

AgDRIFT[®] Version Control: 2.01 to 2.0.05 08 May 2002

The modeling product of the Cooperative Research And Development Agreement (CRADA) between the U. S. Environmental Protection Agency (EPA), USDA Forest Service, USDA Agricultural Research Service, and the SDTF was the AgDRIFT[®] spray prediction model, a regulatory version of the AGDISP model developed by the USDA Forest Service and its cooperators. Several years of Modeling Subcommittee meetings resulted in the release of a beta test version, Version 2.01. This version generated a number of comments and suggestions, including several coding errors that required correction before the model could be released to the EPA, SDTF member companies, and other individuals interested in using the model. After these corrections were made (resulting in Version 2.02), several additional changes were requested by the SDTF (and implemented in Versions 2.03 and 2.04). Later, a further review of the model uncovered additional coding errors that required correction (to Version 2.0.05).

In addition, one minor set of changes were made to the core Lagrangian solution algorithm, in response to the NOAA review of the second modeling paper (M. E. Teske, S. L. Bird, D. M. Esterly, T. B. Curbishley, S. L. Ray and S. G. Perry. 2002. AgDRIFT[®]: A Model for Estimating Near-Field Spray Drift from Aerial Applications. *Environmental Toxicology and Chemistry* 21:659-671). During the review process we found an error in the generation of the expressions for droplet position and velocity correlation with ambient velocity (equations 19, 20, and 24 in the paper). This error does not change the droplet paths but does change the droplet dispersion slightly. The change is most apparent when comparing the default Tier III deposition prediction for ASAE Coarse to Very Coarse with the corresponding Tier I result.

This document summarizes the changes made to the model at each of these version levels.

Changes Made to 2.01 to Generate 2.02: 11 July 2001

AgDRIFT[®] (Beta) Version 2.01 was reviewed by the CRADA model development team. The following comments required changes to the model and/or its documentation. Each comment is summarized and placed in quotation marks:

1. "Application efficiency is shown in the orchard airblast information but wasn't measured in the field; rather, it was computed from the curve fits." Clarification was added to the User Manual to explain how application efficiency was determined.
2. "Individual orchards are shown only if the user has the SDTF proprietary data, which were not supplied with the Beta Version." The Public Use User Manual now displays a correct orchard screen shot.

3. “In Tier II Forestry mode, the model crashes with higher canopy heights.” In this particular case the wind profile is such that the particle spread remains zero for large drop sizes, which the model could not handle. Appropriate changes were made.
4. “The model gives different warnings for different input values.” Tier II errors are Tier III warnings. This does not affect normal model operation, and the user can make the warnings go away by checking “Suppress Calculation Warnings” in Preferences. Further explanation has been added to the User Manuals.
5. “An error was found in the Distance Traveled output in the Drop Distance Toolbox.” This toolbox was not handling canopy conditions correctly. “Drop Size at Impact” replaced “Drop Size at Ground” to avoid confusion with Ground Reference or Canopy Height stopping the calculation.
6. “Sample file demonstrated a problem with Spray Block Statistics.” A strange COV curve was generated by the sample file provided by the reviewer. A filter was added on COV values to get past the initial points in the generated curve.
7. “Sample file run with one flight line generated a Subscript Out of Range error.” The width of the spray block was not defined correctly for large swath displacements.
8. Mode and Tier on the Main Menu bar could generate some confusing configurations where it would look like available options have disappeared. To correct this problem, Mode was inserted into Tier to make one drop-down menu that displays all available model options.
9. User Manuals: Suggested modifications were made consistent between the Public Use and Regulatory manuals, and implemented, along with Help comments. Added “Flux Plane Distance” and “Total Accountancy” to Help.
10. Expanded Help file for imported wind rose to indicate the sum of the frequencies of occurrence over all wind speeds must equal 1 (also added to User Manuals).
11. Corrected a coding error when reading a user-defined MAA wind rose file.
12. “Boom length and aircraft selection are not independent. The program should be modified to adjust the boom length depending on aircraft type selected.” Distribution Type has been removed; additional messages have been added when leaving the Aircraft screen.
13. “The import function for the DSD User-defined should parse the data file until the first row is two numbers. This would allow the user to place a comment in the file; or export the DSD and then import the DSD into a new case.” Added “#” to the first column of each comment line on all exported files, and expect “#” in the first column of comment lines on imported files. These Import files include those containing:

Nozzles, DSD, Spray Block Boundary, Discrete Receptors, and Area Coverage Boundary. User manual contents changed to describe this formatting change.

