate. By allowing cumulative modeling to be required even when a project screens below established thresholds, the provision introduces additional uncertainty into the permitting process and makes it more difficult for applicants to determine compliance obligations in advance.

As written, this approach could make SIL thresholds effectively non-determinative, resulting in case-by-case decisions that are less transparent and more difficult to implement consistently across jurisdictions. This uncertainty may place Washington facilities at a competitive disadvantage by reducing applicants' ability to make informed project investment and development decisions. This situation is particularly concerning when combined with low SIL values and a more stringent ambient standard, which together may already increase the number of projects subject to detailed review.

WSPA reiterates that Ecology should clarify and appropriately narrow this provision so that SILs retain their intended function as a reliable screening mechanism. If discretion to require additional review for cases below or equal to the SIL is included in future rule revisions, it should be only in clearly defined and limited circumstances.

[2] *Comments on Preliminary Draft Rule Language – WAC 173-448, Air Quality in Overburdened Communities* (Feb. 14, 2026), Appendix A, *Washington OBC PSAT Analysis* (Feb. 13, 2026), prepared by Alpine Geophysics, LLC.

Conclusion

On behalf of WSPA and its member companies, I would like to express our thanks for considering our public input on this rulemaking. If you have any questions regarding our comments, please do not hesitate to contact me directly at (360) 918-2178 or via email at jspiegel@wspa.org.

Sincerely,

Jessica Spiegel
Vice President, Northwest Region
WSPA

Commented [GF1]: Can you make this more of a narrative vs bullets.

WSPA
Jessica Spiegel
Vice President, Northwest Region

February 14, 2026

Sent via email to: anthony.bruma@ecy.wa.gov

Anthony Bruma
Rulemaking Lead
Washington State Department of Ecology
Air Quality Program
P.O. Box 47696
Olympia, WA 98504-7696

Re: Comments on Preliminary Draft Rule Language - WAC 173-448 – Air Quality in Overburdened Communities

Dear Mr. Bruma:

The Western States Petroleum Association (WSPA) appreciates the opportunity to provide the Washington State Department of Ecology (Ecology) with comments on the agency's preliminary draft rule language in Chapter 173-448 WAC, "Air Quality in Overburdened Communities." WSPA is a non-profit trade association that represents companies that safely explore for, produce, refine, transport and market petroleum, petroleum products, natural gas and other energy supplies in California, Washington, Oregon, Nevada, and Arizona.

WSPA supports efforts to improve air quality in overburdened communities. However, the draft regulation is not well designed to achieve that objective. WSPA members have two major areas of concern.

First, the rulemaking focuses exclusively on regulatory controls and compliance orders for permitted and registered stationary sources, regardless of whether those sources meaningfully contribute to the air quality concerns in those areas. This exclusive focus is contrary to the statute and will not result in measurable air quality improvements in the identified overburdened communities.

Second, the area being defined as a "neighboring community" is so expansive that it encompasses distant geographic areas, airsheds, and population centers that are not comparable to the overburdened community. This is inconsistent with the legislature's intent.

Focus on Identification and Reduction of Greatest Contributors

WSPA recommend that the rule be reconfigured to follow the process outlined in RCW 70A.65.020. After identifying overburdened communities, the statute directs Ecology to establish air quality targets, identify the stationary and mobile sources that are the greatest contributors to the air quality concerns in these communities, and then adopt emission control strategies or other methods to improve air quality. The proposed regulations skip the critical step of determining what sources are the primary causes of the area quality problems. Instead, the rule focuses exclusively on permitted and registered sources, despite existing data showing that they are not the primary contributors to the air quality concerns.

Well before the step of issuing compliance orders, the law expects Ecology to set (by rule per RCW 70A.15.3000(2(a)(and (3)) area specific ambient air quality standards or emission standards or limitations as the basis for establishing the emission reductions to be required by the various

sources. The draft language omits steps to set emission standards or limits and makes no connection between standards/limits and required emission reduction plans.

This refocus will require Ecology to evaluate what regulatory and non-regulatory programs can be implemented to reduce emissions from the greatest contributors. We understand that the effort to develop and implement programs for reductions of criteria pollutants from non-regulated sources (wood stoves, open burning, agricultural tilling, etc.) can be challenging, but these types of programs have been developed and successfully implemented in Washington in the past (e.g., to address the Tacoma non-attainment area for $PM_{2.5}$).

The 2023 Ecology report characterizing the first 16 overburdened communities (OBC) identified $PM_{2.5}$ as the primary criteria pollutant of concern for nearly all areas.[1] Ecology determined that the primary sources of this $PM_{2.5}$ were wildfires, wood stoves, various forms of open burning, and mobile sources. Ozone is listed as a pollutant of concern for only one overburdened community (Tri-cities to Wallula), and Ecology determined that "NOx and VOCs come from many sources, but cars and trucks are the largest contributors." Permitted and registered sources are not identified as significant or predominant sources for any of the 16 overburdened communities.[2] As such, reducing emissions from these sources as currently planned in this draft rule will not address the greatest contributors of air pollution.

If kept in its current form, the rule needs several improvements to achieve meaningful reductions and effective implementation:

1. The law requires proportionate reductions based on a permitted source's contribution to air quality in the OBC compared to both other permitted sources and to all other sources of criteria pollutants in the OBC.[3] This proportionate requirement is not evaluated in Ecology's 2023 report, not addressed in Ecology's other reports, nor is it reflected in the draft rule language. To adhere to the statute, the rule requires Ecology to evaluate proportionality in each community and to outline the methods for this evaluation.

   As described in the previous section, permitted/registered sources have not been identified as contributing sources in the overburdened communities, so it is fundamentally unreasonable and unproductive to focus the rule on reducing emissions at these sources. The rule should not prescribe emissions reductions of high priority emitters. Reductions should be established on a case-by-case basis based on that source's proportional contribution to air quality concentrations in the overburdened community.

2. The rule language should include a requirement that Ecology review all sources of emissions when determining what sources are the "Greatest Contributors" in each overburdened community. Next, this "greatest contributors" list should be used as the basis for identifying whether a given stationary source is a "High Priority Significant Emitter." If the evaluation for a

[1] "Cumulative criteria air pollution" is listed for Northeast Puyallup identifies, while PM2.5 specifically is listed for all other OBC's list. No other specific criteria pollutants are listed other than ozone, which is listed only for Tri-Cities to Wallula. https://apps.ecology.wa.gov/publications/UIPages/documents/2302115.pdf

[2] While many OBC descriptions include a statement such as "particulate matter comes predominantly from woodburning related to home heating in the wintertime," "industrial sources" or any other descriptor that could describe a permitted/registered source is listed only once, as the last among eight possible sources of particulate matter in the Tri-cities to Wallula area.

[3] Actions imposed under this section may not impose requirements on a permitted stationary source that are disproportionate to the permitted stationary source's contribution to air pollution compared to other permitted stationary sources and other sources of criteria pollutants in the overburdened community. [**RCW 70A.65.020**(2)(c).

community does not identify permitted/registered sources as greatest contributors, Ecology should make a determination that no emissions reductions are required from permitted/registered sources in that community, and they should not be listed as "High Priority Significant Emitters."

The current language uses major modification emission thresholds established for Prevention of Significant Deterioration (PSD) permitting applicability as an initial basis for identifying "High Priority Significant Emitters.". We disagree with this methodology because there is not a direct connection between emissions from a stationary source and the air quality impact in the affected community by that source. As proposed, a source could be designated high priority even if it does not cause or contribute to criteria air pollutant concentrations within the overburdened community. Ecology should evaluate both emissions and air quality modeling data in order to determine which sources should be designated High Priority Significant Emitters."

3. WSPA recommends that this rulemaking include programs within the rule to address non-permitted/registered sources. Without these programs, the rule would leave some 96% of emissions in the state unaddressed.[4]

    a. The draft rule explicitly covers only stationary sources subject to permitting or registration requirements under the State Clean Air Act., This limitation excludes wood-burning stoves and any of the various forms of open burning covered by other programs in the state Clean Air Act, or mobile sources, highlighting a clear mismatch between what is being regulated and what is causing elevated pollution.

4. Provide a method for how to demonstrate a source does not "cause or contribute to criteria air pollution in the identified community." If the ambient air quality impact of a given source are de minimis, a straightforward method to demonstrate this status is needed.

5. Provide a clear path for a source to reduce emissions and not be subject to this rule's requirements. As a result of the current language, a point source may remain designated even if its emissions are reduced or eliminated, until the entire community's air quality is improved. A determination should be based on a facility's contribution, rather than community-level pollution data.

