



September 15, 2026

Lauren Sanchez, Chair
California Air Resources Board
1001 'I' Street
Sacramento, CA 95814

**RE: Pesticide Action and Agroecology (PAN) & Californians for Pesticide Reform (CPR)
Comments on CARB's Air Toxics Roadmap**

Dear Chair Sanchez and Members of the Board:

Pesticide Action and Agroecology Network (PAN), on behalf of our 8,000 members and supporters in California and Californians for Pesticide Reform, a coalition of 200+ organizations, appreciate the opportunity to comment on the California Air Resources Board (CARB) DRAFT 2026 Roadmap to Reduce Air Toxics. We support CARB's decision to re-envision the Air Toxics program by deepening our understanding of the nexus between cumulative impacts and adverse human health outcomes, streamlining the identification of toxic air contaminants (TACs), and upholding the state's scientific rigor in the face of injurious rollbacks at the federal level.

CARB has stated that NO_x reductions take precedence over VOC-emitting ozone-precursors. We have expressed concern in numerous avenues that pesticide-induced volatile organic compound (VOC) and nitrous oxide (N₂O) emissions receive inadequate regulatory attention and should be taken seriously, as they contribute to adverse human health outcomes and intensify climate change effects. VOCs react with ambient nitrogen oxides and UV rays to produce ground-level ozone (O₃), a potent greenhouse gas, crop injurer, respiratory toxicant, and neurotoxicant.¹ Many VOC-emitting pesticides used in California agriculture are also Toxic Air Contaminants (TACs) associated with serious health and environmental

¹ Manisalidis, Ioannis et al. "Environmental and Health Impacts of Air Pollution: A Review." *Frontiers in public health* vol. 8 14. 20 Feb. 2020, doi:10.3389/fpubh.2020.00014

harms, including carcinogenicity², reproductive and developmental toxicity, neurotoxicity, endocrine disruption, respiratory impacts³, and ecological toxicity affecting pollinators and broader ecosystems.⁴

Fumigant pesticides produce high volatile organic compound (VOC) emissions⁵, are used at very high application rates⁶, and are especially prone to long-range drift.⁷ Still, estimated VOC emissions and inventory of use in the San Joaquin Valley has shown that 76% of pesticide VOC emissions are from non-fumigant pesticides.⁸ In 2023, DPR also estimated that unregulated low-VOC products accounted for 0.522 (tons per day) tpd or 52% of VOC emissions compared to 0.473 tpd or 48% of regulated high-VOC products, warranting scrutiny of low-VOC use volume contributing to total VOC emissions.⁹ Agricultural pesticides emit 14.8 tons of VOCs per day in the San Joaquin Valley, a level that is higher than all other major industrial sectors in the region, according to DPR's recent annual 2025 VOC report.¹⁰ Further, studies have found that as much as 80-90% of applied pesticides may volatilize within a few days of application.¹¹

Research demonstrates that fumigation with chloropicrin can increase nitrous oxide (N₂O) production by 700-800%.¹² Nitrous oxide is a greenhouse gas (GHG) that's 300 times more potent than carbon dioxide (CO₂) at trapping heat, and other fumigants are expected to yield comparable results. Similar effects on

² McGwin, Gerald Jr, and Russell L Griffin. "An Ecologic Study of the Association between 1,3-Dichloropropene and Pancreatic Cancer." *Cancers* vol. 15,1 150. 27 Dec. 2022, doi:10.3390/cancers15010150

³ M. Pesonen, K. Vähäkangas, Chloropicrin-induced toxicity in the respiratory system, *Toxicology Letters*, Volume 323, 2020, Pages 10-18, ISSN 0378-4274, <https://doi.org/10.1016/j.toxlet.2020.01.022>.

⁴ oxyfluorfen has been classified by EPA as a possible human carcinogen and presents ecological risks; and abamectin raises ecological risks to terrestrial invertebrates, including pollinator-relevant concerns.

⁵ "Volatile Organic Compounds (VOC) Field Fumigation Emission Reduction Regulations." *California Department of Pesticide Regulation*, 22 Jul. 2008,

www.cdpr.ca.gov/cac-letter/volatile-organic-compounds-voc-field-fumigation-emission-reduction-regulations/.

⁶ California Department of Pesticide Regulation. "Department of Pesticide Regulation Releases Annual Pesticide Use Report." *California Department of Pesticide Regulation*, 2 Sept. 2025, www.cdpr.ca.gov/2025/09/02/departments-of-pesticide-regulation-releases-annual-pesticide-use-report/. Press release.