14. Drop Distance changed to Drop Distance Calculator under Toolbox.
15. Updated Easter Egg.
16. Updated the SDTF nozzles for water to include: 11002XR, 11004XR, 2080-20, 4006, 4010, 4020, 6506, 6510, 6520, 8002, 8003, 8004, 8004EVS, 8004XR, 8006, 8006XR, 8010, 8010-OC, 8015, 8015XR, Accu-Flo 028, Accu-Flo 047, AU5000 4000 rpm, AU5000 6000 rpm, Beecomist 10000 rpm, CP 0.061, CP 0.078, CP 0.125, CP 0.171, D2, D2-25, D4, D4-23, D4-45, D4-46, D6, D6-45, D6-46, D8, D8-46, D10, D10-45, D12-56, Delavan LFR4-80, DG8002, DG8004, DG8005, M. LUND #6, M. LUND #8, QCRFLD15, QCTF-15VS, RA-4, RA-6, RD-4, RD-9, RegloJet 40, RegloJet 50, RF-4, RF-6, TF-VS2, TF-VS3, TF-VS5, TG-1, TG-3, TG-5, TJ-60 8004, TK-1, TK-3, TK-5, Turbo TeeJet 11004, Turbo TeeJet 11005, TVB 035, TVB 045, WFR25-20, WFR30-25, WRW4.
17. “If you select CP nozzle, it provides selections that have been covered by the USDA ARS wind tunnel tests. If you select flat fan or disc-core nozzles, however, it does not provide prompts that reflect the range of nozzles tested, and therefore the range for which the model is appropriate.” Users can enter any orifice size they like, without model-restricted limits. Range-checking is provided in this screen; however, some of the limits were incorrectly programmed.
18. “The orifice size prompt is confusing.” Additional explanation has been added to the User Manuals.
19. Further Help and User Manual comments have also been implemented.
20. “Error: from USDA ARS Nozzle Models, select a CP or CP Straight Stream nozzle, and select the orifice size. The options are 0.009, 0.012, 0.019, and 0.026 in. They should be 0.061, 0.078, 0.125, and 0.171 in. Curve-fits for expanded tunnel speed (Disc Orifice 46 Core and Straight Stream) were implemented incorrectly. Orifice diameters were fixed.
21. “It appears that the drop size distribution recovered from the current algorithm in the USDA ARS Nozzle Models is different from the published data.” Upon review, a new parameter fit was developed from a separate analysis, using $D_{v0.5}$, %V<100 μm , and %V<200 μm , thereby ensuring the same level of accuracy.
22. Nozzle categories were identified as ASAE.
23. Remove Stability Class from Tier III/FS.
24. Revise orchard curve designations.

25. If I select Drops in Spray Block Details numerator, Component should be dimmed.
26. Edge of the Field becomes Edge of the Application Area in aquatic, terrestrial, and stream assessment screens.

Changes Made to 2.02 to Generate 2.03: 13 August 2001

1. Change library version number (library versions are separate from model versions). There were no changes to library content, just the stored version number. This change prevents anyone from using earlier versions of the library with anything other than the latest version of the model.
2. In the Aircraft form, if the user modifies aircraft parameters and clicks “Add Current” (user library), the original data is added, not the modified data. This behavior was corrected so that the aircraft parameters displayed on the aircraft form are the ones that get into the user library.

Changes Made to 2.03 to Generate 2.04: 28 August 2001

1. Aquatic Assessment and Terrestrial Assessment: use of the Print button leads to a printout that has not been extended to add the additional Initial Average Deposition unit (in lb/ac) added to the toolbox. In Aquatic Assessment the printout presents the Initial Average Concentration as if it were an Initial Average Deposition. Corrected.
2. Tier I main screens (aerial, ground, and orchard/airblast): a single click on the AgDRIFT[®] logo brings up the About AgDRIFT screen. Corrected.
3. Help: the Optical Canopy table of data does not recover the correct Help entry. Print Preview (under File on the main menu bar) has no Help entry. In Spray Block Assessment the Deposition Level and Concentration Level entries are not defined correctly in Help. Corrected.
4. User Manuals: Spray Block is not displayed in the figure describing the coordinate system for Wind Direction. Numerical Values should include a Save button. Drop Size Distribution Library presents an incorrect Component percentage for water. Corrected.

Changes Made to 2.04 to Generate 2.0.05: 21 January 2002

1. Print from Terrestrial Assessment in Tier II and III includes a blank output for Active Rate. This entry was removed, consistent with Print from Aquatic Assessment. The Run ID uniquely locates the input conditions used to generate these results.
2. File save containing the DC-6B aircraft generates a “Subscript Out of Range” error, because of an attempt to save 4 engine locations when only 2 are needed. Corrected.

3. A divide by zero was uncovered with the aid of a specialized sample problem, and corrected. In addition, it was reasoned that the aircraft cannot be flying so low that its propeller hits the ground; the input checker was subsequently modified.
4. Version generation was changed to a 2.0.05 template, rather than 2.05.