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Comments of the NAAQS Regulatory Review and Rulemaking ("NR3") Coalition on Proposed Rule on "Guideline on Air Quality Models; Enhancements to the AERMOD Dispersion Modeling System," 88 Fed. Reg. 72,826 (Oct. 23, 2023)

To Whom It May Concern:

The NAAQS Regulatory Review and Rulemaking ("NR3") Coalition offers the attached comments, prepared for us by ALL4 LLC, on EPA's proposed rule on the "Guideline on Air Quality Models; Enhancements to the AERMOD Dispersion Modeling System," 88 Fed. Reg. 72826 (Oct. 23, 2023).[1] Briefly, the NR3 Coalition supports the proposed enhancements to EPA's AERMOD model. The Coalition is concerned, however, that EPA's proposed revisions

[1] The NR3 Coalition is an ad hoc association of industry groups and companies supportive of NAAQS that provide the requisite protection of public health and welfare and that are implemented in ways that provide protection consistent with the economic health of the country. Members of the NR3 Coalition and their member companies are committed to reducing emissions, consistent with the requirements of the Act, so as to provide air quality protective of public health and welfare, while continuing to facilitate economic growth in the United States. Companies represent by NR3 Coalition members and NR3 Coalition members themselves have worked for many years with EPA, states, and local authorities to lower concentrations of criteria pollutants in the ambient air. NR3 Coalition members joining these comments include American Forest & Paper Association, American Wood Council, The Fertilizer Institute, National Mining Association, National Cotton Council, National Cotton Ginners's Association, National Oilseed Processors Association, Texas Cotton Ginners Association, and The Aluminum Association.

to its Guideline on Air Quality Models ("Modeling Guideline") are insufficient to address excessive conservatism in EPA's currently recommended approaches to modeling for both air emissions permits and State Implementation Plans. As the NR3 Coalition previously explained,[2] reducing this conservatism will be of paramount importance should EPA finalize its proposal to significantly reduce the level of its annual primary NAAQS for $PM_{2.5}$. Thus, the NR3 Coalition urges EPA to issue a supplemental proposal that will address continuing issues with the overly-conservative treatment of emissions, background air quality, and combining predicted ambient concentrations of primary and secondary $PM_{2.5}$. In addition, EPA should rethink how it defines ambient air. Measures to address these issues should be finalized at the same time as those in the current proposal concerning AERMOD.

Please reach out if you have any questions concerning these comments.

Yours truly,

Joseph C. Stanko, Jr.
Counsel to the NR3 Coalition

[2] *See* https://www.regulations.gov/comment/EPA-HQ-OAR-2015-0072-2361.

ALL4 LLC COMMENTS ON EPA'S PROPOSED REVISIONS TO THE GUIDELINE ON AIR QUALITY MODELS

Prepared on behalf of the NAAQS Regulatory Review and Rulemaking Coalition

88 Fed. Reg. 72826

October 23, 2023

Submitted to Docket ID No. EPA-HQ-OAR-2022-0872

December 22, 2023

1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

ALL4 LLC (ALL4) submits these comments on the proposed revisions to the Guideline on Air Quality Models (the Guideline) (88 Fed. Reg. 72826, October 23, 2023) at the request of the National Ambient Air Quality Standard (NAAQS) Regulatory Review and Rulemaking Coalition (NR3). ALL4 acknowledges the substantial effort that the United States Environmental Protection Agency (EPA) has made over time to review model evaluation studies and develop, test, and implement changes to the AERMOD modeling system. The revisions EPA has made in the past and these proposed revisions continue to improve the scientific accuracy of the model in specific areas and provide modelers with more options to apply when performing modeling studies specific to those situations. The proposed additions to the regulatory non-default options available to modelers: COARE, GRSM, and RLINE, are helpful additions, if not likely to see widespread use. The proposed revisions to Appendix W Section 8, specifically the revised guidance addressing the selection of ambient monitors to apply representative ambient background concentrations and on the selection of offsite sources to be explicitly included in the modeling, is helpful, and moving the guidance to a document referenced by Appendix W rather than including it directly in Appendix W should facilitate more timely revisions in the future when updates are warranted.