⁷ DPR's Environmental Monitoring Branch, for instance, linked an elevated 1,3-dichloropropene reading at the Shafter air monitoring site to an application 8.2 miles away on Jan. 12, 2020.

⁸ California Department of Pesticide Regulation. *Preliminary Adjusted Volatile Organic Compound Emissions from Pesticides in the San Joaquin Valley: 2019*. California Environmental Protection Agency, 2 Oct. 2020, www.cdpr.ca.gov/wp-content/uploads/2024/11/voc_emissions_2019.pdf; Department of Pesticide Regulation. Preliminary Estimates of Volatile Organic Compound Emissions from Pesticides in the San Joaquin Valley: Emissions for 2018. https://www.cdpr.ca.gov/docs/emon/vocs/vocproj/voc_emissions_2018.pdf.

⁹ California DPR, *Appendix 3: Low-VOC, High-VOC, and Total Hypothetical Emissions*, Table A3-2, attached to *Annual Report on Volatile Organic Compound Emissions from Pesticides: Emissions for 1990–2023*. https://www.cdpr.ca.gov/wp-content/uploads/2025/04/appendix_3_voc_emissions_from_pesticides_emissions_1990-2023.pdf?utm_source=chatgpt.com

¹⁰ U.S. Environmental Protection Agency, *Approval of Clean Air Plans; San Joaquin Valley, California; Contingency Measures for the 1997 Ozone Standards*, 90 Fed. Reg. 51029 (Nov. 14, 2025). <https://www.federalregister.gov/documents/2025/11/14/2025-19884/approval-of-clean-air-plans-san-joaquin-valley-california-contingency-measures-for-1997-ozone>

¹¹ Majewski, M. S. (2019). *Pesticides in the atmosphere: distribution, trends, and governing factors* (Vol. 1). CRC press; Aktar, M. W., Sengupta, D., & Chowdhury, A. (2009). Impact of pesticides use in agriculture: their benefits and hazards. *Interdisciplinary toxicology*, 2(1), 1.

¹² Spokas, K., & Wang, D. (2003). Stimulation of nitrous oxide production resulted from soil fumigation with chloropicrin. *Atmospheric Environment*, 37(25), 3501-3507.

N₂O production have been documented after application of other pesticides and these effects were evident after 48 days for some applications, nearly four times longer than fertilizer-induced N₂O emissions.¹³ Researchers posit that significant N₂O emissions may be related to impacts on soil microbial activity post-application of pesticides.¹⁴ Pesticide application can also increase reliance on GHG-emitting synthetic fertilizers by damaging soil microbial food webs and disrupting natural nutrient cycling.¹⁵ For instance, Wang and Tang (2024) reported ‘soil chemical fumigation may kill most soil microorganisms’, adversely impacting these natural processes.¹⁶

Nearly 20 million pounds of the most commonly used fumigants (1,3-D, chloropicrin, metam sodium, and dazomet) are used every year on California fields, yet many of the fumigants used in the state are banned elsewhere.¹⁷ These findings are especially concerning given that pesticide exposure reflects the starkest racial and ethnic disparities in California, particularly in communities already cumulatively burdened by environmental stressors, according to researchers at the Office of Environmental Health Hazard Assessment in the California Environmental Protection Agency.¹⁸ In fact, counties with majority Latine populations face 906% more pesticide exposure per square mile than counties with fewer than 24% Latine residents.¹⁹ In response to these staggering figures, community advocates are advocating to eliminate the use of organophosphates and fumigants, an ambition that aligns with the state’s goal to eliminate all ‘priority pesticides’ by 2050²⁰. ***Given that equity is a core principle of CARB’s Air Toxics Roadmap, CARB should prioritize the elimination of GHG-inducing and health-harming fumigant pesticides.***

According to CARB, DPR has authority to regulate ‘when, where, and how pesticides are used’, but critically not how much. It’s CARB’s jurisdiction to regulate emissions, and DPR’s purview is to determine how to safely use pesticides so that use does not exceed CARB’s emission standards. ***Under California law, CARB and local air districts have independent and primary authority to regulate pesticide TAC emissions after pesticidal use has ended, including authority to impose enforceable***

¹³ Spokas, K., Wang, D., & Venterea, R. (2005). Greenhouse gas production and emission from a forest nursery soil following fumigation with chloropicrin and methyl isothiocyanate. *Soil Biology and Biochemistry*, 37(3), 475–485.; Jezierska-Tys, S., Joniec, J., Bednarz, J., & Kwiatkowska, E. (2021). Microbiological Nitrogen Transformations in Soil Treated with Pesticides and Their Impact on Soil Greenhouse Gas Emissions. *Agriculture*, 11(8), 787.