6. Address economic hardship issues resulting from imposing costly emission reduction requirements on permitted/registered sources, more likely the case for small businesses and sole proprietorships. This economic hardship is of particular concern when the reductions being required are not expected to achieve an improvement in ambient air quality levels, such as in the Yakima Valley.

Neighboring Community Boundaries

Neighboring Community Boundaries
In addition, the statute states that air quality in an overburdened community should be as good as in a neighboring community, as it relates to National Ambient Air Quality Standards. A reasonable interpretation would be comparison at a maximum within the same airshed, city or even

[4] The industrial/commercial stationary categories account for only 4% of state-wide criteria pollutant emissions from Ecology's most recent emission inventory report (2020 Washington Comprehensive Emissions Inventory, apps.ecology.wa.gov/publications/documents/2002012.pdf), 7% if "Industrial, commercial, and consumer solvent use" is conservatively included. Categories included in these totals are "Large point sources," "Industrial/Commercial/Institutional fuel use," and "Gasoline storage and transport."

neighborhoods. Ecology instead defined "neighboring community" as any location within the broader Ecology Regional Office boundaries, which spans large and diverse geographic areas, airsheds, and population sizes.

During the Dec. 10, 2025 public meeting on the draft rule, Ecology expressed its vision of using the Regional Office boundaries to denote the "neighboring community". The approach discussed instead would be a process of producing design value/air quality target concentration based on an average or other statistical measure of all monitors in the region and outside of an OBC. If this approach is what Ecology intends to implement, the rule text will need significant revision to make that approach clear and it could still be problematic. This approach still poses the same issue of including monitors in locations that are not neighboring communities and not comparable to the OBC. In addition, the approach does not address the situation where the boundary of an OBC encompasses two regional office boundaries and does not resemble a reasonable interpretation of what a 'nearby community" would be.

Definition of Contributing Sources and High Priority Significant Emitters

The overburdened community boundary should be maintained for inclusion of contributing sources and "High Priority Significant Emitters**."** The draft rule uses the overburdened community boundary to determine whether sources can be included as contributing sources needing criteria pollutant reduction. This approach aligns with the statute in WAC 70A.65,(1)(c)(i) and should be maintained. In addition, any other approach would lead to high uncertainty. Ecology has limited options for determining a scientifically sound alternative boundary or other approach for inclusion of sources other than completing a detailed analysis similar to a non-attainment area analysis.

Volatile Organic Compounds (VOC) as a Precursor to PM2.5

During the December 10, 2025 public meeting, Ecology invited comments on whether VOC should be treated as a precursor to $PM_{2.5}$. EPA's permitting regulations and guidance for ozone and fine particulate permit modeling do not treat VOC as a $PM_{2.5}$ precursor because VOC is often not a significant contributor to $PM_{2.5}$ in the specific area.[5] Under the regulations, a state may include VOC as a precursor if they choose to demonstrate that VOC emissions in a specific area are a significant contributor. Therefore, if Ecology is considering including VOC as a $PM_{2.5}$ precursor, a demonstration should be conducted for each specific overburdened community airshed where VOC may be considered. Based on Ecology's source apportionment work using their chemical speciation network monitoring data, $PM_{2.5}$ from VOC (known as secondary organic aerosol) is not identified as a contributor to $PM_{2.5}$. In the Tacoma area, the top contributor is wood smoke (53%). In addition, biogenic VOC far outweighs anthropogenic VOC in Washington – VOC emissions from soil, vegetation and wildfires made up 65% of VOC from the state in the most recent inventory, compared to only 1.7% from the "large point sources" category.[6]

[5] See 73 FR at 28333. The EPA's PSD and nonattainment program regulations do not presumptively require VOC to be treated as precursors to PM2.5. However, a state or the EPA may demonstrate that VOC emissions in a specific area are a significant contributor to that area's ambient PM2.5 concentrations and, thus, should be treated as a regulated NSR pollutant subject to the PSD and NNSR permitting requirements. 40 CFR 50.165(a)(1)(xxxvii)(4) and 40 CFR 52.21(b)(50)(i)(b)(4). https://www.epa.gov/sites/default/files/2020-09/documents/draft_guidance_for_o3_pm25_permit_modeling.pdf

[6] apps.ecology.wa.gov/publications/documents/2002012.pdf

Conclusion

As noted previously, WSPA supports policy makers and Ecology's efforts to improve air quality in overburdened communities. However, the agency should adopt a rule that focuses on highest contributors of criteria air pollution as required by the CCA to achieve meaningful reductions.

Thank you for considering our comments. We look forward to continued engagement in this important rulemaking process. If you have any questions regarding our comments, please do not hesitate to contact me directly at (360) 918-2178 or via email at jspiegel@wspa.org.

Sincerely,



Jessica Spiegel
Vice President, Northwest Region
WSPA

Attachments:
Appendix A: Washington OBC PSAT Analysis 02-13-26

Appendix A. Washington OBC PSAT Analysis 02-13-26

The memo below was prepared by Alpine Geophysics, LLC (Alpine) and is based on modeling and materials created in 2024.

I.) Introduction

In November 2025, the Washington Department of Ecology released a proposed regulation—WAC 173-448, *Air Quality in Overburdened Communities*—designed to reduce unequal air pollution impacts in communities experiencing elevated environmental burdens. The proposal establishes an approach for improving air quality in overburdened communities (OBCs) by developing localized air-quality benchmarks using a combination of regulatory monitoring stations and sensor networks. Air-quality goals would be set based on either conditions in nearby communities or the National Ambient Air Quality Standards, depending on which standard offers greater protection. Under the proposal, Ecology would identify major pollution sources and priority emitters through emission inventories, air-quality modeling, monitoring results, and community feedback, and could require these entities to adopt monitoring plans, submit additional reporting, or implement pollution-control measures.

Utilizing previously prepared CAMx photochemical grid modeling, Western States Petroleum Association and its members analyzed the data at the monitors closest to the four refineries in northwest Washington. Based on this analysis, the contributions to $PM_{2.5}$ in all communities, including overburdened, is insignificant and any further source controls on this industry will have little to no measurable difference on monitored concentrations.

