

Implementing Appendix W for Refined Hot-Spot Analysis

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Outline

- What is Appendix W? How did it change in 2017?
- What is AERMOD? How does it work?
- What activities are involved in a PM Quantitative Hotspot (Refined) Analysis?
- Summary



WHAT IS APPENDIX W? HOW DID IT CHANGE IN 2017?



Appendix W

- 40 CFR Part 51 Appendix W, “Guideline on Air Quality Models”
 - <https://www.epa.gov/scram/air-quality-dispersion-modeling>
- Provides EPA’s preferred models, other techniques, and guidance for estimating ambient concentrations of air pollutants (dispersion modeling)
- Used for SIP modeling, permitting, conformity and other air quality assessments
- For FHWA, affects CO and PM hot-spot analyses for transportation conformity purposes



2017 Final Rule

- January 17, 2017 Final Rule revised Appendix W
- CO Screening Analysis
 - Continue to rely on 1992 CO guidance that employs CAL3QHC
- Refined mobile source applications
 - AERMOD replaces CALINE as preferred model after transition period
 - Continue to choose AERMOD or CALINE3/CAL3QHCR for any refined analysis started before the end of the 3-year transition period (January 17, 2020)

5182 Federal Register / Vol. 82, No. 10 / Tuesday, January 17, 2017 / Rules and Regulations

ENVIRONMENTAL PROTECTION AGENCY
40 CFR Part 51
EPA-HQ-OAR-2015-0210; FRL-9956-23-OAR
RIN 2060-A554

Revisions 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

AGENCY: Environmental Protection Agency (EPA).
ACTION: Final rule.

SUMMARY: In this action, the Environmental Protection Agency (EPA) promulgates revisions to the *Guideline on Air Quality Models* ("Guideline"). The Guideline provides EPA's preferred models and other recommended techniques, as well as guidance for their use in estimating ambient concentrations of air pollutants. It is incorporated into the EPA's regulations, satisfying a requirement under the Clean Air Act (CAA) for the EPA to specify with reasonable particularity models to be used in the Prevention of Significant Deterioration (PSD) program. This action includes enhancements to the formulation and application of the EPA's preferred near-field dispersion modeling system, AERMOD (American Meteorological Society (AMS)/EPA Regulatory Model), and the incorporation of a tiered demonstration approach to address the secondary chemical formation of ozone and fine particulate matter (PM_{2.5}) associated with precursor emissions from single sources. The EPA is changing the preferred status of and removing several air quality models from appendix A of the Guideline. The EPA is also making various editorial changes to update and reorganize information throughout the Guideline to streamline the compliance assessment process.

DATES: This rule is effective February 16, 2017. For all regulatory applications covered under the Guideline, except for transportation conformity, the changes to the appendix A preferred models and revisions to the requirements and recommendations of the Guideline must be integrated into the regulatory processes of respective reviewing authorities and followed by applicants by no later than January 17, 2018. During the 1-year period following promulgation, protocols for modeling analyses based on the 2005 version of the Guideline, which are submitted in a timely manner, may be approved at the discretion of the appropriate reviewing authority. This final rule also starts a 3-year transition period that ends on January 17, 2020 for transportation conformity purposes. Any refined analyses that are started before the end of this 3-year period, with a preferred appendix A model based on the 2005 version of the Guideline, can be completed after the end of the transition period, similar to implementation of the transportation conformity grace period for new emissions models. See the discussion in section IV.A.4 of this preamble for details on how this transition period will be implemented.

All applicants are encouraged to consult with their respective reviewing authority as soon as possible to assure acceptance of their modeling protocols and for modeling demonstration during either of these periods.

ADDRESSES: The EPA has established a docket for this action under Docket ID No. EPA-HQ-OAR-2015-0210. All documents in the docket are listed on the <https://www.regulations.gov> Web site. Although listed in the index, some information is not publicly available, e.g., Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available electronically through <https://www.regulations.gov>.

FOR FURTHER INFORMATION CONTACT: Mr. George M. Bridges, Air Quality Assessment Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Mail code 4203-01, Research Triangle Park, NC 27711; telephone: (919) 541-5563; fax: (919) 541-0644; email: Bridges.George@epa.gov.

