AIR MONITORING NETWORK RESULTS FOR 2023

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EXECUTIVE SUMMARY

The California Department of Pesticide Regulation's (DPR) Air Monitoring Network (AMN) is comprised of four air monitoring stations located in the communities of Oxnard, Shafter, Santa Maria, and Watsonville. AMN monitoring stations provide DPR with data on pesticides in ambient air that allows for the long-term assessment of potential pesticide exposures in agricultural communities with high pesticide use. The AMN monitors for 40 pesticides (35 pesticides and 5 breakdown products) on a weekly basis with higher-risk pesticides prioritized for inclusion into the study based on use, likelihood to enter the air, and toxicity. The AMN data, as part of DPR's continuous evaluation of pesticide risks, allow DPR to determine if pesticide product label restrictions and California's required mitigation measures are effective in addressing risks to human health and the environment. DPR's Continuous Evaluation (augmented by AB 2113 in 2024) is a process in which DPR considers new information about pesticide risks and impacts on human health and the environment and uses this information to assess the current potential risks from pesticide use and to inform the effectiveness of existing mitigation measures or the need to develop and implement additional restrictions.

Out of the 40 pesticides and breakdown products monitored, eight pesticides were detected (i.e., found at quantifiable concentrations) in ambient air in 2023, including four fumigants: 1,3-dichloropropene (1,3-D), chloropicrin, methyl bromide, and methyl isothiocyanate (MITC), and four non-fumigants: captan, DDVP, malathion, and pendimethalin. MITC and 1,3-D were detected at all four sites. Chloropicrin and methyl bromide were detected at three sites. Captan and DDVP were detected at one, malathion at two, and pendimethalin at three sites. No pesticide concentration exceeded its acute, sub-chronic, or chronic screening or regulatory level (described in the section below) in 2023, meaning that pesticide concentrations found in the air are unlikely to be harmful to human health.

The highest magnitude of pesticide concentrations relative to a screening level was 95% for chloropicrin sub-chronic exposures in Oxnard. Chloropicrin is a soil fumigant that is managed by DPR and County Agricultural Commissioners (CACs) as a restricted material (i.e., chloropicrin use is limited to licensed and trained individuals and then only at times and places approved by CACs). Local permit conditions have been in place statewide since 2015 to mitigate hazards of any offsite movement of chloropicrin to protect bystanders and residents from acute exposures. After chloropicrin air concentrations exceeded the 13-week sub-chronic screening level in 2021, DPR began exploring the factors that contributed to the elevated detections. The 2023 maximum 13-week average concentration of chloropicrin that is below but close to the screening level prompted DPR to conduct a more detailed evaluation of pesticide use data, historical weather patterns, intensive modeling, and more intensive monitoring to better understand potential sources and exposures in the area. DPR's reevaluation of chloropicrin and the California Council on Science and Technology's Fumigant Alternatives Study will be used to supplement DPR's AMN assessment of the fumigant.

About the Air Monitoring Network

DPR evaluates potential pesticide risks by comparing pesticide air concentrations with health thresholds called screening levels (SL) and regulatory targets (RT) established by DPR scientists. If pesticide concentrations in ambient air exceed these thresholds, DPR takes steps to investigate the causes, and if warranted, develop and implement mitigation measures to reduce exposures to protect human health. In determining SL and RT, DPR evaluates the potential for health impacts related to short-term (acute, 24-hour), medium-term (sub-chronic, 4 or 13 weeks), and long-term (chronic, 1-year) exposures. Examples of symptoms from short-term exposure to high concentrations of pesticides include eye, nose, and throat irritation, nausea, stomach aches, vomiting, skin irritation, blurred vision, headaches, and dizziness. Long-term exposures could potentially lead to birth defects, nervous system problems, and reproductive harm for some pesticides if exposure is persistent over many months or years. Medium-term exposure is tracked to provide an early indication of areas where there may be longer-term (chronic) exposure and the need for additional studies. For some pesticides, DPR also has a threshold to measure against exposure that could lead to lifetime cancer risk.

DPR screening levels incorporate current scientific research, pesticide-specific evaluation, and rigorous monitoring and modeling studies. The levels are based on reference concentrations (i.e., air concentrations at which no adverse effects are expected to occur in humans with an additional conservative factor included to account for uncertainties). SL are set well below the level at which health effects are expected to occur. Four of the pesticides monitored by the AMN have established RT that are similar to SL but are associated with regulatory actions. Exposures at concentrations below a screening or regulatory level indicate that adverse health effects are unlikely. Concentrations above these levels may lead to adjustments of existing pesticide use restrictions to reduce exposures.

INTRODUCTION

Background

In February 2011, as part of the California Department of Pesticide Regulation's (DPR) mandate for continuous evaluation of currently registered pesticides, DPR implemented its first multi-year statewide Air Monitoring Network (AMN) to measure pesticide concentrations in ambient air, hereafter referred to as air, in various California agricultural communities. The goal is to provide data that assists in assessing potential health risks, developing measures to mitigate risks, and evaluating the effectiveness of current regulatory requirements.

The AMN has the following scientific objectives:

- Monitor pesticides in air and determine seasonal, annual, and multi-year concentrations.
- Compare concentrations to acute, sub-chronic, chronic, and lifetime (when available) regulatory targets (RT) or health screening levels (SL).
- Track temporal variation in pesticide concentrations in the air.
- Estimate cumulative exposure to multiple pesticides with common physiological modes of action in humans (e.g., cholinesterase inhibitors).

In 2020, DPR reevaluated reported California pesticide use data to identify four monitoring stations to continue with AMN monitoring operation in 2021 and beyond (CDPR 2020). DPR evaluated 1,228 communities and ranked them based on pesticide use (both local and regional), demographic data, and availability of other exposure and health data. Communities with similar pesticide-use rankings were prioritized based on the number of children, number of persons over 65, and number of persons living in close proximity to farms and agricultural areas with high pesticide use. Complete details on community selection can be found in DPR's Air Monitoring Network webpage.

The 1,3-dichloropropene (1,3-D) and methyl bromide samples (the volatile organic compound analysis) collected in the AMN were analyzed by both the California Air Resources Board's Northern Laboratory Branch from 2011 to 2020, and by the California Department of Food and Agriculture's Center for Analytical Chemistry (CDFA) from 2011 until today. CDFA notified DPR that it had identified an error in the analyses conducted on samples collected via air canister between 2011 and 2024. The lab error resulted in the underreporting of 1,3-D and methyl bromide concentrations analyzed only by CDFA. This version of the AMN report for 2023 revised all 1,3-D and methyl bromide concentrations to reflect the correction factor of 1.58 recommended by CDFA (view CDFA memo) (view DPR memo).

Communities Monitored

In 2023, DPR monitored the air in the vicinities of four communities across California: Oxnard, Santa Maria, Shafter, and Watsonville (Table 1).

1. Oxnard is in Ventura County. The monitoring station is located at Rio Mesa High School and is operated by the Ventura County Commissioner's office (V-CAC) (Appendix A).
2. Santa Maria is in Santa Barbara County. The monitoring station is located at Bonita Elementary School and is operated by the Santa Barbara County Commissioner's office (SB-CAC) (Appendix B).
3. Shafter is in Kern County. The monitoring station is located adjacent to Sequoia Elementary School and is operated by DPR (Appendix C).
4. Royal Oaks is on the northern edge of Monterey County bordering Santa Cruz County. This monitoring station, also referred to as Watsonville, is located at Ohlone Elementary School and is operated by DPR (Appendix D).

Table 1. List of communities in the Air Monitoring Network in 2023.

Station Location	Coordinates	Greater Area	County	Sampling Since	Agency responsible
Oxnard	34.255139, -119.144639	Oxnard	Ventura	10/24/2011	V-CAC
Santa Maria	34.957718, -120.509308	Santa Maria	Santa Barbara	08/11/2010	SB-CAC
Shafter	35.516472, -119.268785	Bakersfield	Kern	02/09/2011	DPR
Royal Oaks	36.870118, -121.760891	Watsonville	Santa Cruz/ Monterey	11/05/2011	DPR

Pesticides Monitored

DPR, with the assistance of staff from the Santa Barbara and Ventura CAC offices, monitored a total of 40 chemicals, 35 pesticides and 5 breakdown products. Chemicals were selected based primarily on potential health risk (CDPR 2013). Four analytical methods were used to analyze the collected air samples (Appendices E-F):

1. Volatile Organic Compounds (VOC) for 1,3-dichloropropene and methyl bromide: samples taken using steel air-canisters.
2. Methyl Isothiocyanate (MITC): samples taken using coconut-charcoal glass sorbent tubes.
3. Chloropicrin: samples taken using glass sorbent tubes with XAD-4 resin.
4. Multi-Pesticide Residue for 36 Chemicals: samples taken using Teflon cartridges with XAD-4 resin.

RESULTS

This report is the 13th volume of this study and contains the results from January 1 to December 31, 2023. Tables 2-8 show the analytical results for the pesticides monitored in 2023, and the results for each individual community are available below in Appendices A-D.

Pesticide Detections

A total of 8,085 analyses (samples multiplied by the number of chemicals analyzed in each sample) were conducted on the air samples collected from the four AMN sites operating in 2023. Of these, 381 resulted in detectable concentrations, which included both quantifiable and trace detections. Quantifiable detections refer to concentrations above the limit of quantitation (LOQ) for the respective pesticide, while Trace detections are measured concentrations above the method detection limit (MDL) but below the LOQ. Samples that resulted in a quantifiable detection accounted for 169 of all analyses conducted.

Of the 40 pesticides and breakdown products monitored in 2023:

- 8 chemicals were detected at Quantifiable levels: 1,3-dichloropropene, captan, chloropicrin, DDVP, MITC, malathion, methyl bromide, and pendimethalin.
- 11 chemicals were detected only at Trace levels: cypermethrin, dacthal, diazinon, EPTC, malathion oa, norflurazon, oxyfluorfen, permethrin, phosmet, propargite, and trifluralin.
- 21 chemicals were not detected: acephate, bensulide, chlorothalonil, chlorpyrifos, chlorpyrifos oa, DEF, diazinon oa, dimethoate, dimethoate oa, diuron, endosulfan, endosulfan sulfate, fenpyroximate, iprodione, methidathion, methomyl, metolachlor, oryzalin, oxydemeton methyl, simazine, and pp-dicofol.

Note: seven chemicals are no longer registered for agricultural use in California: chlorpyrifos, chlorpyrifos oa, endosulfan, endosulfan sulfate, methidathion, oxydemeton methyl, and pp-dicofol. Since these pesticides are no longer registered, detections are no longer expected. However, DPR will continue monitoring these pesticides.

Table 2 lists the number and percentage (out of the number of collected samples for that specific pesticide) of quantifiable and trace detections at each monitoring station in 2023.

Table 2. Number and percentage of quantifiable and trace detections per location in 2023.

Chemical	Oxnard	Santa Maria	Shafter	Watsonville
1,3-dichloropropene	8 (15%)	11 (22%)	11 (22%)	14 (28%)
Acephate	0	0	0	0
Bensulide	0	0	0	0
Captan	12 (25%)	0	0	1 (2%)
Chloropicrin	23 (44%)	18 (35%)	2 (4%)	14 (28%)
Chlorothalonil	0	0	0	0
Chlorpyrifos	0	0	0	0
Chlorpyrifos oa	0	0	0	0

Chemical	Oxnard	Santa Maria	Shafter	Watsonville
Cypermethrin	0	0	0	1 (2%)
DDVP	2 (4%)	17 (33%)	1 (2%)	3 (6%)
DEF	0	0	0	0
Dacthal	0	1 (2%)	0	0
Diazinon	1 (2%)	0	0	0
Diazinon oa	0	0	0	0
Dimethoate	0	0	0	0
Dimethoate oa	0	0	0	0
Diuron	0	0	0	0
EPTC	0	0	6 (12%)	0
Endosulfan	0	0	0	0
Endosulfan Sulfate	0	0	0	0
Fenpyroximate	0	0	0	0
Iprodione	0	0	0	0
MITC	15 (31%)	15 (29%)	21 (42%)	8 (16%)
Malathion	2 (4%)	24 (47%)	1 (2%)	4 (8%)
Malathion oa	1 (2%)	4 (8%)	1 (2%)	2 (4%)
Methidathion	0	0	0	0
Methomyl	0	0	0	0
Methyl Bromide	15 (29%)	15 (29%)	17 (33%)	16 (32%)
Metolachlor	0	0	0	0
Norflurazon	0	0	0	1 (2%)
Oryzalin	0	0	0	0
Oxydemeton Methyl	0	0	0	0
Oxyfluorfen	1 (2%)	2 (4%)	0	1 (2%)
Pendimethalin	16 (33%)	9 (18%)	38 (73%)	0
Permethrin	0	0	0	1 (2%)
Phosmet	0	0	0	1 (2%)
Propargite	0	0	0	1 (2%)
Simazine	0	0	0	0
Trifluralin	0	3 (6%)	0	0
pp-dicofol	0	0	0	0

Pesticide Concentrations

Acute Exposure: Highest 24-hour concentrations among all sites

Table 3 lists the highest 24-hour concentrations at any site for the pesticides detected at a quantifiable concentration in 2023. None of the pesticides or breakdown products exceeded their respective acute (8-, 24- or 72-hour) screening level (SL) or regulatory target (RT) in 2023. The pesticides with the highest percentage of 24-hour air concentrations compared to its acute exposure levels were 1,3-dichloropropene (14.5%), followed by chloropicrin (1.7%), and Captan (1.6%). All other compounds were 1% or less than their acute SL or RT during monitoring in 2023. Summary tables for each site showing the maximum 24-hour concentrations and comparisons to SL and RT can be found in Appendix A-D.

Table 3. Highest 24-hour air concentrations, acute screening levels, and percent of screening level of any pesticide detected at a quantifiable concentration in 2023.

