



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

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OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Proposed Approach for Demonstrating Ozone PSD Compliance
FROM: Tyler J. Fox, Group Leader 
Air Quality Modeling Group, C439-01
Office of Air Quality Planning and Standards
TO: Proposed Regulatory Docket No. EPA-HQ-OAR-2015-0310

Introduction

To specifically assist the public in commenting on the “Revision to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter” proposed rule within the overall context of the New Source Review (NSR) program, including Prevention of Significant Deterioration (PSD), the Environmental Protection Agency (EPA) has added two memoranda to the docket of this proposed rule.^{1,2} These memoranda provide details on how a future approach to PSD compliance demonstrations will work for secondary fine particulate matter (PM_{2.5}) and our expectations for how such an approach might work for ozone based on future, separate actions to establish a Significant Impact Level (SIL) and Model Emissions Rates for Precursors (MERPs) for PM_{2.5} and ozone. This memorandum will focus on ozone and the related precursors of volatile organic compounds (VOC) and nitrogen oxides (NO_x).

The complex chemistry of ozone formation is well-documented and has historically presented significant challenges with the identification and establishment of particular models for assessing the impacts of individual stationary sources on the formation of this air pollutant.^{3,4}

¹ U.S. EPA, 2015. “Proposed Approach for Demonstrating PM_{2.5} PSD Compliance”, Memorandum to Docket No. EPA-HQ-OAR-2015-0310 by Tyler J Fox, U.S. EPA/OAQPS, Research Triangle Park, NC. June 30, 2015.

² U.S. EPA, 2015. “Proposed Approach for Demonstrating Ozone PSD Compliance”, Memorandum to Docket No. EPA-HQ-OAR-2015-0310 by Tyler J Fox, U.S. EPA/OAQPS, Research Triangle Park, NC. June 30, 2015.

³ NARSTO, 2000. An Assessment of Tropospheric Ozone Pollution: A North American Perspective. The NARSTO Synthesis Team. NARSTO Management Office (Envair), Pasco, Washington.

⁴ Seinfeld and Pandis. 1998. Atmospheric Chemistry and Physics: From Air Pollution to Climate Change. J. Seinfeld and S. Pandis. Wiley Interscience. New York, New York. ISBN 0 47 117815 2.

Because of these considerations, the EPA's judgment in the past has been that it was not technically sound to assign with particularity specific models that must be used to assess the impacts of a single source on ozone concentrations. Instead, the EPA has chosen to satisfy the requirements of Section 165(e) (3) (D) of the Clean Air Act (CAA) by determining particular models or other analytical techniques that should be used on a case-by-case basis.⁵ As stated in Section 5.2.1.c of the current *Guideline on Air Quality Models* (published as Appendix W to 40 CFR Part 51, hereafter *Guideline*), the “[c]hoice of methods used to assess the [ozone] impact of an individual source depends on the nature of the source and its emissions.” Under this approach, the appropriate methods for assessing ozone impacts are determined in consultation with the appropriate EPA Regional Office and/or permit reviewing authority on a case-by-case basis. A modeling protocol should be developed by the permit applicant and approved by the appropriate permitting authority to ensure that the analysis conducted will conform to the recommendations, requirements, and principles of Section 10.2.1 of the current *Guideline*.

In the January 2012, Sierra Club petition grant,⁶ the EPA committed to engage in rulemaking to evaluate whether updates to the *Guideline* are warranted and, as appropriate, incorporate new analytical techniques or models for ozone and secondarily formed PM_{2.5}. The EPA’s proposed revisions to the *Guideline* satisfies the EPA’s commitment in the petition grant. As a part of this commitment and in compliance with CAA section 320, the EPA conducted the Tenth Modeling Conference in March 2012, where there were presentations of ongoing research of single-source plume chemistry and photochemical grid modeling techniques, as well as several public forums, and the EPA subsequently received written comments pertaining to such modeling. The EPA initiated Phase 3 of the Interagency Workgroup on Air Quality Modeling (IWAQM) process in June 2013 to inform this process to update the *Guideline* to address chemically reactive pollutants for near-field and long-range transport applications. Comments received from stakeholders at the Tenth Modeling Conference supported this collaborative effort to provide additional guidance for modeling single-source impacts of secondarily formed pollutants in the near-field and for long-range transport. Stakeholder comments also supported the idea of this collaborative effort occurring in parallel with stakeholders’ efforts to further model development and evaluation. The EPA’s recommended revisions to the *Guideline* are largely based on detailed review and assessment of this input.