¹⁴ Ibid

¹⁵ B. Ni, L. Xiao, D. Lin, T. Zhang, Q. Zhang, Y. Liu, Q. Chen, D. Zhu, H. Qian, M.C. Rillig, & Y. Zhu, Increasing pesticide diversity impairs soil microbial functions, *Proc. Natl. Acad. Sci. U.S.A.* 122 (2) e2419917122, <https://doi.org/10.1073/pnas.2419917122> (2025).

¹⁶ Wang Y and Tang DWS (2024) Soil chemical fumigation alters soil phosphorus cycling: effects and potential mechanisms. *Front. Plant Sci.* 15:1289270. doi: 10.3389/fpls.2024.1289270

¹⁷ Department of Pesticide Regulation annual Pesticide Use Reports. <https://www.cdpr.ca.gov/docs/pur/purmain.htm>.

¹⁸ Lara Cushing, John Faust, Laura Meehan August, Rose Cendak, Walker Wieland, and George Alexeeff: *Racial/Ethnic Disparities in Cumulative Environmental Health Impacts in California: Evidence From a Statewide Environmental Justice Screening Tool (CalEnviroScreen 1.1)* *American Journal of Public Health* 105, 2341–2348, <https://doi.org/10.2105/AJPH.2015.302643>

¹⁹ Californians for Pesticide Reform. (2021). *Disproportionate Impact of Hazardous Pesticides on Latinx Communities in California*. [Pesticide Reform](#)

²⁰ California Department of Pesticide Regulation. *Accelerating Sustainable Pest Management: A Roadmap for California*. California Environmental Protection Agency, Jan. 2023, www.cdpr.ca.gov/wp-content/uploads/2024/10/spm_roadmap.pdf.

air-pollution standards, emission-control requirements, permit conditions, health-risk thresholds, control-efficiency requirements, or other enforceable TAC controls. DPR has exclusive jurisdiction over how the pesticide is used and applied.

Pesticides should be a major focus of CARB's Air Toxics Roadmap because they represent a substantial, longstanding, and completely unaddressed source of toxic air pollution. California has already identified numerous pesticides as TACs. Further, DPR identified hundreds of pesticide products as VOC emitters, but regulatory action was exceedingly narrowed to just seven active ingredients, applicable to certain seasons in the San Joaquin Valley.²¹ ***The Roadmap provides an opportunity for CARB and DPR to move beyond treating pesticide emissions primarily as an ozone-precursor issue and address their direct toxic, cumulative, and community-level health impacts.***

I. CARB SHOULD WORK WITH DPR TO STRENGTHEN CALIFORNIA'S AIR QUALITY MONITORING NETWORK FOR PESTICIDES

DPR's Air Monitoring Network (AMN) is critical for public transparency, informing mitigation efforts, and measuring concentrations of harmful pesticides; however, several aspects of the AMN are substandard. Siting of monitoring sites are often not community-informed, communities aren't surveyed for inquiries regarding AMN findings, presentations do not use accessible language for non-scientific audiences, processes for developing air levels of concern are nebulous, DPR's dissemination of AMN findings are often misleading, and proposed actions for addressing pesticide air levels that exceed screening levels or regulatory targets are not divulged to the public.

The DRAFT Air Toxics Roadmap states 'CARB intends to strengthen the monitoring system so it can be more targeted, adaptable, and responsible to emerging air toxic concerns, community priorities, and emission reduction needs. ***CARB should work with DPR to conduct joint AMN meetings in communities impacted by harmful, airborne pesticides.*** This joint collaboration should conduct local surveys to inform site location efforts, distribute community surveys to ascertain community interest and provide AMN-specific technical information during presentations in local communities, and disseminate technical overview webinars prior to local AMN presentations.