Community	Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Shafter	1,3-dichloropropene	06/21/2023	8 ppb (36,286 ng/m^3)	55 ppb*‡ (250,000 ng/m^3)	14.5 %
Oxnard	Captan	05/01/2023	0.0025 ppb (30.4 ng/m^3)	0.15 ppb (1,844 ng/m^3)	1.6 %
Santa Maria	Chloropicrin	05/24/2023	1.2 ppb (8,137 ng/m^3)	73 ppb*† (491,000 ng/m^3)	1.7 %
Santa Maria	DDVP	08/10/2023	0.0071 ppb (64 ng/m^3)	1.2 ppb (11,000 ng/m^3)	0.58 %
Santa Maria	Malathion	09/17/2023	0.0023 ppb (31.2 ng/m^3)	8.3 ppb (112,500 ng/m^3)	0.03 %
Watsonville	Methyl Bromide	11/03/2023	0.025 ppb (95.7 ng/m^3)	210 ppb (820,000 ng/m^3)	0.01 %
Shafter	MITC	12/13/2023	2.3 ppb (6,806 ng/m^3)	220 ppb*† (660,000 ng/m^3)	1.0 %
Oxnard	Pendimethalin	09/21/2023	0.012 ppb (138 ng/m^3)	150 ppb (1,700,000 ng/m^3)	0.01 %

* This value is a regulatory target rather than a screening level.
† This value is an 8-hour time-weighted-average (TWA) used to compare the 24-h measured concentration.
‡ This value is a 72-hour TWA used to compare against the 24-hour measured concentration.

Sub-chronic Exposure: Highest rolling 4- or 13-week average concentrations among all sites

Sub-chronic (seasonal) concentrations for 1,3-dichloropropene and chloropicrin are averaged every 13 weeks (CDPR 2016b), while the sub-chronic concentrations of the remaining 38 active ingredients are averaged every 4 weeks. Table 4 lists the highest observed rolling 4- or 13-week average concentrations for any chemical detected at a quantifiable concentration among all sites in 2023. None of the pesticides or breakdown products exceeded their respective sub-chronic (4- or 13-week) SL or RT in 2023. Chloropicrin was the pesticide with the highest rolling 13-week average concentration with an estimated concentration of 0.33 ppb (95%). The pesticide with the highest 4-week average was MITC with an estimated concentration of 0.67 ppb (67% of its subchronic SL). Summary tables for each site showing the maximum 4- or 13-week average concentrations and comparisons to SL and RT can be found in Appendix A-D.

Table 4. Highest rolling average concentrations, sub-chronic screening levels, and percent of screening levels of any pesticide detected at a quantifiable concentration in 2023.

Community	Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
Shafter	1,3-dichloropropene	06/27/2023	0.66 ppb (2,987 ng/m^3)	3 ppb (14,000 ng/m^3)	21.3 %
Oxnard	Captan	05/08/2023	0.0012 ppb (14.5 ng/m^3)	0.11 ppb (1,352 ng/m^3)	1.1 %
Oxnard	Chloropicrin	08/15/2023	0.33 ppb (2,195 ng/m^3)	0.35 ppb (2,300 ng/m^3)	95.4 %
Santa Maria	DDVP	08/24/2023	0.0025 ppb (22.9 ng/m^3)	0.24 ppb (2,200 ng/m^3)	1 %
Santa Maria	Malathion	09/28/2023	0.0013 ppb (17.7 ng/m^3)	6 ppb (80,600 ng/m^3)	0.02 %
Shafter	Methyl Bromide	02/23/2023	0.014 ppb (54.9 ng/m^3)	5 ppb* (19,400 ng/m^3)	0.28 %
Shafter	MITC	12/28/2023	0.67 ppb (2,010 ng/m^3)	1 ppb (3,000 ng/m^3)	67 %
Oxnard	Pendimethalin	10/10/2023	0.0087 ppb (99.6 ng/m^3)	49 ppb (560,000 ng/m^3)	0.02 %

* This value is a regulatory target rather than a screening level.

Chronic Exposure: Highest 1-year average concentrations among all sites

Table 5 presents the highest observed annual average concentrations for each chemical detected at a quantifiable concentration in 2023 at any AMN site alongside its respective chronic SL. The highest annual average concentration relative to its chronic screening level was observed for MITC (68.1%), followed by chloropicrin (38.7%), and 1,3-dichloropropene (12%). Summary tables for each site showing the maximum one-year concentrations and comparisons to SL can be found in Appendix A-D.

Table 5. Highest annual average air concentrations, chronic screening levels, and percent of screening level of any pesticide detected at a quantifiable concentration in 2023.

Community	Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Shafter	1,3-dichloropropene	0.24 ppb (1,083 ng/m^3)	2 ppb (9,000 ng/m^3)	12 %
Oxnard	Captan	0.00038 ppb (4.9 ng/m^3)	0.037 ppb (455 ng/m^3)	1.1 %
Oxnard	Chloropicrin	0.1 ppb (696 ng/m^3)	0.27 ppb (1,800 ng/m^3)	38.7 %
Santa Maria	DDVP	0.00065 ppb (5.8 ng/m^3)	0.085 ppb (770 ng/m^3)	0.75 %
Santa Maria	Malathion	0.00036 ppb (5.1 ng/m^3)	0.6 ppb (8,100 ng/m^3)	0.06 %
Watsonville	Methyl Bromide	0.0059 ppb (23 ng/m^3)	1 ppb (3,900 ng/m^3)	0.59 %
Shafter	MITC	0.068 ppb (204 ng/m^3)	0.1 ppb (300 ng/m^3)	68.1 %
Oxnard	Pendimethalin	0.0009 ppb (11.1 ng/m^3)	49 ppb (560,000 ng/m^3)	0.01 %

Lifetime exposure: Cancer Risk Estimates

The AMN program monitors six pesticides that are designated as known or probable carcinogens by Proposition 65 or by US EPA's B2 list:

1. 1,3-dichloropropene
2. Chlorothalonil
3. DDVP
4. Diuron
5. Iprodione
6. Propargite

In 2023, 1,3-dichloropropene and DDVP were detected at quantifiable concentrations, hence their annual average concentrations and cancer risk estimates were calculated (Table 6 & 7). These calculations use the average concentration based on all data available from the specified site. It is important to note that these shorter timeframes are less suitable for comparison to a 70-year target and are for illustrative purposes only. These values differ from those presented in the calculated annual concentrations above because those are a simple mean (average) while a time-weighted-average is used for the cancer risk estimates. Cancer risk is expressed as a probability for the occurrence of cancer, such as 1 in 100,000 or 10^{-5}. Risk in the range of 10^{-5} is generally considered to be at the limit of negligible. Cancer risk is estimated based on the following calculation:

$$\text{Cancer Risk} = \text{nBR} * \text{LAC} * \mathrm{CPF_H}$$

where:

- Cancer Risk = probability of an additional case of cancer over a 70-year period
- nBR = normalized breathing rate of a human adult (m^3/kg/day)
- LAC = mean lifetime (70-year) air concentration (mg/m^3)
- $\mathrm{CPF_H}$ = estimated cancer potency factor in humans $(\text{mg/kg/day})^{-1}$

DPR uses the default respiratory rate (nBR) for an adult of 0.28 m^3kg/day (CDPR 2000), and LAC is the mean annual concentration of the pesticide for all available monitoring years. The $\mathrm{CPF_H}$ values for 1,3-dichloropropene (1,3-D) and DDVP which were detected in 2023 are as follows:

- 1,3-D: $\mathrm{CPF_H}$ = 0.014 $(\text{mg/kg/day})^{-1}$ (CDPR, 2015).
- DDVP: $\mathrm{CPF_H}$ = 0.350 $(\text{mg/kg/day})^{-1}$ (CDPR, 1996).

Tables 6-7 depict the historic average concentrations and cancer risk estimates for 1,3-D and DDVP. In 2016, DPR set the lifetime regulatory target for 1,3-D at 0.56 ppb (CDPR 2016a).

Table 6. Cumulative average concentration, cancer risk (CR) estimate, CR target and percent of CR target for 1,3-dichloropropene at each sampling location as of 2023.

Community	1,3-D Concentration	Cancer Risk Estimate	Cancer Risk Target	Percent of Target
Oxnard	0.11 ppb (482 ng/m^3)	1.9e-06	1e-05	19 %
Santa Maria	0.12 ppb (525 ng/m^3)	2.1e-06	1e-05	21 %
Shafter	0.53 ppb (2,387 ng/m^3)	9.4e-06	1e-05	94 %
Watsonville	0.092 ppb (415 ng/m^3)	1.6e-06	1e-05	16 %

Table 7. Cumulative average concentration, cancer risk estimate, cancer risk target and percent of cancer risk target for DDVP at each sampling location as of 2023.

Community	DDVP Concentration	Cancer Risk Estimate	Cancer Risk Target	Percent of Target
Oxnard	0.00016 ppb ($1.47\ ng/m^3$)	1.4e-07	1e-05	1.4 %
Santa Maria	0.00052 ppb ($4.62\ ng/m^3$)	4.5e-07	1e-05	4.5 %
Shafter	0.00013 ppb ($1.18\ ng/m^3$)	1.2e-07	1e-05	1.2 %
Watsonville	0.00019 ppb ($1.7\ ng/m^3$)	1.7e-07	1e-05	1.7 %

Organophosphates Cumulative Exposure

Cumulative exposures were calculated for pesticides classified as organophosphates, which are a class of chemical compounds that can cause adverse health effects on humans, such as the inhibition of cholinesterase, an enzyme in the nervous system. The 15 organophosphates included in the AMN monitoring are:

1. Acephate
2. Bensulide
3. Chlorpyrifos
4. Chlorpyrifos OA
5. DDVP
6. DEF
7. Diazinon
8. Diazinon OA
9. Dimethoate
10. Dimethoate OA
11. Malathion
12. Malathion OA
13. Methidathion
14. Oxydemeton methyl
15. Phosmet

The cumulative exposure was estimated using a 2-step procedure. First, we estimated a Hazard Quotient (HQ) for each organophosphate by dividing the detected air concentration by its screening level. Secondly, the organophosphate cumulative exposure is calculated using a Hazard Index (HI) approach where all organophosphates' HQs are added (Appendix G).
A HI equal or greater than 1.0 suggests the need for further evaluation.

Table 8 summarizes the highest calculated HI for each community and time period during monitoring in 2023. Both the acute and sub-chronic HI values were calculated for each individual sample set, from which the maximum observed HI was reported. None of the HI exceeded a value of 1.0 at any of the sampling locations in 2023. This indicates that even for the combined 15 organophosphate compounds, a summed screening level was not exceeded.

Table 8. Organophosphate cumulative exposure: acute, subchronic, and chronic hazard indices (HI) across all AMN sites in 2023.

Community	Acute HI	Sub-chronic HI	Chronic HI
Oxnard	0.06	0.03	0.03
Santa Maria	0.02	0.03	0.04
Shafter	0.02	0.02	0.03
Watsonville	0.02	0.03	0.03

SUMMARY

Forty chemicals were monitored by the Air Monitoring Network in 2023, eight pesticides were detected at quantifiable concentrations, including the four fumigants 1,3-dichloropropene, chloropicrin, methyl bromide, and MITC. Of the eight pesticides detected at quantifiable concentrations, MITC and 1,3-dichloropropene were detected across all four sampling locations, whereas chloropicrin and methyl bromide were detected at three sampling locations.

None of the 40 chemicals exceeded their acute, sub-chronic, or chronic screening level or regulatory target in 2023.

1,3-dichloropropene cancer risk estimates ranged from 16% in Watsonville to 94% in Shafter, and cancer risk estimates for DDVP ranged from 1.2% in Shafter to 4.5% in Santa Maria. The highest Hazard Index (HI) calculated for any site at any exposure period was 0.06, indicating a low risk from organophosphate cumulative exposure.

DPR's regulations to mitigate 1,3-D acute and lifetime cancer risk to non-occupational bystanders went into effect on January 1, 2024. DPR has proposed a regulation, developed through a joint and mutual process with OEHHA to mitigate 1,3-D lifetime cancer risks to occupational bystanders. DPR and OEHHA are reviewing the public comments and peer review of the proposed regulation. DPR and OEHHA intend to complete the proposed rulemaking in a timely manner and to implement mitigation to protect occupational bystanders by the next 1,3-D permitting season.

APPENDIX A: OXNARD RESULTS

Oxnard

Oxnard is located in Ventura County and is 39.2 square miles in area. The average elevation is 52 feet and receives an average of 15.6 inches of precipitation annually. Daily average temperatures range from 56° to 76°F in the summer and 42° to 66°F in the winter. Based on the 2020 census, the population of Oxnard was 202,000 of which 27% were under 18 years of age and 10% were over 65 years of age. The Oxnard Plain is primarily known for strawberry production. The monitoring station is located at Rio Mesa High School and transitioned from a Toxic Air Contaminant (TAC) Network site to an Air Monitoring Network (AMN) site. Monitoring is conducted through a DPR contract with the Ventura County Agricultural Commissioner's (V-CAC) office. V-CAC staff follow strict standard operating procedures established by DPR's Air Program, ensuring that samples are collected, handled, and transported appropriately to maintain consistency and integrity of the samples. DPR Air Program staff provides annual training and continuous support to V-CAC for operation and monitoring at this sampling location.

Pesticide Detections

Table A–1 lists the number and percentage of analyses resulting in detections at the Oxnard AMN monitoring station in 2023. The chemical with the highest number of quantifiable detections was chloropicrin (n=15, 28.8%), MITC (n=9, 18.4%), and pendimethalin (n=7, 14.3%).

Table A–1. Number and percentage of positive samples per chemical in Oxnard in 2023.

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	52	8	5	15.4 %	9.6 %
Acephate	49	0	0	0 %	0 %
Bensulide	49	0	0	0 %	0 %
Captan	49	12	2	24.5 %	4.1 %
Chloropicrin	52	23	15	44.2 %	28.8 %
Chlorothalonil	49	0	0	0 %	0 %
Chlorpyrifos	49	0	0	0 %	0 %
Chlorpyrifos oa	49	0	0	0 %	0 %
Cypermethrin	49	0	0	0 %	0 %
DDVP	49	2	0	4.1 %	0 %
DEF	49	0	0	0 %	0 %
Dacthal	49	0	0	0 %	0 %
Diazinon	49	1	0	2 %	0 %

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Diazinon oa	49	0	0	0 %	0 %
Dimethoate	49	0	0	0 %	0 %
Dimethoate oa	49	0	0	0 %	0 %
Diuron	49	0	0	0 %	0 %
EPTC	49	0	0	0 %	0 %
Endosulfan	49	0	0	0 %	0 %
Endosulfan Sulfate	49	0	0	0 %	0 %
Fenpyroximate	49	0	0	0 %	0 %
Iprodione	49	0	0	0 %	0 %
MITC	49	15	9	30.6 %	18.4 %
Malathion	49	2	1	4.1 %	2 %
Malathion oa	49	1	0	2 %	0 %
Methidathion	49	0	0	0 %	0 %
Methomyl	49	0	0	0 %	0 %
Methyl Bromide	52	15	0	28.8 %	0 %
Metolachlor	49	0	0	0 %	0 %
Norflurazon	49	0	0	0 %	0 %
Oryzalin	49	0	0	0 %	0 %
Oxydemeton Methyl	49	0	0	0 %	0 %
Oxyfluorfen	49	1	0	2 %	0 %
Pendimethalin	49	16	7	32.7 %	14.3 %
Permethrin	49	0	0	0 %	0 %
Phosmet	49	0	0	0 %	0 %
Propargite	49	0	0	0 %	0 %
Simazine	49	0	0	0 %	0 %
Trifluralin	49	0	0	0 %	0 %
pp-dicofol	49	0	0	0 %	0 %
Total	1,969	96	39	4.9 %	2 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table A–2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Oxnard AMN monitoring station in 2023. The highest concentration relative to its exposure level was that of 1,3-dichloropropene at 2.9%, followed by Captan at 1.6% and chloropicrin at 1.5%. The remaining chemicals for which there were quantifiable detections at Oxnard in 2023 were detected at less than 1% of their screening level.