The remainder of this memo provides a summary of the current approach and the proposed approach, as anticipated under the proposed revisions to the *Guideline* and other future

⁵ We note that this technical judgment has no effect on the obligation of sources subject to PSD to conduct a source impact analysis and demonstrate that a proposed source or modification will not cause or contribute to a violation of any NAAQS. 40 CFR 51.166(k); 52.21(k). That is, the inclusion of a process rather than a specific preferred model in Appendix W does not relieve the source of the requirement to make this demonstration, which necessarily involves an analysis.

⁶ U.S. EPA, 2012. Gina McCarthy Letter to Robert Ukeiley dated January 4, 2012, Washington, D.C. 20460. http://www.epa.gov/ttn/scram/10thmodconf/review_material/Sierra_Club_Petition_OAR-11-002-1093.pdf.

EPA rulemakings and guidance, for demonstrating compliance with the ozone National Ambient Air Quality Standards (NAAQS).

Summary of Current Approach

As described above, the current approach to assess the ozone impacts of an individual source is performed on a case-by-case basis in consultation with the appropriate EPA Regional Office and/or permit reviewing authority. Section 5.2.1.c of the current *Guideline* states, the “[c]hoice of methods used to assess the [ozone] impact of an individual source depends on the nature of the source and its emissions.” There is currently not a preferred or recommended analytical technique or modeling system to perform ozone compliance demonstration assessments for individual sources. Some assessments have been completely qualitative in nature; while others have utilized chemical transport (*e.g.*, photochemical grid) models as part of the assessment. Through the consultation process, a modeling protocol should be developed by the permit applicant and approved by the appropriate permitting authority to ensure that the analysis conducted will conform to the recommendations, requirements, and principles of Section 10.2.1 of the current *Guideline*.

Summary of Proposed Approach under Future EPA Rulemakings

For the proposed revisions to the *Guideline*, the EPA has determined that advances in photochemical modeling science indicate it is now reasonable to provide more specific, generally-applicable guidance that identifies particular models or analytical techniques that may be used under specific circumstances for assessing the impacts of an individual source on ozone. For assessing ozone impacts from single sources, the degree of complexity required to assess potential impacts varies depending on the nature of the source, its emissions, and the background environment. In order to provide the user community flexibility in estimating single-source ozone impacts and given the emphasis on the use of chemical transport models for these purposes, the EPA is proposing a two-tiered demonstration approach for addressing single-source impacts on ozone, *i.e.*,

- First tier involves use of technically credible relationships between precursor emissions and a source’s impacts that may be published in the peer-reviewed literature; developed from modeling that was previously conducted for an area by a source, a governmental agency, or some other entity and that is deemed sufficient; or generated by a peer-reviewed reduced form model.
- Second tier involves application of more sophisticated case-specific chemical transport models (*e.g.*, photochemical grid models) to be determined in consultation with the EPA Regional Office and conducted consistent with new EPA single-source