The AMN should serve as a powerful precursor to meaningful action, not just serve as a notification tool. Often during AMN presentations to local communities, DPR does not explain what they are obligated to do in the face of elevated pesticide air levels that may exceed screening levels and regulatory targets, nor are communities asked what types of mitigations they'd prefer to address high pesticide air levels so air levels of another pesticide don't rise. CARB's January 2022 draft proposal stated 'This measure would involve CARB working with the California Department of Pesticide Regulation (DPR) to develop new regulations to further reduce ROG emissions from commercial and agricultural pesticides used in California through reformulation, reduced usage, and innovative technologies and practices'; however, the

²¹ DPR's 2012 Notice of Proposed Regulatory Action for DPR Regulation No. 12-001: Volatile Organic Compounds in the San Joaquin Valley Ozone Nonattainment Area, <https://cdn.cocodoc.com/cocodoc-form-pdf/pdf/22567649--Notice-of-Proposed-Regulatory-Action-DPR-12-001-Notice-of-Proposed-Regulatory-Action-and-Notice-of-Public-Hearing-cdpr-ca-.pdf>

initiative was dwindled to taking meaningful action on one pesticide in the final State Implementation Plan (SIP).²² ***CARB should work with DPR to explain to communities impacted by pesticide exposure, both CARB's and DPR's legal authority to address exceedances or near exceedances.***

The underlying processes for developing DPR pesticide screening levels or regulatory targets are also not clearly explained during local AMN presentations. This is critical for fostering community trust, understanding risk, and decision-making. ***CARB and DPR should work together to reinforce, verify, and collaboratively generate AMN screening levels and regulatory targets and post on both CARB and DPR's websites the rationale.***

Growers employing alternative, sustainable pest management (SPM) practices support air quality in numerous ways. Ecological growers omit or minimize inputs, such as synthetic pesticides and fertilizers (derived from fossil fuels), and employ practices that build healthy soils and sequester large quantities of carbon in the soil.²³ ***CARB should work with DPR to create a 'state of the air' card for growers that adopt alternatives to pesticides of concern in areas with near exceedances or exceedances.*** We should celebrate the growers that are prioritizing equity and community health.

II. CARB SHOULD DEVELOP A PESTICIDE EMISSIONS INVENTORY FOR AGRICULTURE

The agricultural sector generates massive amounts of volatile organic compounds (VOCs), and 71 pesticide active ingredients are officially classified as Toxic Air Contaminants (TACs).²⁴ Further, pesticide formulations (inerts and adjuvants), especially emulsifiable concentrate formulations, often contain VOCs that help dissolve active ingredients, exacerbating VOC emissions.²⁵

The DRAFT Air Toxics Roadmap states ‘emissions inventories help identify which sources are releasing air toxics, which pollutants are being emitted, and where those emissions may be occurring...better emissions inventories improve modeling.’ DPR collects several key pieces of information from growers that would directly support the development of a comprehensive pesticide-specific air toxics inventory, including the following:

- (a) **Chemical Identity and Registration Number** - Registrant information
- (b) **Total Pounds Applied, Acres Treated, Application Rate** - Pesticide Use Reports

²² South Coast Air Quality Management District. *2022 Air Quality Management Plan: Appendix IV-B: Regional SOx RECLAIM Transition / Control Measures*. SCAQMD, 2022, www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/combined-appendix-iv-b.pdf.

²³ Rodale Institute. *The Farming Systems Trial: Celebrating 30 Years*. Rodale Institute, 2011, <https://rodaleinstitute.org/wp-content/uploads/fst-30-year-report.pdf>.

²⁴ California Department of Pesticide Regulation. *Use Trends of Pesticides on DPR's Toxic Air Contaminants List: Cumulative Acres Treated*. Aug. 2025, www.cdpr.ca.gov/wp-content/uploads/2025/08/2023_toxic_air_contaminants_acres_treated.pdf. Accessed 15 Sept. 2026.

²⁵ 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>.