Table A–2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Oxnard in 2023.

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
1,3-dichloropropene	07/31/2023	1.6 ppb (7,128 ng/m^3)	55 ppb*‡ (250,000 ng/m^3)	2.9 %
Captan	05/01/2023	0.0025 ppb (30.4 ng/m^3)	0.15 ppb (1,844 ng/m^3)	1.6 %
Chloropicrin	07/31/2023	1.1 ppb (7,239 ng/m^3)	73 ppb*† (491,000 ng/m^3)	1.5 %
Malathion	06/06/2023	0.0016 ppb (22.1 ng/m^3)	8.3 ppb (112,500 ng/m^3)	0.02 %
MITC	04/03/2023	0.086 ppb (258 ng/m^3)	220 ppb*† (660,000 ng/m^3)	0.039 %
Pendimethalin	09/21/2023	0.012 ppb (138 ng/m^3)	150 ppb (1,700,000 ng/m^3)	0.008 %
Acephate		ND	1.6 ppb (12,000 ng/m^3)	
Bensulide		ND	15.9 ppb (259,000 ng/m^3)	
Chlorothalonil		ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos		ND	0.084 ppb (1,200 ng/m^3)	
Chlorpyrifos oa		ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin		ND	6.6 ppb (113,000 ng/m^3)	

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Dacthal		ND	1732 ppb (23,500,000 ng/m^3)	
DDVP		Trace	1.2 ppb (11,000 ng/m^3)	
DEF		ND	0.68 ppb (8,800 ng/m^3)	
Diazinon		Trace	0.01 ppb (130 ng/m^3)	
Diazinon oa		ND	0.011 ppb (130 ng/m^3)	
Dimethoate		ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate oa		ND	0.49 ppb (4,300 ng/m^3)	
Diuron		ND	17.8 ppb (170,000 ng/m^3)	
Endosulfan		ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate		ND	0.19 ppb (3,300 ng/m^3)	
EPTC		ND	29.7 ppb (230,000 ng/m^3)	
Fenpyroximate		ND	0.87 ppb (15,000 ng/m^3)	
Iprodione		ND	23.2 ppb (313,000 ng/m^3)	
Malathion oa		Trace	8.8 ppb (112,500 ng/m^3)	
Methidathion		ND	0.25 ppb (3,100 ng/m^3)	
Methomyl		ND	4.8 ppb (32,000 ng/m^3)	

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Methyl Bromide		Trace	210 ppb (820,000 ng/m^3)	
Metolachlor (S-Metolachlor)		ND	7.3 ppb (85,000 ng/m^3)	
Norflurazon		ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin		ND	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl		ND	3.7 ppb (39,200 ng/m^3)	
Oxyfluorfen		Trace	34.5 ppb (510,000 ng/m^3)	
Permethrin		ND	10.5 ppb (168,000 ng/m^3)	
Phosmet		ND	5.9 ppb (77,000 ng/m^3)	
pp-dicofol		ND	4.5 ppb (68,000 ng/m^3)	
Propargite		ND	0.98 ppb (14,000 ng/m^3)	
Simazine		ND	13.3 ppb (110,000 ng/m^3)	
Trifluralin		ND	87.5 ppb (1,200,000 ng/m^3)	

* This value is a regulatory target rather than a screening level.
† This value is an 8-hour time-weighted-average (TWA) used to compare the 24-h measured concentration.
‡ This value is a 72-hour TWA used to compare against the 24-hour measured concentration.

Sub-chronic (4- or 13-week) Concentrations

Sub-chronic (seasonal) concentrations for 1,3-dichloropropene and chloropicrin are averaged every 13 weeks (CDPR 2016b), while the sub-chronic concentrations of the remaining 38 active ingredients are averaged every 4 weeks (Table A-3). The highest concentration relative to its exposure level was that of chloropicrin at 95.4%, 1,3-dichloropropene at 5.4%, and MITC 3%. The remaining chemicals for which there were quantifiable detections at Oxnard in 2023 were detected at less than 1% of their screening level.

Table A–3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub- chronic screening level for chemicals monitored in Oxnard in 2023.

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
1,3-dichloropropene	10/05/2023	0.17 ppb (751 ng/m^3)	3 ppb (14,000 ng/m^3)	5.4 %
Captan	05/08/2023	0.0012 ppb (14.5 ng/m^3)	0.11 ppb (1,352 ng/m^3)	1.1 %
Chloropicrin	08/15/2023	0.33 ppb (2,195 ng/m^3)	0.35 ppb (2,300 ng/m^3)	95.4 %
Malathion	06/21/2023	0.00053 ppb (7.4 ng/m^3)	6 ppb (80,600 ng/m^3)	0.009 %
MITC	04/03/2023	0.03 ppb (91.2 ng/m^3)	1 ppb (3,000 ng/m^3)	3 %
Pendimethalin	10/10/2023	0.0087 ppb (99.6 ng/m^3)	49 ppb (560,000 ng/m^3)	0.018 %
Acephate		ND	1.1 ppb (8,500 ng/m^3)	
Bensulide		ND	1.5 ppb (24,000 ng/m^3)	
Chlorothalonil		ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos		ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos oa		ND	0.062 ppb (850 ng/m^3)	
Cypermethrin		ND	4.8 ppb (81,000 ng/m^3)	
Dacthal		ND	34.6 ppb (470,000 ng/m^3)	
DDVP		Trace	0.24 ppb (2,200 ng/m^3)	
DEF		ND	0.68 ppb (8,800 ng/m^3)	
Diazinon		Trace	0.01 ppb (130 ng/m^3)	

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
Diazinon oa		ND	0.011 ppb (130 ng/m^3)	
Dimethoate		ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate oa		ND	0.34 ppb (3,000 ng/m^3)	
Diuron		ND	1.8 ppb (17,000 ng/m^3)	
Endosulfan		ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate		ND	0.19 ppb (3,300 ng/m^3)	
EPTC		ND	3.1 ppb (24,000 ng/m^3)	
Fenpyroximate		ND	0.58 ppb (10,000 ng/m^3)	
Iprodione		ND	7.1 ppb (95,600 ng/m^3)	
Malathion oa		Trace	6.3 ppb (80,600 ng/m^3)	
Methidathion		ND	0.25 ppb (3,100 ng/m^3)	
Methomyl		ND	4.8 ppb (32,000 ng/m^3)	
Methyl Bromide		Trace	5 ppb* (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)		ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon		ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin		ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl		ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen		Trace	12.2 ppb (180,000 ng/m^3)	

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
Permethrin		ND	5.6 ppb (90,000 ng/m^3)	
Phosmet		ND	2 ppb (26,000 ng/m^3)	
pp-dicofol		ND	3.2 ppb (49,000 ng/m^3)	
Propargite		ND	0.98 ppb (14,000 ng/m^3)	
Simazine		ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin		ND	12.4 ppb (170,000 ng/m^3)	

* This value is a regulatory target rather than a screening level.

Chronic (annual) Concentrations

Table A–4 shows the annual average concentration for all chemicals monitored at the Oxnard monitoring station in 2023. The pesticide with highest concentration relative to its screening level (SL) was that of chloropicrin at 38.7%, followed by MITC at 9.5%, and 1,3-dichloropropene at 2.2%. All other monitored chemicals were less than 1% of their chronic SL in 2023.

Table A–4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored in Oxnard in 2023.

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
1,3-dichloropropene	0.044 ppb (200 ng/m^3)	2 ppb (9,000 ng/m^3)	2.2 %
Captan	0.00038 ppb (4.9 ng/m^3)	0.037 ppb (455 ng/m^3)	1.1 %
Chloropicrin	0.1 ppb (696 ng/m^3)	0.27 ppb (1,800 ng/m^3)	38.7 %
Malathion	0.000089 ppb (1.4 ng/m^3)	0.6 ppb (8,100 ng/m^3)	0.018 %
MITC	0.0096 ppb (28.6 ng/m^3)	0.1 ppb (300 ng/m^3)	9.5 %
Pendimethalin	0.0009 ppb (11.1 ng/m^3)	49 ppb (560,000 ng/m^3)	0.002 %

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Acephate	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	ND	1.5 ppb (24,000 ng/m^3)	
Chlorothalonil	ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.036 ppb (510 ng/m^3)	
Chlorpyrifos oa	ND	0.037 ppb (510 ng/m^3)	
Cypermethrin	ND	1.6 ppb (27,000 ng/m^3)	
Dacthal	ND	3.5 ppb (47,000 ng/m^3)	
DDVP	Trace	0.085 ppb (770 ng/m^3)	
Diazinon	Trace	0.01 ppb (130 ng/m^3)	
Diazinon oa	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	ND	0.032 ppb (300 ng/m^3)	
Dimethoate oa	ND	0.034 ppb (300 ng/m^3)	
Diuron	ND	0.6 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.019 ppb (330 ng/m^3)	
EPTC	ND	1.1 ppb (8,500 ng/m^3)	
Fenpyroximate	ND	0.058 ppb (1,000 ng/m^3)	
Iprodione	ND	7.1 ppb (95,600 ng/m^3)	

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Malathion oa	Trace	0.63 ppb (8,100 ng/m^3)	
Methidathion	ND	0.2 ppb (2,500 ng/m^3)	
Methomyl	ND	4.8 ppb (32,000 ng/m^3)	
Methyl Bromide	Trace	1 ppb (3,900 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	Trace	3.4 ppb (51,000 ng/m^3)	
Permethrin	ND	5.6 ppb (90,000 ng/m^3)	
Phosmet	ND	1.4 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.3 ppb (20,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin	ND	3 ppb (41,000 ng/m^3)	

Temporal Trends in Detected Concentrations

The following figures depict the concentrations over time for any chemical detected at a quantifiable concentration in Oxnard in 2023.

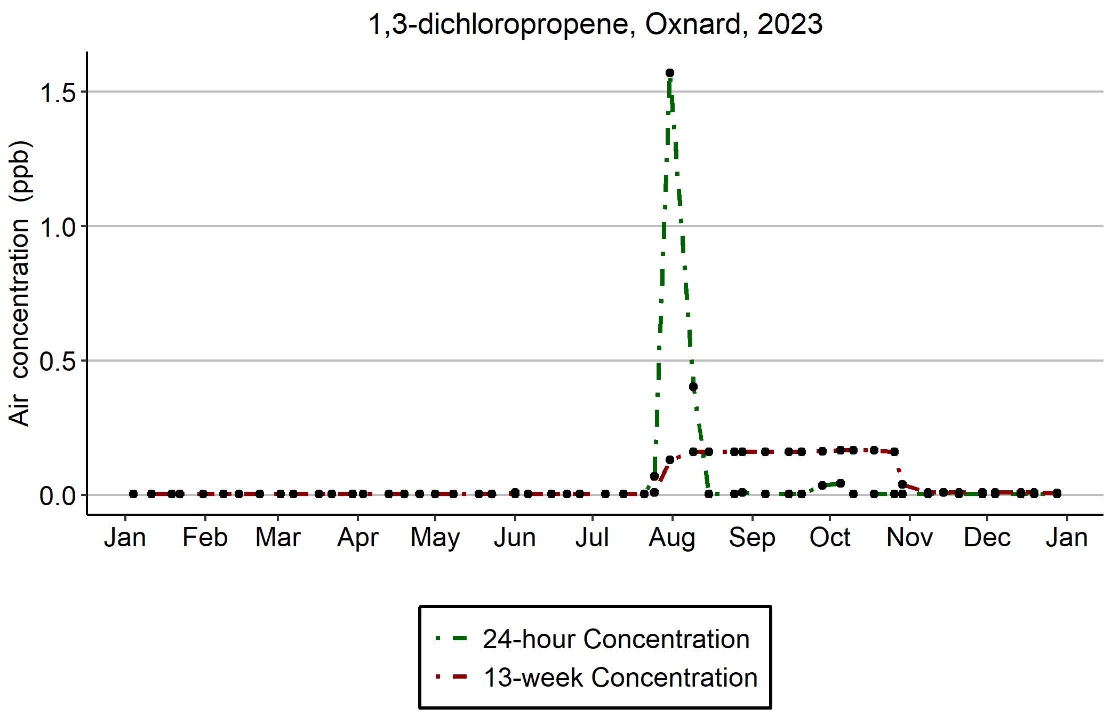

Figure A-1. Temporal trend in 1,3-dichloropropene concentrations in Oxnard in 2023 (Acute RT = 55 ppb ; Sub-chronic SL = 3 ppb).