SUPPLEMENTARY INFORMATION:

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K. Congressional Review Act (CRA)

I. General Information

A. Does this action apply to me?

This action applies to federal, state, territorial, local, and tribal air quality management agencies that conduct air quality modeling as part of State Implementation Plan (SIP) submittals and revisions, New Source Review (NSR) permitting (including new or modifying industrial sources under Prevention of Significant Deterioration (PSD), conformity, and other air quality assessments required under EPA regulation, Categories and entities potentially regulated by this action include:

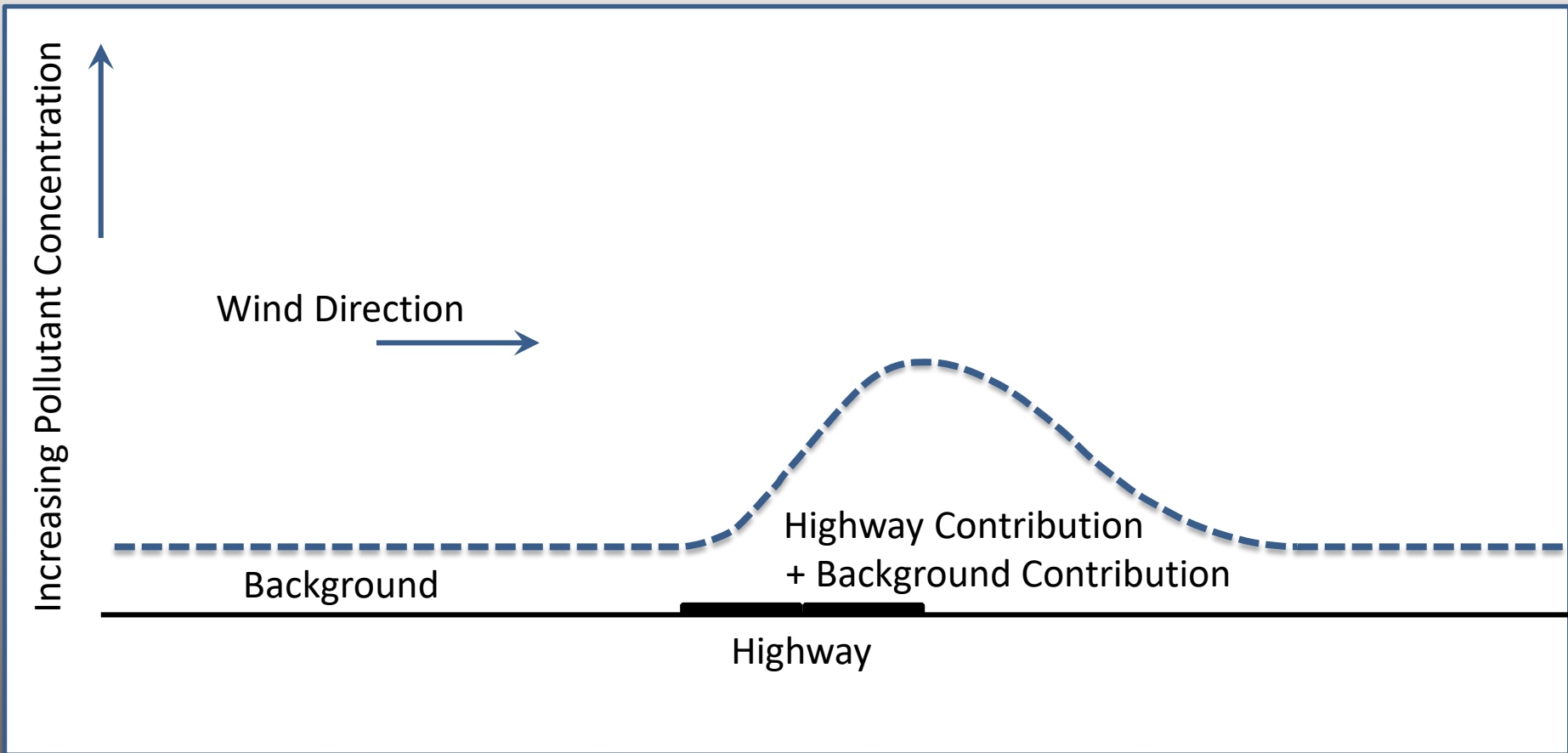


Defining Analysis Terms

- **Hot-Spot Analysis**
 - an estimation of likely future localized pollutant concentrations and a comparison of those concentrations to the relevant NAAQS (40 CFR 93.101)
 - **Screening model***
 - simple techniques using preset, worst-case meteorology
 - conservative estimates of air quality impacts
 - **Refined model***
 - detailed treatment of physical and chemical atmospheric processes,
 - detailed and precise input data
 - more specialized concentration estimates
- *Paraphrased from Appendix W Section 2.2



Project-Level Hot-Spot Analysis



WHAT IS AERMOD? HOW DOES IT WORK?



