

May 18, 2026

**Re: 2026 State Implementation Plan Revisions for the California Extreme Ozone Nonattainment Areas**

To whom it may concern:

Thank you for the opportunity to comment on the revised State Implementation Plan (SIP). I am a Senior scientist at Pesticide Action & Agroecology Network (PAN). PAN North America works to create a just, healthy, and equitable food system and is one of five regional centers cooperating to transform food systems across the globe.

Data on volatile organic compound (VOCs) emissions from pesticides and DPR's 2026 annual report indicates that CARB should review pesticide-related emissions with a focus on nonfumigant pesticides for the revised SIP. There is potential for California to further mitigate emissions from nonfumigant pesticides.

**CARB should review emissions from nonfumigant pesticides for the SIP and develop reduction measures**

In a study of pesticide use and greenhouse gas emissions in China, VOCs from several pesticides were measured and emission factors were calculated.<sup>1</sup> Insecticides in a formulation used in an orchard (beta-cypermethrin and malathion) were found to have the highest VOC emissions.<sup>2</sup> Two factors influenced the emissions: the pesticide was an emulsifiable concentrate (EC) and the formulation had a low active ingredient content (about 20%). Both of these factors contributed to the high content of organic solvents in the pesticide formulation.

Of the 11 active ingredients studied, two more pesticide formulations had relatively high VOC emissions: MCPA-dimethylammonium and copper abietate. The study also found that due to intensive use in maize and rice, herbicides had the highest cumulative emissions compared to insecticides or fungicides, while in orchards the VOC emissions were highest for insecticide use.

CARB should review the emissions data for the nonfumigant pesticide formulations used in California and should issue further guidance to DPR to recommend actions that mitigate nonfumigant pesticides emissions, including

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<sup>1</sup> VOC emissions data were also collected on several other pesticides, some of which were used together: atrazine and nicosulfuron, copper abietate, fluopicolide and propamocarb hydrochloride, indoxacarb and chlorpyrifos, MCPA-dimethylammonium.

<sup>2</sup> Li, Ruimin, et al. "Volatile Organic Compound Emission Inventory for Pesticide Spraying in an Agricultural City of Northeast China: Real-Time Monitoring and Method Optimization." *Agriculture* 14, no. 8 (2024): 1223. <https://doi.org/10.3390/agriculture14081223>.

DPR recommendations on alternative farming practices that decrease intensive use of pesticides.

DPR's annual report on VOC emissions from pesticides reported that total hypothetical emissions for 2024 increased from 2023, driven by an increase in nonfumigant pesticide emissions. DPR stated that it will examine low-emission alternatives, however, the report attributed the increased emissions to nonfumigant alternatives to chlorpyrifos. It is not clear from the report's language whether DPR will examine other types of nonfumigant pesticides that contribute to emissions.

**CARB should review emissions from emulsifiable concentrate formulations for the SIP and develop reduction measures**

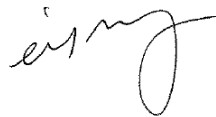
DPR reported that revised emissions calculations for the San Joaquin Valley nonattainment area (NAA) for EC formulations of the insecticides fenpyroximate and hexathiazox increased emissions, resulting in prohibitions in 2015. However, herbicides are also available in EC formulations. Use of ECs result in increased emissions in DPR's reporting for all of the NAAs. CARB should issue a clear guidance to DPR to recommend further prohibitions on EC formulations.<sup>3</sup>

**CARB should collect emissions data on nonfumigant pesticides during real-time applications in order to inform reduction measures**

DPR's VOC reports cite hypothetical emissions often. The projections on emissions would benefit from more real-world data collection, especially for nonfumigant pesticides. A literature search for VOC emissions from pesticide use indicated that a relatively limited amount of data are available. CARB should collect these data with DPR to obtain a more accurate picture of the level of emissions coming from nonfumigant pesticide use and to then take action on reducing emissions from pesticide use.

Thank you for the opportunity to comment.

Sincerely,

A handwritten signature in black ink, appearing to read 'Emily Marquez', with a stylized flourish at the end.

Emily Marquez, Ph.D.  
Senior scientist

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<sup>3</sup> California Department of Pesticide Regulation. *Annual Report on Volatile Organic Compound Emissions from Pesticides: Emissions for 1990-2024*. Air 2026 Draft. California Environmental Protection Agency, 2026.