Model Change Bulletin (MCB) 16
AERMOD version 22112 (April 22, 2022)

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

Bug Fixes

Item	Modification	Pollutants	Source Types
1	Updated DISTF to calculate plume penetration factor for an urban source only when the stack height is less than the mixing height and the stack height plus plume rise is greater than or equal to mixing height. Prior to this change, the penetration factor was calculated when the stack height plus plume rise was greater than or equal to mixing height without consideration for the stack height relative to the mixing height. Adding the additional consideration for stack height less than mixing height avoids NaN for penetration factor calculations when stack height is at or above mixing height.	All	All urban sources
2	End-of-File logical variable (EOF) was prematurely set to TRUE in subroutine SUMTBL in aermod.f when reading from temporary error file and writing AERMOD.OUT file after encountering 999 warnings in temporary file. In some circumstances, this would result in overwriting existing messages beyond the first 999 in the temporary file before messages are written to the permanent ERRORS.OUT file. Subroutine in SUMTBL in aermod.f was updated to read to end of the temporary file to avoid overwriting existing messages.	All	All
3	Corrected double counting of NO2 background concentrations when the PVMRM NOX-to-NO2 Tier 3 method is applied when modeling NO2.	NO2	POINT, AREA, VOLUME, OPENPIT
4	Corrected the logic in SOSET.f to check that a BLPINPUT record is present in the input control file when one or more buoyant line sources are modeled. Also added checks for the omission or presence of combinations of BUOYLINE source type, BLPINPUT keyword, and BLPGROUP keyword	All	BUOYLINE

5	Corrected Monin-Obukhov Length calculation for URBANOPT to select the most neutral value for nighttime hours and the most convective for daytime hours.	All	All
6	Corrected the PG Stability class assignment for the BOUYLINE source when urban option is used. PG stability class is now set to 4 for stable hours when the URBANOPT is used.	All	BUOYLINE
7	The array DEL was changed from a fixed value (10) to an allocatable array. Corrected an additional bug in which two or more BLPGROUP keywords with the same BLP Group ID (*BLPGrpID*) caused an error during setup, i.e., BLPGROUP was not repeatable with the same *BLPGrpID*, inconsistent with the AERMOD User's Guide.	All	BUOYLINE
8	Corrected selection of indices to be used in an interpolation in subroutine BL_INTRSE in file bline.f. A limited number of indices were selected in v21112, the correction allows all indices to be selected.	All	BUOYLINE
9	Corrected discontinuity in vertical velocity profile at (Z = Z0 +_DISPHT).	All	RLINE, RLINEXT
10	Corrected double counting of initial lateral dispersion (sigmay) for RLINE source types.	All	RLINE, RLINEXT
11	Corrections to RLINEXT barrier algorithm: initialize barrier variables in RLCALC; correct location of barrier relative to road in TRANSLATE_ROTATE; correct location of release for upwind barriers in oblique winds	All	RLINEXT
12	Corrected order of variable declarations for array lengths in POLYINTERP in rline.f, needed for some compilers.	All	All
13	Added 900 to the file units for AWMADWDBUNT, RLINEDBUNT, PLATFMDBUNT, URBNUT, URBNUT1, and BLPUNT in modules.f to avoid possible output file unit conflict with several system files. Conflict is still possible, but user now receives warning of conflict	All	All

Enhancements

Item	Modification	Pollutants	Source Types
1	Comment out variables that are set but never used and variables that are defined but never used.	All	All
2	Reformatted user options summary that is reported in the standard aermod.out file to simplify future code maintenance.	All	All
3	Added debug file for the BOUYLINE source, RLINE source types, and the urban option, URBANOPT.	All	All, BOUYLINE. RLINE
4	Modified the EVALFIL output to have only one line per hour/receptor rather than screen breaks.	All	All
5	Implemented MEANDR subroutine in RLINE for calculating FRAN (fraction of random plume). This update replaces original RLINE meander calculations and further integrates RLINE into AERMOD for consistency with AERMOD formulation for other source types.	All	RLINE
6	Updated error/warning message arrays to use dynamic array indices (incremented variable) rather than hardcoded numbers to simplify future code maintenance.	All	All
7	Added a FAST option for RLINE source types based on CALINE interpolation approach for estimating plume width. This same approach has been applied in estimating the effective wind speed for RLINE in which a look-up table us used to determine plume wind speed, reducing computation time.	All	RLINE, RLINEXT
8	Removed ALPHA requirement for using the URBAN option with the RLINE or BOUYLINE sources	All	RLINE & BOUYLINE

Formulation updates – Regulatory

Item	Modification	Pollutants	Source Types
1	NOMINO3 option has been added that removes the nighttime, stable, minimum ozone restriction for NO2 conversion. Unless NOMINO3 option is specified, AERMOD will limit the minimum nighttime ozone to 40 ppb (78 ug/m3) for NO conversion in OLM, PVMRM, GRSM, and TTRM. NOMINO3 option should be used in consultation with reviewing agency.	NO2	All except BOUYLINE and RLINE

Formulation updates – BETA

Item	Modification	Pollutants	Source Types
1	The GRSM NO2 conversion method has been changed from ALPHA to BETA status	NO2	All except BOUYLINE and RLINE

Formulation updates – ALPHA

Item	Modification	Pollutants	Source Types
1	Added new keyword, PLATFORM, on SO pathway to input overwater platform dimensions. One platform is associated with one SRCID. Modified POINT source type processing to enhance plume spread and decrease plume rise when a platform is present.	All	POINT, POINTHOR, POINTCAP
2	Added model option RLINEFDH, which removes the displacement height from RLINE wind speed profile.	All	RLINE
3	The TTRM2 NO2 conversion method has been added as a new ALPHA NO2 conversion technique. TTRM2 applies the existing TTRM method with one of ARM2, OLM, or PVMRM and will select the lowest NO2 concentration from TTRM and the other selected NO2 technique.	NO2	All except BOUYLINE and RLINE
4	Experimental source type SWPOINT was added to facilitate further research of "sidewash" phenomena caused by building downwash. Sidewash occurs when wind is at an oblique angle to the long side of an elongated building. In this circumstance, there is	All	SWPOINT

	a lateral shift of the cavity that forms on the lee side of the building. This a point type source with limited input and no buoyancy and does not utilize the PRIME building downwash algorithm.		
5	Updated subroutine wake_u_turb in prime.f associated with AWMA ALPHA downwash options AWMAUTURB and AWMAUTURBHX. Limit on *tiz* updated from 50 to 18. Limit on *tiy* updated from 50 to 6.	All	POINT, POINTHOR, POINTCAP
6	Added two alpha low wind options (*FRANmin* and PBAL) to the LOW_WIND keyword in the CO pathway. *FRANmin* is a user-specified minimum value for the meander factor within a range of 0.0 – 1.0 which overrides the default value of 0.0. PBAL is a secondary keyword to replace the default energy balance approach to determining plume meander with a momentum balance approach.	All	All