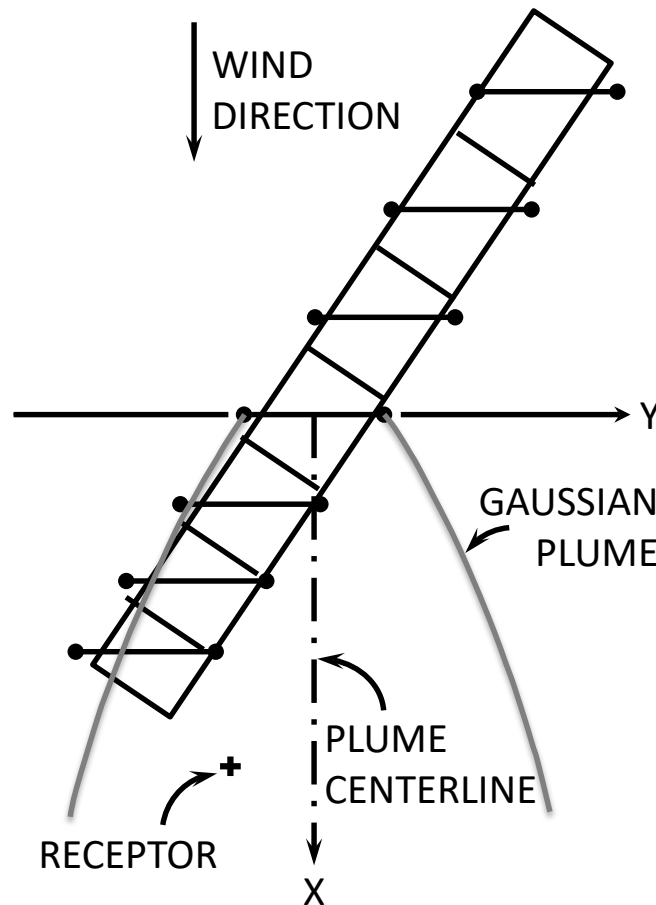
AERMOD

- American Meteorological Society/EPA Regulatory Model (AERMOD)
 - steady-state plume model
 - air dispersion based on planetary boundary layer turbulence structure and scaling concepts



Plume Dispersion from Highways

adapted from Benson, 1979



AERMOD Source Types

- AERMOD options for modeling transportation projects:
 - Volume
 - Area/Line
 - RLINE
 - Expected to be released as a beta option in a new version of AERMOD



Highway Air Dispersion Model

Emissions

- Highway Configuration
- Traffic Parameters
- Emission Factors

Meteorology

- Wind Speed
- Wind Direction
- Atmospheric Stability
- Mixing Height

Dispersion Model

- Transport and Diffusion
- Traffic-Induced Turbulence
- Chemical Transformation

Receptor Concentration



WHAT ACTIVITIES ARE INVOLVED IN A PM QUANTITATIVE HOT-SPOT (REFINED) ANALYSIS?