modeling guidance.⁷

To fully implement these proposed changes to the *Guideline* related to addressing ozone impacts, the EPA intends to pursue a separate rulemaking to establish a technical basis and new values for ozone Significant Impact Levels (SILs) and to introduce a new demonstration tool for ozone precursors referred to as Model Emissions Rates for Precursors (MERP). Figure 1 illustrates how the demonstration tools would be implemented in the future proposed approach. A MERP would neither replace the existing Significant Emissions Rates (SERs) for these pollutants nor serve as the basis for the applicability of PSD requirements to sources with emissions above the SER. However, a MERP would represent a level of emissions of precursors that is not expected to contribute significantly to concentrations of ozone. Our present understanding of the atmospheric science of ozone formation indicates that MERP values for VOC and NO_x will likely be higher than their SERs as criteria pollutants and more appropriate for evaluating their impacts as precursor pollutants to ozone formation. As part of the separate rulemaking, the EPA intends to demonstrate that a source with precursor emissions of VOC or NO_x below the MERP level will have ambient impacts that will be less than the SIL and, thereby, provide a sufficient demonstration that the source will not cause or contribute to a violation of the ozone NAAQS.

The EPA's *Guidance for PM_{2.5} Permit Modeling*⁸ provides for a three-tiered approach to address secondary PM_{2.5} that includes:

- 1) a qualitative assessment;
- 2) a hybrid qualitative/quantitative assessment utilizing existing technical work; and
- 3) a full quantitative modeling exercise.

Aspects of this three-tiered approach provides a parallel for consideration of conducting permit modeling for ozone. As such, the EPA expects that MERPs as a demonstration tool will absolve the need for a first tier of a qualitative assessment since sources that would potentially provide a qualitative assessment of ozone impacts are expected to have precursor emissions levels below the MERP. The second and third tiers of assessment would then be consistent with the EPA's proposed two-tiered demonstration approach for ozone reflected in Section 5.3.2 of the proposed revisions to the *Guideline*.

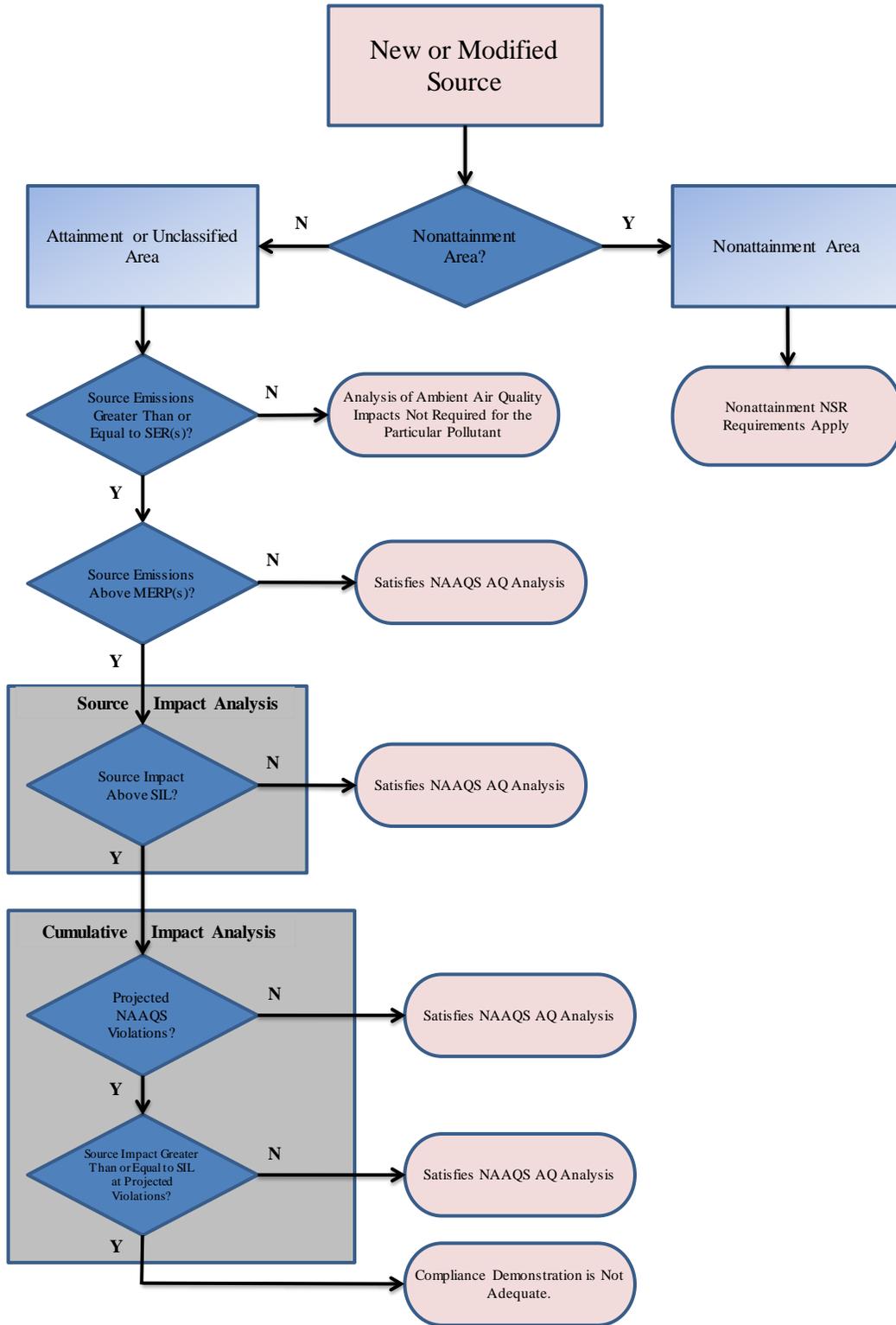
While the development of MERPs for ozone precursors is expected to address a number of PSD permitting situations, the EPA believes that most of the remaining situations in which a source must demonstrate compliance under the proposed *Guideline* will be addressed sufficiently

