Model Change Bulletin (MCB) 17
AERMOD version 23132 (May 12, 2023)

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

Bug Fixes

Item	Modification	Pollutants	Source Types
1	Logic updated that interprets the 2-digit year from the surface file to be in the 1900s if the year is >=50 and in the 2000s if < 50. This update is needed when year specified on the SURFDATA in the ME pathway does not match the year recorded in the SFC meteorological file.	All	All
2	Updated initialized value of NO2STACK from 0.1 to -9.0 which is outside of the valid range or 0.0-1.0. This ensures NO2STACK cannot be set erroneously from within the code to a valid but unspecified value.	NO2	All
3	Event processing with the BUOYLINE source type updated to correct conflicts with source group id prevent when multiple source types are defined on the SO pathway.	ALL	BUOYLINE
4	Corrected recursive subroutines which caused runtime error when compiled with gfortran compiler with fcheck-recursive or fcheck-all flag set. Two subroutines were identified, RECSIZ in aermod.f and RECARD in reset.f.	All	All
5	Added logic to the URBCALC subroutine in METEXT.f to cycle the urban source loop if the no urban transition option (NOURBTRAN) is chosen in AERMOD. This eliminates possible "Nan" in the urban debug file.	All	All
6	Add header to BUOYLINE debug file	All	BUOYLINE
7	Variable DHP3PLAT, associated with penetrated plumes and the alpha option for platform downwash was declared in modules.f but never initialized and assumed to be zero. DHP3PLAT is a placeholder variable for future updates and should be zero.	All	POINT POINTCAP POINTHOR (offshore platform sources only)

8	Corrected a false warning message "Julian Day Out of Range" that was issued when using DAYRANGE keyword. Logic statement in meset.f referenced incorrect variable JDAY. Code was updated to replace JDAY with JDAYB and JDAYE.	All	All
9	Corrected logic to require ALPHA flag when RLINEXT source type is specified.	All	RLINEXT
10	Corrected logic to generate error message rather than a warning message when NOMINO3 is used with ARM2. NOMINO3 turns off minimum background ozone concentration which does not apply to ARM2.	NO2	All
11	Correction when AREACIRC sources are listed in an INCLUDED file. Sources were being overwritten when multiple reads of AREACIRC sources caused memory conflicts between array sizing and id assignments. Bug fix enables correct AREACIRC source ID and NVERTs tracking for multiple AREACIRC sources.	All	AREACIRC
12	Updated the logic for ARMRATIO minimum and maximum values to match the ranges provided in the AERMOD User's Guide when based on whether the DFAULT keyword is specified	NO2	All
13	Updated code to initialize variable I_ALPHA in INTERP_COEFFS subroutine to avoid runtime error encountered by 64-bit executable in some circumstances.	All	RLINE
14	Add warning message when an NO2 conversion method is used with a source type for which it has not been implemented. Model run will complete but list a warning indicating the NO2 option was not applied to a source type.	NO2	All
15	A warning message was added when the SCREEN option is used with RLINE, RLINEXT, BUOYLINE, SWPOINT, AREA, or LINE sources.	All	RLINE RLINEXT AREA AREAPOLY AREACIRC LINE BUOYLINE SWPOINT

16	Added a warning message that receptor ZHILL and ZELEV values are ignored for source when FLAT is used in the place of the source elevation field on the SO LOCATION field.	All	All
17	Correction to code logic in bline.f, rline.f, and soset.f causing inconsistent results for BUOYLINE, RLINE, and RLINEXT source types depending on how FLAT terrain was specified.	All	BUOYLINE RLINE RLINEXT
18	Correction for SWPOINT source array. Incorrectly allocated.	All	SWPOINT

Enhancements

Item	Modification	Pollutants	Source Types
1	Added capability to use elevated terrain (ELEV) to RLINE and RLINEXT sources. In previous versions, RLINE and RLINEXT required the FLAT terrain flag be specified for those source types. **NOTE: When modeling project level conformity and hot-spot analyses, refer to the Office of Transportation and Air Quality (OTAQ) for current guidance for modeling roadway sources.**	All	RLINE RLINEXT
2	Added new debug file for urban sources that reports temperature and vertical potential temperature profiles.	All	All

