



Department of Pesticide Regulation

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MEMORANDUM

Julie Henderson
Director

TO: Minh Pham
Environmental Program Manager II
Environmental Monitoring Branch

VIA: Shelley DuTeaux, PhD MPH, Chief
Human Health Assessment Branch

FROM: Chunbo Zhang, PhD, Associate Toxicologist
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Toxicology and Dose Response Assessment Section

Svetlana Koshlukova, PhD, Senior Toxicologist
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DATE: February 6, 2023

SUBJECT: RISKS FROM HUMAN EXPOSURE TO METHOXYFENOZIDE IN SURFACE WATER

On January 17, 2023, the Department of Pesticide Regulation's (DPR) Human Health Assessment (HHA) Branch was notified by the Environmental Monitoring Branch (EMB) that the Surface Water Protection Program (SWPP) reviewed data from the Surface Water Database (SURF) in response to the potential expansion of methoxyfenozide use on California crops. This review included data from DPR, California State Water Resources Control Board, and the United States Geological Survey (USGS) collected between May 2012 and December 2020 from 256 sites in the state. The maximum detected concentration was 10.1 ppb.

Pesticide residues in surface water could potentially make their way into community drinking water systems that draw water from surface water sources. Therefore, EMB requested that HHA provide Human Health Reference Levels (HHRLs) that could be used to determine if methoxyfenozide detections in surface water pose a significant risk to human health (see the request, Appendix 1). This memorandum is in response to that request.

Conclusions and Recommendations:

1. HHA calculated Human Health Reference Levels (HHRLs) to be used when methoxyfenozide residues are detected in surface water using (1) acute and chronic consumption rates for drinking water from the National Health and Nutrition Examination Survey (NHANES) 2005–2010 database; and (2) toxicological endpoints

established by the United States Environmental Protection Agency (US EPA) for chronic exposure and by European Food Safety Authority (EFSA) for acute exposure (DPR, 2022).

2. A DPR Acute HHRL (commonly referred to as the DPR HHRL) of methoxyfenozide (504 ppb) applies to evaluations of **maximum** residue levels of methoxyfenozide in drinking water and is applicable for both surface water and groundwater sources (DPR, 2022). Detected methoxyfenozide residues equal to or less than the DPR Acute HHRL of 504 ppb are not expected to pose a risk to human health, including for sensitive subpopulations. Thus, the highest detected methoxyfenozide residues in California surface water (10.1 ppb) should not be considered an acute health concern.
3. A DPR Chronic Surface Water HHRL of methoxyfenozide (205 ppb) applies to evaluations of **average** residue levels in surface water. Average residue levels of methoxyfenozide in surface water equal to or less than the Chronic HHRL of 205 ppb are not expected to pose a chronic risk to human health, including for sensitive subpopulations.

DPR Human Health Reference Levels for Methoxyfenozide

Acute HHRL for screening maximum residue levels in surface water

HHA previously calculated acute and chronic human health reference levels (HHRLs) of 504 ppb and 1025 ppb, respectively. The lower of the two values (504 ppb) was selected as the DPR Acute HHRL for screening maximum methoxyfenozide residue levels detected in drinking water (DPR, 2022). This Acute HHRL is applicable for maximum detected residue levels in both surface water and groundwater.

Chronic HHRL for screening time-average residue levels in surface water

For this evaluation, HHA calculated a DPR Chronic Surface Water HHRL of 205 ppb specifically for screening average methoxyfenozide residues in surface water. This Chronic Surface Water HHRL incorporates a relative source contribution (RSC) factor of 0.2. The RSC factor accounts for the possibility that exposure to a pesticide residue may come from sources other than drinking water (*i.e.*, food and air). A default RSC of 0.2 assumes that the exposure from water sources will be 20% of the total exposure while other intakes will make up the remainder (80%). RSCs are routinely used by regulatory agencies for deriving chronic screening levels for drinking water (US EPA, 2015; US EPA, 2023). DPR Chronic Surface Water HHRLs that incorporate RSCs are only appropriate for the evaluation of averaged (*i.e.*, mean) residue levels in surface water.

The recommended HHRLs for methoxyfenozide in drinking water are summarized in Table 1.

Other Reference or Regulatory Levels

There is not an enforceable US EPA Maximum Contaminant Level (MCL¹) or US EPA Health Advisories (HAs²) for methoxyfenozide (US EPA, 2018; US EPA, 2022). There is a chronic Human Health Benchmark for Pesticides (HHBP³) for methoxyfenozide of 600 ppb (US EPA, 2021). The US EPA chronic HHBP is based on the same chronic toxicological endpoint and RSC used to calculate the DPR Chronic Surface Water HHRL. The DPR Chronic Surface Water HHRL and US EPA chronic HHBP differ because they were calculated using different consumption rates.