- (c) **Date and Time of Application, and Location Metrics** - SprayDays Notification System for restricted use materials, Public Land Survey System, and CalAg permits
- (d) **Application Methods** (aerial, groundsprayer, chemigation, soil injection) and **Environmental Controls** (tarps or other sealing methods) - Pesticide Use Reports
- (e) **Crop and Site Type** - Pesticide Use Reports

A pesticide-specific emissions inventory would power predictive models that forecast future pollution levels, support emission reduction progress, identify high-risk areas, inform siting of air monitoring networks, and trigger enforcement mechanisms. ***CARB should work with CDPR to create an emissions inventory for all TAC pesticides.***

III. DPR's PESTICIDE MODELING MUST BE GROUNDTRUTHED BY REAL-WORLD AIR QUALITY MONITORING DATA, AND INDEPENDENTLY VERIFIED BY CARB

Our analyses of air monitoring concentrations in 2023 and 2024 revealed concentrations of 1,3-D ***increased*** at the Delhi, Parlier, and Santa Maria monitoring locations despite implementation of DPR's low-emission fumigation methods.²⁶ Thus, DPR's estimated 1,3-D emissions do not correlate with 1,3-D concentrations in the air as measured by DPR's Air Monitoring Network. ***CARB should work with DPR to unveil the discrepancy between elevated 1,3-D AMN concentrations and lower emission estimates. DPR's modeling may not include "worst-case" scenarios for drift. It's possible that the data used in DPR's modeling underestimate emissions. Also, emission estimates should be done using highest values, not averages. CARB may be able to support DPR in adjusting assumptions made in their models to reflect the real-world AMN data.***

Total VOC emissions = Pounds of Products Used x Emission Potential (EP) x Application Method Emission Rating (ER), according to DPR's VOC 2023 report.²⁷

DPR's VOC report states 'DPR thoroughly evaluates registrant-submitted thermogravimetric analysis (TGA) data to determine Emission Potentials (EPs) for new and existing products'. Zeinali *et al.*, 2011 stated 'TGA alone is inadequate to compose any meaningful decisions on the regulation of pesticide products to reduce ozone pollution. Results can be misleading with respect to other VOC content, and it does not provide a straightforward approach for determining 'ozone forming potential (OFP)'. The ideal assessment approach will include: (1) unambiguous chemical composition information, (2) flexible simulation models to estimate emissions under different management practices, and (3) accurate reactivity predictions.²⁸ Accurate reactivity is paramount for determining ozone-forming potential, as TGA only

²⁶ California Department of Pesticide Regulation. *Monitoring of 1,3-Dichloropropene in Fresno and Merced Counties: Results for 2024*. Report no. AIR 25-02, 2025, www.cdpr.ca.gov/report/monitoring-of-13-dichloropropene-in-fresno-and-merced-counties-results-for-2024/.

²⁷ [Annual Report on Volatile Organic Compound Emissions from Pesticides: Emissions for 1990–2023](#).

²⁸ Zeinali, M., McConnell, L. L., Hapeman, C. J., Nguyen, A., Schmidt, W. F., & Howard, C. J. (2011). Volatile organic compounds in pesticide formulations: Methods to estimate ozone formation potential. *Atmospheric Environment*, 45(15), 2404-2410. <https://doi.org/10.1016/j.atmosenv.2011.01.039>

tracks weight changes when a material is heated. It misses real-world atmospheric chemistry, such as the rate at which ozone formation occurs. ***CARB should work with DPR to ascertain whether additional information is necessary to generate emission potential, such as accurate reactivity predictions.***

A critical component of deriving Emission Ratings (ERs) is the Application Method Adjustment Factor (AMAF), which has been determined from field study data and is specific to a given combination of Active Ingredients and application methods. In light of the increased 1,3-D air concentrations, DPR should review the underlying assumptions for the AMAFs and use real-world emissions data for various field application scenarios. ***CARB and DPR should conduct an analysis evaluating the chasm between estimated pesticide emission reductions and real-world air quality data as an additional uncertainty factor integrated into the AMAF calculation. Additionally, other facts such as soil moisture verification, differences in soil texture, variable environments, or other considerations may need to be taken into account for the AMAF.***

IV. CARB SHOULD SUPPORT DPR BY TRAINING, EDUCATING, AND INSTITUTING PROTOCOLS FOR ASSESSING CUMULATIVE PESTICIDE EXPOSURES USING CARB'S HOTSPOTS ANALYSIS AND REPORTING (HARP2) AS A MODEL.

As illustrated in both OEHHHA's [CalEnviroScreen 5.01](#) and the [California People and Pesticide Explorer Tool](#), growers, farmworkers, and community members who work in or live adjacent to conventional, pesticide-reliant farms are cumulatively exposed to high levels of toxic air contaminants (TACs), many of which are fumigant pesticides. A report conducted by the Sustainable Technology and Policy Program at the University of California, Los Angeles (UCLA), found some CA residents and especially farmworkers residing within a quarter mile of schools were synergistically exposed (the interaction of two or more chemicals resulting in toxicity greater than their sum) to more than one of the following fumigants: metam sodium, metam potassium, chloropicrin, and 1,3-dichloropropene, increasing the risk of carcinogenicity and other human health hazards.²⁹ Under California law, DPR and County Agricultural Commissioners (CACs) are required to consider cumulative impacts in decision-making regarding registration and restricted materials permitting. Currently, state officials do not assess cumulative impacts.