1.2 SUMMARY OF ALL4'S COMMENTS ON THE PROPOSED REVISIONS TO APPENDIX W AND UPDATES TO THE AERMOD MODELING SYSTEM

1.2.1 We generally support the proposed revisions to Appendix W and the AERMOD modeling system

ALL4 generally supports the following proposed revisions to the AERMOD modeling system:

- Incorporation of the Coupled Ocean-Atmosphere Response experiment (COARE) algorithms into AERMET, the meteorological preprocessor to AERMOD, for use in overwater marine boundary layer environments;
- Addition of the Generic Reaction Set Method (GRSM) as a new regulatory non-default Tier 3 screening technique for the conversion of nitrogen oxides (NO_X) to nitrogen dioxide (NO_2);

- Addition of the RLINE source type to AERMOD as another option for users to characterize mobile sources in regulatory modeling, while retaining the use of the existing AREA, VOLUME, and LINE sources as options for characterizing mobile sources as well; and
- Inclusion of revisions and clarifications to Section 8 of Appendix W refining the recommendations regarding the determination of appropriate model input data, specifically background concentration and offsite inventory source selection, for use in NAAQS modeling demonstrations.

1.2.2 The proposed revisions do not significantly mitigate modeling challenges related to increasingly stringent NAAQS

While ALL4 generally supports the proposed revisions described in Section 1.2.1, we are concerned that these revisions are relatively minor and primarily focus on specific modeling scenarios that may not be useful or applicable in most modeling situations. Additionally, the proposed inclusion of COARE, GRSM, and RLINE into the AERMOD modeling system are as regulatory non-default options, meaning that while an alternative modeling demonstration as described in Section 3.2 of Appendix W is not required, additional justification and consultation with the EPA Regional Office and appropriate reviewing authority would still be necessary, and approval for their use required. As a result, it is unlikely that any of these options will find widespread use in regulatory modeling demonstrations or affect the more overarching issues described in these comments.

That said, the proposed revisions and clarifications to Section 8 are welcome, especially the specific reference to considering exceptional events when selecting appropriate design values to represent ambient background concentrations. But unfortunately, they are unlikely to change the existing methodologies that states and other regulating agencies are using to determine which monitored values to use and what sources must explicitly be included in modeling studies. Additionally, there appears to be no plan to address the future of AERMOD and its ultimate potential successor as the modeling system reaches its third decade as EPA's preferred short range air dispersion modeling system, nor any plan to identify a preferred regional model to replace the CALPUFF modeling system that was removed from the list of preferred models in Appendix A of the Guideline in 2017.

Finally, the proposed revisions fail to address the many layers of conservatism that exist in current air dispersion modeling approaches. While many of these approaches have existed for years, these

unrealistically conservative approaches are impractical as recent and anticipated upcoming revisions of the NAAQS approach levels close to the existing ambient background concentrations, as is expected to be the case if the annual fine particulate matter with a diameter of less than 2.5 microns ($PM_{2.5}$) NAAQS is revised. As the standards approach background levels it leaves a smaller amount of headroom for building new infrastructure and expanding manufacturing and the associated jobs. With these potential adverse impacts in mind, we urge EPA to provide a supplemental proposal to address these many unrealistic elements (outlined in Section 3 of these comments).

2. COMMENTS ON PROPOSED REVISIONS TO APPENDIX W AND THE AERMOD MODELING SYSTEM

2.1 GENERAL APPRECIATION OF PROPOSED REVISIONS TO APPENDIX W AND THE AERMOD MODELING SYSTEM

ALL4 appreciates EPA's efforts and generally supports the proposed revisions to Appendix W and the AERMOD modeling system discussed below. These revisions should increase the scientific accuracy of the AERMOD modeling system in certain specific areas.

