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MEMORANDUM

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TO: Randy Segawa
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SUBJECT: RESPONSE TO STAKEHOLDER COMMENTS ON PILOT PROJECT
PROPOSAL: ESTIMATING PESTICIDE PRODUCT VOLATILE ORGANIC
COMPOUND EMISSION SPECIATION AND REACTIVITY BASED ON
PRODUCT COMPOSITION

INTRODUCTION

The Department of Pesticide Regulation (DPR) recently invited stakeholder comment on a draft proposal to investigate speciation and reactivity of volatile organic compound (VOC) emissions from pesticides (Oros, 2009). Comments were received from the Western Plant Health Association (WPHA), Dow Agrosciences (DAS), Exxon Mobil Chemical Company (EMCO), the California Integrated Waste Management Board (CIWMB) and the California Department of Food and Agriculture (CDFA). The CDFA comments were supportive of the reactivity proposal. This memorandum summarizes the comments from WPHA, DAS, EMCO, and CIWMB and provides DPR's response to those comments.

1. Two commenters expressed reservations about promulgating volatile organic compound reactivity-based regulations at this time due to scientific uncertainty.

Western Plant Health Association:

“We consider the current level of scientific understanding on the complex interactions of VOC with nitrogen oxides (NO_x) in rural airsheds insufficient for possible consideration in promulgating meaningful pesticide VOC reduction regulations at this time.”

“WPHA does not recommend the addition of reactivity factors into the rural airshed VOC EP (*emission potential*) inventory data simply because the scientific basis and understanding to support this concept presently has not advanced to the level needed to support it.”



Dow Agrosiences:

“The Oros (2009) proposal to integrate reactivity factors into the mass-based inventory system lacks the fundamental scientific basis to support effective regulatory policies.”

Department of Pesticide Regulation’s response:

DPR does not propose to promulgate regulations or otherwise implement reactivity concepts into the VOC inventory at this time. DPR also agrees that there are unanswered scientific questions about how reactivity might be eventually incorporated into the current mass-based VOC inventory. The purpose of the proposed study is to identify the scientific uncertainties and questions, and to then investigate potential solutions. As stated on DPR’s Web site posting for solicitation of comments on the reactivity proposal:

“DPR proposes to evaluate selected pesticide products, and estimate the reactivity of various active and inert ingredients. DPR will evaluate the scientific issues, uncertainties, and resources needed to account for reactivity in its emission inventory and regulatory restrictions.”

Change to proposal:

Text added in the introduction to further emphasize that this is a scientific investigation, and not a regulatory proposal.

2. Three commentors expressed concern over the use of the Maximum Incremental Reactivity (MIR) scale to describe ozone formation potential.

Western Plant Health Association:

“WPHA asks DPR to recognize that MIR’s that have been established for urban airsheds have very limited significance to the SJV NAA and other rural airsheds. These rural agricultural airsheds are more likely to be NO_x-limited. Lack of this necessary reactant would significantly limit further formation of tropospheric ozone from VOC emissions. “

Dow Agrosiences:

“The proposed MIR scale has questionable significance for rural NO_x-limited air-sheds”; “(there is)... some basis to consider that the SJV may be a NO_x-limited air shed, and thus that the proposed MIR reactivity metric would over-estimate OFP (*ozone formation potential*)”; “More study is needed to understand whether the proposed MIR’s have application for air sheds such as the rural SJV NAA prior to building these into the current mass-based VOC inventory system.”

Exxon Mobil Chemical Company:

“CDPR Should Evaluate the Appropriateness of the Application of Reactivity Values in Agricultural Areas and Identify the Most Appropriate Reactivity Metric For the Agricultural Scenario. What is the Appropriate Metric for Assessing Ozone Formation Potential in the San Joaquin Valley and Other Predominantly Agricultural Areas?”

Department of Pesticide Regulation’s response:

DPR agrees that the MIR may not be the best metric for modeling actual ozone formation under NOx-limited conditions. However, DPR does not model or estimate actual ozone formation. The 1994 State Implementation Plan requires DPR to achieve VOC emission reductions relative to the 1990 base year (where the VOC emissions may be adjusted for reactivity if such information exists). Consequently the relative reactivity ranking of different chemicals is most important.

DPR does intend to evaluate different metrics for their suitability to describe the relative ozone formation potential of different chemicals. This scientific evaluation might include a comparison of different reactivity metrics for various NOx levels, and/or investigation of ambient NOx monitoring data for the SJV to more fully characterize NOx levels.

Change to proposal

Text will be added stating that the suitability of different available metrics for describing relative reactivity in rural airsheds will be investigated.

3. Minor edit

The California Integrated Waste Management Board pointed out that the proposal states "These top 80 products account for 90 percent and 85 percent of adjusted San Joaquin Valley ozone season emissions in 1990 and 2007, respectively. " This is incorrect. That statement has been revised to say "These top 80 products account for 90 percent and 85 percent of adjusted San Joaquin Valley pesticide ozone season emissions in 1990 and 2007, respectively. "

4. Continue to refine and improve the mass-based inventory by using an alternate method to measure emission potentials and employ a low vapor pressure exemption.

Western Plant Health Association:

“WPHA suggests that a better approach would be to continue to refine and improve the accuracy of the current and baseline mass-based pesticide VOC inventory system. This approach would be transparent and provide a defensible foundation for possible future regulatory initiatives targeted to limit tropospheric ozone formation.”

