Revisions to the Guideline on Air Quality Models

The U.S. Environmental Protection Agency (EPA) promulgated revisions to the Guideline on Air Quality Models (January 17, 2017) with an effective date that was deferred to May 22, 2017. The Guideline on Air Quality Models (GAQM) provides EPA’s preferred models and other recommended techniques, as well as guidance for their use in estimating ambient concentrations of air pollutants. This Document contains a brief summary of some of the significant revisions made to the GAQM. Additional details on the listed revisions, as well as revisions not summarized here, can be found with the final rule package.

Please note that the Air Dispersion Modeling Team (ADMT) is reviewing the Air Quality Modeling Guidelines (APDG document 6232) and will be making updates to the guidance document based on revisions to the GAQM. Until the guidance document is updated, be sure to consult with the ADMT on modeling approaches/techniques.

Updates to the AERMOD Modeling System

- The EPA adopted the ADJ_U* option in AERMET as a regulatory option for use in AERMOD for sources using standard National Weather Service (NWS) airport meteorological data, site-specific meteorological data without turbulence parameters, or prognostic meteorological inputs derived from prognostic meteorological models. The TCEQ is collecting recent NWS airport meteorological data and will process these data using the ADJ_U* option in AERMET and will make these AERMOD-ready meteorological files available on the Agency’s website as soon as possible.

- The EPA did not adopt the LOWWIND3 model option as a regulatory option in AERMOD, as proposed. The LOWWIND3 model option, along with the LOWWIND1 and LOWWIND2 model options, will remain beta options until further evaluations are conducted by the EPA.

- The EPA updated the regulatory options in AERMOD to address plume rise for horizontal and capped stacks. These two types of point sources (POINTHOR and POINTCAP) are now regulatory options in AERMOD.

- The EPA integrated the Buoyant Line and Point Source (BLP) dispersion model into the AERMOD modeling system.

- The EPA updated the NO2 Tier 2 and Tier 3 screening techniques in AERMOD. The EPA replaced the existing Tier 2 Ambient Ratio Method (ARM) with a revised ARM2 approach. The EPA incorporated the existing Ozone Limiting Method (OLM) and the updated Plume Volume Molar Ratio Method (PVMRM) (proposed as PVMRM2) model options as regulatory options in AERMOD. Required inputs associated with the OLM and PVMRM model options will need to be determined in consultation with the ADMT and EPA Region 6.

Updates to the Three-Tiered Approach for NO2

- The EPA replaced the existing Tier 2 ARM - factors of 0.75 for annual and 0.8 for 1-hour - with a revised ARM2 approach. ARM2 is based on hourly measurements of the NO2 to NOx ratios and provides more detailed estimates of this ratio based on the total NOx present. For Tier 2, multiply the Tier 1 results by the ARM2, which provides estimates of representative equilibrium ratios of NO2/NOx values based on ambient levels of NO2 and NOx derived from national data from the EPA’s Air Quality System. The national default for ARM2 will include a minimum NO2/NOx ratio of 0.5 and a maximum ratio of 0.9. Alternative default minimum NO2/NOx values may be established based on the source’s in-stack emissions ratio, with alternative minimum values reflecting the source’s in-stack NO2/NOx ratios. These should be based on source-specific data, which satisfies all quality assurance procedures that ensure data accuracy for both NO2 and NOx within the typical range of measured values. However, manufacturer test data, state or local agency guidance, peer-reviewed literature, or the EPA’s NO2/NOx ratio database may be used as sources of data.

- Tier 3 was revised to list the PVMRM model option along with the OLM model option as detailed screening techniques. Because of the additional input data requirements and complexities associated with the Tier 3 screening options, their usage shall occur in consultation with the ADMT and EPA Region 6.
**AERSCREEN**

- The EPA incorporated AERSCREEN into the GAQM as the recommended screening model for AERMOD.

**Single Source Impacts on Ozone and Secondary PM2.5**

- The EPA promulgated a two-tiered demonstration approach for addressing single-source impacts on ozone and secondary PM$_{2.5}$. The first tier involves the use of technically credible relationships between precursor emissions and a source's impact (that may be published in literature; developed from modeling that was previously conducted for an area by a source, a governmental agency, or some other entity that is deemed sufficient; or generated by a reduced form model) in combination with other supportive information and analysis for the purpose of estimating secondary impacts from a particular source. The second tier involves application of more sophisticated case-specific chemical transport models (e.g., photochemical grid models). The appropriate tier for a given application should be selected in consultation with the ADMT and be consistent with EPA guidance (this is guidance that was provided as a support document with the proposed revisions and subsequently updated with the final rule package).