II.) Modeling Methodology

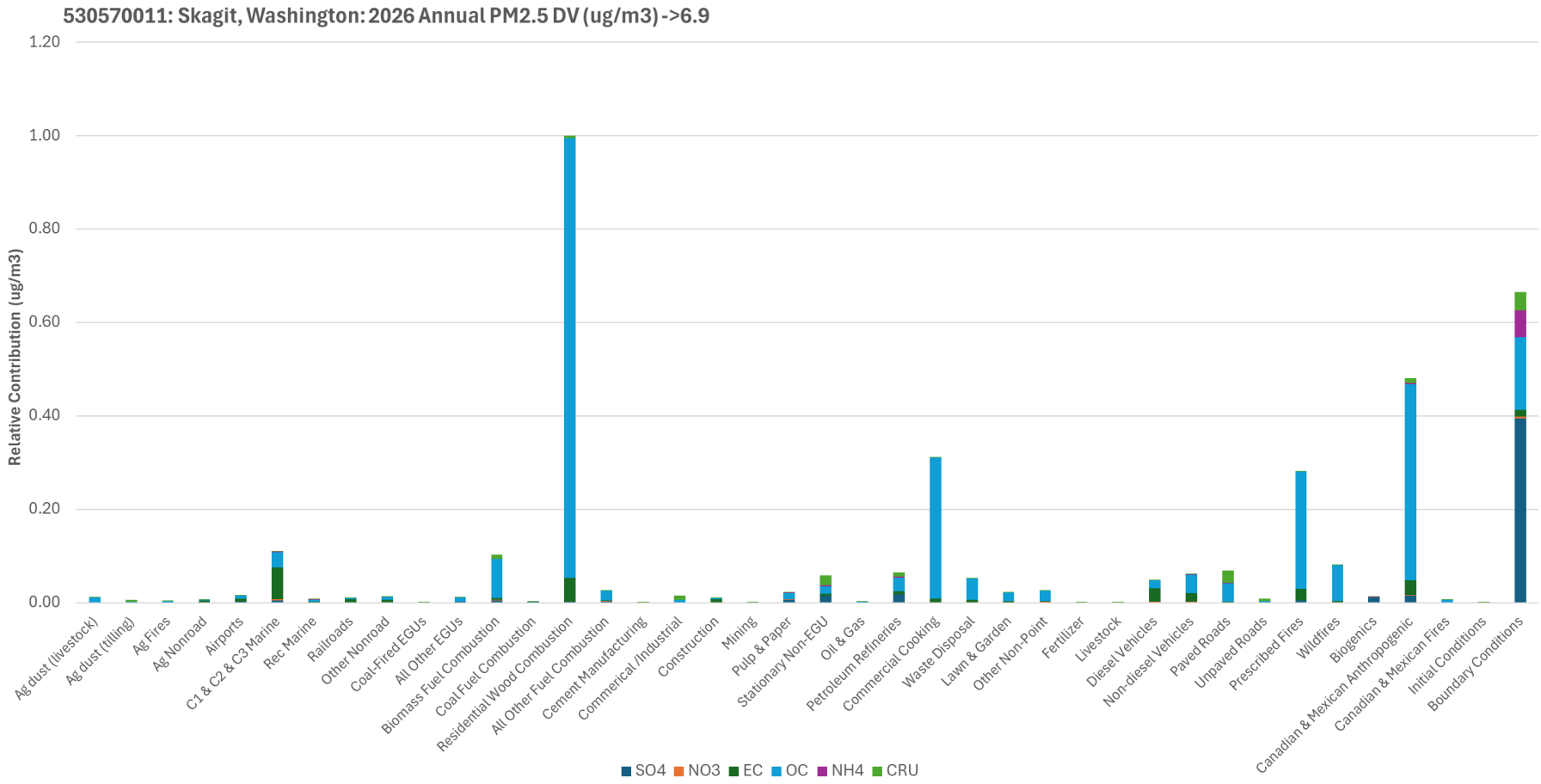
In early 2024, Alpine Geophysics, LLC (Alpine) ran a particulate matter source apportionment run[1] with thirty-nine (39) tagged emission categories using EPA's 2016v3 modeling platform projections to 2026. This simulation allowed for the calculation of relative contribution of specific $PM_{2.5}$ species from each of the tagged categories to the modeled $PM_{2.5}$ concentrations at downwind receptors. Below we present a summary of this modeling for monitor 530570011 in Skagit County, Washington with overall and top ten category contribution tables and figures. We also summarize EPA's and Alpine's findings that in most regions in the United States, proximal emissions dominate the modeled $PM_{2.5}$ concentration found at $PM_{2.5}$ monitors which is consistent with National Ambient Air Quality Standard (NAAQS)[2] exceedances being driven by the urban $PM_{2.5}$ increment as documented in EPA's RIA. We also note the low responsiveness of $PM_{2.5}$ concentrations to primary $PM_{2.5}$ emission reductions the farther the source of emissions to the monitor as documented by EPA in its assessment that adjacent county control of primary $PM_{2.5}$ emissions is four times less responsive than the value used when applying in-county emissions reductions.

[1] https://www.midwestozonegroup.com/_files/ugd/7ec07f_744eb1e14e444b2b93dff141fadee7b8.pdf

[2] Primary NAAQS standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly with an adequate margin for safety.

III.) Monitor 530570011 – Skagit County, WA (Near HF Sinclair and Marathon Petroleum Anacortes)

Skagit County has one monitor that is currently attaining (5.1 µg/m^3; 2022-2024 annual $PM_{2.5}$ design value) and is projected in the 2026 base case to be in attainment of the 9.0 µg/m^3 primary health-based NAAQS. Monitor 530570011 has a modeled 2026 base case annual $PM_{2.5}$ design value of 6.9 µg/m^3. The relative contribution of tagged $PM_{2.5}$ species from each of the categories to this monitor is presented below. The relative height of each bar represents the relative contribution of that category to the overall modeled $PM_{2.5}$ concentration.

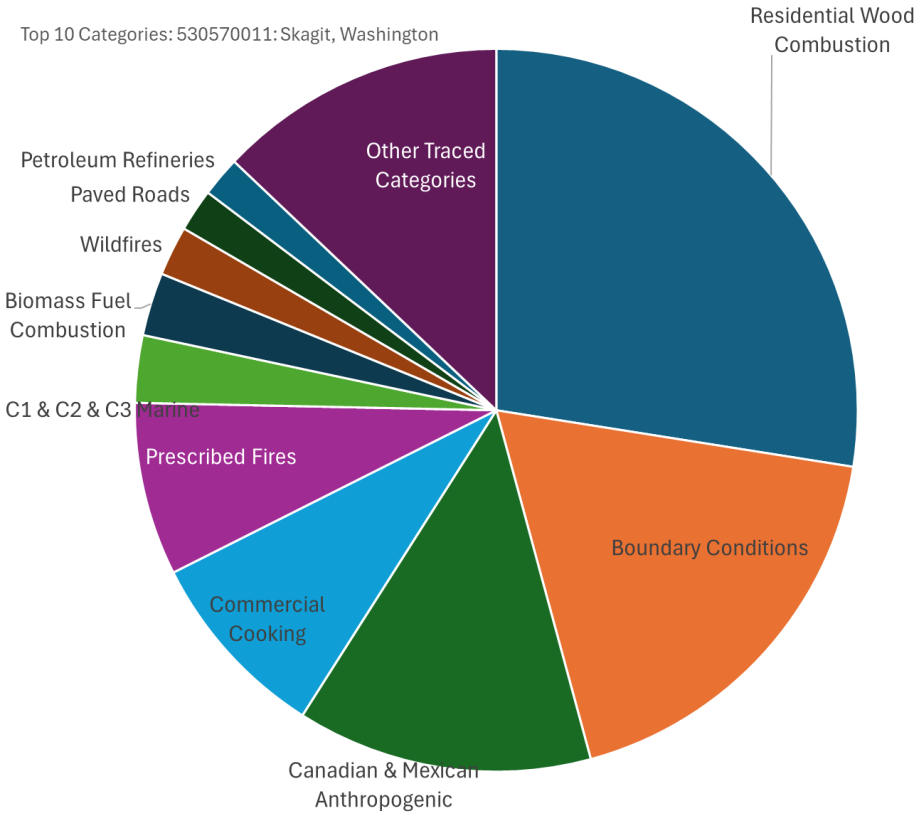


Top Ten Categories

From the thirty-nine categories tagged in the simulation, the top ten categories contributing to this monitor are listed by category and tagged species in the table and pie chart below. These figures and tables may provide information valuable in determining upwind source categories that would have greatest potential for incremental control in helping to maintain attainment with the NAAQS at this location.

