

Model Change Bulletin (MCB) 15

AERMOD version 21112 (April 22, 2021)

Changes are listed by type and with each change are the affected pollutants and source types:

Bug Fixes

Item	Modification	Pollutants	Source Types
1	Added capability to use flagpole receptor heights to buoyant line sources.	All	BUOYLINE
2	Updated subroutine DEBOPT to add a default debug filename, DEPOS.DBG that contains wet deposition information when deposition debug requested and model debug is not requested.	All	All
3	Updated subroutine METEXT to recognize MMIF data processed through AERMET as valid. Previously MMIF processed through AERMET was seen by AERMOD as possibly from an outdated version of AERMET.	All	All
4	Added error message when using ppb or ppm for background units unless pollutant is NO ₂ , SO ₂ , or CO. Other pollutants are assumed to be ug/m ³ and do not have conversion factors built in.	All	All
5	Updated PFLCNV to remove duplicate sigma-v calculations when checking to see if adjust u* has been applied. Sigma-v is initially calculated from sigma-theta if wind speed is not missing. Duplicate code calculated sigma-v from sigma-theta even if wind speed was missing. This fix only affects meteorological data with site-specific turbulence measurements. Applications involving NWS data only are not affected.	All	All
6	Added check to determine if lines in a buoyant line group are parallel; differences in excess of 5 degrees generates a warning message and AERMOD will continue the model run.	All	BUOYLINE
7	Corrected BL_CALC to not reset key met parameters to rural values when no urban sources.	All	BUOYLINE
8	Updated RLINE.F to add local QEMIS for calculation of emissions when using EMISFACT keyword for time-varying emission factors with RLINE sources.	All	RLINE
9	Updated HRLOOP to set AO3CONC to missing when reading missing values from the hourly ozone data file so that MAXDCONT results will match base AERMOD run.	NO ₂	All

10	Initialize logical variable AWMADWDBG to FALSE to avoid writing downwash debug output even when building downwash not being calculated.	All	POINT, POINTHOR, POINTCAP
11	Updated AWMA_DOWNWASH subroutine in COSET.F to change error message for AWMAUTURB and STREAMLINE to be 126 to avoid conflict with intended purpose of error message 125. Error message 125 is for situations where keyword FINISHED is not found. Updated modules.f to include error message 126 and error message 125.	All	All
12	Updated the SUMBACK_NO2 and EV_SUMBACK modules to properly convert background concentrations when the BACKUNIT keyword is used to convert output units.	NO2	All
13	Removed fatal error which would occur if processing INCLUDED files with RLINE or RLINEXT LOCATION inputs.	All	RLINE & RLINEXT

Enhancements

Item	Modification	Pollutants	Source Types
1	Added check to determine if lines in a buoyant line group are parallel; differences in excess of 5 degrees generates a warning message and AERMOD will continue the model run.	All	BUOYLINE
2	Added capability to process multiple buoyant line groups.	All	BUOYLINE
3	The warning message that has been associated with code 305 - 'Stack height > or = EPA formula height for SRCID: ' has been removed and AERMOD will no longer issue this message. This warning was added in version 11059 when the WAKEFLG setting based on the wind direction specific GEP calculation was disabled. The warning was originally added at the time to inform users that downwash would be applied even though stack height was above the direction specific GEP for the hour, calculated using the direction specific building dimension for the current hour the model is processing. The message has caused confusion implying that the stack height is > or = to the non-direction specific formula GEP height based on the building height and maximum projected building width.	All	POINT, POINTHOR, POINTCAP

4	Updated SOSET to allow users to enter a 0 for gas deposition parameters to use a default value for that parameter. Also updated SOSET to allow users to enter a 0 for fine mass fraction and/or mean particle diameter for certain pollutants.	AS, CD, PB, HG, HG0, HGII, POC, TCDD, BAP, POC, NO2, SO2	All
5	Add new keywords in ME pathway to set non-missing σ_{θ} or σ_w in profile file to missing for all hours, stable hours only, or convective hours only. Options are also available to set each one missing independently of the other.	All	All
6	Made changes to code to improve speed without affecting result (e.g., using integer exponent when possible).	All	RLINE and RLINEXT
7	Added PROG to metext.f and meset.f to include PROG as viable source of met in addition to MMIF. This is to accommodate the update to AERMET with a PROG pathway. The update ensures capability with previous versions of AERMET and future AERMET updates. This only affects cases with prognostic data.	All	All

Formulation updates – Regulatory

None

Formulation updates – BETA

None

Formulation updates – ALPHA

Item	Modification	Pollutants	Source Types
1	A 2-barrier algorithms (i.e., barriers on both sides of a roadway) was added for the RLINEXT source type. The input SO RBARRIER pathway now includes an option for a second barrier.	All	RLINEXT
2	The existing 1-barrier algorithms were updated for the RLINEXT source type based on Ahangar et al. 2017 and Venkatram et al. 2021.	All	RLINEXT

3	<p>Added two new ALPHA options (AWMAENTRAIN and AWMAUTURBHX) that affect that affect the PRIME downwash algorithm. AWMAENTRAIN changes the beta entrainment coefficient for PRIME downwash referred to in the code as, beta0 and betap, from 0.60 to 0.35 in PRIME.f. AWMAUTURBHX enables enhanced calculation of tiz, tiy using subroutine wake_u_turb; it is also used to get a new value of velocity deficit like AWMAUTURB. With this option all enhanced calculations use the PRIME plume rise at each x value.</p>	All	POINT, POINTHOR, POINTCAP
4	<p>Add two new ALPHA low wind options (SWMIN and BIGT) which allow the user to override AERMOD's default values of minimum sigma-w and the time period used to calculate the time scale TRAN, respectively. AERMOD's default value for SWMIN is 0.02 m/s. With the SWMIN option, the user can specify a value within a range of 0.0 m/s to 3.0 m/s. AERMOD's default value for BIGT is 24.0 hours. With the BIGT option, the user can specify a value within a range of 0.5 hours to 48.0 hours.</p>	All	All
5	<p>Added the Generic Reaction Set Method (GRSM) for computing NO to NO2 conversion based on equilibrium chemistry between NO, NO2, and the reaction with ozone. Method requires ozone background through the OZONEVAL, O3VALUES, or OZONEFIL keyword and NOx background through new NOXVALUE, NOX VALS, or NOX FILE keyword.</p>	NO2	POINT, VOLUME, and AREA
6	<p>Added the Travel Time Reaction Method (TTRM) for computing NO to NO2 conversion based on the reaction with ozone and limitations of the travel time between the source and receptor. Method requires ozone background through the OZONEVAL, O3VALUES, or OZONEFIL keyword.</p>	NO2	POINT, VOLUME, and AREA