Yet, while we support these proposed additions, we note that they are added only as regulatory non-default options in AERMOD, requiring further justification and approval before they can be used in a regulatory modeling setting. Because of the added time and effort required to garner that approval and the only slight improvement these options may provide, as well as their relatively limited application in modeling studies, these options are not likely to see widespread use, nor do they significantly improve on the many conservatisms present in the AERMOD modeling system. We encourage EPA to continue evaluating these options to facilitate their inclusion as regulatory default options in AERMOD as quickly as possible.

2.1.1 The incorporation of COARE algorithms into AERMET for use in over water marine boundary layer environments should improve scientific accuracy

The COARE algorithms are an improvement over the existing algorithms in AERMET for boundary layer scenarios over water as provided in "Evaluation of the Implementation of the Coupled Ocean Atmosphere Response Experiment (COARE) Algorithms into AERMET for Marine Boundary Layer Environments," as would be the case in the modeling for offshore wind and oil drilling facilities that are becoming increasingly more prevalent. At present, the use of the standalone program AERCOARE to include consideration of overwater boundary layer meteorology requires an alternative modeling demonstration to use in marine modeling scenarios. If COARE becomes a regulatory non-default option in AERMOD for these scenarios, it would be helpful for EPA to streamline the methodology approval process and improve the accuracy of the modeling results for over water modeling studies (offshore wind, etc.), though

consultation with the EPA Regional Office and appropriate reviewing authority would still be necessary for approved use.

2.1.2 The addition of GRSM as a third Tier 3 screening technique for NO_X to NO_2 conversion provides additional options

The GRSM option specifically addresses two areas not considered in the current Tier 3 NO_X to NO_2 conversion techniques used in NO_2 modeling, the Plume Volume Molar Ratio Method (PVMRM) and the Ozone Limiting Method (OLM):

- Photolytic conversion of NO_2 to nitric oxide (NO), which effectively reverses some of the NO_X to NO_2 conversion process; and
- The time to convert NO_X to NO_2 via titration and ozone entrainment and therefore the distance the plume travels before that conversion occurs.

The failure to consider these two aspects in the existing Tier 3 screening techniques can cause overprediction of NO_2 concentrations when using those techniques. GRSM has been shown to be more accurate than OLM in most situations and similar in performance to PVMRM as discussed in the report titled Evaluation of the Generic Reaction Set Method for NO_2 conversion in AERMOD. The modification of AERMOD to include ADMS chemistry. Cambridge Environmental Research Consultants (CERC) Technical Report. Because GRSM requires additional input (background NO concentration data) and is proposed to be available only as a regulatory-non default option, it is likely to be used only on occasions where the regulatory default Tier 2 Ambient Ratio Method (ARM2) does not produce the desired modeling results, as is the case with the existing Tier 3 screening techniques. ALL4 agrees with and supports EPA's proposal to include GRSM as a 3rd regulatory non-default Tier 3 screening technique available when modeling NO_2.

2.1.3 The addition of RLINE source as a mobile source type provides another option for handling on-road emissions

The proposed addition of RLINE to the AERMOD modeling system is a follow-on to the 2017 updates to Appendix W where the CALINE3 model was dropped from Appendix A of the Guideline, which contains EPA's list of preferred models, for mobile source modeling and was replaced by AERMOD. The RLINE source type is designed to model near-surface releases, is focused on evaluating the impacts of the source on or near the road itself, and is more accurate than using the existing source types available in the AERMOD system as discussed in Incorporation and Evaluation of the RLINE Source Type in AERMOD For

Mobile Source Applications. EPA is also proposing the use of the urban option in AERMOD and terrain when using this source type, although the proposal does not supersede EPA's existing hot-spot guidance that recommends the use of the FLAT terrain option for modeling applications. Additionally, the proposal still allows for the use of the existing AREA, VOLUME, and LINE source types commonly used to represent mobile sources in AERMOD. While we support the inclusion of the RLINE source type in the AERMOD system, we note that these additional considerations when using the RLINE source type, as well as the additional consultation requirements in a regulatory modeling application, make it unlikely that this source type will see extensive use.