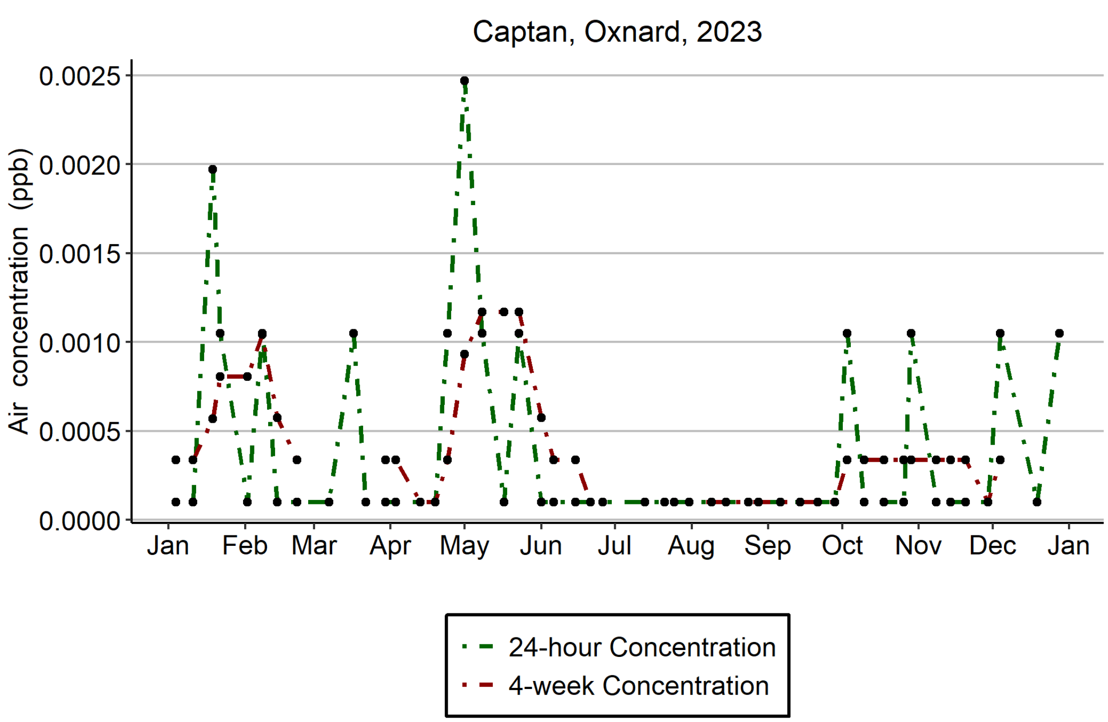

Figure A-2. Temporal trend in Captan concentrations in Oxnard in 2023 (Acute SL = 0.15 ppb ; Sub-chronic SL = 0.11 ppb).

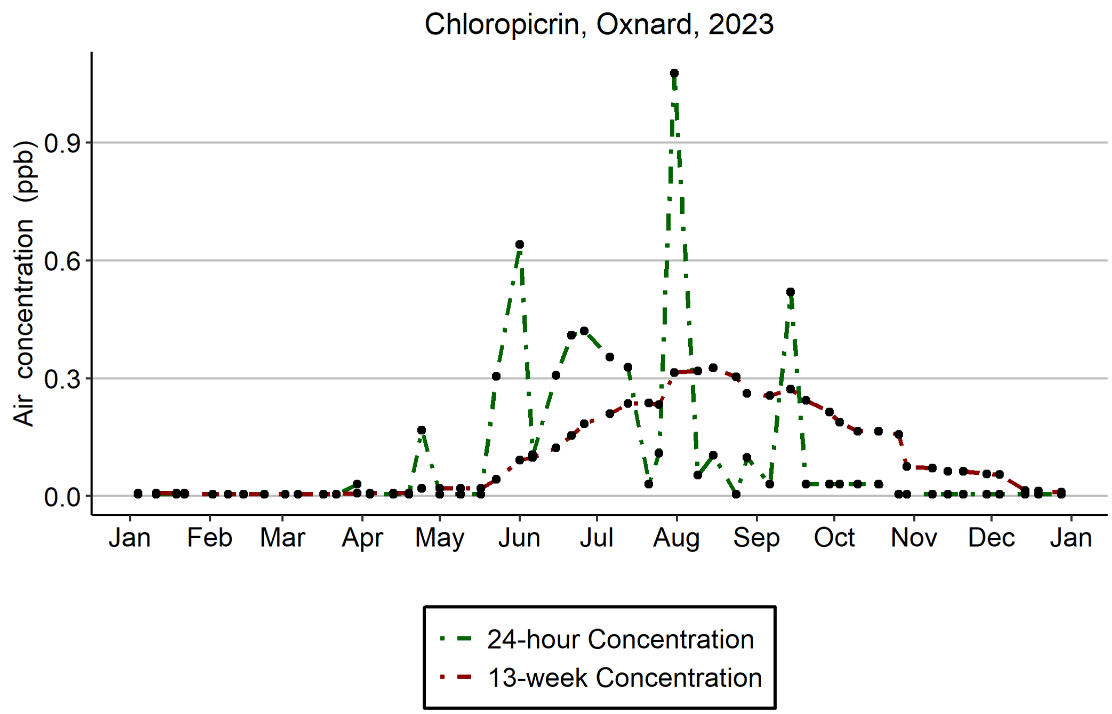

Figure A-3. Temporal trend in Chloropicrin concentrations in Oxnard in 2023 (Acute RT = 73 ppb ; Sub-chronic SL = 0.35 ppb).

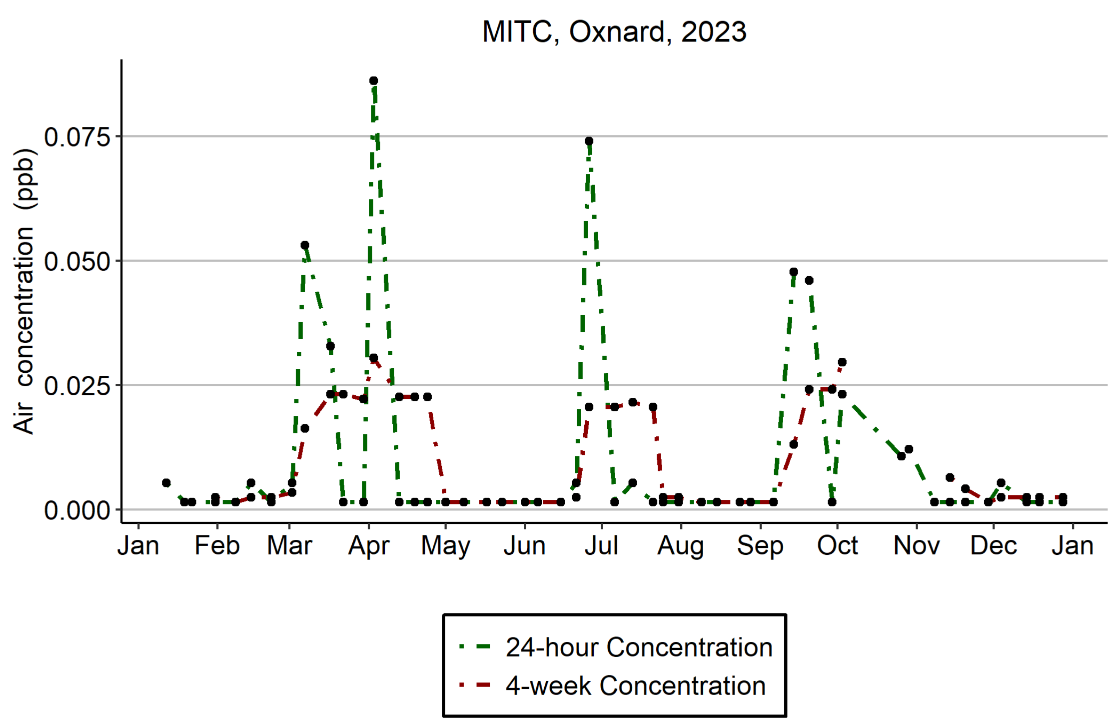

Figure A-4. Temporal trend in MITC concentrations in Oxnard in 2023 (Acute RT = 220 ppb ; Sub-chronic SL = 1 ppb).

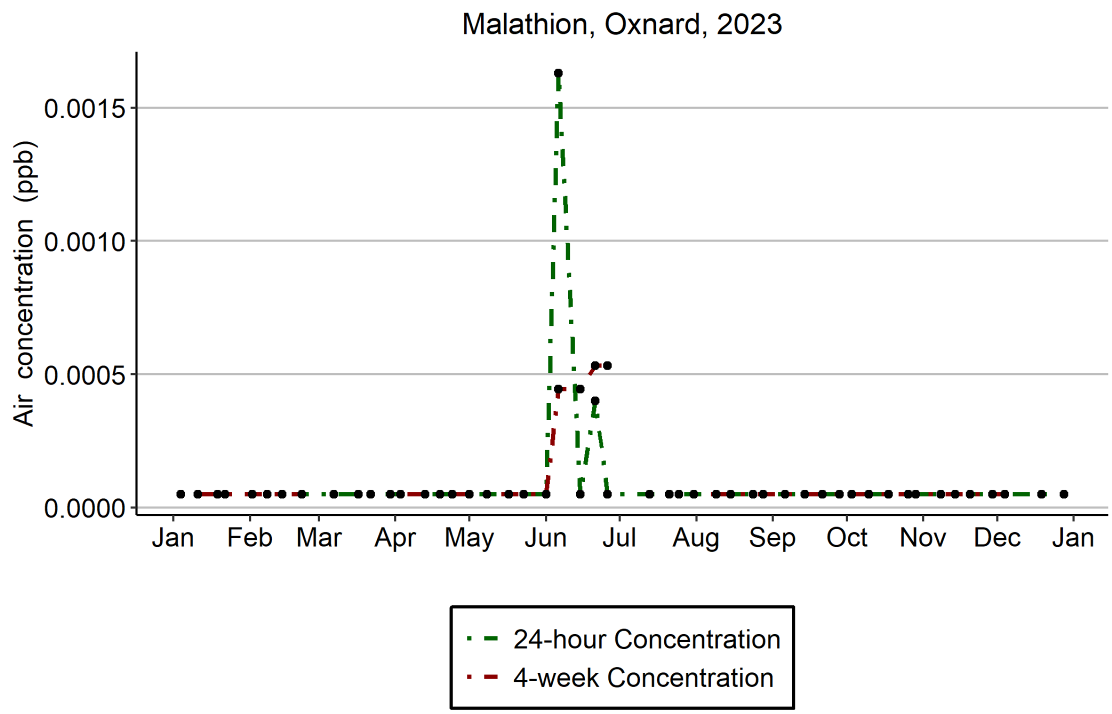

Figure A-5. Temporal trend in Malathion concentrations in Oxnard in 2023 (Acute SL = 8.3 ppb ; Sub-chronic SL = 6 ppb).

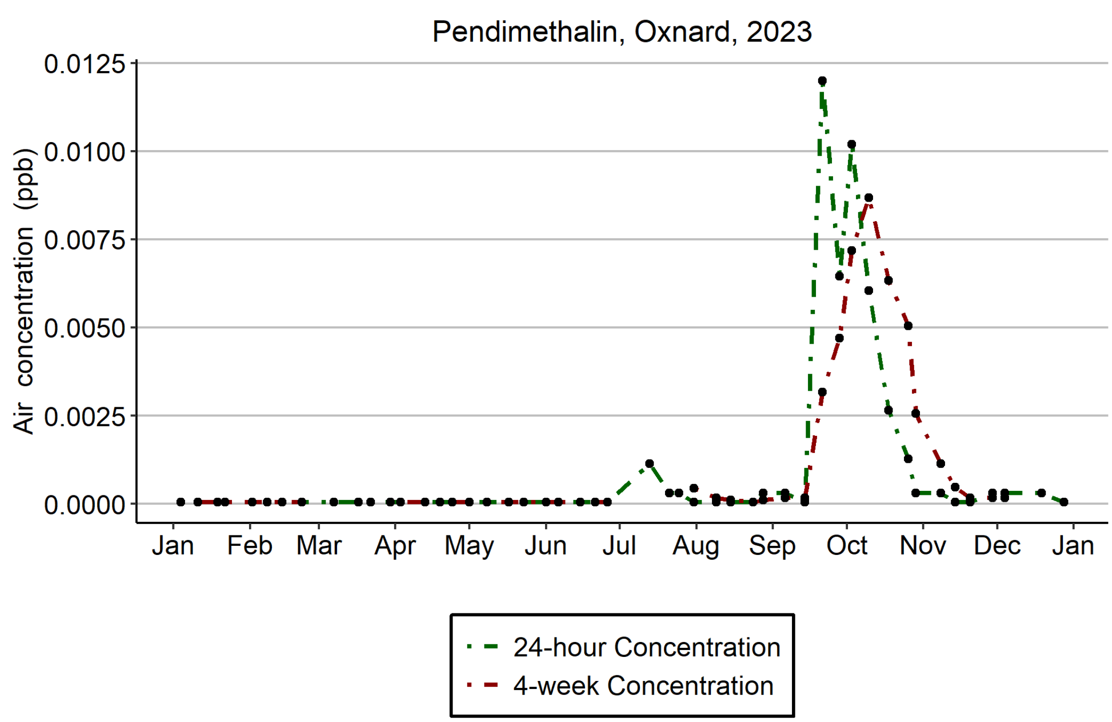

Figure A-6. Temporal trend in Pendimethalin concentrations in Oxnard in 2023 (Acute SL = 150 ppb ; Sub-chronic SL = 49 ppb).

APPENDIX B: SANTA MARIA RESULTS

Santa Maria

Santa Maria is located in Santa Barbara County and is 23.4 square miles in area. The average elevation is 217 feet; it receives an average of 14 inches of precipitation annually. Daily average temperatures range from 47° to 73°F in the summer and 39° to 64°F in winter. Santa Maria is the most populous city in Santa Barbara County, with a population of 110,000 based on the 2020 census. Of this population, 31% were below 18 years of age and 10% were above 65 years of age. The major crops in the immediate area are strawberries, wine grapes, and broccoli. The monitoring station was relocated from a CARB monitoring location to the southwest corner of Bonita Elementary School where sampling began on November 12, 2019. Monitoring is conducted through a DPR contract with the Santa Barbara County Agricultural Commissioner's (SB-CAC) office. SB-CAC staff follow strict standard operating procedures established by DPR's Air Program, ensuring that samples are collected, handled, and transported appropriately to maintain consistency and integrity of the samples. DPR Air Program staff provides annual training and continuous support to SB-CAC for operation and monitoring at this location.

Pesticide Detections

Table B–1 lists the number and percentage of analyses resulting in detections at the Santa Maria AMN monitoring station in 2023. The chemical with the highest number of quantifiable detections was MITC (n=14, 27.5%), followed by chloropicrin (n=11, 21.6%), and 1,3-dichloropropene (n=9, 17.6%).

Table B–1. Number and percentage of positive samples per chemical in Santa Maria in 2023.