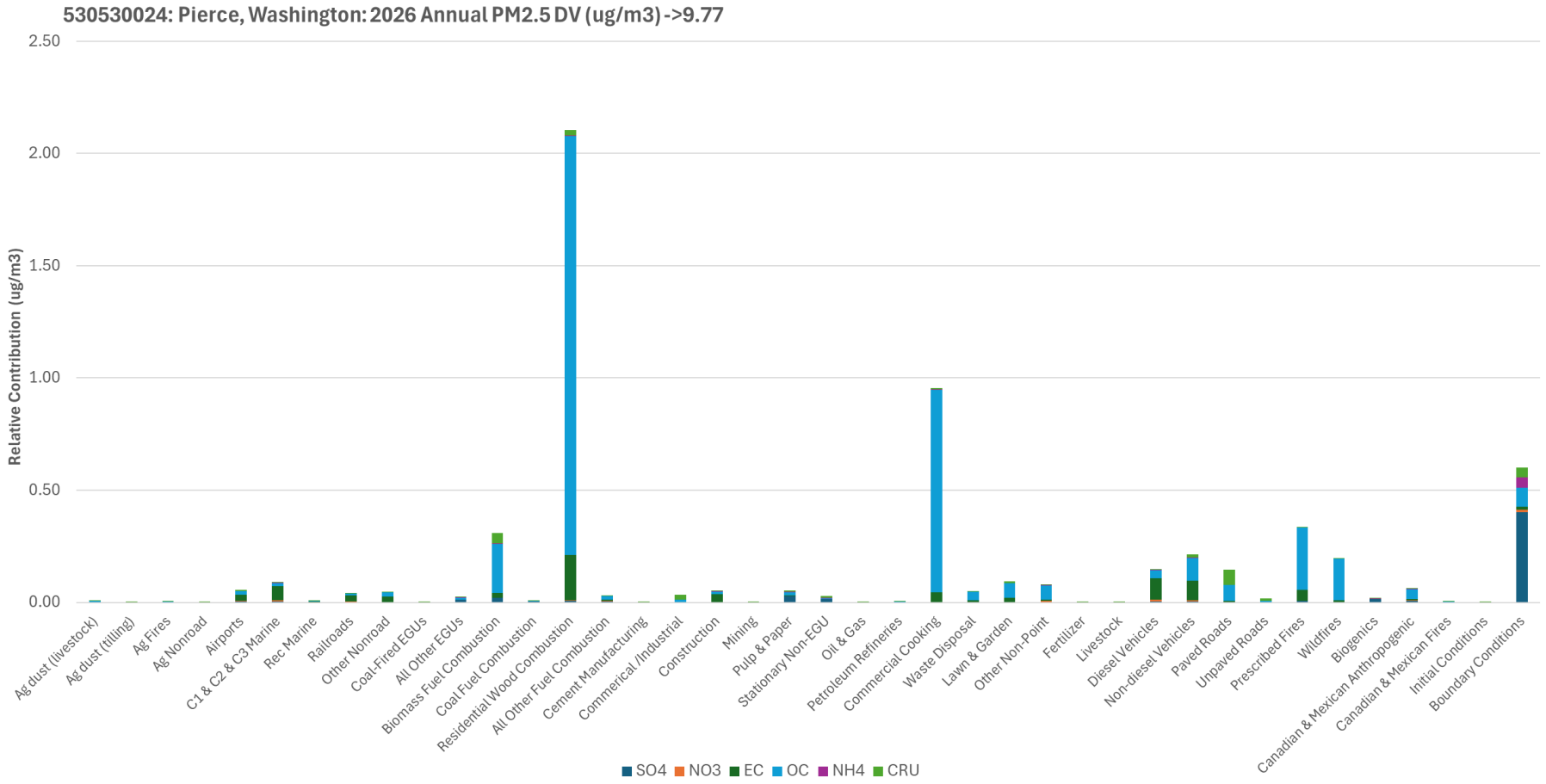
530570011: Skagit, Washington				2026 Annual PM2.5 DV (ug/m3) ->			**6.90**
	Relative Traced Species Contribution (ug/m3)						
Top 10 Categories	**Species Total**	**SO4**	**NO3**	**EC**	**OC**	**NH4**	**CRU**
Residential Wood Combustion	1.000	0.002	0.000	0.051	0.941	0.000	0.005
Boundary Conditions	0.665	0.395	0.003	0.015	0.154	0.058	0.039
Canadian & Mexican Anthropogenic	0.481	0.015	0.002	0.031	0.420	0.003	0.010
Commercial Cooking	0.312	0.000	0.000	0.008	0.302	0.000	0.001
Prescribed Fires	0.282	0.005	0.000	0.025	0.251	0.001	0.001
C1 & C2 & C3 Marine	0.109	0.005	0.002	0.068	0.033	0.001	0.000
Biomass Fuel Combustion	0.103	0.005	0.000	0.005	0.083	0.001	0.009
Wildfires	0.081	0.001	0.000	0.003	0.077	0.000	0.000
Paved Roads	0.069	0.001	0.000	0.002	0.039	0.000	0.027
Petroleum Refineries	0.065	0.018	0.001	0.006	0.029	0.003	0.009

SO4 = Particulate Sulfate
NO3 = Particulate Nitrate
EC = Elemental Carbon
OC= Organic Carbon
NH4 = Ammonium
CRU = Crustal Material



IV.) Monitor 530530024 – Pierce County, WA (Tacoma 36th Street Monitor) near U.S. Oil

Pierce County has three monitors that are currently attaining (6.5 µg/m^3, 7.0 µg/m^3, and 7.7 µg/m^3; 2022-2024 annual $PM_{2.5}$ design value) the 9.0 µg/m3 primary health-based NAAQS. Monitor 530530024 has a modeled 2026 base case annual $PM_{2.5}$ design value of 9.77 µg/m^3. The relative contribution of tagged $PM_{2.5}$ species from each of the categories to this monitor is presented below. The relative height of each bar represents the relative contribution of that category to the overall modeled $PM_{2.5}$ concentration.

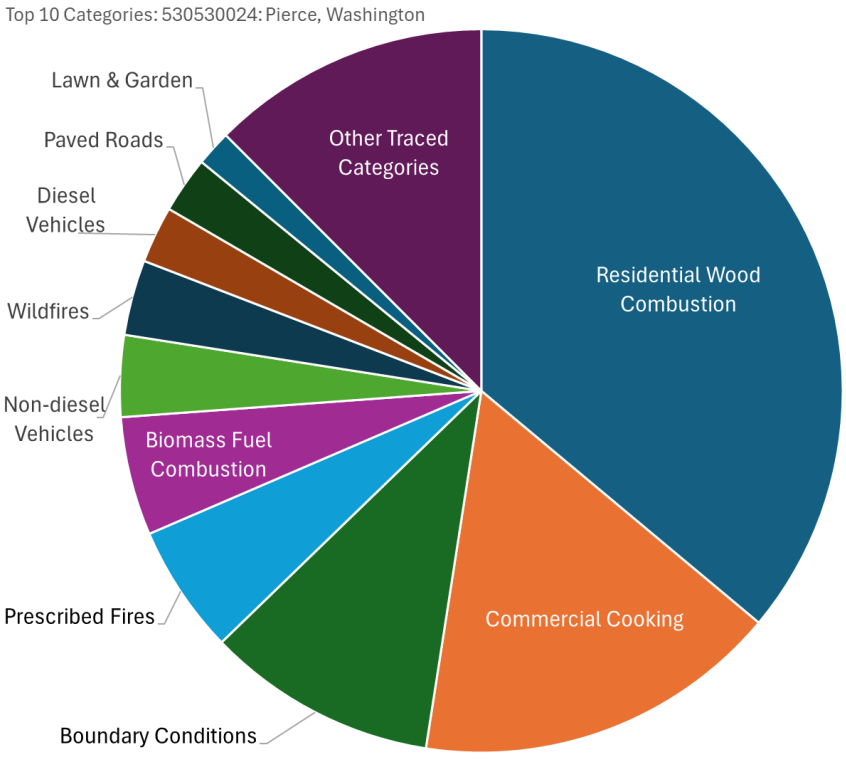


Top Ten Categories

From the thirty-nine categories tagged in the simulation, the top ten categories contributing to this monitor are listed by category and tagged species in the table and pie chart below. These figures and tables may provide information valuable in determining upwind source categories that would have greatest potential for incremental control in helping to maintain attainment with the NAAQS at this location.