In 'Building Capacity for Robust Pesticide Regulation', a report written by University of California, Los Angeles (UCLA), researchers recommended DPR adopt a conceptual Cumulative Risk Assessment Tool (CalCAT).³⁰ "CalCAT would calculate likely health impacts to the persons most at risk using a component based approach developed by DPR in consultation with OEHHHA, identifying whether cumulative exposures are likely to exceed acceptable levels. Where necessary, it would display a set of standard risk mitigation measures for that combination of pesticides. CAC staff would choose one or more of these measures to mitigate the cumulative risk. The CalCAT concept is inspired by CARB's HARP2, which

²⁹Zaunbrecher, Virginia, et al. *Exposure and Interaction: The Potential Health Effects of Using Multiple Pesticides*. UCLA Sustainable Technology & Policy Program, 2016, www.researchgate.net/publication/308698332.

³⁰ Malloy, Timothy, and Patrick Allard. *Building Capacity for Robust Pesticide Regulation: Part I: Cumulative Impacts*. UCLA School of Law, 2024, law.ucla.edu/sites/default/files/UCSL-0371_UCLALaw_Cumulative-Impacts-Report_Final_Screen.pdf. [1, 2]

“assesses air emissions only but can be used for cumulative exposures.” ***CARB should host an informational session with the public and invite DPR staff to discuss how regulators have benefitted from HARP2 and how it can be applied to cumulative exposure assessments.***

V. CARB MUST WORK WITH DPR TO UPDATE ITS VOC EMISSION STANDARDS TO MATCH UPDATED REQUIREMENTS

Since 1994 California has addressed pesticide VOC emissions in the SIP for complying with national ambient air quality standards (NAAQS). However, DPR’s core pesticide VOC reduction framework remains tied to outdated SIP targets that do not reflect today’s substantially more stringent ozone attainment obligations. Since 1994, the federal ozone NAAQS has progressively tightened from the 1-hour 80 ppb to the 70 ppb 8-hour ozone standard adopted in 2015, with California’s extreme ozone nonattainment areas now required to attain that standard by 2037. Yet the San Joaquin Valley remains in severe/extreme ozone nonattainment and pesticides continue to represent a significant source of ozone-forming VOC/Reactive Organic Gases (ROG) emissions.³¹

DPR’s current nonfumigant VOC framework focuses narrowly on restricting certain “high-VOC” pesticide products containing four primary active ingredients (AIs) — abamectin, chlorpyrifos, gibberellins, and oxyfluorfen — when used on seven specified crops in the San Joaquin Valley during ozone season (May 1–October 31).³² Products classified by DPR as “low-VOC” or “excluded” are not subject to these restrictions. Yet, Low-VOC products similarly accounted for the majority of emissions in each year from 2019–2023: in 2019 64%, in 2020 64%, in 2021 63%, in 2022 56%. ***CARB should work with DPR to adopt more stringent new regulations for VOC-emitting nonfumigants that take these and other gaps into account in order to help achieve the 70 ppb 8-hour attainment goal. For fumigant pesticides, CARB should also require DPR to strengthen fumigant VOC controls by adopting SIP-enforceable limits that reduce high-emission fumigant uses, require the lowest-emission feasible application methods, and establish declining seasonal ROG caps for fumigant emissions in the San Joaquin Valley. At minimum, CARB should make the claimed 0.4 tpd 1,3-D ROG reduction directly enforceable, rather than treating it as an expected co-benefit of a separate DPR health-risk rule as is proposed.***

VI. RESEARCH ENDEAVORS SHOULD PRIORITIZE FUNDING FOR PILOTS THAT SUPPORT GROWERS WITH TRANSITIONING FROM VOC-EMITTING PESTICIDES

Ecological farming addresses the root cause of pest outbreaks. Agroecological practices like cover cropping, intercropping, hedgerows, etc., reinstate ecological networks and support natural enemies of

³¹ California Air Resources Board. "2026 State Implementation Plan Revisions for the California Extreme Ozone Nonattainment Areas." *California Air Resources Board*, 17 Apr. 2026, ww2.arb.ca.gov/resources/documents/2026-SIP-Revisions-California-Extreme-Ozone-NAAs.

