REFINING MODELING FOR BUFFER ZONES

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Setting appropriate buffer zones is essential to ensuring that the use of agricultural fumigants will be available to growers in the future, as well as maintaining safe environmental conditions for bystanders. Buffer zones are based in part on the use of dispersion models that estimate airborne concentration of the pesticide(s) in the ambient air. The evolution of dispersion models, and Monte Carlo techniques in conjunction with these models, have provided a range of options to accomplish this objective.

During the previous round of re-registration reviews at the U.S. Environmental Protection Agency, two models were evaluated by the EPA Science Advisory Panel, i.e. the FEMS and PERFUM models. The Agency chose to rely on PERFUM at that time. PERFUM is a more conservative model than FEMS, i.e. it contained embedded conservatism that acts to overstate airborne concentrations. Conservatism can be a useful way of ensuring that decisions are made with a margin of safety, however, the more important question is - - at what point does the degree of conservatism become excessive and counter-productive.

When a dispersion modeling approach is highly conservative, its' use can place the regulatory agency charged with making decisions (in this case the U.S. EPA) in a difficult position. Fumigants that have been used for many years and with minimal reported adverse effects, for example, may show excessive buffer zones would be required when using more typical percentiles, such as the 90^{th} or 95^{th} percentiles. On the other hand, the use of such fumigants is essential to preserving the quality and yields of U.S. production of crops ranging from potatoes, to carrots, strawberries, tomatoes, etc. In other words, there also is a risk from over-regulation in terms of reducing the affordability of high quality and nutritious fruits and vegetables. Balance is needed

between environmental management and maintaining and enhancing the U.S. agricultural food production.

In order to use more typical percentiles to regulate, and to achieve a firm, scientific basis for regulatory decisions, it is proposed that conservatism in the modeling be maintained, but that the degree of conservatism in the front-end exposure assessments be reduced. There certainly is a substantial margin available to do so.

There is an excellent opportunity at this time to refine the basis for the dispersion modeling used to support buffer zone assessments. The core dispersion model used in the previous models, i.e. the ISCST3 dispersion model, was replaced by a new and improved model, AERMOD. This development occurred long ago, but after the previous SAP hearings. It is proposed that AERMOD serve as the core model for future buffer zone assessments. Of greater importance, however, is that a new modeling approach rely on a higher level of scientific rigor to meet the objective of maintaining a reasonable margin of safety in the modeling while promoting a more realistic assessment to serve EPA decision makers.

Some of the features of PERFUM and some from FEMS could be developed into a new modeling system that would meet the preceding objectives. A more refined use of Monte Carlo methods, which the Agency in general has relied on for many years, can be incorporated into such a system, with the degree of such methods developed in consultation with EPA technical staff. The development and validation of an updated modeling system could be developed in approximately a six month period.

Two steps are needed to achieve this objective: (1) a sponsor(s) is needed to support development, and (2) input is needed at the outset from EPA technical staff on options that can be incorporated into a more refined modeling system. This technical paper will present options that could be explored and implemented into a more refined modeling system to better serve the U.S. EPA and the regulated agricultural community, and produce a more sustainable basis for future regulatory action.