2.2 PROPOSED REVISIONS TO GUIDANCE ON SELECTION OF AMBIENT BACKGROUND AND INVENTORY SOURCES

ALL4 appreciates the efforts of EPA to create the Draft Guidance on Developing Background Concentrations for Use in Modeling Demonstrations document towards clarifying the process for selecting representative ambient background monitors and offsite sources to include in modeling, as well as directly referencing it in the proposed revised Appendix W. The currently used term "significant concentration gradient," which is utilized to help determine which sources should be included in a modeling study, is poorly defined and has been a source of uncertainty since it was added to Appendix W, at times causing confusion in determining what sources to explicitly model. This confusion may have led many state agencies to their current practice of considering all sources out to 50 km from the study source for inclusion in the offsite inventory to be explicitly modeled, as described in the New Source Review (NSR) guidance of 1990. Replacing that term with a series of steps to be taken in selecting a representative ambient monitor and determining the offsite inventory simply formally documents the steps for these choices that have unofficially been in use by agencies and modelers for many years. Specific to this guidance, ALL4 provides the following comments:

1. We support the reference to guidance not directly included in the text of Appendix W. This should allow for revisions and additions to the guidance in a simpler and more timely manner than the process for formally updating Appendix W. At the same time, EPA should provide an opportunity for comments on any proposed revisions of the guidance.

2. We note that while the guidance document clarifies the decision-making process and removes the vague "significant concentration gradient" term, the new stepwise approach still does not have specific metrics or criteria to define which sources are suitably represented in the ambient background concentration and which should be explicitly modeled. Critically, there is nothing in this guidance that is likely to cause states to change their current behaviors in requiring which sources should be included in a cumulative modeling exercise. This is important for two reasons:
    a. While EPA often states that it has little or no control over what states require in developing an offsite inventory for modeling, the state agencies are the ones that determine those inventories, even for PSD projects. Therefore, those states need specific guidance as to what is and isn't appropriate to include in a cumulative modeling inventory and assurances that they will not be second guessed by EPA on those determinations.
    b. EPA, at a December 14, 2023 meeting with the forest products industry relating to the pending annual $PM_{2.5}$ NAAQS revision, stated that consultants are "including too many offsite sources in their modeling studies", yet the proposed guidance document includes nothing that would encourage state agencies to change the behaviors that are already in place under the previous Appendix W text. If EPA truly believes that too many sources are being included, more concrete language to encourage state and other regulating agencies to limit the extent of their offsite inventories is necessary.

    By way of example, the Oregon Department of Environmental Quality (ODEQ) requires permit applicants to explicitly model all facilities with Title V or minor permits within 20 kilometers of the study site as part of the cumulative inventory, which is clearly not the intention of the previous Appendix W Section 8 guidance or that of the proposed draft guidance. While the ODEQ guidance is primarily used for in-state modeling, there is little doubt that ODEQ would use that same guidance for a PSD project being proposed in Oregon, and that EPA Region 10 would not be involved in or comment on the selection of the inventory.

    Because of this reality, EPA should define in more concrete terms exactly what criteria are expected to be used when determining which offsite sources are to be explicitly included in a modeling demonstration in support of a permit action.

3. We support the general acknowledgement that using a less conservative background design value, (i.e., a value adjusted by excluding values that resulted from direct contribution of emission sources not representative of emissions in the modeling domain, selection of a background monitor based on representativeness and not proximity, etc.) is acceptable in regulatory modeling exercises. This is critical in the context of modeling exercises where all of the modeling inputs are typically worst-case scenarios and the statistical probability of all such worst-case events occurring at the same time as the worst-case ambient background concentration is near-zero or nonexistent. This includes the consideration that the use of diurnal or seasonal background values rather than a single value may produce more accurate and less overly conservative results.

