



Teresa Marks
Acting Director

MEMORANDUM

Jared Blumenfeld
Secretary for
Environmental Protection

TO: Karen Morrison, PhD, Assistant Director
Jesse Cuevas, Assistant Director

FROM: Teresa Marks
Acting Director
916-445-4000

DATE: May 28, 2019

SUBJECT: RISK MANAGEMENT DIRECTIVE FOR CHLORPYRIFOS

This document outlines the Department of Pesticide Regulation's (DPR's) risk management decision based on the July 2018 Risk Characterization Document for chlorpyrifos (2018 RCD) and the Scientific Review Panel's (SRP's) review of the 2018 RCD and findings. The decision sets the regulatory target concentration and dose necessary to initiate and guide the development and adoption of permanent mitigation measures to address acute exposures to bystanders identified in the 2018 RCD.

Background

Chlorpyrifos is a pesticide used to control a variety of insects on more than 60 crops, with major uses in California for nut trees, alfalfa, citrus, cotton, and several other food crops. Although the use of chlorpyrifos in California has been declining, nearly one million pounds was used on agricultural crops in 2016. There are several dozen chlorpyrifos products, registered by approximately 20 different companies. Methods of application have included aircraft, orchard and vineyard tractor airblast sprayers, tractor ground boom, granular, application using irrigation systems, and others. Major use areas include the Central Valley, Central Coast region, and Imperial County.

Chlorpyrifos is an organophosphate that inhibits the functioning of the nervous system (acetylcholinesterase inhibition). This is how it kills insects. Acute exposure can have similar effects on humans (sweating, salivation, vomiting, low blood pressure and heart rate, seizures, death). Recent research has shown that chlorpyrifos is also a developmental neurotoxin in children and sensitive populations, and that the threshold for chlorpyrifos-induced neurodevelopmental effects is approximately 10-fold lower than the threshold for acetylcholinesterase inhibition. Using acetylcholinesterase inhibition data and adding an uncertainty factor for the more sensitive neurotoxic effect, DPR staff calculated a reference concentration of 9.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) of air. Based on the recommendations of the SRP, DPR staff calculated a second reference concentration of 4.05 $\mu\text{g}/\text{m}^3$ based on studies that looked specifically at developmental neurotoxicity (DNT), including recent animal studies. (Reference concentration refers to the level at or below which exposure to chlorpyrifos would have negligible risk to human health.)

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DPR finalized its latest health evaluation in July 2018 after review by the Office of Environmental Health Hazard Assessment (OEHHA) and the SRP as part of the toxic air contaminant (TAC) process. After receiving the SRP's findings in August 2018, DPR initiated rulemaking to list chlorpyrifos as a TAC. That regulation was filed with the Secretary of State on January 30, 2019 and became effective on April 1, 2019.

Following its initiation of the rulemaking process to list chlorpyrifos as a TAC, DPR recommended that county agricultural commissioners implement interim mitigation measures that prohibit or otherwise limit certain kinds of applications (aerial and airblast), institute buffer zones of up to a quarter mile, and restrict use to certain crops without acceptable pesticide alternatives. These recommendations were available to the county agricultural commissioners to use as of January 1, 2019. While the interim measures offer protection, they do not reduce air concentrations to less than $4.05 \mu\text{g}/\text{m}^3$.

Regulatory Target Concentration and Dose to Address Acute Bystander Exposure and the Appropriate Degree of Control Measures

As stated above, in the 2018 RCD, DPR scientists calculated the $4.05 \mu\text{g}/\text{m}^3$ reference concentration using a point of departure based on DNT effects after conducting a comprehensive review of recently available animal studies. Additionally, DPR calculated a reference dose for aggregate exposure of 0.0001 milligrams per kilogram per day (mg/kg/day). This reference dose would result in negligible risk from all routes of exposure combined, including inhalation, dermal, incidental oral (child hand-to-mouth exposure from contaminated surfaces), and dietary. DPR considered factors associated with uncertainty in the $4.05 \mu\text{g}/\text{m}^3$ reference concentration and 0.0001 mg/kg/day reference dose and concluded that the concentration and dose are supported. The SRP included the $4.05 \mu\text{g}/\text{m}^3$ reference concentration and the 0.0001 mg/kg/day reference dose in its findings.

On this basis, consistent with the SRP recommendation and findings, DPR selects the regulatory target concentration and dose of $4.05 \mu\text{g}/\text{m}^3$ and 0.0001 mg/kg/day and finds that additional control measures are necessary to achieve these levels. The 2018 RCD determined that exposure to chlorpyrifos above the selected target concentration and dose is associated with DNT effects in children and sensitive populations that include altered cognition, motor control, and behavior. These are serious, adverse effects. DPR's 2018 RCD indicates that there is not any feasible mitigation available to reduce chlorpyrifos exposure to a level below the selected target concentration and dose.

Pursuant to Food and Agricultural Code section 14023(e), please submit this proposed determination on the need for and appropriate degree of control measures to OEHHA and the Air Resources Board, followed by the air pollution control districts or air quality management districts in the affected counties for consultation. Subject to all prerequisite consultation

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requirements, given that DPR's 2018 RCD indicates that there is not any feasible mitigation available to reduce exposure below the selected target concentration and dose, please direct staff to begin preparation for the cancellation of the registration of chlorpyrifos.

Per the memorandum of understanding between DPR and the California Department of Food and Agriculture (CDFA), please also notify CDFA that the need for control measures is being considered and that DPR is preparing to cancel the registration of chlorpyrifos. Please coordinate with CDFA to establish a time period within which CDFA may comment.