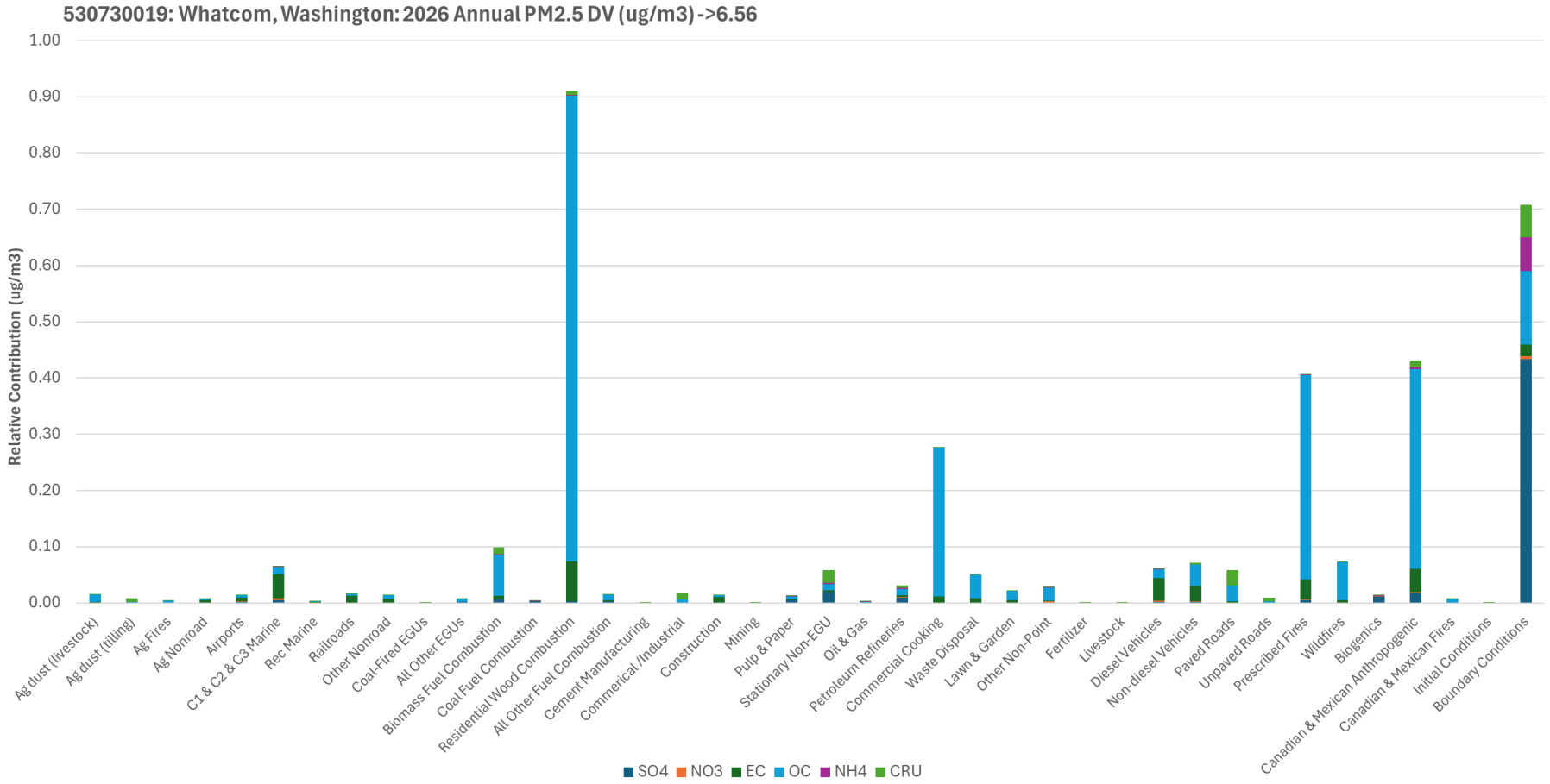
530530024: Pierce, Washington				2026 Annual PM2.5 DV (ug/m3) ->			**9.77**
	Relative Traced Species Contribution (ug/m3)						
Top 10 Categories	**Species Total**	**SO4**	**NO3**	**EC**	**OC**	**NH4**	**CRU**
Residential Wood Combustion	2.104	0.008	0.002	0.201	1.869	0.001	0.025
Commercial Cooking	0.956	0.002	0.000	0.043	0.903	0.000	0.008
Boundary Conditions	0.602	0.403	0.011	0.013	0.083	0.049	0.044
Prescribed Fires	0.337	0.007	0.000	0.048	0.278	0.001	0.001
Biomass Fuel Combustion	0.309	0.020	0.001	0.022	0.218	0.003	0.046
Non-diesel Vehicles	0.213	0.005	0.005	0.087	0.102	0.002	0.012
Wildfires	0.196	0.001	0.000	0.008	0.186	0.000	0.000
Diesel Vehicles	0.148	0.005	0.008	0.096	0.033	0.003	0.003
Paved Roads	0.147	0.002	0.000	0.004	0.072	0.000	0.069
Lawn & Garden	0.093	0.000	0.001	0.020	0.065	0.000	0.008

SO4 = Particulate Sulfate
NO3 = Particulate Nitrate
EC = Elemental Carbon
OC= Organic Carbon
NH4 = Ammonium
CRU = Crustal Material



V.) Monitor 530730019 – Whatcom County, WA (Bellingham) Near Phillips 66 Refinery

Whatcom County has one monitor (with an incomplete design value due to invalid data completeness in one quarter of 2022) that is currently attaining (5.6 µg/m^3; 2022-2024 annual $PM_{2.5}$ design value) and is projected in the 2026 base case to be in attainment of the 9.0 µg/m^3 primary health-based NAAQS. Monitor 530730019 has a modeled 2026 base case annual $PM_{2.5}$ design value of 6.56 µg/m^3. The relative contribution of tagged $PM_{2.5}$ species from each of the categories to this monitor is presented below. The relative height of each bar represents the relative contribution of that category to the overall modeled $PM_{2.5}$ concentration.

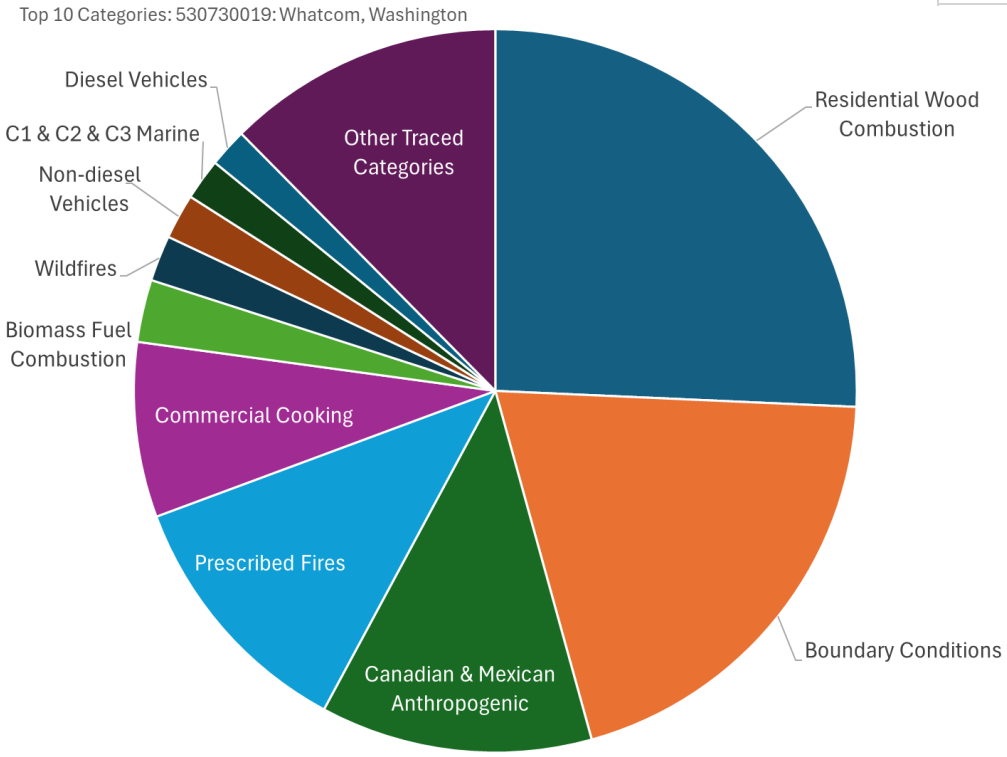


Top Ten Categories

From the thirty-nine categories tagged in the simulation, the top ten categories contributing to this monitor are listed by category and tagged species in the table and pie chart below. These figures and tables may provide information valuable in determining upwind source categories that would have greatest potential for incremental control in helping to maintain attainment with the NAAQS at this location.

