**AERMOD Modeling System Development White Papers**

**Background**

The *Guideline on Air Quality Models* (published as Appendix W to 40 CFR Part 51) is used by the EPA, other federal, state, territorial, and local air quality agencies, and industry to prepare and review new source permits, source permit modifications, SIP submittals and revisions, conformity, and other air quality assessments required under EPA regulation. The *Guideline* serves as a means by which national consistency is maintained in air quality analyses for regulatory activities. In April 2000, EPA proposed that the AERMOD Modeling System be adopted as a replacement to ISC3 in Appendix A of the *Guideline*. In November 2005, the EPA finalized this proposal, and formally adopted AERMOD as the preferred dispersion model for many regulatory applications. This promulgation of AERMOD represented the culmination of over a decade of development, evaluation, and review, including multiple rounds of public comment through the formal rule making process. In 2017, the EPA finalized a 2015 proposal that updated the *Guideline* and included enhancements to the formulation and application of the EPA’s AERMOD.

**AERMOD Development and Update Plan**

The historical AERMOD development has followed the requirements for preferred models outline in the *Guideline*. As the EPA looks to future updates, enhancements, and development of the AERMOD Modeling System, it is important to maintain high standards for development, evaluation, and quality assurance. To accomplish this goal, the EPA has developed the AERMOD Development and Update Plan. The Plan provides extensive history on AERMOD development, documents the EPA’s best practices for model development, and outlines a path for future development to maximize transparency and feedback from the stakeholder community.

* **AERMOD Modeling System Development and Update Plan** (To be released as soon as possible)

**AERMOD White Papers**

The papers have a standard format to ensure these items are addressed in order to lay the appropriate groundwork for further research and development:

* Overview of issue – this section provides a description of the known issue in AERMOD that needs to be addressed. The emphasis is that there is a clearly demonstrable deficiency in the model related to specific features or formulations of the model (e.g., a statement that the model overpredicts is too general to serve as the basis for further model development).
* Current implementation in AERMOD – this section is meant to provide a summary of the model formulation in AERMOD (or other preferred if AERMOD is not the preferred model).
* Summary of current literature or research – In general, the modeling issues addressed in the model development plan white papers have some sort of path forward, i.e., that there is already research or development for the EPA and stakeholder to consider. Thus, this section should provide a summary of known literature on the topic or provide other pertinent information, such as field study data available to inform the development process.
* Considerations for updates to the model system – this section is meant to summarize how the available information could be applied in the modeling system, with an emphasis on the practical application and implementation.

The current iteration of the model development plan consists of a body of white papers that have been developed solely by the EPA. However, many of the white paper topics are based on work initiated or completed and provided by the modeling community (e.g., downwash and overwater dispersion). By providing this template for white paper development, the EPA is actively seeking input from the stakeholder community on potential model improvements by requesting similar white papers. The EPA can evaluate community-supplied white papers, and if appropriate, incorporate to the Model Development and Update Plan and distribute to the wider stakeholder community.

* [LOWWIND Options (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/lowwind_overview_white_paper.pdf)(3 pp, 189 K, 05-13-2019):  Continued efforts intended to address AERMOD’s tendency to overpredict in low wind conditions for some source types.
  + [Minimum Value for Lateral Turbulence (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/lowwind_min_sigma-v_white_paper.pdf)(4 pp, 220 K, 05-13-2019)
  + [Issues Related to Plume Meander in the AERMOD System (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/lowwind_plume_meander_white_paper.pdf)(4 pp, 305 K, 05-13-2019)
* [Saturated Plumes (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/plume_rise_white_paper.pdf)(4 pp, 145 K, 05-13-2019): Effort to enhance AERMOD’s treatment of moist plumes due to enhanced thermodynamics not currently accounted for by the model.
* [Downwash Algorithms (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/downwash_overview_white_paper.pdf)(5 pp, 157 K, 05-13-2019):  Efforts to improve AERMOD predictions for downwash situations involving near-term updates and long-term incorporation of new research.
  + [Building Downwash Alpha Options in AERMOD (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/downwash_alpha_options_white_paper.pdf)(6 pp, 274 K, 05-13-2019)
* [NO2 Modeling Techniques (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/no2_modeling_techniques_white_paper.pdf)(3 pp, 135 K, 05-13-2019):  Continued efforts intended to improve performance of AERMOD’s Tier 3 methods.
* [NO2 Travel Time (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/no2_travel_time_white_paper.pdf)(4 pp, 193 K, 10-01-2019): Development of a new Tier 2 NO2 method
* [Mobile Source Modeling (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/mobile_sources_white_paper.pdf)(5 pp, 155 K, 05-13-2019):  Efforts intended to integrate R-LINE into the AERMOD dispersion model for future consideration as an EPA preferred model.
* [Overwater Modeling (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/overwater_white_paper.pdf)(8 pp, 225 K, 05-13-2019):  Efforts intended to allow AERMOD to replace OCD model as an EPA preferred model.

For reference, the initial memorandum and version of the AERMOD White Papers from September 2017 are provided below:

* [EPA White Papers on Planned Updates to AERMOD Modeling System Memorandum (PDF)](https://www.epa.gov/sites/production/files/2021-01/documents/20170919_aermod_development_white_papers.pdf)(40 pp, 967 K, 09-19-2017)

Feedback and technical comments with respect to the AERMOD White Papers or the AERMOD Modeling System Development and Update Plan can be sent to Chris Owen, [Owen.Chris@epa.gov](mailto:Owen.Chris@epa.gov).