Regulatory PM Hot-spot Guidance

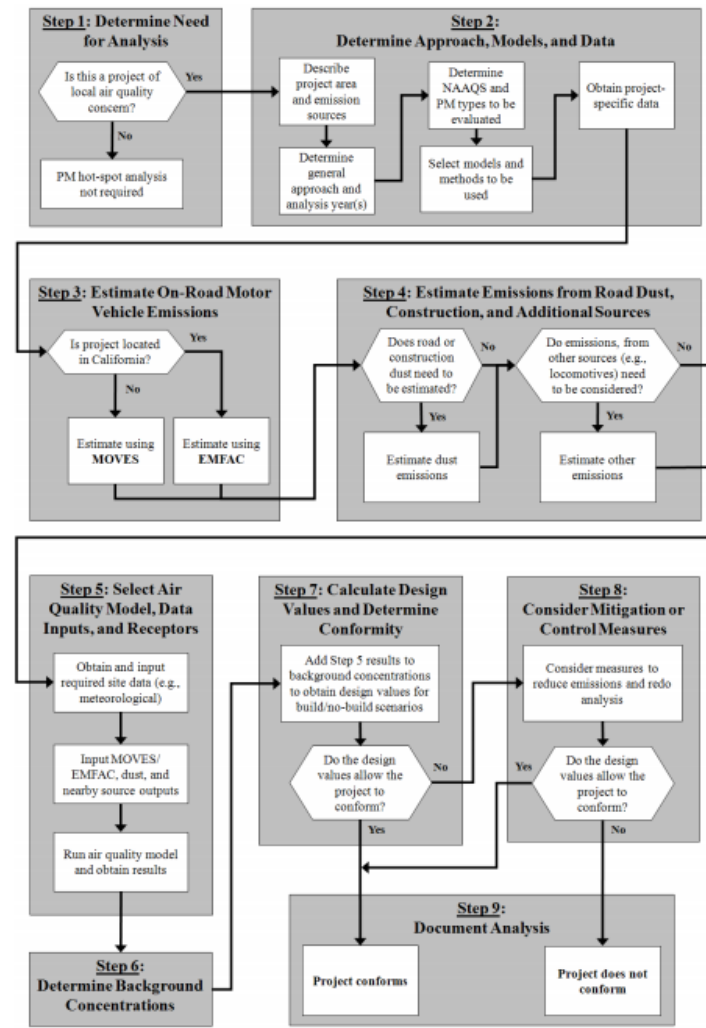
Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM_{2.5} and PM₁₀ Nonattainment and Maintenance Areas



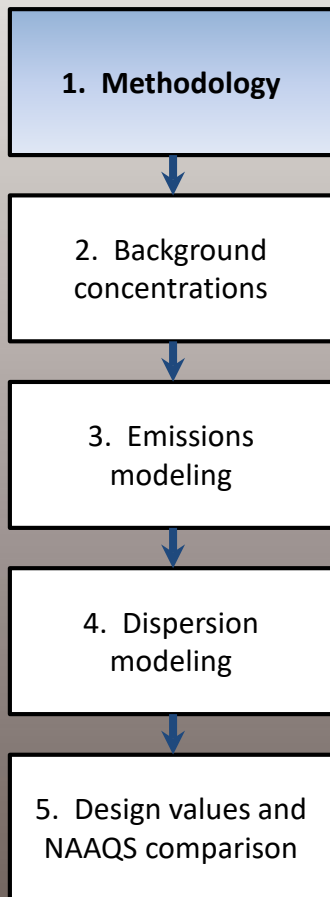
Available at:
<https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100NMXM.pdf>



U.S. Department of Transportation
Federal Highway Administration



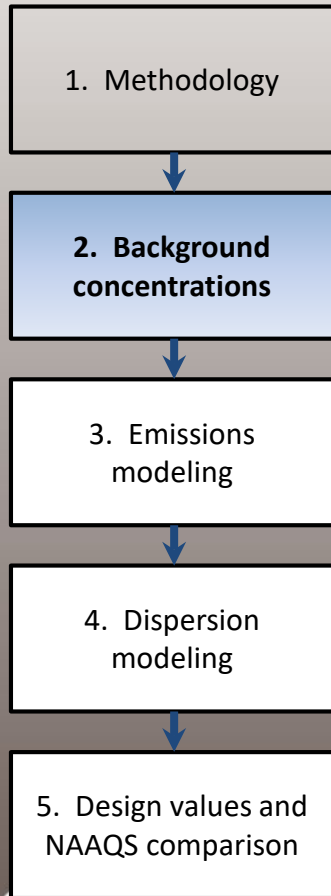
1. Methodology



- Applicable pollutants and NAAQS to be evaluated
- Scaled map of the project area
- General approach, including:
 - analysis year(s)
 - project alternatives
 - proposed method for developing background concentrations
 - project-specific traffic and meteorology data to be used
- Schedule for conducting the analysis and points of coordination