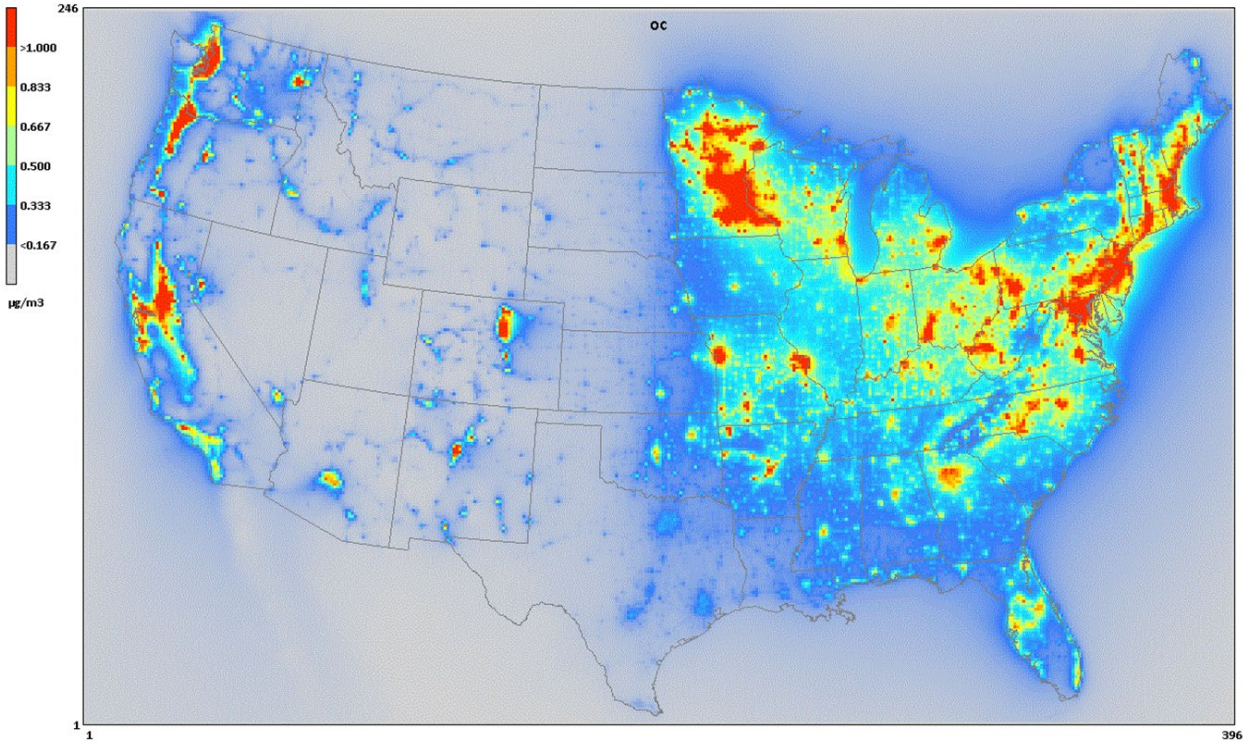
530730019: Whatcom, Washington				2026 Annual PM2.5 DV (ug/m3) ->			**6.56**
	Relative Traced Species Contribution (ug/m3)						
Top 10 Categories	**Species Total**	**SO4**	**NO3**	**EC**	**OC**	**NH4**	**CRU**
Residential Wood Combustion	0.910	0.003	0.000	0.071	0.828	0.000	0.008
Boundary Conditions	0.708	0.433	0.006	0.021	0.131	0.059	0.058
Canadian & Mexican Anthropogenic	0.431	0.017	0.003	0.042	0.355	0.003	0.012
Prescribed Fires	0.407	0.005	0.000	0.036	0.363	0.001	0.001
Commercial Cooking	0.277	0.000	0.000	0.011	0.264	0.000	0.002
Biomass Fuel Combustion	0.099	0.006	0.000	0.006	0.073	0.001	0.012
Wildfires	0.072	0.000	0.000	0.004	0.067	0.000	0.000
Non-diesel Vehicles	0.071	0.002	0.001	0.027	0.038	0.001	0.003
C1 & C2 & C3 Marine	0.065	0.005	0.003	0.042	0.014	0.002	0.000
Diesel Vehicles	0.061	0.002	0.002	0.040	0.016	0.001	0.001

SO4 = Particulate Sulfate
NO3 = Particulate Nitrate
EC = Elemental Carbon
OC= Organic Carbon
NH4 = Ammonium
CRU = Crustal Material



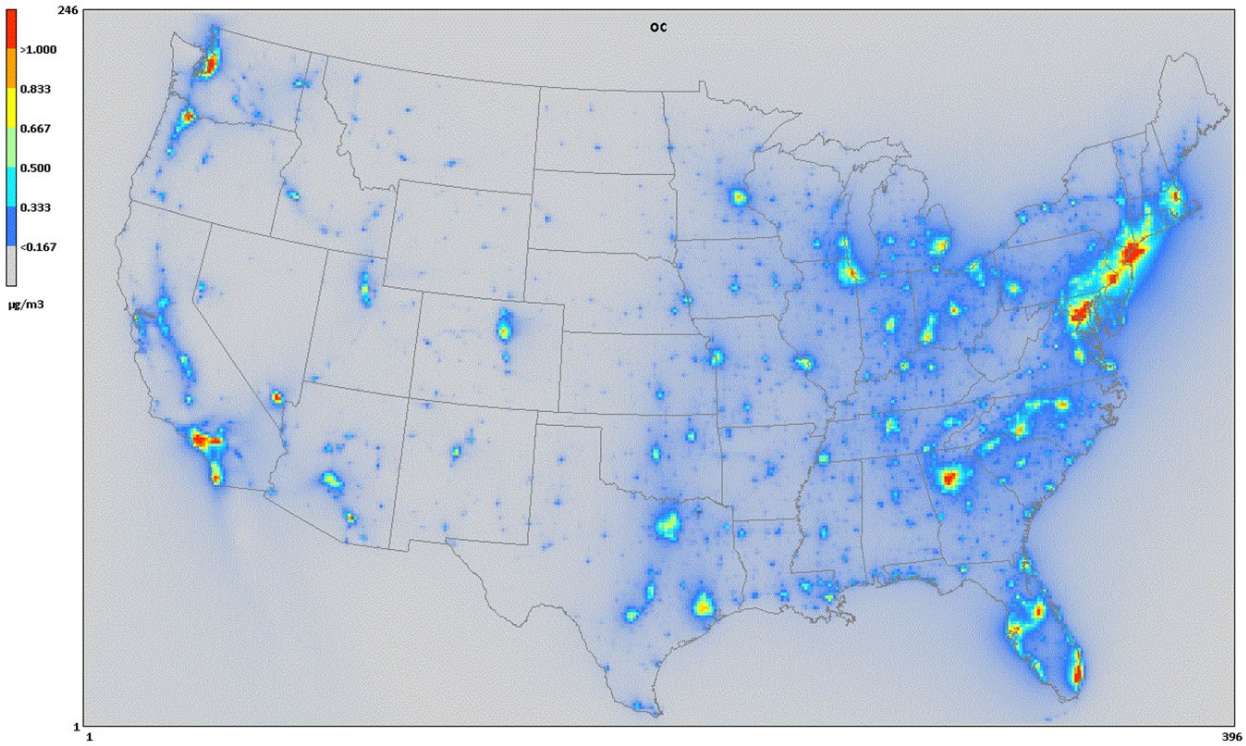
VI.) National Category-Based Spatial Distribution

Selected top ten maximum contributing categories by traced species concentrations for the Skagit County monitor are represented in the following national figures below. To best demonstrate the spatial distribution of each tagged category, the following are represented by the tagged species of highest concentration as modeled within each individual category. Note that the scale remains the same for each figure. Additional category-specific graphics can be found in the Alpine report[3].

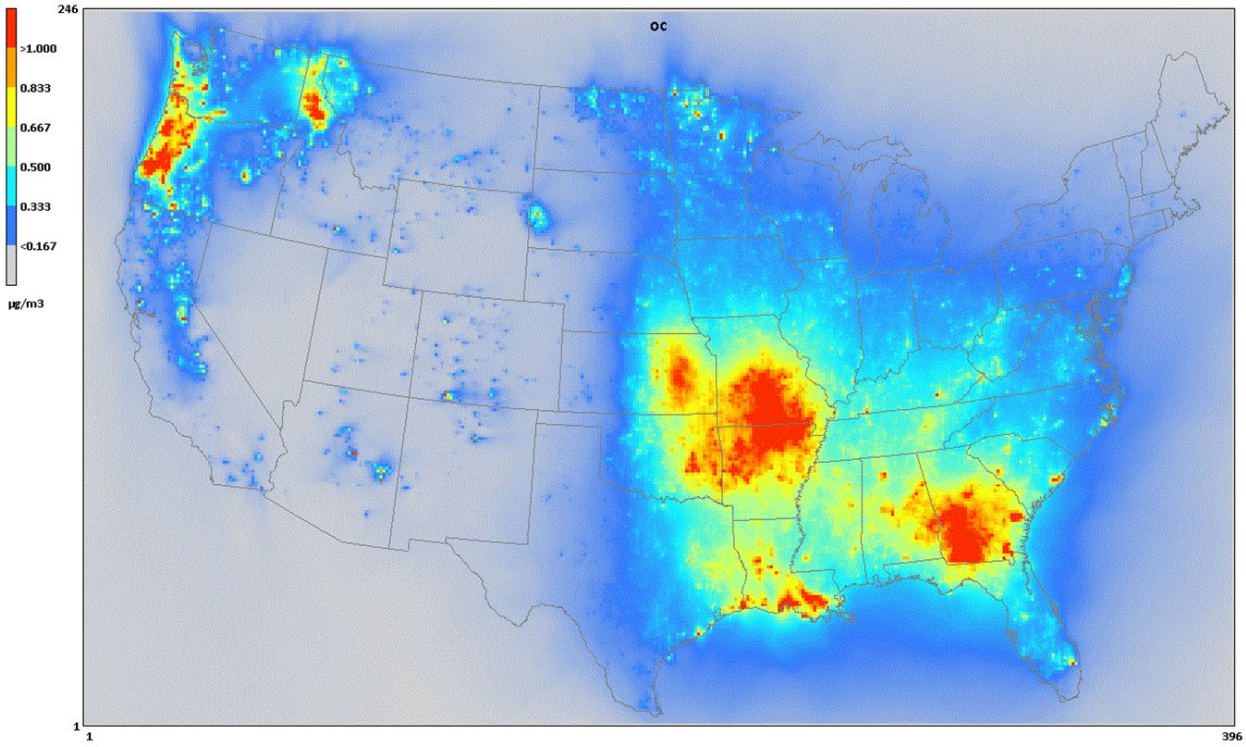


Modeled annual organic carbon concentrations (µg/m3) from 2026 base case simulation for residential wood combustion category.