4. We generally support the acknowledgment that "Data may also be modified or excluded from the ambient data record when the monitor is impacted by atypical activities (i.e., impacts that will not occur again in the future)," as referenced in EPA's 2019 guidance on Additional Methods, Determinations, and Analyses to Modify Air Quality Data Beyond Exceptional Events. The ability to review and potentially remove from consideration ambient background concentrations related to exceptional events, especially from events like wildfires, in the context of determining ambient background concentrations for ozone (O_3) and $PM_{2.5}$ modeling studies, is critical. However, while this guidance has been available for several years, most agencies have not been willing to use the guidance as it lacks clear and efficient steps that would aid agencies in making the determination of what constitutes an exceptional event. The process for submitting exceptional events information to EPA needs to be simplified as it is too costly and time consuming for states. For example, one state air agency evaluated 60 air events at a cost of $750,000 and devoted 7,500 hours of staff time only to have EPA accept just 20 submissions.[1] To that end, we recommend that EPA set forth a specific, stepwise process that agencies should follow to review these events and correct the ambient background data, to provide a clear path on how they should address these atypical events. State agencies whose primary responsibilities include collection, quality assurance, and certification of ambient concentration measurements should be consulted to develop systematic and consistent procedures and tools.

[1] Particulate Matter NAAQS: Perspectives and Challenges – Arizona, September 27, 2023, https://cleanairact.org/wp-content/uploads/2023/09/19_Brad-Busby-ADEQ-AAPCA-2023-Fall-Meeting-PM-Challenges_Final.pdf.

5. As a corollary, EPA should include in the guidance similar steps for the consideration and removal of impacts from emissions sources that directly affect the design concentration of an otherwise representative monitor and are not representative of conditions in the modeling domain.

6. Additionally, we recommend that EPA present a methodology for correcting known biases present in Federal Equivalent Method (FEM) monitors. These monitors are known to EPA to exhibit a conservative bias compared to more accurate co-located Federal Reference Method (FRM) monitors, often by as much as 15-20%[2]. EPA should either provide guidance as to how to make the correction and utilize the corrected data in regulatory modeling or correct the data themselves and make the corrected data available for use in modeling exercises. Correcting the historical record is critical because ambient monitoring data used for regulatory modeling relies on 3-year averages of certified measurements; biased measurements are prevalent in the current record from 2020-2022 (and soon 2021-2023) and should not be used without correction because they cannot provide an accurate estimate of the background concentration.

7. Section 5, "Additional Considerations" of the draft guidance document explains that determining appropriate ambient background concentrations may include consideration of at-risk communities in the context of environmental justice (EJ), and references the use of EPA's Environmental Justice Screening and Mapping Tool, EJScreen to help with that characterization. However, EPA does not have a formal definition of what constitutes an at-risk community or EJ community (also referred to at times as an overburdened community) even in the context of its own EJ initiatives, and EJScreen not only does not determine if a community is at-risk or EJ, but the data in the tool is often outdated and relies heavily on the use of surrogates (i.e., using a count of houses built prior to 1960 as the determinant for the lead paint environmental indicator) to determine EJ Index scores. In some cases, EJScreen may be reliant on outdated data related to the very criteria and non-criteria pollutants that are being modeled using more up-to-date data. Additionally, it is unclear whether consideration of EJ concerns in this context without any formal accommodation for EJ in the current permitting requirements is appropriate. Finally, EJScreen is

[2] Per "Assessment of PM2.5 Data Comparability between FRM and FEM Monitors" by Karen Mentz and Zach Emerson of NCASI, presented at 2023 NCASI Annual Conference.

only one of several tools and guidelines, including the Council on Environmental Quality's CEJST tool, EPA's recently issued Draft EJ Guidance for Regulatory Cost/Benefit Analysis, etc. that have differing guidelines on what constitutes an EJ community. EPA should include a specific definition of what constitutes an EJ community for modeling purposes, and the requirements around the consideration of EJ in the permitting context, if this reference is to be included in the final guidance document. Without such definition and direction, we recommend this section be removed from the guidance document altogether until such time as those requirements are formally defined.

