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A Theoretical Analysis of Downwind Drift of Herbicide Sprayed From an Aircraft

by

Mr. S.N. Blumenfeld
Office of the Science Advisor
Military Assistance Command, Vietnam

4 April 1968

SUMMARY

The problem of drift of herbicide released from an aircraft is treated theoretically herein. The parameters of release are an altitude of 50 m (162.5 ft), a windspeed of 10 knots (11.5 mph), and neutral temperature gradient. Two hypothetical distributions of particle size are postulated, both statistically normal and centering about a median size of 300 microns. In the first case, the major fraction of the particles are distributed over a fairly narrow size range; 95% of all the particles fall within 300 ± 100 microns. In the second case, the particles are distributed more widely: 68% of the particles fall between 300 ± 200 microns, only 38% within 300 ± 100 microns.

The goal of the analysis is the determination of the percentage of released agent which drifts various distances downwind of the release line. This is done in stepwise fashion, starting from an analysis of the distribution of particle size by percentage within 50-micron categories for each postulated distribution. The rate of fall of particles in each of the categories is calculated, and from these data, downwind drift is determined. Next, the percentage of total output mass falling in each size range is developed, and this leads directly to the desired information on the percentage of agent output which drifts varying distances downwind. These data, developed for the general case, can easily be employed to ascertain the ground concentrations of agent at any point downwind for any initial concentration of agent of 3 gal/acre, it [illegible] acre will be produced some 262 m (852 [illegible] 03 gal/acre some 348 m (1131 ft) downwind. Smaller amounts of agent will drift even further and, [illegible] and thermals, "hot spots", concentrations of agent greater than that over the [illegible] area are also likely to be formed.

[illegible] out that a theoretical analysis can only [illegible] the overall magnitude of the problem of drift. It can not be substituted for real testing of the equipment actually [illegible] conditions in which the actual operational [illegible] such tests can reasonably assure verity in the final evaluation of this problem.