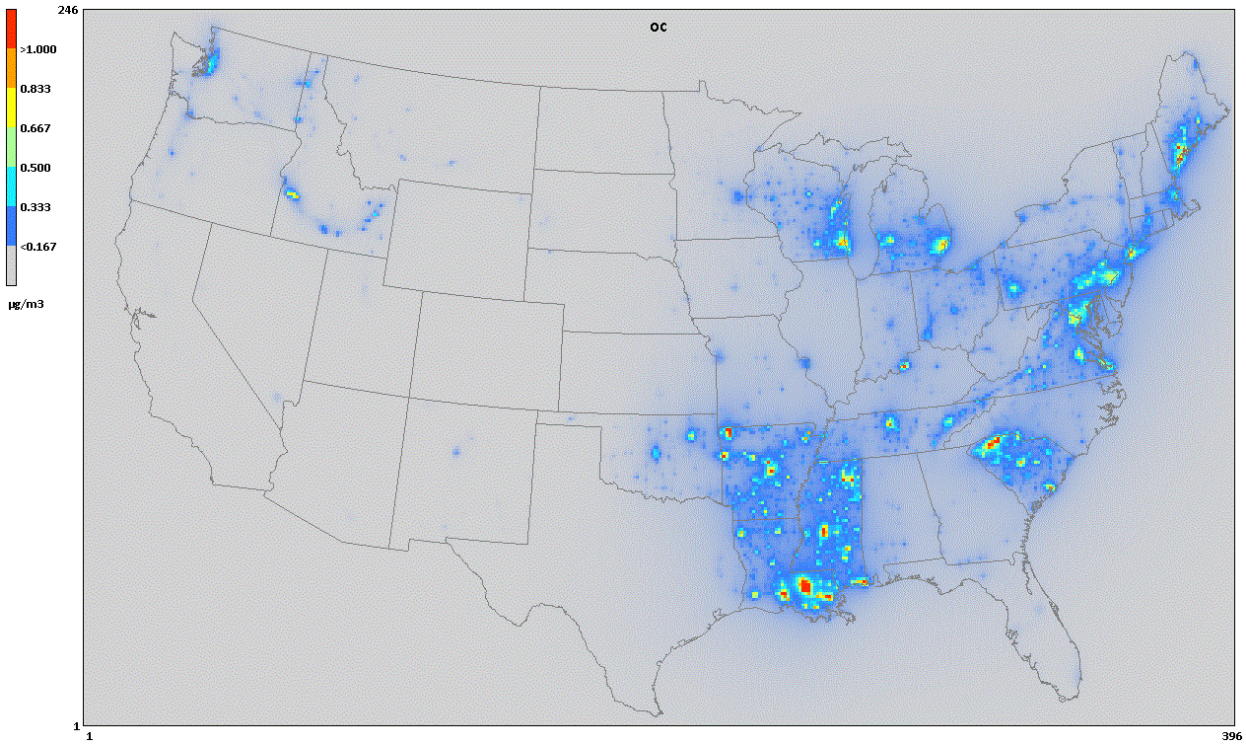
[3] https://www.midwestozonegroup.com/_files/ugd/7ec07f_744eb1e14e444b2b93dff141fadee7b8.pdf



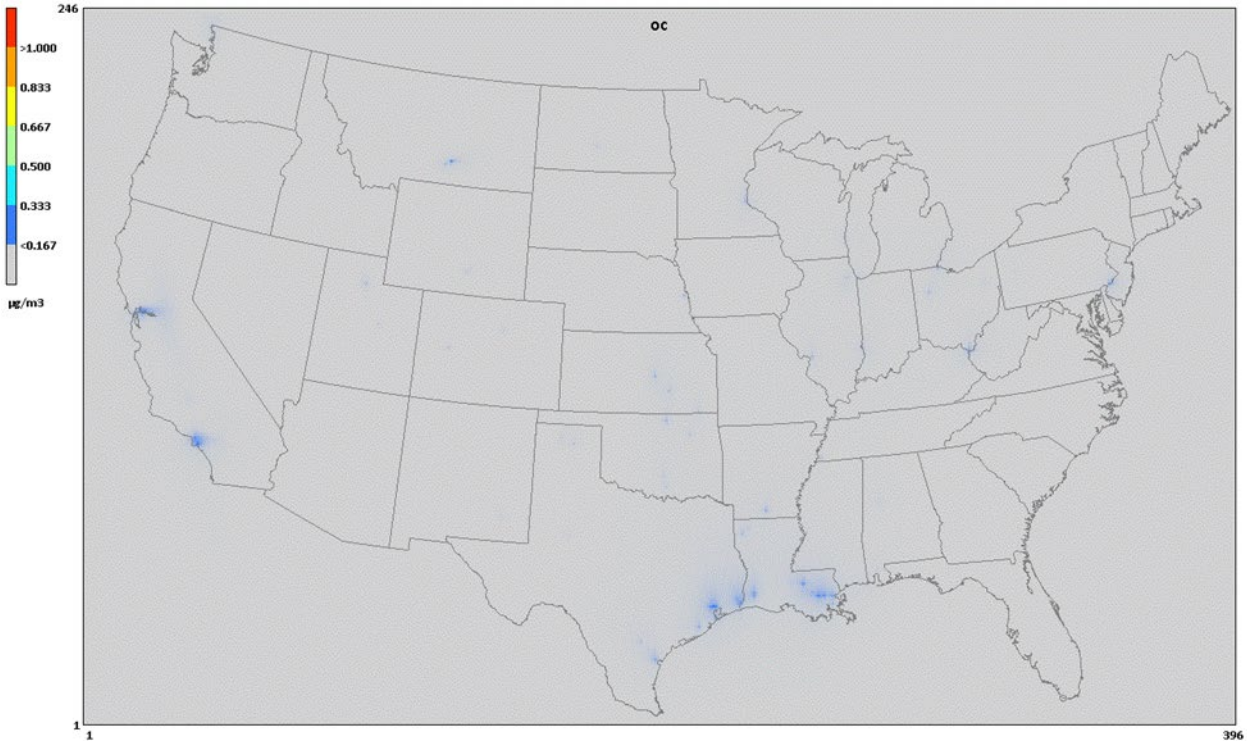
Modeled annual organic carbon concentrations (µg/m3) from 2026 base case simulation for commercial cooking category.



Modeled annual organic carbon concentrations (µg/m3) from 2026 base case simulation for prescribed fire category.