- In the preamble to the proposed revisions, the EPA noted an intention to pursue separate rulemaking to establish a technical basis and new values for PM$_{2.5}$/O$_3$ significant impact levels (SILs) and to introduce a new demonstration tool for PM$_{2.5}$/O$_3$ precursors referred to as Model Emission Rates for Precursors (MERPs). The EPA issued draft guidance (Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program and Guidance on the Use of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Permit Related Programs) and deferred rulemaking at this time.

**CALPUFF and Long-Range Transport**

- The EPA removed CALPUFF as a preferred model in Appendix A for long-range transport assessments.

- The EPA codified a screening approach to address long-range transport (beyond 50 kilometers) for purposes of assessing NAAQS and/or PSD increments. The screening approach shall be used to determine if a significant ambient impact will occur with particular focus on Class I areas and/or the applicable receptors that may be threatened beyond 50 kilometers. The first step of the screening approach relies upon the near-field application of the appropriate screening and/or preferred model to determine the significance of ambient impacts at or about 50 kilometers from the new or modified source. If the analysis indicates there may be significant ambient impacts at this distance, further analysis is necessary. For further assessment of the significance of ambient impacts for NAAQS and/or PSD increments, there is not a preferred model or screening approach for distances beyond 50 kilometers. Thus, approaches (models and modeling parameters) must be established on a case-by-case basis in consultation with the ADMT and EPA Region 6 to conduct the second level assessment.

- If a cumulative impact analysis for NAAQS and/or PSD increments beyond 50 kilometers is necessary, the selection and use of an alternative model shall occur in consultation with the ADMT with approval from EPA Region 6 based on requirements of section 3.2.2(e) of the GAQM.

**EPA’s Model Clearinghouse**

- The EPA codified the process of the EPA Regional Offices consulting and coordinating with the Model Clearinghouse on all approvals of alternative models or techniques. All alternative model approvals will be issued by EPA Region 6 only after consultation with the EPA’s Model Clearinghouse and formal documentation through a concurrence memorandum that indicates that the alternative model requirements in section 3.2.2 of the GAQM have been met.

**Modeling Procedures for Cumulative Impact Analyses**

- The EPA provided a more definitive definition of the modeling domain. The modeling domain is the geographic area for which the required air quality analyses for the NAAQS and PSD increments are conducted. When conducting a NAAQS or PSD increment assessment, the modeling domain or project’s impact area shall include all locations where the emissions of a pollutant from the new or modifying source(s) may cause a significant ambient impact. This impact area is defined as an area with a radius extending from the new or modifying source to:
(1) the most distant location where air quality modeling predicts a significant ambient impact will occur, or (2) the nominal 50 kilometer distance considered applicable for Gaussian dispersion models, whichever is less.

- As part of a cumulative impact analysis, Table 8-2 of the GAQM allows for the model user to account for actual operations in developing the emissions inputs for dispersion modeling of nearby sources (i.e., relying on actual emissions data), while other sources are best represented by air quality monitoring data. Consultation with the ADMT is recommended on the identification of nearby sources, and the establishment of the appropriate emissions inputs for the nearby sources.

- The EPA made revisions regarding the determination of background concentrations. Many of these revisions are based on the EPA clarification memoranda issued since 2010 that were intended to provide the necessary clarification regarding applicability of the GAQM to PSD modeling for new standards. The revisions are for situations involving isolated single-sources and multi-source areas with an emphasis on how to determine which nearby sources to explicitly model, based on the concept of significant concentration gradients, and the use of monitored background to adequately represent other sources.

**Meteorological Input Data**

- The GAQM recommends the use of the AERMINUTE meteorological data processor to calculate hourly average wind speed and direction when processing NWS automated surface observing station (ASOS) data for AERMET.

- The GAQM provides an option to use prognostic meteorological data for a regulatory modeling application where there is no representative NWS station, and it is prohibitive or not feasible to collect adequately representative site-specific data. The EPA released the Mesoscale Model Interface Program (MMIF) that converts the prognostic meteorological data (Mesoscale Model 5 or Weather Research and Forecasting) into a format suitable for dispersion modeling applications. When processing prognostic meteorological data for AERMOD, the MMIF should be used to process data to generate AERMET inputs and the data subsequently processed through AERMET for input into AERMOD. The GAQM also notes that at least three years of prognostic meteorological data are required, and an operational evaluation of the meteorological modeling data for all model years (i.e., statistical or graphical) should be completed. The use of these data will need to be coordinated with the ADMT.

**Transition Period**

- The EPA established a one-year transition period for all regulatory applications, except for transportation conformity (which has a three-year transition period), for integrating revisions to the requirements and recommendations of the GAQM into the regulatory process. The transition period began on the promulgation date of January 17, 2017. During the one-year transition period, protocols for modeling analyses based on the 2005 version of the GAQM may be approved at the discretion of the ADMT.