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	51	11	9	21.6 %	17.6 %
Acephate	51	0	0	0 %	0 %
Bensulide	51	0	0	0 %	0 %
Captan	51	0	0	0 %	0 %
Chloropicrin	51	18	11	35.3 %	21.6 %
Chlorothalonil	51	0	0	0 %	0 %
Chlorpyrifos	51	0	0	0 %	0 %
Chlorpyrifos oa	51	0	0	0 %	0 %
Cypermethrin	51	0	0	0 %	0 %
DDVP	51	17	2	33.3 %	3.9 %
DEF	51	0	0	0 %	0 %
Dacthal	51	1	0	2 %	0 %

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Diazinon	51	0	0	0 %	0 %
Diazinon oa	51	0	0	0 %	0 %
Dimethoate	51	0	0	0 %	0 %
Dimethoate oa	51	0	0	0 %	0 %
Diuron	51	0	0	0 %	0 %
EPTC	51	0	0	0 %	0 %
Endosulfan	51	0	0	0 %	0 %
Endosulfan Sulfate	51	0	0	0 %	0 %
Fenpyroximate	51	0	0	0 %	0 %
Iprodione	51	0	0	0 %	0 %
MITC	51	15	14	29.4 %	27.5 %
Malathion	51	24	7	47.1 %	13.7 %
Malathion oa	51	4	0	7.8 %	0 %
Methidathion	51	0	0	0 %	0 %
Methomyl	51	0	0	0 %	0 %
Methyl Bromide	51	15	1	29.4 %	2 %
Metolachlor	51	0	0	0 %	0 %
Norflurazon	51	0	0	0 %	0 %
Oryzalin	51	0	0	0 %	0 %
Oxydemeton Methyl	51	0	0	0 %	0 %
Oxyfluorfen	51	2	0	3.9 %	0 %
Pendimethalin	51	9	1	17.6 %	2 %
Permethrin	51	0	0	0 %	0 %
Phosmet	51	0	0	0 %	0 %
Propargite	51	0	0	0 %	0 %
Simazine	51	0	0	0 %	0 %
Trifluralin	51	3	0	5.9 %	0 %
pp-dicofol	51	0	0	0 %	0 %
Total	2,040	119	45	5.8 %	2.2 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table B–2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Santa Maria AMN monitoring station in 2023. All chemicals for which there were quantifiable detections were detected at less than 2% of their health screening or target levels.

Table B–2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Santa Maria in 2023.

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
1,3-dichloropropene	09/17/2023	0.55 ppb (2,510 ng/m^3)	55 ppb*‡ (250,000 ng/m^3)	1 %
Chloropicrin	05/24/2023	1.2 ppb (8,137 ng/m^3)	73 ppb*† (491,000 ng/m^3)	1.7 %
DDVP	08/10/2023	0.0071 ppb (64 ng/m^3)	1.2 ppb (11,000 ng/m^3)	0.58 %
Malathion	09/17/2023	0.0023 ppb (31.2 ng/m^3)	8.3 ppb (112,500 ng/m^3)	0.028 %
Methyl Bromide	10/24/2023	0.023 ppb (89.6 ng/m^3)	210 ppb (820,000 ng/m^3)	0.011 %
MITC	10/09/2023	1.2 ppb (3,588 ng/m^3)	220 ppb*† (660,000 ng/m^3)	0.54 %
Pendimethalin	10/18/2023	0.001 ppb (12 ng/m^3)	150 ppb (1,700,000 ng/m^3)	0.001 %
Acephate		ND	1.6 ppb (12,000 ng/m^3)	
Bensulide		ND	15.9 ppb (259,000 ng/m^3)	
Captan		ND	0.15 ppb (1,844 ng/m^3)	
Chlorothalonil		ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos		ND	0.084 ppb (1,200 ng/m^3)	
Chlorpyrifos oa		ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin		ND	6.6 ppb (113,000 ng/m^3)	

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Dacthal		Trace	1732 ppb (23,500,000 ng/m^3)	
DEF		ND	0.68 ppb (8,800 ng/m^3)	
Diazinon		ND	0.01 ppb (130 ng/m^3)	
Diazinon oa		ND	0.011 ppb (130 ng/m^3)	
Dimethoate		ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate oa		ND	0.49 ppb (4,300 ng/m^3)	
Diuron		ND	17.8 ppb (170,000 ng/m^3)	
Endosulfan		ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate		ND	0.19 ppb (3,300 ng/m^3)	
EPTC		ND	29.7 ppb (230,000 ng/m^3)	
Fenpyroximate		ND	0.87 ppb (15,000 ng/m^3)	
Iprodione		ND	23.2 ppb (313,000 ng/m^3)	
Malathion oa		Trace	8.8 ppb (112,500 ng/m^3)	
Methidathion		ND	0.25 ppb (3,100 ng/m^3)	
Methomyl		ND	4.8 ppb (32,000 ng/m^3)	
Metolachlor (S-Metolachlor)		ND	7.3 ppb (85,000 ng/m^3)	
Norflurazon		ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin		ND	29.7 ppb (420,000 ng/m^3)	

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Oxydemeton Methyl		ND	3.7 ppb (39,200 ng/m^3)	
Oxyfluorfen		Trace	34.5 ppb (510,000 ng/m^3)	
Permethrin		ND	10.5 ppb (168,000 ng/m^3)	
Phosmet		ND	5.9 ppb (77,000 ng/m^3)	
pp-dicofol		ND	4.5 ppb (68,000 ng/m^3)	
Propargite		ND	0.98 ppb (14,000 ng/m^3)	
Simazine		ND	13.3 ppb (110,000 ng/m^3)	
Trifluralin		Trace	87.5 ppb (1,200,000 ng/m^3)	

* This value is a regulatory target rather than a screening level.

† This value is an 8-hour time-weighted-average (TWA) used to compare the 24-h measured concentration.

‡ This value is a 72-hour TWA used to compare against the 24-hour measured concentration.

Sub-chronic (4- or 13-week) Concentrations

Table B–3 shows the highest rolling 4-week or 13-week average concentrations for all chemicals monitored in Santa Maria in 2023. The highest concentration relative to its screening level (SL) was that of chloropicrin at 58.9% and MITC at 44.8%. The remaining chemicals for which there were quantifiable detections were detected at less than 2% of their SL.

Table B–3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub- chronic screening level for chemicals monitored in Santa Maria in 2023.

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
1,3-dichloropropene	11/08/2023	0.077 ppb (348 ng/m^3)	3 ppb (14,000 ng/m^3)	2.5 %
Chloropicrin	11/15/2023	0.2 ppb (1,355 ng/m^3)	0.35 ppb (2,300 ng/m^3)	58.9 %

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
DDVP	08/24/2023	0.0025 ppb (22.9 ng/m^3)	0.24 ppb (2,200 ng/m^3)	1 %
Malathion	09/28/2023	0.0013 ppb (17.7 ng/m^3)	6 ppb (80,600 ng/m^3)	0.022 %
Methyl Bromide	01/04/2023	0.013 ppb (50.2 ng/m^3)	5 ppb* (19,400 ng/m^3)	0.26 %
MITC	10/09/2023	0.45 ppb (1,345 ng/m^3)	1 ppb (3,000 ng/m^3)	44.8 %
Pendimethalin	10/24/2023	0.00048 ppb (7.3 ng/m^3)	49 ppb (560,000 ng/m^3)	0.001 %
Acephate		ND	1.1 ppb (8,500 ng/m^3)	
Bensulide		ND	1.5 ppb (24,000 ng/m^3)	
Captan		ND	0.11 ppb (1,352 ng/m^3)	
Chlorothalonil		ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos		ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos oa		ND	0.062 ppb (850 ng/m^3)	
Cypermethrin		ND	4.8 ppb (81,000 ng/m^3)	
Dacthal		Trace	34.6 ppb (470,000 ng/m^3)	
DEF		ND	0.68 ppb (8,800 ng/m^3)	
Diazinon		ND	0.01 ppb (130 ng/m^3)	
Diazinon oa		ND	0.011 ppb (130 ng/m^3)	
Dimethoate		ND	0.32 ppb (3,000 ng/m^3)	

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
Dimethoate oa		ND	0.34 ppb (3,000 ng/m^3)	
Diuron		ND	1.8 ppb (17,000 ng/m^3)	
Endosulfan		ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate		ND	0.19 ppb (3,300 ng/m^3)	
EPTC		ND	3.1 ppb (24,000 ng/m^3)	
Fenpyroximate		ND	0.58 ppb (10,000 ng/m^3)	
Iprodione		ND	7.1 ppb (95,600 ng/m^3)	
Malathion oa		Trace	6.3 ppb (80,600 ng/m^3)	
Methidathion		ND	0.25 ppb (3,100 ng/m^3)	
Methomyl		ND	4.8 ppb (32,000 ng/m^3)	
Metolachlor (S-Metolachlor)		ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon		ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin		ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl		ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen		Trace	12.2 ppb (180,000 ng/m^3)	
Permethrin		ND	5.6 ppb (90,000 ng/m^3)	
Phosmet		ND	2 ppb (26,000 ng/m^3)	

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
pp-dicofol		ND	3.2 ppb (49,000 ng/m^3)	
Propargite		ND	0.98 ppb (14,000 ng/m^3)	
Simazine		ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin		Trace	12.4 ppb (170,000 ng/m^3)	

* This value is a regulatory target rather than a screening level.

Chronic (annual) Concentrations

Table B–4 shows the annual average concentration for all chemicals monitored at the Santa Maria monitoring station in 2023. The pesticide with highest concentration relative to its SL level was that of MITC at 44.3%, followed by chloropicrin at 31.2%. All other monitored chemicals were less than 1% of their chronic SL in Santa Maria in 2023.

Table B–4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored in Santa Maria in 2023.

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
1,3-dichloropropene	0.026 ppb (118 ng/m^3)	2 ppb (9,000 ng/m^3)	1.3 %
Chloropicrin	0.083 ppb (561 ng/m^3)	0.27 ppb (1,800 ng/m^3)	31.2 %
DDVP	0.00065 ppb (5.8 ng/m^3)	0.085 ppb (770 ng/m^3)	0.75 %
Malathion	0.00036 ppb (5.1 ng/m^3)	0.6 ppb (8,100 ng/m^3)	0.063 %
Methyl Bromide	0.0044 ppb (17 ng/m^3)	1 ppb (3,900 ng/m^3)	0.44 %
MITC	0.044 ppb (133 ng/m^3)	0.1 ppb (300 ng/m^3)	44.3 %
Pendimethalin	0.00011 ppb (2 ng/m^3)	49 ppb (560,000 ng/m^3)	0.001 %

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Acephate	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	ND	1.5 ppb (24,000 ng/m^3)	
Captan	ND	0.037 ppb (455 ng/m^3)	
Chlorothalonil	ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.036 ppb (510 ng/m^3)	
Chlorpyrifos oa	ND	0.037 ppb (510 ng/m^3)	
Cypermethrin	ND	1.6 ppb (27,000 ng/m^3)	
Dacthal	Trace	3.5 ppb (47,000 ng/m^3)	
DEF	ND	NA ppb (NA ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon oa	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	ND	0.032 ppb (300 ng/m^3)	
Dimethoate oa	ND	0.034 ppb (300 ng/m^3)	
Diuron	ND	0.6 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.019 ppb (330 ng/m^3)	
EPTC	ND	1.1 ppb (8,500 ng/m^3)	
Fenpyroximate	ND	0.058 ppb (1,000 ng/m^3)	

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Iprodione	ND	7.1 ppb (95,600 ng/m^3)	
Malathion oa	Trace	0.63 ppb (8,100 ng/m^3)	
Methidathion	ND	0.2 ppb (2,500 ng/m^3)	
Methomyl	ND	4.8 ppb (32,000 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	Trace	3.4 ppb (51,000 ng/m^3)	
Permethrin	ND	5.6 ppb (90,000 ng/m^3)	
Phosmet	ND	1.4 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.3 ppb (20,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin	Trace	3 ppb (41,000 ng/m^3)	

Temporal Trends in Detected Concentrations

The following figures depict the concentrations over time for any chemical detected at a quantifiable concentration in Santa Maria in 2023.

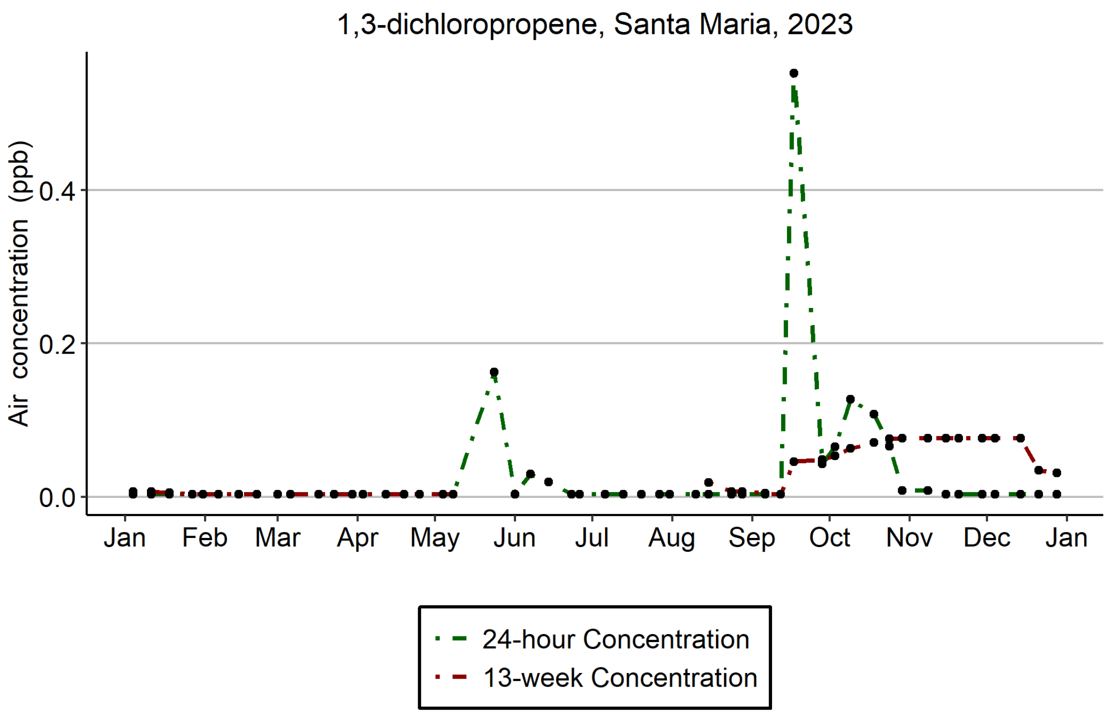

Figure B-1. Temporal trend in 1,3-dichloropropene concentrations in Santa Maria in 2023 (Acute RT = 55 ppb ; Sub-chronic SL = 3 ppb).