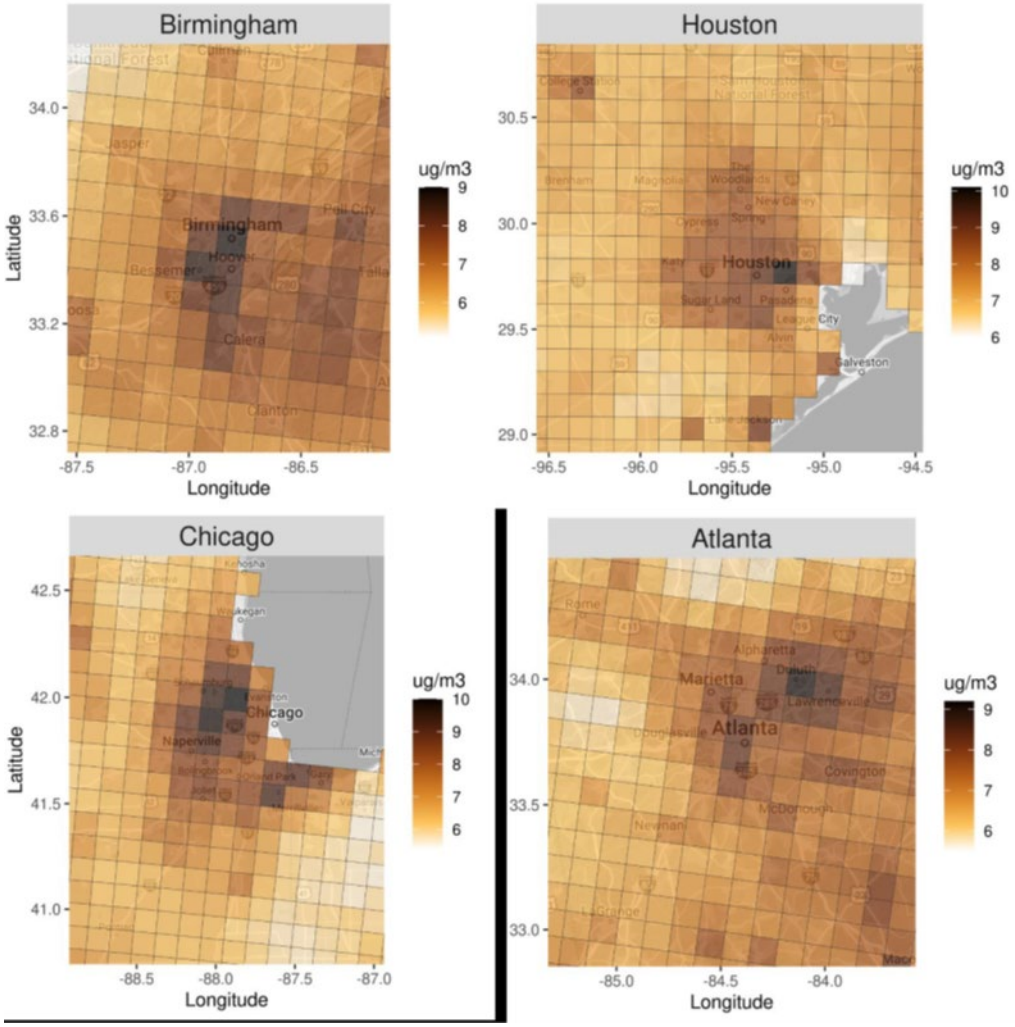
Modeled annual organic carbon concentrations (µg/m3) from 2026 base case simulation for biomass fuel combustion category.



Modeled annual organic carbon concentrations (µg/m3) from 2026 base case simulation for petroleum refinery category.

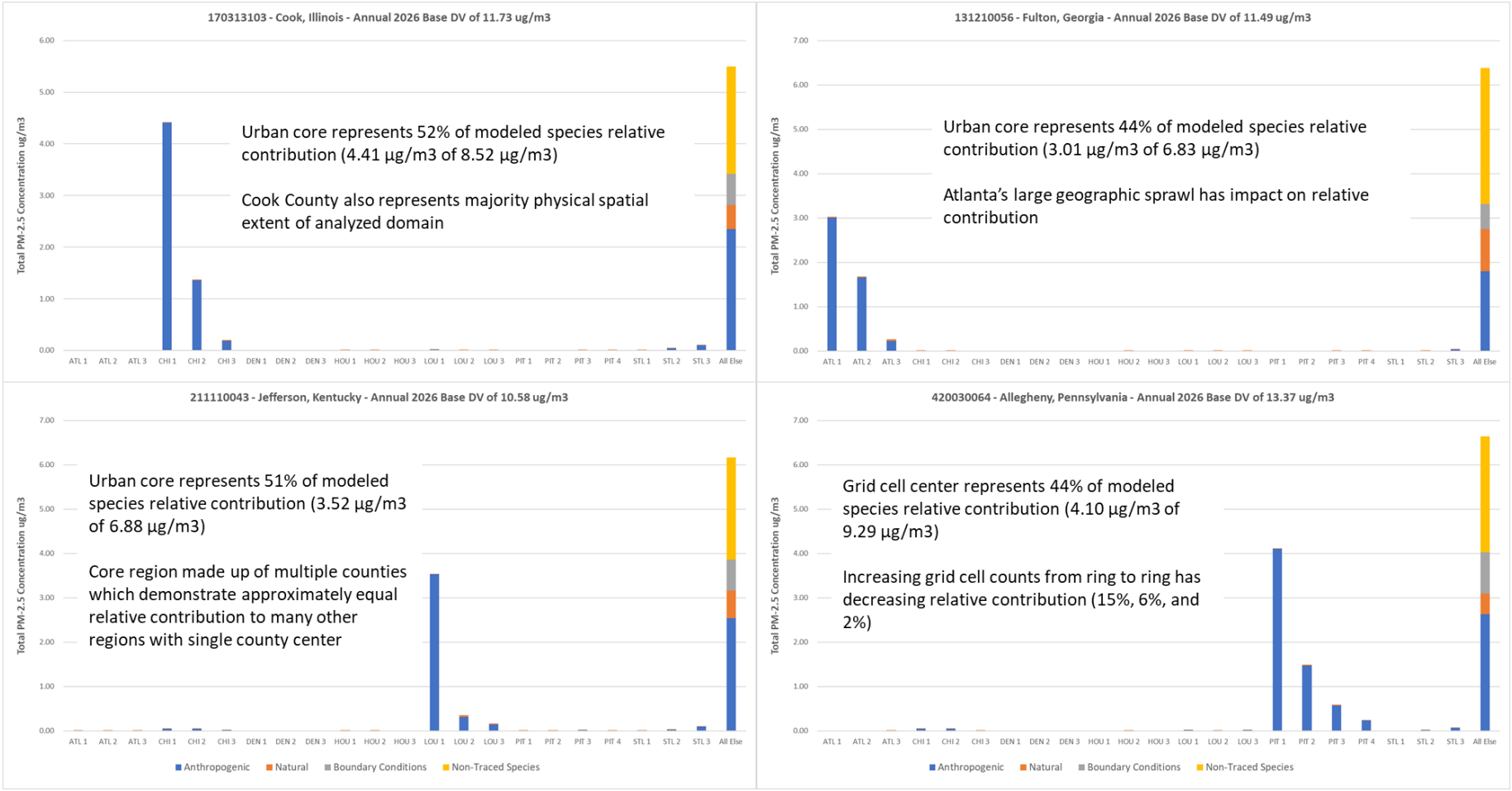
VII.) EPA and Alpine Findings on Spatial Extent of Contribution

In the RIA[4] to the PM NAAQS reconsideration, EPA calculated gridded $PM_{2.5}$ concentrations over selected urban areas based on the 2032 modeling case. A common feature of these diverse locations was the relatively high $PM_{2.5}$ concentrations over the proximal urban area and lower concentrations just outside of the urban core. $PM_{2.5}$ concentrations in the proximal core of these U.S. areas exceed revised and alternative standards levels considered in the RIA, whereas concentrations surrounding the urban core are below the revised and alternative standard levels. Additionally, when EPA applied the emissions reductions from adjacent counties to monitor locations in their attainment strategy, they used a $\mu g/m^3$ per ton $PM_{2.5}$ air quality ratio that was four times less responsive than the ratio used when applying in-county emissions reductions (i.e., they applied four tons of $PM_{2.5}$ emissions reductions from an adjacent county for one ton of emissions reduction needed in a given county). This analysis led to the finding that in most regions, NAAQS concentrations are being driven by the local $PM_{2.5}$ increment and the relatively high responsiveness of $PM_{2.5}$ concentrations to primary $PM_{2.5}$ emission reductions comes from sources in proximity to those monitors.



[4] https://www.epa.gov/system/files/documents/2024-02/naaqs_pm_reconsideration_ria_final.pdf

Alpine also conducted a source apportionment study[5] which corroborated EPA's data to support regional $PM_{2.5}$ relative contributions, and therefore also reduction potential, are significantly less effective as distance increases from monitors.



Both analyses support that reductions should focus on local areas around targeted monitors as emission contribution to modeled concentrations and reduction effectiveness drops precipitously the farther from the monitor the reductions occur.

[5] https://www.midwestozonegroup.com/_files/ugd/7ec07f_744eb1e14e444b2b93dff141fadee7b8.pdf

VIII.) Summary

Based on the data generated by this modeling exercise, refineries in northwest Washington State are well controlled and have minimal impact on PM2.5 concentrations. Any further controls at refineries with the hope of targeting reductions in overburdened communities will not show any measurable decrease. Further source apportionment work demonstrates that residential wood burning, commercial cooking, biomass combustion, prescribed fires and well as anthropogenic sources in southern Canada are the primary drivers of PM in northwest Washington.

Lastly, work completed by EPA and Alpine geophysics, show that PM controls on stationary sources become significantly less effective at just one county away, unlike ozone precursors which can travel across state lines. This further demonstrates the futility of relying on further stationary source controls at refineries with the intent to reduce PM concentrations in this region.