# Model Change Bulletin (MCB) 11 - AERMOD version 15181 changes by change type.

**Listed with each change are the affected pollutants and source types.**

**BUG FIXES**

| Item | Modification | Pollutants | Source Types |
|------|-------------|-----------|--------------|
| 1 | Modified subroutine PCALC to check for POINTCAP and POINTHOR options before checking for the NOSTD option. Previous versions checked for NOSTD first, which could result in skipping the POINTCAP option and producing erroneous results for capped stacks if the NOSTD option was included on the MODELOPT keyword. Results for POINTHOR sources would not have been affected by this bug since the POINTHOR option is consistent with the NOSTD option. | All | POINTCAP |
| 2 | Modified subroutine CENTROID to account for distance-dependent centroid height (CENTER) and SURFAC logical variable under stable conditions. | All | All |
| 3 | Modified subroutines REFL_HT and DISTF to address a formulation bug that imposed unrealistic limits on plume rise for some tall sources in urban areas (see Section 5.1 of the AERMOD Implementation Guide). The new formulation emulates the plume rise for penetrated plumes during convective conditions if the initial plume height estimate is greater than or equal to the urban mixing height. | All | All |
| 4 | Modified subroutines PCALC, VCALC, ACALC, and OCALC to include an array to save the flow vectors for each source for use in the MAXDCONT processing. | $NO_2$, $SO_2$, and $PM_{2.5}$ | All |
| 5 | Modified subroutines ACALC and OCALC to reset the emission rate (QTK) after processing each receptor since it may have been changed if the point source approximation was used under the FASTAREA or FASTALL options. | All | AREA, AREACIRC, AREAPOLY, LINE, and OPENPIT |
| 6 | Modified subroutines PLUME_VOL, PCALC, VCALC, ACALC, and OCALC to include the vertical and horizontal dimensions of the contributing sources for the penetrated plume contribution for the PVMRM and PVMRM2 options. | $NO_2$ | All |
| 7 | Modified subroutines PVMRM_CALC and MAJOR_CONT to remove the CWDELT and DWDELT variables previously used in determining which sources contributed to the NO to NO2 conversion under the PVMRM option. | $NO_2$ | All |
| 8 | Modified subroutine MAJOR_CONT to define the elevation of the receptor above the source elevation (ZRT) to use ZRT based on the dominant source instead of varying for each source. | $NO_2$ | All |
| 9 | Modified subroutine MOLES_NOX to determine the total NOx emissions of major contributing sources separately | $NO_2$ | All |

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| | based on the horizontal plume component and the terrain-responding plume component under the PVMRM and PVMRM2 options. The NOx emissions associated with the penetrated plume contribution were also added for horizontal and terrain-responding plume components. | | |
| 10 | Modified subroutine OZONVALS to use ISECT instead of IO3SECT as the array index for variable O3 concentrations for the HRDOW variable emission option. | $NO_2$ | All |
| 11 | Modified subroutines HRLOOP, SET_METDAT and DAYRNG to include separate IPROC and IPROCL arrays to identify which days to process for non-leap years and leap years, respectively, under the ME DAYRANGE keyword. | All | All |
| 12 | Modified subroutines PSIDE and PSIDE_TOX to change the tolerance parameter passed to subroutine ZBRENT from 1.0 to 0.001. Earlier versions may have produced anomalous results for winds blowing nearly perpendicular to AREA/LINE sources in some cases. | All | AREA, AREAPOLY, AREACIRC, LINE, and OPENPIT |

## ENHANCEMENTS

| Item | Modification | Pollutants | Source Types |
|------|--------------|------------|--------------|
| 1 | Included a new Plume Volume Molar Ration Method 2 non-DFAULT/BETA option that uses total dispersion coefficients instead of relative dispersion coefficients for stable conditions and relative dispersion coefficients for unstable conditions. The new PVMRM2 option incorporates additional modifications relative to the PVMRM option, including the use of downwind distance instead of radial distance from source to receptor to calculate the plume volume and moles of NOx. See the modified Model Formulation Document Addendum for additional details. | $NO_2$ | All |
| 2 | Included a new LowWind3 non-DFAULT/BETA option that increases the minimum value of sigma-v from 0.2 to 0.3, consistent with the LowWind2 option, but eliminates upwind dispersion, consistent with the LowWind1 option. The LowWind3 option uses an "effective" sigma-y value that replicates the centerline concentration accounting for meander, but sets concentrations to zero (0) for receptors that are more than 6*sigma-y off the plume centerline, similar to the FASTALL option. | All | All |
| 3 | Included a new source type option, BUOYLINE, to allow modeling of buoyant line sources based on the BLP model. | All | BUOYLINE |
| 4 | Included a new debug file for the relative dispersion coefficients used with the PVMRM and PVMRM2 options. | $NO_2$ | All |
| 5 | Modified subroutine PSTANN to include ANNUAL results for each year in the data period for ANNUAL POSTFILEs. | All | All |
| 6 | Modified subroutine OUCARD to allow use of the MAXDAILY and MDYBYYR output options for 24-hour PM2.5 processing. | PM2.5 | All |
| 7 | Modified subroutine COCARD to include a field in the MODOPS array incorporated in the page header for all output files to indicate whether all sources were modeled as RURAL, all sources were modeled as URBAN, or if both RURAL and URBAN sources were included. | All | All |

## MISCELLANEOUS

| Item | Modification | Pollutants | Source Types |
|------|--------------|------------|--------------|
| 1 | Modified subroutine METDEB to clarify that the ambient temperature included in the METEOR debug file is at stack height rather that at the surface. | All | All |