Table 1. HHRLs for Methoxyfenozide in Drinking Water

Residue	Acute or Chronic	Water Consumption Rates for Non-Nursing Infants ^a (kg water/kg BW)	RfD ^b (mg/kg/day)	Human Health Reference Levels (ppb)
Methoxyfenozide	Acute	0.194566	0.098	504 ^c
	Chronic Surface Water	0.09959	0.102	205 ^d

^a 95th percentile water consumption for non-nursing infants from NHANES database (2005-2010). Acute and chronic water consumption data were extracted using the Dietary Exposure Evaluation Model - Food Commodity Intake Database (DEEM-FCID, version 4.02, 5-10c). A 1 ppm residue level was used for data generation so that resulting exposure levels would be numerically equal to corresponding consumptions.

^b Acute or chronic reference dose (RfD) for methoxyfenozide. Acute and chronic RfDs for methoxyfenozide were calculated using the corresponding acute and chronic point of departures (PODs): 9.8 mg/kg/day and 10.2 mg/kg/day, respectively, and a total uncertainty factor (UF) of 100, which is detailed in a previous memo (DPR, 2022).

^c An Acute Human Health Reference Level (Acute HHRL) for maximum residual levels was calculated as follows: acute RfD (mg/kg/day) ÷ Drinking Water Consumption (DWC; L or kg water/kg bodyweight) x (1000 ppb/mg/L or kg water)

^d A Chronic Surface Water Human Health Reference Level (Chronic Surface Water HHRL) for time-average residual levels was calculated as follows: chronic RfD (mg/kg/day) ÷ DWC (L or kg water/kg bodyweight) x RSC (0.2) x (1000 ppb/mg/L or kg water)

¹ MCLs are used for the protection of public drinking water systems and do not apply to privately owned wells or any other individual water system. Available at <https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations> (US EPA, 2022).

² HAs are estimated acceptable drinking water levels for chemicals based on information of adverse health effects and are not legally enforceable Federal standards, but rather serve as technical references to be used by federal, state, and local officials. Available at <https://www.epa.gov/system/files/documents/2022-01/dwtable2018.pdf> (US EPA, 2018).

³ The 2021 HHBPs contained 430 pesticides that currently have no federal drinking water standards. The HHBPs are not legally enforceable federal standards but rather provided by US EPA for pesticides that have no drinking water standards or health advisories (HAs). Available at <https://www.epa.gov/system/files/documents/2021-07/hh-benchmarks-technical-document-2021.pdf> (US EPA, 2021).

Conclusion

Pesticide residues in surface water could potentially get into community drinking water systems that draw water from surface water sources. In this evaluation, HHA calculated Human Health Reference Levels (HHRLs) to be used when methoxyfenozide residues are detected in surface water. Maximum residue levels of methoxyfenozide equal to or less than the DPR Acute HHRL of 504 ppb in drinking water, and time-average residue levels in surface water equal to or less than the DPR Chronic Surface Water HHRL of 205 ppb are not expected to pose a risk to human health, including for sensitive subpopulations. Thus, the highest detected methoxyfenozide residues in California surface water (10.1 ppb) should not be considered either an acute or a chronic health concern.

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**Appendix 1: DPR Memo: Potential Health Effects of Methoxyfenozide in Surface Water
17 January 2023 (1 page)**



Julie Henderson
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Yana Garcia
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Environmental Protection

MEMORANDUM

TO: Shelley DuTeaux
Environmental Program Manager II
Human Health Assessment Branch

VIA: Minh Pham
Environmental Program Manager II
Environmental Monitoring Branch

FROM: Anson Main
Acting Environmental Program Manager I
Surface Water Protection Program

DATE: January 17, 2023

SUBJECT: POTENTIAL HUMAN HEALTH EFFECTS OF METHOXYFENOZIDE IN
SURFACE WATER

The Environmental Monitoring Branch, Surface Water Protection Program (SWPP) monitors California surface waters to determine the fate of pesticides, protecting the public and the environment from pesticide contamination. Consistent with EMB's mission, the SWPP routinely monitors a range of pesticide active ingredients (incl. insecticides, herbicides, and fungicides) in rivers, creeks, storm drains, and agricultural ditches.

One active ingredient (AI) of particular interest to stakeholders is methoxyfenozide. The SWPP currently includes this AI in our annual monitoring; however, with the potential expansion of methoxyfenozide use on California crops, it is unclear if detected concentrations would pose a risk to human health through potential drinking water sources.

In a review of existing data from the Surface Water Database (SURF), which includes data from DPR, California State Water Resources Control Board and USGS, between May 2012 and December 2020, ~59% of samples collected contained methoxyfenozide concentrations. These data were collected from 256 sites across the State. To date, the highest concentration detected in surface water was 10.1 ppb.

To determine whether the detections of methoxyfenozide pose a significant risk to human health, SWPP requests the assistance of the Human Health Assessment Branch. We kindly request that HHA provide a human health reference level (i.e., a no risk level concentration) for methoxyfenozide to use for screening concentrations detected in surface water.

cc: Robert Budd, Acting Senior Environmental Scientist (Supervisory)
Xuyang Zhang, Research Scientist III