3. ISSUES THAT SHOULD BE ADDRESSED IN REVISION TO APPENDIX W

While ALL4 appreciates the technical work behind the proposed revisions to Appendix W, we note that the revisions to AERMOD are incremental, only apply to a subset of modeling scenarios, and have only been proposed as regulatory non-default options. None of these changes are likely to have an impact on most regulatory modeling and they require additional effort and approval by the regulating agency to use. The periodic revisions to Appendix W provide an opportunity to address the numerous modeling related issues that have persisted for many years, either directly or through referenced guidance. EPA, in the currently proposed set of revisions, has not taken the opportunity to do this. We recommend a supplemental proposal from EPA to address the topics discussed below. These considerations are critical as the NAAQS become increasingly stringent and approach ambient background levels, leaving little margin for error amid overly conservative approaches in permitting and modeling decision making.

3.1 LACK OF PROGRESS IN ADVANCING AERMOD / SUCCESSION PLANNING

The AERMOD modeling system was the result of a collaborative effort between the American Meteorological Society and EPA. It took many years to develop and test and was supported by numerous field studies. Since 2005 when the model was formally adopted by EPA as the preferred model for most regulatory applications, AERMOD has been slowly improved and its capabilities expanded to enable it to cover a larger array of potential modeling scenarios. Many of the recent additions have involved integrating other older specialized models into the AERMOD system, with some integrations being more successful than others. At this point, AERMOD has been the preferred regulatory model for nearly 20 years and progress on improvements, notwithstanding the 2017 Appendix W revisions, and associated changes in the model, has slowed. At the public hearing on the Appendix W revisions held at EPA in Research Triangle Park, NC on November 14-15, 2023, there was no mention of what EPA's long-term plans for AERMOD are as the system increasingly shows its age. Indeed, the system of developing white papers to identify and promote improvements in model performance which was introduced with the 2017 revisions has come to a stop: There have been no updates to the white papers since the documents were originally uploaded on September 19, 2017. Additionally, the number of preferred and recommended models listed in Appendix A of the Guideline for regulatory use has fallen to an all-time low of 3: AERMOD, along with the rarely used CTDMPLUS and OCD models. And, since removing CALPUFF from the list with the 2017 revisions, no replacement for regional modeling scenarios has been recommended. EPA should chart out

and publish its plan for the future of AERMOD, including what and when significant revisions will be made, what models may be considered as its successor, and other planned changes, so that interested parties can participate and prepare. The current policy where known problems with the model are layered over by making conservative assumptions will not work as the NAAQS are lowered towards levels near existing ambient background values.

3.2 ACCOMODATION OF STATISTICAL APPROACHES TO ADDRESS EMISSIONS VARIABILITY

ALL4 is concerned that with the lowering of NAAQS to near background levels, the current policy outlined in Appendix W Section 8.0 of unrealistically assuming that a source always operates at its maximum potential-to-emit (PTE) emission rate is becoming less viable, especially for those sources with highly variable emission rates that rarely, if ever, reach PTE levels. As described in Table 8-1 (for State Implementation Plan [SIP] modeling) and Table 8-2 (for cumulative NAAQS compliance demonstrations for Prevention of Significant Deterioration [PSD] permits), mass emission rates are input to the model as a function of the **emission limit** (lb/MMBtu or lb/unit of production [UOP]), **operating level** (MMBtu/hr or UOP/hr), and **operating factor** (hr/yr or hr/day). To the extent the current prescription to simulate emission rates from new and modified emission units based on the maximum allowable emission limit at the maximum operating level and continuous operations overestimates actual emissions and resulting ambient concentrations, that overestimation is amplified by the number of emission units simulated that affect the modeled design concentration. For example, if the simulated emission limit, operating level, and operating factor of an emissions unit are each overestimated (regardless of cause) by merely 10%, the resulting estimate of the ambient concentration would be expected to be overestimated by approximately 33%, which equivalently suggests the actual concentration is 75% of what would be predicted by the model. In a typical annual average $PM_{2.5}$ analysis that quantifies the modeled design concentration to be on the order of 2.0 $\mu g/m^3$ attributable to one emission unit, this equates to 0.5 $\mu g/m^3$ for only a 10% overestimate in each component of the modeled emission rate. Larger overestimates of the emission rates compound to larger overestimates of ambient concentrations, emphasizing the importance of using unbiased estimates of the emission limit (based on available emissions source testing methods) and realistic representations of the operating level and operating factor. In the prior 2017 revision of Appendix W, EPA recognized the importance of this – the latter operating level and factor specifically – in Table 8-2 for nearby sources modeled as part of PSD analyses and in Table 8-1 for sources