Formulation updates – Regulatory

None

Formulation updates – BETA

Item	Modification	Pollutants	Source Types
1	**Proposed Regulatory Update** Original implementation of the RLINE source type was reformulated to bring the RLINE source type into better agreement with other AERMOD source types and simultaneously not degrade the previous evaluation database results. There were three main aspects of the reformulation: (1) Wind Speed calculation, (2) Harmonization with AERMOD sources, and (3) Dispersion Coefficients. The modifications were made in this order, with the wind speed and harmonization changes made first, then the reexamination of the parameters used in the vertical and lateral dispersion calculations. Refer to the following for details on the reformulation which can be found on the EPA SCRAM website: EPA, 2023. Incorporation and Evaluation of the RLINE source type in AERMOD for Mobile Source Applications. EPA-2023/R-23-011, Office of Air Quality Planning and Standards, RTP, NC.	All	RLINE RLINEXT

2	**Proposed Regulatory Update** Formulation of the GRSM NO2 conversion option updated. Refer to the following for details on the reformulation which can be found on the EPA SCRAM website: Environmental Protection Agency, 2023. Technical Support Document (TSD) for Adoption of the Generic Reaction Set Method (GRSM) as a Regulatory Non-Default Tier-3 NO2 Screening Option, Publication No. EPA-454/R-23-009. Office of Air Quality Planning & Standards, Research Triangle Park, NC.	NO2	POINT POINTHOR POINTCAP AREA AREAPOLY AREACIRC LINE VOLUME OPENPIT
3	**Proposed Regulatory Update** The COARE algorithm for processing marine-based meteorological data for modeling offshore sources was added to AERMET v23132. This update to AERMET has been proposed as an update to the formulation of AERMET for regulatory modeling applications. AERMET writes the string 'COARE' in the SFC file header when the COARE algorithm is used. The AERMOD source code was updated to require the BETA flag in the AERMOD control file if 'COARE' is found in the SFC file header. The presence of 'COARE' in the SFC file header without the inclusion of the BETA flag in the AERMOD control file will result in an error message.	All	All

Formulation updates – ALPHA

Item	Modification	Pollutants	Source Types
1	Meander added to AREA source types. Current implementation computes meander for downwind receptors only.	All	AREA AREAPOLY AREACIRC LINE
2	AREA and VOLUME sources were updated to accept additional parameters to characterize aircraft sources. A new keyword ARCFTOPT must specified, and aircraft sources must be identified with the new ARCFTSRC keyword. New aircraft parameters (for AREA and/or VOLUME sources) must be provided in an hourly emissions file.	All	AREA AREAPOLY AREACIRC LINE VOLUME
3	Added ALPHA option for highly buoyant plumes (HBP) when plume penetrates the top of the mixed layer. Limited to point source types (POINT, POINTHOR, POINTCAP)	All	POINT POINTHOR POINTCAP

Documentation Updates Only

Item	Modification
1	Update Section 3.2.5 of AERMOD User's Guide to clarify that ARM2 is only applied to SRCGROUP ALL. If at least one source group is defined and is not ALL, AERMOD will assume SRCGROUP ALL and apply ARM2.
2	Updated Section 5.9 in the Model Formulation Document (MFD) to state that Equation 109 leads to Equation 110. MFD previously stated that Equation 103 leads to Equation 110.
3	Updated the AERMOD User's Guide Section 3.3.1 to define Zs and effective depth for the OPENPIT source.
4	Added the equation for the buoyancy flux calculation to the AERMOD User's Guide Section 3.3.2.11.
5	Updated Section 5.5.1.1 of MFD to correct definition of X term Eqn 77 to $X = \tilde{\sigma}_v \, x/\tilde{u}zi$.