Fumigant Emissions Modeling System (FEMS)

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The Fumigant Emissions Modeling System (FEMS) was developed to meet the evolving regulatory need for an exposure assessment system that can meet the specific needs of fumigation applications. One of the most characteristic features of fumigants is the off-gassing emissions at any particular location generally occur above background levels only 1-4 days per year. As an infrequent source with a complex emissions pattern, there is an important need to account for the high variability in emission rates and the random nature of the annual application event. The primary alternative would be to simplify the analysis, which would tend to increase modeled impacts and potentially could lead to more restrictive regulatory constraints. FEMS provides the interface between two EPA models, i.e. the Industrial Source Complex model (ISCST) and the TOXST Monte Carlo emissions processing software. FEMS allows the user to input:

- Emission off-gassing sequence for the fumigant to be modeled (specific to application method and sealing methodology)
- The number applications per year for a particular field
- Averaging time (e.g. 4 hours, 8 hours, etc.).
- Region to define meteorological conditions, regulatory endpoint of interests
- Size of field
- Number of simulated years to be analyzed
- Location (latitude / longitude)

Using the EPA standard exceedance concept, the downwind distance needed to decrease airborne concentrations to reach the regulatory endpoint of interest is displayed. Through multiple runs through FEMS a matrix of distances as a function of application rate, acres applied per day, application / sealing method, and region. As a point of perspective with the ambient modeled concentrations, FEMS also supports the evaluation of indoor exposures and personal exposures through the use of an indoor model and standard assumptions regarding indoor versus outdoor exposure frequencies. Such comparisons provide perspective on standard ambient modeled exposures in comparison to those expected from routine activities of daily living.