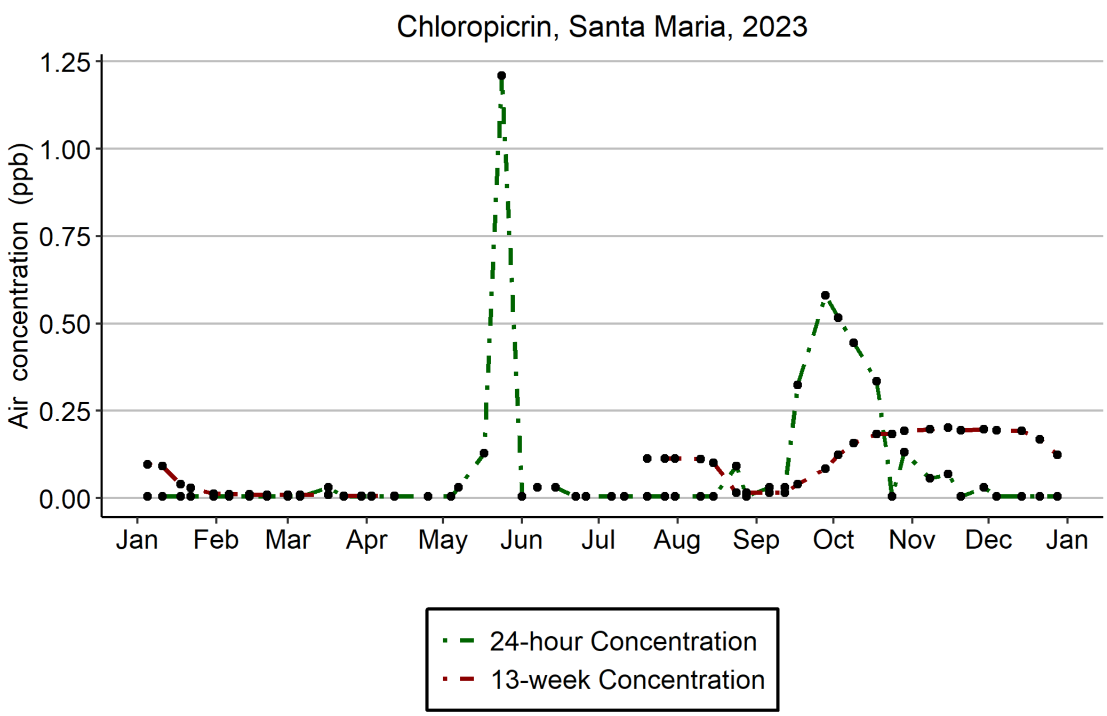

Figure B-2. Temporal trend in Chloropicrin concentrations in Santa Maria in 2023 (Acute RT = 73 ppb ; Sub-chronic SL = 0.35 ppb).

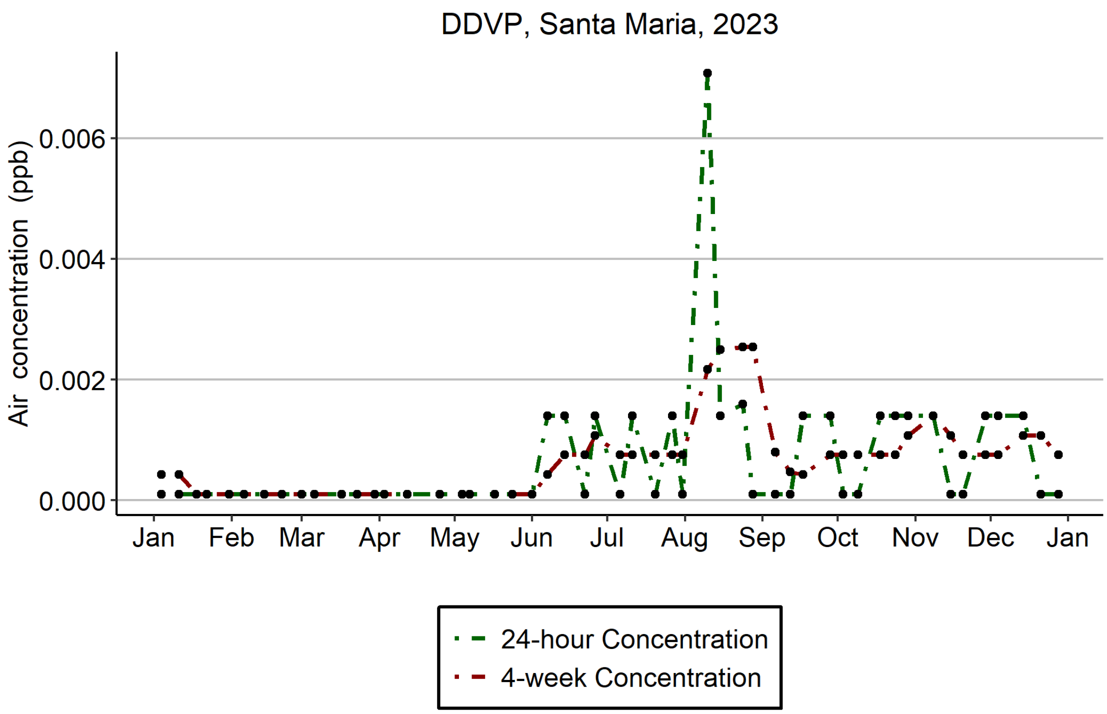

Figure B-3. Temporal trend in DDVP concentrations in Santa Maria in 2023 (Acute SL = 1.2 ppb ; Sub-chronic SL = 0.2 ppb).

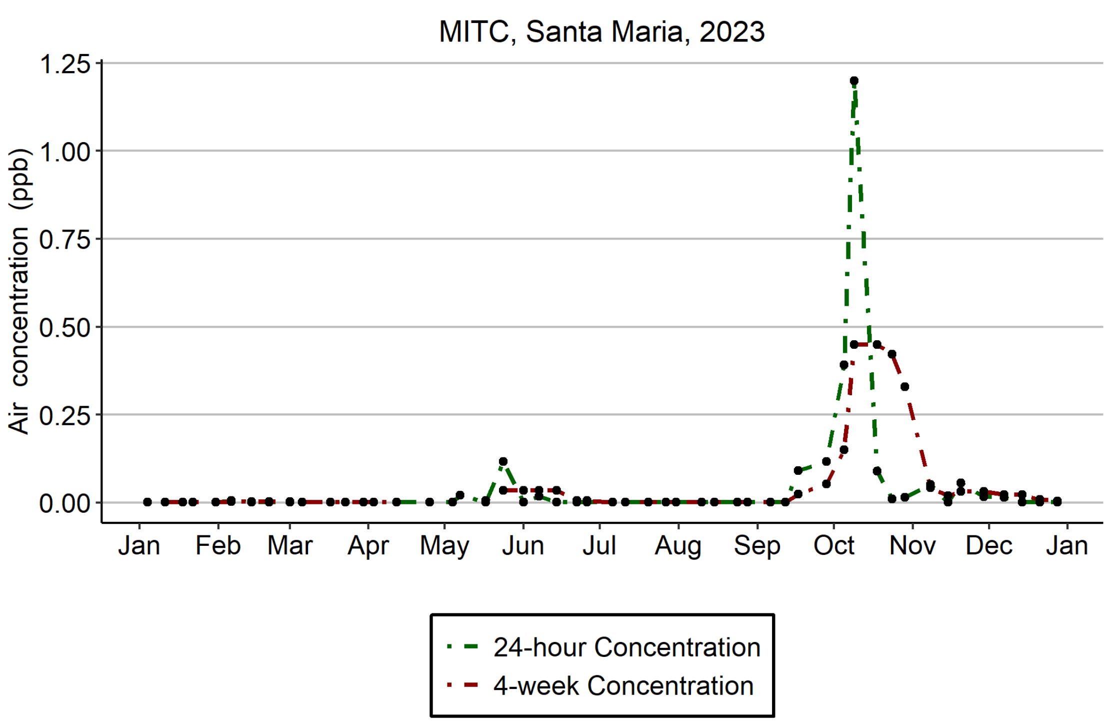

Figure B-4. Temporal trend in MITC concentrations in Santa Maria in 2023 (Acute RT = 220 ppb ; Sub-chronic SL = 1 ppb).

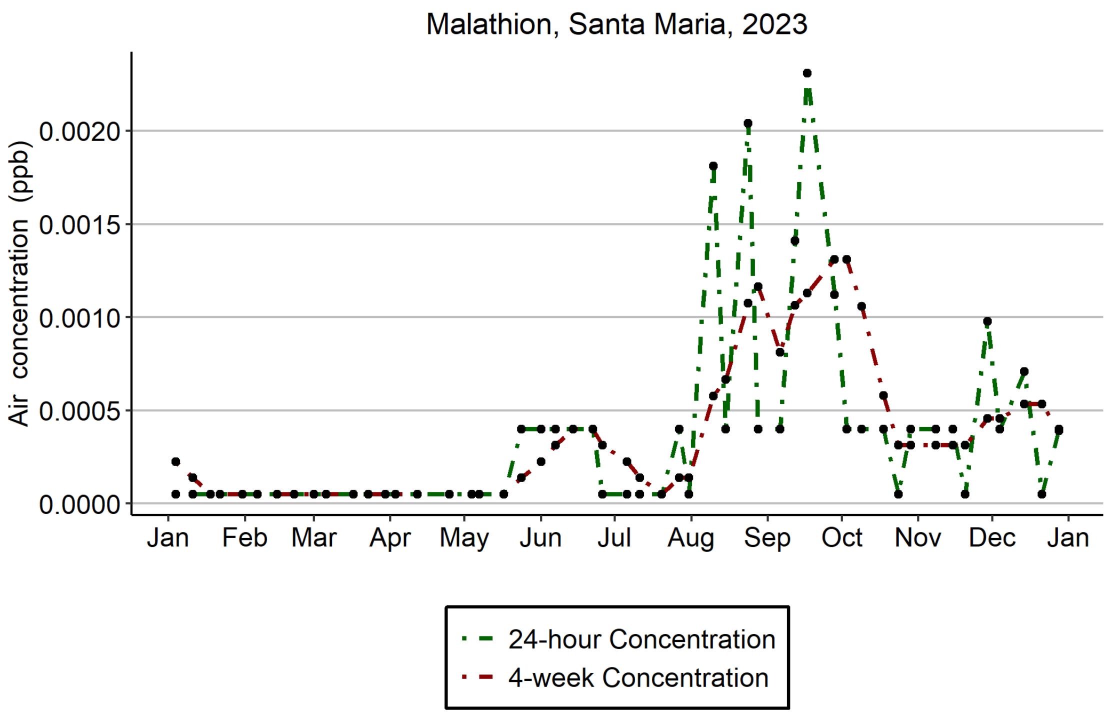

Figure B-5. Temporal trend in Malathion concentrations in Santa Maria in 2023 (Acute SL = 8.3 ppb ; Sub-chronic SL = 6 ppb).

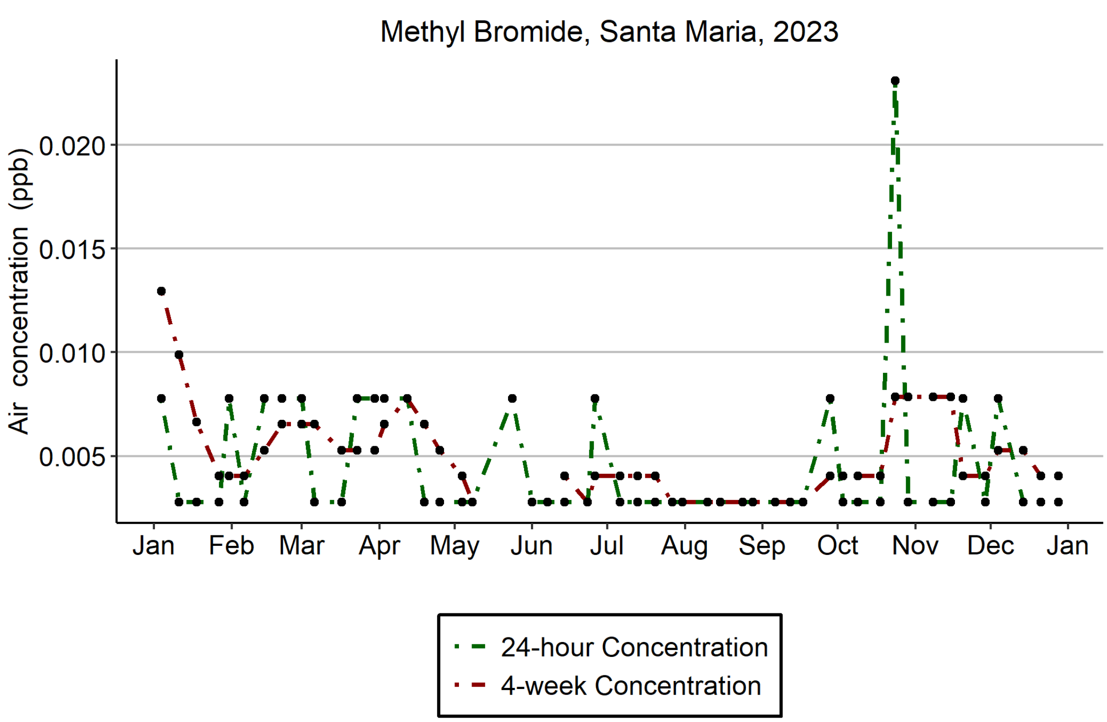

Figure B-6. Temporal trend in Methyl Bromide concentrations in Santa Maria in 2023 (Acute RT = 210 ppb ; Sub-chronic RT = 5 ppb).