subject to SIP demonstrations. This level of consideration should be extended to the sources that are the subject of the study themselves.

We recommend that EPA revise Section 8 of Appendix W, and specifically Table 8-2, to allow and promote alternative approaches that characterize variability in emissions for new and modified emission units as part of PSD analyses, including statistical evaluations of variable emissions rates at a given source. Statistical approaches and Monte Carlo-style randomization techniques, and post processing of modeling results using the Emissions Variability Processor (EMVAP) or other similar postprocessors can be used to generate many thousands of modeling scenarios representative of the true operating conditions of a source and show that none, or an extremely small percentage of those scenarios will result in exceedances of the NAAQS being considered. Such approaches can still include an appropriate amount of conservatism by, for example, assuming the maximum allowable emission limit for each scenario while simulating realistic operating levels and operating factors (potentially resulting in a permit limit to that effect) in each scenario to model a much more realistic array of emissions over each averaging period of interest. Four current examples of such studies or approaches allowed by regulatory agencies include:

1. The 1-hour SO_2 (SIP) submitted by the Texas Commission on Environmental Quality (TCEQ) for the Howard County, Texas nonattainment area. This SIP utilized a Monte Carlo randomization scheme for four flares with highly variable emissions operating at an oil refinery in the nonattainment area to generate millions of emissions scenarios. It showed that the impact in none of those scenarios exceeded the 1-hour sulfur dioxide (SO_2) NAAQS in millions of iterations of the modeling. This SIP is currently under review by EPA.
2. The Washington Department of Ecology (WAECY) allows for the use of a Monte Carlo statistical approach when estimating the potential NO_2 impacts from the intermittent use and testing of emergency engines located at data centers in the state. These data centers typically have many engines that are only occasionally used and tested (except in emergency conditions), requiring special accommodation for assessing their potential impacts. WAECY describes this approach in its January 2011 memorandum regarding "A statistical method for modeling the intermittent emissions and estimating the 98^{th} percentile impacts".
3. Oregon Department of Environmental Quality also allows the use of the WAECY statistical approach when evaluating NO_X emissions from emergency engines at data centers in that state.

4. The Iowa Department of Natural Resources (IDNR) allows sources to limit themselves to operating multiple hours per day without specifying which hours and without having to include the full model-predicted impacts from every hour that the source may operate. This methodology is provided in the document titled DNR Suggested Methodology for Modeling Restricted Hours of Operation, specifically Option 3 of that guidance.

3.3 ADDITIONAL MODELING CHALLENGES RELATED TO MULTIPLE LAYERS OF CONSERVATISM

In addition to providing the ability to consider more realistic patterns of emissions from sources with variable emission rates as described above, EPA should address the multiple layers of conservatism that individually reflect highly unlikely scenarios but, when combined, create worst-case conditions that are unlikely to occur. Our suggestions in this regard are discussed below:

1. In Section 9.2.2 of Appendix W, EPA should address the issue of ambient air in a manner that accommodates the likelihood of a member of the public being exposed to a degree consistent with the modeling period. For example, accommodations should be made for the handling of receptors on public roads that pass through an industrial site where a member of the public would never be at the location of a receptor for a full hour, let alone for periods that are reflective of NAAQS with longer averaging times. Similar considerations should be made for fence line or other receptors near a facility where members of the public would have no reason to congregate. Additional considerations should be made for alternative ways to preclude public access, like signage, security patrols, etc.