³² California Department of Pesticide Regulation, *Volatile Organic Compounds Nonfumigant Regulations – Fact Sheets*, available at: [DPR VOC Nonfumigant Regulations Fact Sheets](#)

pests that effectively control pest populations.³³ Cultivating natural pest controls can eliminate the perceived need for pesticides.

DPR's Sustainable Pest Management (SPM) roadmap sets two overarching goals of making SPM the de facto pest management system in CA, and eliminating the use of priority pesticides by 2050.³⁴ SPM practices can help reduce emissions of both VOCs and other health-harming particulate matter. Healthy soil has high microbial activity, enabling soil microbes to degrade volatile organic pollutants before vaporizing into the air.³⁵ Healthy soil practices typically involve ground cover, providing a physical and hydraulic barrier, making it harder for volatile gases to escape into the atmosphere. Further, good soil structure with roots and organic matter protects against wind erosion, precluding dust and particulate matter from mobilizing into the air.³⁶ Hedgerows can also capture gaseous pollutants, such as NO_x and VOCs.³⁷

In 2023, DPR estimated that unregulated low-VOC products accounted for 0.522 tpd or 52% of VOC emissions compared to 0.473 or 47% of VOCs represented by regulated high-VOC products. This statistic suggests that DPR is still focused on advocating for low-VOC pesticides rather than encouraging implementation of SPM practices as a way to enhance natural pest controls and reduce continued use of hazardous pesticides. ***CARB should join the DPR-led SPM Advisory Committee and work with CDEA and CDPR to identify, prioritize, and eliminate, through the use of ecological pest management practices, the use of high VOC-emitting pesticides and heavily used low-VOC pesticides in elevated ozone and ozone nonattainment areas, such as, the San Joaquin Valley.***

VII. CONCLUSION

Pesticides must be accounted for in CARB's endeavor to reduce Air Toxics. Our current paradigm of regulating VOC-emitting pesticides is not adequately driving emission reductions. In addition to fortifying the infrastructure, associated with pesticide monitoring, modeling, research, and emissions

³³ "Agroecology." *Pesticide Action & Agroecology Network*, www.panna.org/our-work/agroecology/. Accessed 15 Sept. 2026.

³⁴ Sustainable Pest Management Working Group. *Accelerating Sustainable Pest Management: A Roadmap for California*. California Department of Pesticide Regulation, 2023, www.cdpr.ca.gov/wp-content/uploads/2024/10/spm_roadmap.pdf.

³⁵ Ming Chen, Piao Xu, Guangming Zeng, Chunping Yang, Danlian Huang, Jiachao Zhang, Bioremediation of soils contaminated with polycyclic aromatic hydrocarbons, petroleum, pesticides, chlorophenols and heavy metals by composting: Applications, microbes and future research needs, *Biotechnology Advances*, Volume 33, Issue 6, Part 1, 2015, Pages 745-755, ISSN 0734-9750, <https://doi.org/10.1016/j.biotechadv.2015.05.003>.

³⁶ Xiaomin Chang, Libo Sun, Xinxiao Yu, Ziqiang Liu, Guodong Jia, Yusong Wang, Xuhui Zhu, Windbreak efficiency in controlling wind erosion and particulate matter concentrations from farmlands, *Agriculture, Ecosystems & Environment*, Volume 308, 2021, 107269, ISSN 0167-8809, <https://doi.org/10.1016/j.agee.2020.107269>.

³⁷ H.A. Sheikh, B.A. Maher, A.W. Woods, P.Y. Tung, R.J. Harrison, Efficacy of green infrastructure in reducing exposure to local, traffic-related sources of airborne particulate matter (PM), *Science of The Total Environment*, Volume 903, 2023, 166598, ISSN 0048-9697, <https://doi.org/10.1016/j.scitotenv.2023.166598>.

inventory, CARB should work with DPR to use these tools to identify and prioritize intervention of communities inundated with airborne pesticide contaminants. Air toxics work does not cease when we can identify and track pollutants, but must be backed by real change on the ground. When we see a significant decrease in airborne-related illnesses and harmful pesticide use, CARB and DPR will have lived up to their mission.

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