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MEMORANDUM

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SUBJECT: SULFURYL FLUORIDE STRUCTURAL FUMIGATION MITIGATION SCOPING DOCUMENT

The Department of Pesticide Regulation (DPR) completed a risk assessment on inhalation exposure to the active ingredient sulfuryl fluoride (SO₂F₂) emitted from structural fumigations in September 2006. DPR issued a Risk Management Directive (RMD) in April 2007, with target air concentrations for acute exposure for bystanders and residents. At the time, the acute target air concentrations were set at 0.12 ppm pending missing developmental neurotoxicity study data.

In May 2020, DPR released an addendum to the September 2006 risk characterization document for SO₂F₂. The new addendum includes 14 additional toxicology studies, updated human illness reports, additional neurotoxicity data, and new approaches to modeling internal doses and impacts to target tissues. The addendum updated the acute reference concentrations (RfCs) for residential bystanders for potential exposure to the fumigant SO₂F₂. DPR's scientific assessment resulted in a refinement of SO₂F₂ acute RfCs to a range of 0.25 ppm – 0.75 ppm.

This scoping document serves to outline the work that the Environmental Monitoring Branch (EMB) needs to conduct in order to estimate acute SO₂F₂ air concentrations resulting from structural fumigations under typical California application conditions. Depending on the simulated SO₂F₂ air concentrations, EMB will also explore mitigation options that could reduce concentrations. EMB's work will be valuable to better inform a future risk management decision.

Scope of Work

Scientists from EMB developed the computer modeling system, AERFUM (Air Exposure and Risk model for Fumigants), to predict ambient air concentrations resulting from fumigant applications (Luo, 2019a). AERFUM was originally developed for soil fumigants and was validated with

monitoring data for the active ingredient 1,3-dichloropropene (Luo, 2019b). As part of this work, DPR will extend the modeling capabilities of AERFUM to simulate SO₂F₂ structural fumigations.

The updated AERFUM system will be validated against SO₂F₂ monitoring data currently available to DPR. With the same validation data, additionally, the updated AERFUM system will be compared to other modeling approaches in the literature proposed for structural fumigation, including DPR's previous modeling studies and the Probabilistic Exposure and Risk Model for Fumigants (PERFUM). It is worth noting that none of the comparison models have been previously validated with monitoring data of SO₂F₂.

Upon successful validation of the updated AERFUM modeling system, EMB will conduct SO₂F₂ simulations under multiple combinations of parameters, including retention rates, duct heights, aeration flow rate, house sizes, start hours of treatment and aeration, and meteorology data, among others. We hope to identify the effects of changes to these parameters on the resulting SO₂F₂ ambient air concentrations. For any resulting air concentrations exceeding 0.75 ppm, EMB will assess whether and to what extent changes to individual parameters or to combinations of parameters will result in lower SO₂F₂ ambient concentrations .

DPR's modeling work will be focused on residential bystander exposures to structural fumigations, which includes residents of areas in the vicinity of structural fumigations. Distance or spacing between residences in California can range widely; therefore, for this work, an average distance of 5 feet between residences will be used to represent the typical distance that residential bystanders may reside from a treated structure.

Results of this work will be presented to DPR's Assistant Directors to identify any appropriate nextsteps.

References

Luo, Y. (2019a). AERFUM: an integrated air dispersion modeling system for soil fumigants. California Department of Pesticide Regulation, Sacramento, CA.

Luo, Y. (2019b). Evaluating AERMOD for simulating ambient concentrations of 1,3-Dichloropropene. California Department of Pesticide Regulation, Sacramento, CA.