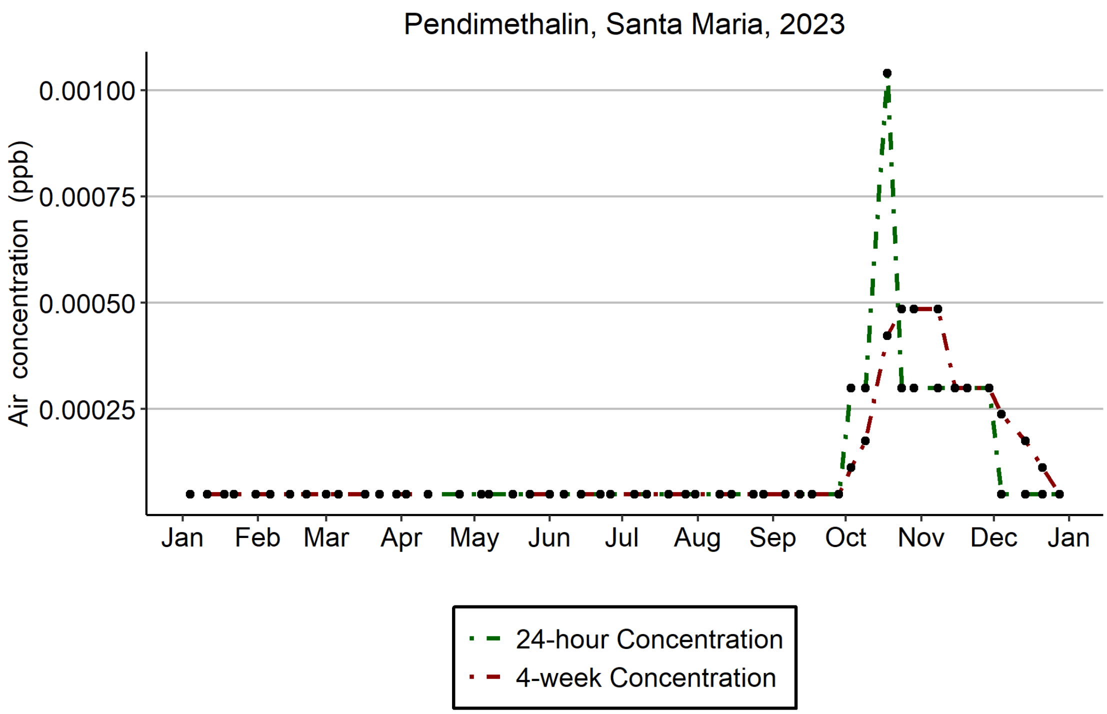

Figure B-7. Temporal trend in Pendimethalin concentrations in Santa Maria in 2023 (Acute SL = 150 ppb ; Sub-chronic SL = 49 ppb).

APPENDIX C: SHAFTER RESULTS

Shafter

The Shafter monitoring station was established in 2011. Shafter is 18 square miles in area located 18 miles west-northwest of Bakersfield in Kern County. The elevation is 351 feet and receives an average of 7 inches of precipitation annually. Average temperatures range from 59° to 99°F in the summer and 35° to 64°F in winter. Based on the 2020 census, the population of Shafter was 16,988, of which 35% were below 18 years of age and 8% were above 65 years of age. The major crops in the immediate area around Shafter are almonds, grapes, carrots, and alfalfa. The monitoring station was originally situated at a city well located adjacent to Shafter High School at the northeastern edge of the city. Monitoring at this sampling location was initially operated by DPR until April 2018 when the California Air Resources Board (CARB) assumed operation. On February 22, 2019, the monitoring station was relocated to the north-west corner of Sequoia Elementary School, a half mile north-northwest from the original sampling location. On January 1, 2021, DPR re-assumed operation of this monitoring station.

Pesticide Detections

Table C–1 lists the number and percentage of analyses resulting in detections at the Shafter AMN monitoring station in 2023. The chemicals with the highest number of quantifiable detections were MITC (n=15, 30%), pendimethalin (n=13, 25%), and 1,3-dichloropropene (n=10, 19.6%).

Table C–1 Number and percentage of positive samples per chemical in Shafter in 2023.

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	51	11	10	21.6 %	19.6 %
Acephate	52	0	0	0 %	0 %
Bensulide	52	0	0	0 %	0 %
Captan	52	0	0	0 %	0 %
Chloropicrin	52	2	0	3.8 %	0 %
Chlorothalonil	52	0	0	0 %	0 %
Chlorpyrifos	52	0	0	0 %	0 %
Chlorpyrifos oa	52	0	0	0 %	0 %
Cypermethrin	52	0	0	0 %	0 %
DDVP	52	1	0	1.9 %	0 %
DEF	52	0	0	0 %	0 %
Dacthal	52	0	0	0 %	0 %
Diazinon	52	0	0	0 %	0 %

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Diazinon oa	52	0	0	0 %	0 %
Dimethoate	52	0	0	0 %	0 %
Dimethoate oa	52	0	0	0 %	0 %
Diuron	52	0	0	0 %	0 %
EPTC	52	6	0	11.5 %	0 %
Endosulfan	52	0	0	0 %	0 %
Endosulfan Sulfate	52	0	0	0 %	0 %
Fenpyroximate	52	0	0	0 %	0 %
Iprodione	52	0	0	0 %	0 %
MITC	50	21	15	42 %	30 %
Malathion	52	1	0	1.9 %	0 %
Malathion oa	52	1	0	1.9 %	0 %
Methidathion	52	0	0	0 %	0 %
Methomyl	52	0	0	0 %	0 %
Methyl Bromide	51	17	7	33.3 %	13.7 %
Metolachlor (S-Metolachlor)	52	0	0	0 %	0 %
Norflurazon	52	0	0	0 %	0 %
Oryzalin	52	0	0	0 %	0 %
Oxydemeton Methyl	52	0	0	0 %	0 %
Oxyfluorfen	52	0	0	0 %	0 %
Pendimethalin	52	38	13	73.1 %	25 %
Permethrin	52	0	0	0 %	0 %
Phosmet	52	0	0	0 %	0 %
Propargite	52	0	0	0 %	0 %
Simazine	52	0	0	0 %	0 %
Trifluralin	52	0	0	0 %	0 %
pp-dicofol	52	0	0	0 %	0 %
Total	2,076	98	45	4.7 %	2.2 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table C–2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Shafter AMN monitoring station in 2023. The highest concentration relative to its exposure level was that of 1,3-dichloropropene at 14.5%. The remaining chemicals for which there were quantifiable detections were detected at 1% (or less) of their screening levels.

Table C–2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Shafter in 2023.

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
1,3-dichloropropene	06/21/2023	8 ppb (36,286 ng/m^3)	55 ppb*‡ (250,000 ng/m^3)	14.5 %
Methyl Bromide	04/17/2023	0.016 ppb (63.7 ng/m^3)	210 ppb* (820,000 ng/m^3)	0.008 %
MITC	12/13/2023	2.3 ppb (6,806 ng/m^3)	220 ppb*† (660,000 ng/m^3)	1 %
Pendimethalin	02/08/2023	0.0025 ppb (28.3 ng/m^3)	150 ppb (1,700,000 ng/m^3)	0.002 %
Acephate		ND	1.6 ppb (12,000 ng/m^3)	
Bensulide		ND	15.9 ppb (259,000 ng/m^3)	
Captan		ND	0.15 ppb (1,844 ng/m^3)	
Chloropicrin		Trace	73 ppb (491,000 ng/m^3)	
Chlorothalonil		ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos		ND	0.084 ppb (1,200 ng/m^3)	
Chlorpyrifos oa		ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin		ND	6.6 ppb (113,000 ng/m^3)	
Dacthal		ND	1732 ppb (23,500,000 ng/m^3)	

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
DDVP		Trace	1.2 ppb (11,000 ng/m^3)	
DEF		ND	0.68 ppb (8,800 ng/m^3)	
Diazinon		ND	0.01 ppb (130 ng/m^3)	
Diazinon oa		ND	0.011 ppb (130 ng/m^3)	
Dimethoate		ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate oa		ND	0.49 ppb (4,300 ng/m^3)	
Diuron		ND	17.8 ppb (170,000 ng/m^3)	
Endosulfan		ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate		ND	0.19 ppb (3,300 ng/m^3)	
EPTC		Trace	29.7 ppb (230,000 ng/m^3)	
Fenpyroximate		ND	0.87 ppb (15,000 ng/m^3)	
Iprodione		ND	23.2 ppb (313,000 ng/m^3)	
Malathion		Trace	8.3 ppb (112,500 ng/m^3)	
Malathion oa		Trace	8.8 ppb (112,500 ng/m^3)	
Methidathion		ND	0.25 ppb (3,100 ng/m^3)	
Methomyl		ND	4.8 ppb (32,000 ng/m^3)	
Metolachlor (S-Metolachlor)		ND	7.3 ppb (85,000 ng/m^3)	
Norflurazon		ND	12.6 ppb (170,000 ng/m^3)	

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Oryzalin		ND	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl		ND	3.7 ppb (39,200 ng/m^3)	
Oxyfluorfen		ND	34.5 ppb (510,000 ng/m^3)	
Permethrin		ND	10.5 ppb (168,000 ng/m^3)	
Phosmet		ND	5.9 ppb (77,000 ng/m^3)	
pp-dicofol		ND	4.5 ppb (68,000 ng/m^3)	
Propargite		ND	0.98 ppb (14,000 ng/m^3)	
Simazine		ND	13.3 ppb (110,000 ng/m^3)	
Trifluralin		ND	87.5 ppb (1,200,000 ng/m^3)	

* This value is a regulatory target rather than a screening level.
† This value is an 8-hour time-weighted-average (TWA) used to compare the 24-h measured concentration.
‡ This value is a 72-hour TWA used to compare against the 24-hour measured concentration.

Sub-chronic (4- or 13-week) Concentrations

Table C–3 shows the highest rolling 4-week or 13-week average concentrations for all chemicals monitored at the Shafter AMN monitoring station in 2023. The highest concentration relative to its exposure level was that of MITC at 67%, followed by 1,3-dichloropropene at 21.3%. The remaining chemicals were less than 1% of their screening levels.

Table C–3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub- chronic screening level for chemicals monitored in Shafter in 2023.

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
1,3-dichloropropene	06/27/2023	0.66 ppb (2,987 ng/m^3)	3 ppb (14,000 ng/m^3)	21.3 %
Methyl Bromide	02/23/2023	0.014 ppb (54.9 ng/m^3)	5 ppb* (19,400 ng/m^3)	0.28 %

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
MITC	12/28/2023	0.67 ppb (2,010 ng/m^3)	1 ppb (3,000 ng/m^3)	67 %
Pendimethalin	02/15/2023	0.0016 ppb (18.2 ng/m^3)	49 ppb (560,000 ng/m^3)	0.003 %
Acephate		ND	1.1 ppb (8,500 ng/m^3)	
Bensulide		ND	1.5 ppb (24,000 ng/m^3)	
Captan		ND	0.11 ppb (1,352 ng/m^3)	
Chloropicrin		Trace	0.35 ppb (2,300 ng/m^3)	
Chlorothalonil		ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos		ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos oa		ND	0.062 ppb (850 ng/m^3)	
Cypermethrin		ND	4.8 ppb (81,000 ng/m^3)	
Dacthal		ND	34.6 ppb (470,000 ng/m^3)	
DDVP		Trace	0.24 ppb (2,200 ng/m^3)	
DEF		ND	0.68 ppb (8,800 ng/m^3)	
Diazinon		ND	0.01 ppb (130 ng/m^3)	
Diazinon oa		ND	0.011 ppb (130 ng/m^3)	
Dimethoate		ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate oa		ND	0.34 ppb (3,000 ng/m^3)	
Diuron		ND	1.8 ppb (17,000 ng/m^3)	

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
Endosulfan		ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate		ND	0.19 ppb (3,300 ng/m^3)	
EPTC		Trace	3.1 ppb (24,000 ng/m^3)	
Fenpyroximate		ND	0.58 ppb (10,000 ng/m^3)	
Iprodione		ND	7.1 ppb (95,600 ng/m^3)	
Malathion		Trace	6 ppb (80,600 ng/m^3)	
Malathion oa		Trace	6.3 ppb (80,600 ng/m^3)	
Methidathion		ND	0.25 ppb (3,100 ng/m^3)	
Methomyl		ND	4.8 ppb (32,000 ng/m^3)	
Metolachlor (S-Metolachlor)		ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon		ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin		ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl		ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen		ND	12.2 ppb (180,000 ng/m^3)	
Permethrin		ND	5.6 ppb (90,000 ng/m^3)	
Phosmet		ND	2 ppb (26,000 ng/m^3)	
pp-dicofol		ND	3.2 ppb (49,000 ng/m^3)	
Propargite		ND	0.98 ppb (14,000 ng/m^3)	

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
Simazine		ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin		ND	12.4 ppb (170,000 ng/m^3)	

* This value is a regulatory target rather than a screening level.

Chronic (annual) Concentrations

Table C–4 shows the annual average concentration for all chemicals monitored at the Shafter monitoring station in 2023. The pesticide with highest concentration relative to its SL was that of MITC at 68%, followed by 1,3-dichloropropene at 12%. All other monitored chemicals were less than 1% of their chronic SL.

Table C–4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored in Shafter in 2023.

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
1,3-dichloropropene	0.24 ppb (690 ng/m^3)	2 ppb (9,000 ng/m^3)	12 %
Methyl Bromide	0.0051 ppb (19.9 ng/m^3)	1 ppb (3,900 ng/m^3)	0.51 %
MITC	0.068 ppb (204 ng/m^3)	0.1 ppb (300 ng/m^3)	68.1 %
Pendimethalin	0.00049 ppb (6.9 ng/m^3)	49 ppb (560,000 ng/m^3)	0.001 %
Acephate	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	ND	1.5 ppb (24,000 ng/m^3)	
Captan	ND	0.037 ppb (455 ng/m^3)	
Chloropicrin	Trace	0.27 ppb (1,800 ng/m^3)	
Chlorothalonil	ND	3.1 ppb (34,000 ng/m^3)	

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Chlorpyrifos	ND	0.036 ppb (510 ng/m^3)	
Chlorpyrifos oa	ND	0.037 ppb (510 ng/m^3)	
Cypermethrin	ND	1.6 ppb (27,000 ng/m^3)	
Dacthal	ND	3.5 ppb (47,000 ng/m^3)	
DDVP	Trace	0.085 ppb (770 ng/m^3)	
DEF	ND	NA ppb (NA ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon oa	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	ND	0.032 ppb (300 ng/m^3)	
Dimethoate oa	ND	0.034 ppb (300 ng/m^3)	
Diuron	ND	0.6 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.019 ppb (330 ng/m^3)	
EPTC	Trace	1.1 ppb (8,500 ng/m^3)	
Fenpyroximate	ND	0.058 ppb (1,000 ng/m^3)	
Iprodione	ND	7.1 ppb (95,600 ng/m^3)	
Malathion	Trace	0.6 ppb (8,100 ng/m^3)	

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Malathion oa	Trace	0.63 ppb (8,100 ng/m^3)	
Methidathion	ND	0.2 ppb (2,500 ng/m^3)	
Methomyl	ND	4.8 ppb (32,000 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	ND	3.4 ppb (51,000 ng/m^3)	
Permethrin	ND	5.6 ppb (90,000 ng/m^3)	
Phosmet	ND	1.4 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.3 ppb (20,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin	ND	3 ppb (41,000 ng/m^3)	

Temporal Trends in Detected Concentrations

The following figures depict the concentrations over time for any chemical detected at a quantifiable concentration in Shafter in 2023.