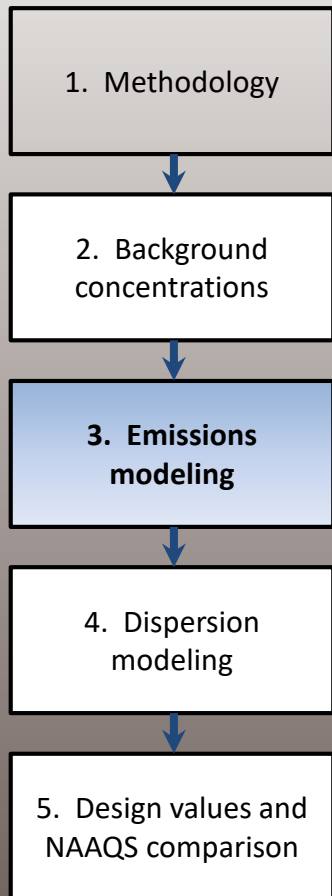
2. Background Concentrations



- Determine background concentrations from other and nearby sources
 - Based on ambient air monitoring data or urban-scale modeling
 - Critical input for particulate matter (PM) hot-spot analyses – should be determined at the start of the analysis



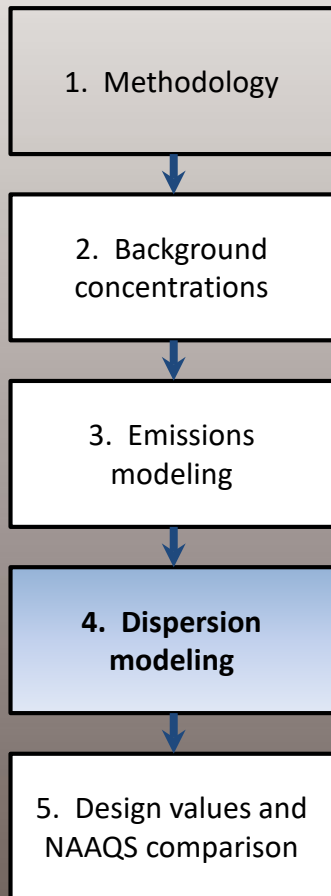
3. Emissions Modeling



- Obtain project-specific traffic data
- Prepare link-specific inputs of project-scale traffic activity
- Run the emissions model to estimate emissions inputs to dispersion modeling
 - Link-specific emissions
 - Emissions factor look-up tables
- Estimate emissions from re-entrained road dust (PM), construction, and additional sources, as applicable



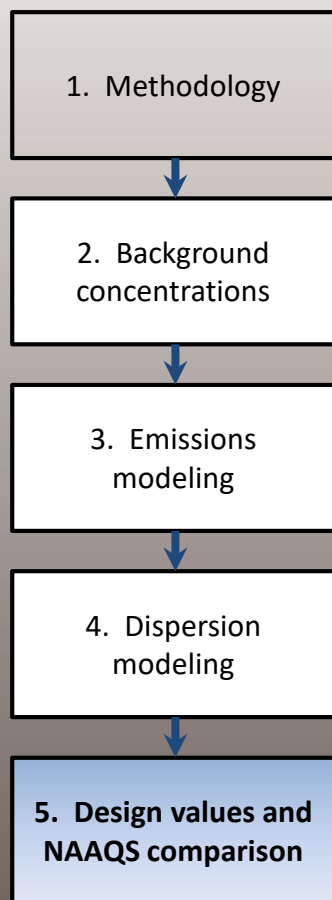
4. Dispersion Modeling



- Select a highway air dispersion model
- Compile data inputs
 - Receptor locations
 - Highway configuration
 - Emissions
 - Meteorology
- Run the highway air dispersion model to estimate the project contribution at each receptor location



5. Design Values and NAAQS Comparison



- The key outcome of a project-level hot-spot analysis
 - Compute design values:
 - Highway contribution + background concentrations
 - Ambient concentration statistics appropriate for comparison to National Ambient Air Quality Standards (NAAQS)
 - Are design values \leq NAAQS ?
- May consider available mitigation and/or control options to minimize impacts



SUMMARY



Summary of Important Points

- Appendix W was updated in 2017 to replace CALINE with AERMOD for refined hot-spot analysis
 - 3-year transition period ends January 17, 2020
- Two options for modeling highway projects in AERMOD, soon to be three
- PM hot-spot analyses require a considerable amount of time and effort



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