METHODS FOR DEVELOPING FUMIGANT REGULATORY REQUIREMENTS IN CALIFORNIA

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Background

The Department of Pesticide Regulation (DPR) has implemented regulatory requirements for the use of some fumigants in California, and additional ones are under development. These requirements are the result of DPR's risk assessment and risk management process. A key component of this process is the identification of the levels of acceptable exposure for human health. The regulatory requirements are designed to ensure that acceptable levels of exposure are achieved. DPR relies on monitoring data as well as computer modeling and other data analysis techniques to develop the requirements. In many respects, the most problematic regulatory requirements are the buffer zones and use limits (township caps) for some fumigants to protect public health.

Air Monitoring

Monitoring data forms the foundation for DPR's regulatory requirements. Two types of monitoring studies are conducted to determine exposure to the public: application-site monitoring (to determine acute exposure) and regional ambient monitoring (to determine seasonal and chronic exposure). Application-site monitoring occurs within the immediate vicinity of a specific fumigation. Normally, several air samplers are placed on different sides of a fumigated field and at different distances away from the fumigated field. In some cases, air samplers are placed at various heights at the center of a fumigated field. Sequential air samples are collected at 4 to 12-hour intervals for two to 14 days. The data from application-site studies provide acute off-site air concentrations and flux (emission rate) estimates. Regional ambient monitoring occurs in an area and time period of multiple fumigations. Normally, four to six air samplers are placed in populated areas, encompassing parts or all of one or two counties. The data from ambient monitoring studies provide estimates of seasonal and long-term air concentrations. Data from both the application-site monitoring and the regional ambient monitoring indicate that unacceptable exposures can occur under some circumstances. The monitoring data provides a snapshot of the air concentrations for the specific locations and time periods monitored. DPR uses the monitoring data in conjunction with computer modeling and statistical analysis to estimate air concentrations for locations and time periods not monitored, and to develop mitigation measures.

Development of Buffer Zone Requirements
DPR uses the Industrial Source Complex-Short Term, version 3 (ISCST3) computer model to estimate air concentrations under a variety of conditions and to develop buffer zones. This model predicts air concentrations based primarily on the flux and meteorology. The ISCST3 model can predict air concentrations associated with a single fumigation or multiple fumigations. The ISCST3 model can also predict air concentrations based on assumed weather conditions, or historical weather data. Using the ISCST3 model and monitoring data, DPR has determined the flux associated with different fumigants and different fumigation methods, and estimated concentrations under various fumigation scenarios and weather conditions. The flux is a key parameter in determining the size of buffer zones, as measured directly or indirectly from the monitoring data. Buffer zones are designed to mitigate acute exposures from individual fumigations. For example, methyl bromide buffer zones range from 50 to 4600 feet depending on application method (relative flux), application rate, acres, and assumed weather conditions.

Development of Township Cap Requirements
Township caps are designed to mitigate seasonal and long-term exposure, by limiting the amount of fumigant that can be used within a 36-mile area (township) for a given period of time. DPR is still evaluating the use of ISCST3 to estimate air concentrations on a regional basis resulting from multiple fumigations. Alternatively, DPR has used linear regression to correlate regional use of fumigants with measured ambient air concentrations. Based on this correlation, DPR has developed a township cap for methyl bromide. California regulations limit the ambient air concentration to 9 ppb as a one-month average. A township cap of 270,000 pounds per month is one method to ensure that the air concentration limit is not exceeded.

Other Fumigant Issues
DPR's risk assessment and risk management process will continue to drive much of the activity. DPR is actively working on the risk assessment or risk management for several fumigants, including methyl isothiocyanate, chloropicrin, 1,3-dichloropropene, iodomethane, and sulfuryl fluoride.

DPR is also evaluating fumigants as volatile organic compounds (VOCs), which are precursors for ozone. Fumigants comprise most of the VOC emissions from pesticides. Under the federal Clean Air Act, DPR is required to reduce VOC emissions from pesticides by specified amounts by specified deadlines in certain ozone nonattainment areas. Three of the nonattainment areas in California are not meeting the pesticide VOC reduction commitments.

Research that leads to decreases in flux from fumigants would reduce exposures and VOC emissions, as well as provide more options for DPR's regulatory requirements.