“These accuracy improvements would include: incorporating soil sorption effects (as per the work of Alan Viets, Ph.D. of Bayer CropScience).”

“WPHA had recommended to DPR that agricultural pesticides with LVP (*low vapor pressure*) or non-reactive species be granted an exemption to further regulatory hurdles. However, DPR had determined not to provide for such an exemption despite ARB’s decision to grant a LVP exemption for consumer pesticide products of similar formulation. “

Dow Agrosiences:

“..... worst case TGA results might be further refined to reflect additional factors. These refinements would include incorporating soil sorption effects (as per the work of Alan Viets, Ph.D. of Bayer Cropscience), considering the atmospheric availability of low vapor pressure (LVP) VOC's based on the unique application practices for agricultural products.”

Department of Pesticide Regulation’s Response:

These comments are outside the scope of the proposed project. In addition, DPR has previously responded to these comments in letters to WPHA dated October 20, 2008, and May 2, 2007.

5. Develop AMAFs by including sorption/degradation/application method effects on volatilization.

Western Plant Health Association:

“WPHA also recommends that DPR should continue to integrate further mass-based inventory corrections that consider the environmental fate of the VOC’s used in pesticides. Appropriate factors should include, but not be limited to:

- Soil sorption effects
- Product specific agricultural use-practices, and
- Consideration for the entire formulation matrix for cases when co-formulants or formulations, and adjuvants rapidly degrade in the soil/water/air media

“include the impacts of demonstrated soil sorption effects that limit the “atmospheric availability” for low volatility VOC’s and accounting for other degradative processes that prevent gas phase reactions with NO_x to form tropospheric ozone is crucial to predict a realistic effect on ozone production.”

Dow Agrosiences:

“As we have discussed previously with the Department, we feel it is more appropriate to continue to include the impacts of demonstrated soil sorption effects that limit the atmospheric availability for low volatility VOCs and accounting for other degradative processes that prevent gas phase reactions with NO, to form tropospheric ozone.”

Exxon Mobil Chemical Company:

“DPR Should Consider Environmental Fate and Atmospheric Availability Concepts To Provide a More Realistic Mass-Balance of VOC Emissions in the Agricultural Field”

Department of Pesticide Regulation’s Response:

These comments are outside the scope of the proposed project. In addition, DPR has previously responded to these comments in letters to WPHA dated October 20, 2008, and May 2, 2007.

6. The Department of Pesticide Regulation Should Consider A Holistic Approach, Utilizing A Life Cycle Assessment Of the Total Agricultural Scenario

Exxon Mobil Chemical Company:

“We suggest that it is most beneficial to consider ground- level OFP through a Life Cycle Assessment (LCA). In general, if the goal is to reduce ground- level ozone, the reaction chemistry and subsequent alternative uses/pesticide product re-formulations need to be combined into a single analysis. For example, it is important to first determine whether the location of interest is under VOC-limited or NOx- limited conditions and to have an understanding of how meteorological and other environmental conditions can affect the ozone formation chemistry. It is also important to compare the quantities and sources of VOC that may be involved for current use and reformulated pesticide products, as well as the application and use requirements for these substances. For example, if a product is reformulated to one that is less efficacious and requires multiple field applications (versus other effective products) what effect does increased use of field equipment have on the total VOC emissions? Could a reformulated product result in a product which is more water-soluble that would result in emissions to other environmental media, such as groundwater, thereby creating a more significant environmental issue in California. Kumar et al. (2008) found that VOC emissions from farm equipment can contribute to VOC emissions at concentrations greater than that from applied pesticide products. They also showed that VOC emission concentrations from the plants (biogenic emissions) were higher than the pesticide product VOC emissions.”

Department of Pesticide Regulation’s Response:

These comments are outside the scope of the proposed project. The proposed project is a research study to evaluate the technical feasibility of accounting for reactivity in DPR’s VOC inventory. If the study shows this is technically feasible, several other major steps must occur before DPR could implement the reactivity adjustments, including revisions to the state implementation plan. Until these other steps occur, the current pesticide element of the state implementation plan requires DPR to reduce the mass of pesticide VOC emission by specified amounts in specified areas. DPR’s primary goal is to comply with its legal obligation to reduce the mass of pesticide VOC emissions, with the important but secondary objective of reducing ground-level ozone. However, DPR does evaluate the impact of its VOC reduction measures holistically, assessing toxic exposure to the public and workers, environmental effects, and other

Randy Segawa
August 14, 2009
Page 6

potential impacts. For example, DPR evaluated and found no potential ground water effects of its fumigant regulations that require additional irrigation to mitigate VOC emissions. DPR agrees that reformulating to a product that requires more frequent applications would have the disadvantages of increasing emissions from farm equipment as well as increasing toxic exposure, and is likely inadvisable. Fortunately, registrants have been successful in reformulating some products with lower VOC content, and maintaining efficacy with the same number of applications and amount of active ingredient.

Randy Segawa
August 14, 2009
Page 7

Reference

Oros, D. 2009. Pilot project proposal: Estimating pesticide product volatile organic compound emission speciation and reactivity based on product composition. Memorandum to Randy Segawa, Environmental Monitoring Branch.