2. EPA should continue and finalize work to update the PRIME building downwash model that has been shown to have many deficiencies and can lead to inaccurate, and often overly conservative, modeling results. While building downwash was an area of focus during the period around the proposed revisions to Appendix W in 2017, it appears that little progress has been made since then, and that EPA is giving less attention to the issue now.

3. EPA should address known issues with AERMOD's AREA and VOLUME source algorithms, especially when used for characterizing fugitive emissions. These algorithms often result in overly conservative results. We support the recent research on handling of AREA sources in low-wind

conditions that has been incorporated into AERMOD as an Alpha option for additional testing and propose additional review of the performance of these source types.

4. EPA should eliminate the overly conservative requirement to estimate and add secondary $PM_{2.5}$ concentrations to primary $PM_{2.5}$ impacts. Primary impacts usually occur at or near the fence line, while EPA's Modeled Emission Rates for Precursor (MERP) guidance shows that secondary formation peaks 7-10 kilometers downwind. EPA should revise the guidance to add secondary impacts only at a set distance from the source.

5. Specifically related to modeling of $PM_{2.5}$, we have concerns with the requirements for $PM_{2.5}$ modeling outlined in the Revised DRAFT Guidance for Ozone and Fine Particulate Matter Permit Modeling that required all components of $PM_{2.5}$ to be considered should any component, including NO_X, SO_2, or primary $PM_{2.5}$ trigger review under the Prevention of Significant Deterioration (PSD) program. Given the conservatisms built into current Appendix W modeling requirements as well as potential overpredicted modeling impacts from sources representing fugitive emissions near a facility fence line, this could create a scenario where a facility triggers PSD review for only SO_2 for a boiler modification, and thus must model primary $PM_{2.5}$ emissions, where even a very small emission increase near the fence line, given the various conservatisms built into present modeling methodology, could exceed the Significant Impact Level (SIL) and require a full cumulative modeling demonstration including all sources at the facility, all nearby offsite sources, and the addition of an ambient background concentration for comparison to the NAAQS. The implementation of this guidance more than 10 years after the $PM_{2.5}$ NAAQS was first implemented for PSD permitting, and only approximately 2 years before a more stringent revised $PM_{2.5}$ NAAQS is implemented, poses substantial challenges to permit applicants and regulatory agencies charged with issuing permits. The increased likelihood of triggering cumulative analyses – even for sources or modifications that are minor for direct $PM_{2.5}$ emissions, amplifies the urgency for EPA to address other issues identified in these comments related to biased ambient monitors, simulation of variable emissions, spatial and temporal correlation of secondary $PM_{2.5}$ formation, and selection of ambient air receptors, all of which can significantly affect the representativeness of a $PM_{2.5}$ cumulative analysis.

4. CONCLUSION

ALL4 appreciates the continued work and effort EPA has made to further the scientific accuracy of the AERMOD modeling system and clarify the process and procedures in Appendix W that are required to perform air dispersion modeling for regulatory analyses. We believe, however, that significant additional changes must be made to accommodate ever stricter NAAQS and increasingly complex modeling scenarios. Given the timeframe of Appendix W revisions, EPA must act now to address the issues outlined in this comment document. Waiting another 3 years to begin to address these issues could put large areas of the country in permitting gridlock and significantly impact the ability of communities to take advantage of the recent generational investments that Congress has enacted through the Bipartisan Infrastructure Bill for new transportation infrastructure, CHIPS and Science Act for semi-conductor facilities, and Inflation Reduction Act clean energy investments. Overly conservative modeling will impose highly costly permitting that may smother both public and private sector investments and their associated economic and employment opportunities. We are seeking review of these areas to reduce the many layers of overly conservative assumptions, not eliminate the protectiveness of the models, with the goal of allowing industry to continue to expand in the United States while continuing the trend of improving air quality throughout the country.