⁷ U.S. EPA, 2015. Guidance on the use of models for assessing the impacts from single sources on secondarily formed pollutants ozone and PM_{2.5}. Publication No. EPA 454/P-15-001. Office of Air Quality Planning & Standards, Research Triangle Park, North Carolina 27711.

⁸ U.S. EPA, 2014. Guidance for PM_{2.5} Modeling. May 20, 2014, Publication No. EPA-454/B-14-001. Office of Air Quality Planning & Standards, Research Triangle Park, NC.
http://www.epa.gov/ttn/scram/guidance/guide/Guidance_for_PM25_Permit_Modeling.pdf.

under the proposed first tier where existing technical information could be used in combination with other supportive information and analysis for the purposes of estimating ozone impacts from a particular source. The existing technical information should provide a credible and representative estimate of the ozone impacts from the project source. In these situations, a more refined approach for estimating ozone impacts from project sources may not be necessary. The EPA has been compiling and reviewing screening approaches that are based on technically credible tools (*e.g.*, photochemical grid models) that relate source precursor emissions to ozone impacts. In review of existing approaches detailed in peer reviewed journal articles and non-peer reviewed forms (*e.g.*, technical reports, conference presentations), it is not clear that a single approach has been clearly proposed to and evaluated by the modeling community for estimating screening level ozone impacts from single sources. Other screening level alternatives to chemical transport model application may include the use of existing credible photochemical model impacts for sources deemed to be similar in terms of emission rates, release parameters, and background environment. The EPA will continue to engage with the modeling community to identify credible alternative approaches for estimating single-source ozone impacts which provide flexibility and are less resource intensive for permit demonstration purposes.

Figure 1. Overview of NAAQS Compliance Demonstration for New or Modifying Sources Under NSR/PSD Programs: Under Future EPA Rulemakings & Guidance



Summary

To summarize, the EPA is providing this memorandum to the docket of the “Revision to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter” proposed rule to specifically assist the public in providing comment. This memoranda provides details within the overall context of the NSR program, including PSD, on how a future approach to PSD compliance demonstrations will work for ozone based on a future action to establish a SIL and MERPs for ozone and its precursors. If you have additional questions regarding this memorandum or the proposed rulemaking, please feel free to contact me, (919) 541-5562 or fox.tyler@epa.gov, or contact George Bridgers, (919) 541-5563 or bridgers.george@epa.gov.

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