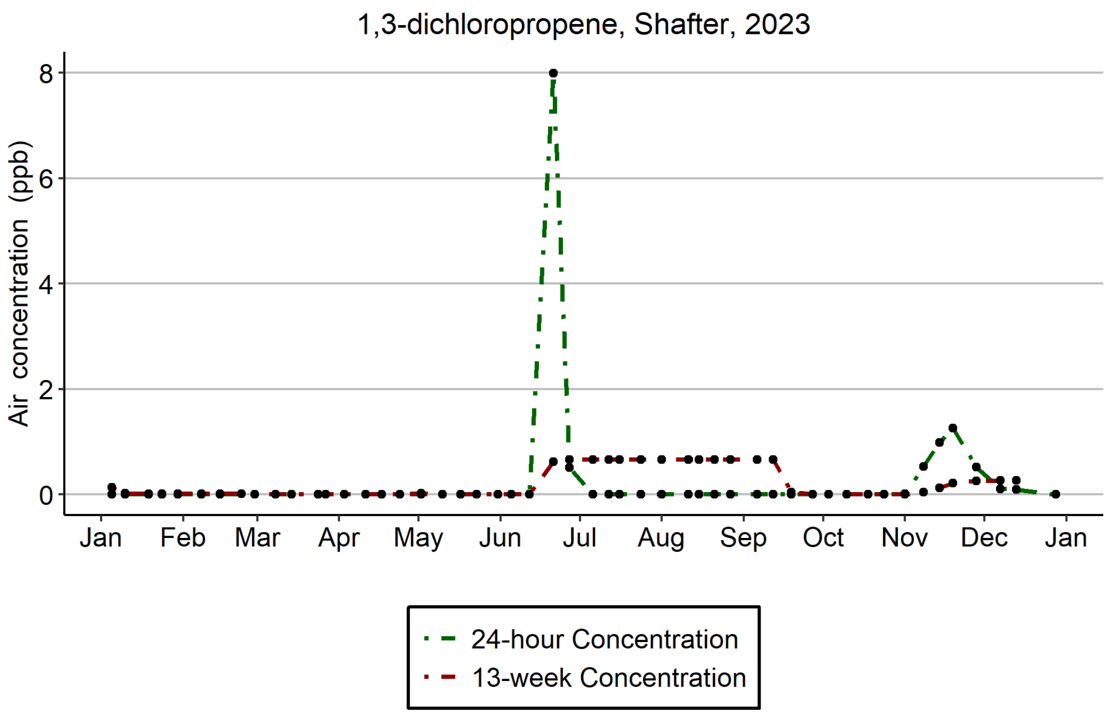

Figure C-1. Temporal trend in 1,3-dichloropropene concentrations in Shafter in 2023 (Acute RT = 55 ppb ; Sub-chronic SL = 3 ppb).

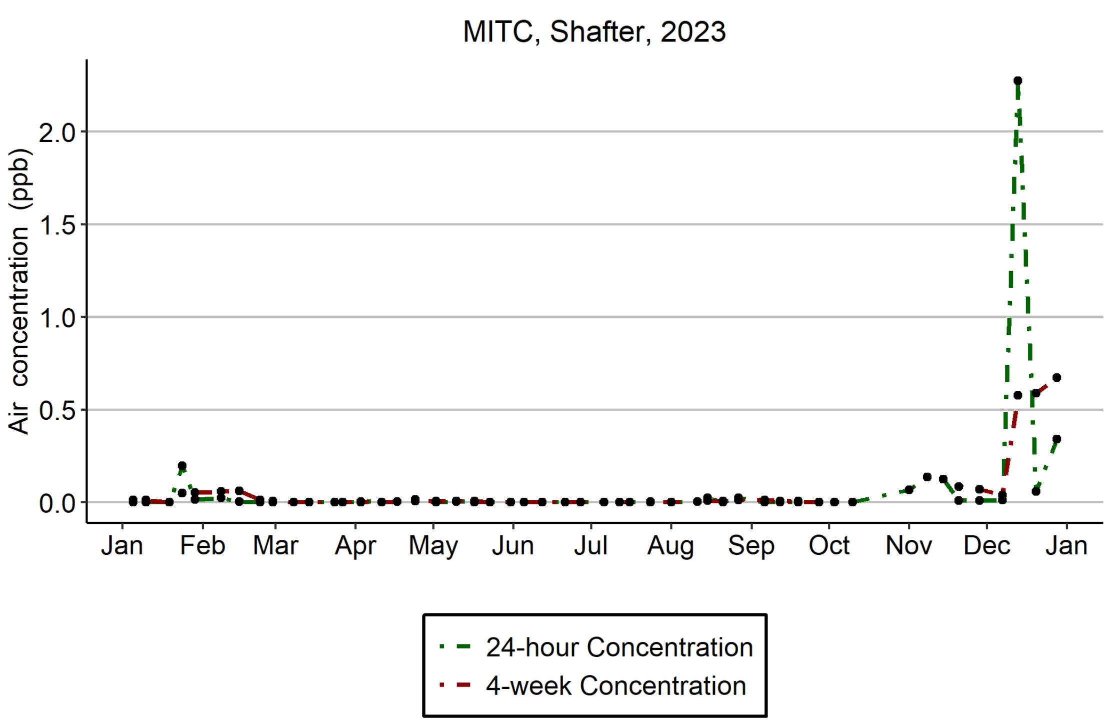

Figure C-2. Temporal trend in MITC concentrations in Shafter in 2023 (Acute RT = 220 ppb ; Sub-chronic SL = 1 ppb).

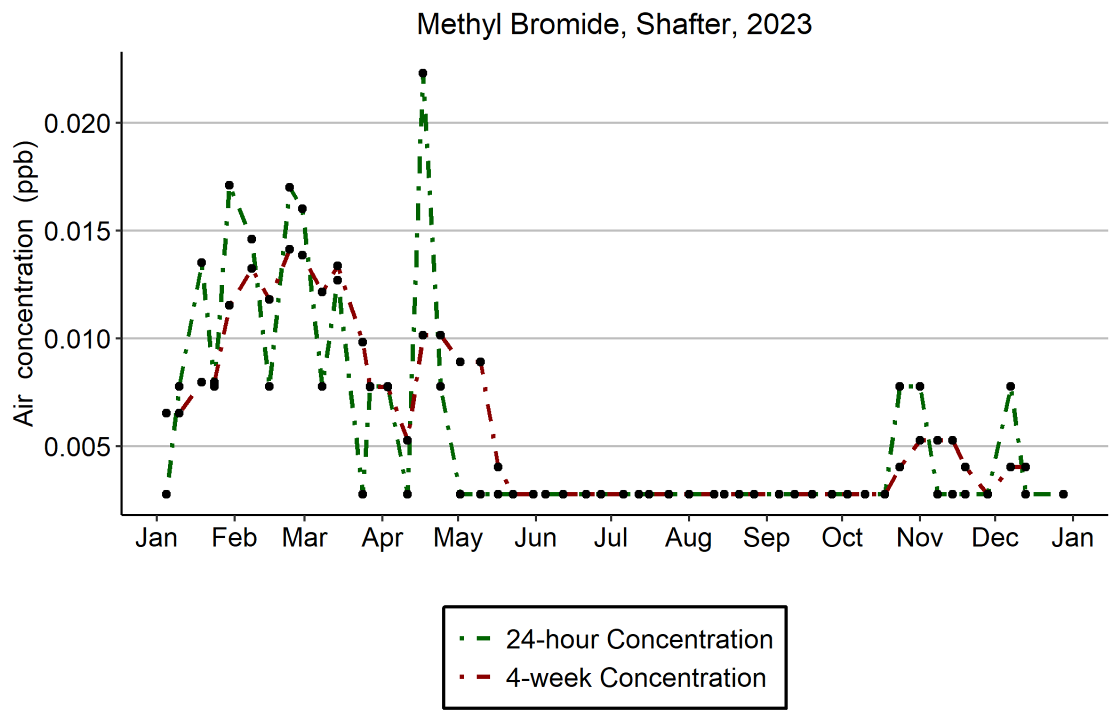

Figure C-3. Temporal trend in Methyl Bromide concentrations in Shafter in 2023 (Acute RT = 210 ppb ; Sub-chronic RT = 5 ppb).

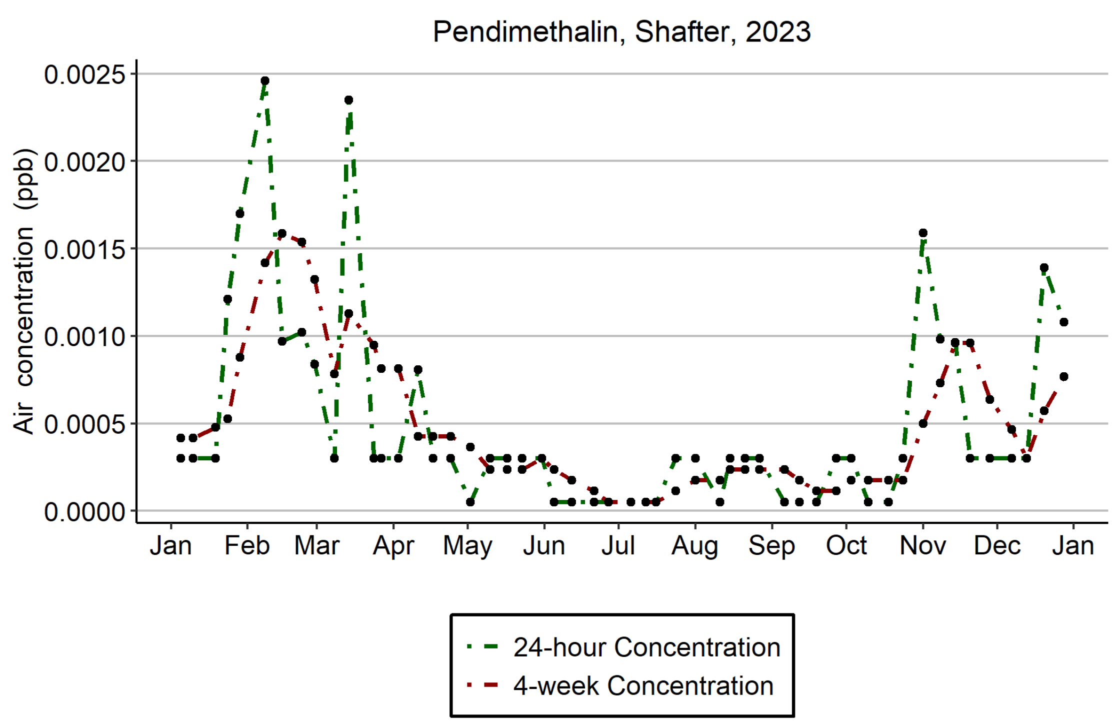

Figure C-4. Temporal trend in Pendimethalin concentrations in Shafter in 2023 (Acute SL = 150 ppb ; Sub-chronic SL = 49 ppb).

APPENDIX D: WATSONVILLE RESULTS

Watsonville

Watsonville is a small city of 7 square miles in area located on the southern edge of Santa Cruz County. The elevation is 29 feet, and it receives on average 22 inches of precipitation annually. Daily average temperatures range from 50° to 72°F in the summer to 38° to 63°F in winter. Based on the 2020 census, the population of Watsonville was 53,000 of which 31% were below 18 years of age and 11% were above 65 years of age. The major crops in the immediate area around Watsonville are strawberries, apples, and lettuce. The monitoring station is located approximately 2 miles south of Watsonville at Ohlone Elementary School. DPR is responsible for operating this monitoring location.

Pesticide Detections

Table D–1 lists the number and percentage of analyses resulting in detections at the Watsonville AMN monitoring station in 2023. The chemical with the highest number of quantifiable detections was 1,3-dichloropropene (n=13, 26%), followed by chloropicrin (n=11, 21.6%).

Table D–1 Number and percentage of positive samples per chemical in Watsonville in 2023.

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	50	14	13	28 %	26 %
Acephate	50	0	0	0 %	0 %
Bensulide	50	0	0	0 %	0 %
Captan	50	1	0	2 %	0 %
Chloropicrin	51	14	11	27.5 %	21.6 %
Chlorothalonil	50	0	0	0 %	0 %
Chlorpyrifos	50	0	0	0 %	0 %
Chlorpyrifos oa	50	0	0	0 %	0 %
Cypermethrin	50	1	0	2 %	0 %
DDVP	50	3	0	6 %	0 %
DEF	50	0	0	0 %	0 %
Dacthal	50	0	0	0 %	0 %
Diazinon	50	0	0	0 %	0 %
Diazinon oa	50	0	0	0 %	0 %

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Dimethoate	50	0	0	0 %	0 %
Dimethoate oa	50	0	0	0 %	0 %
Diuron	50	0	0	0 %	0 %
EPTC	50	0	0	0 %	0 %
Endosulfan	50	0	0	0 %	0 %
Endosulfan Sulfate	50	0	0	0 %	0 %
Fenpyroximate	50	0	0	0 %	0 %
Iprodione	50	0	0	0 %	0 %
MITC	49	8	7	16.3 %	14.3 %
Malathion	50	4	0	8 %	0 %
Malathion oa	50	2	0	4 %	0 %
Methidathion	50	0	0	0 %	0 %
Methomyl	50	0	0	0 %	0 %
Methyl Bromide	50	16	9	32 %	18 %
Metolachlor (S-Metolachlor)	50	0	0	0 %	0 %
Norflurazon	50	1	0	2 %	0 %
Oryzalin	50	0	0	0 %	0 %
Oxydemeton Methyl	50	0	0	0 %	0 %
Oxyfluorfen	50	1	0	2 %	0 %
Pendimethalin	50	0	0	0 %	0 %
Permethrin	50	1	0	2 %	0 %
Phosmet	50	1	0	2 %	0 %
Propargite	50	1	0	2 %	0 %
Simazine	50	0	0	0 %	0 %
Trifluralin	50	0	0	0 %	0 %
pp-dicofol	50	0	0	0 %	0 %
Total	2,000	68	40	3.4 %	2 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table D–2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Watsonville AMN monitoring station in 2023. All chemicals for which there were quantifiable detections were detected at less than 2% of their screening levels in 2023.

Table D–2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Watsonville in 2023.

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
1,3-dichloropropene	09/08/2023	0.35 ppb (1,586 ng/m^3)	55 ppb*‡ (250,000 ng/m^3)	0.63 %
Chloropicrin	09/08/2023	0.97 ppb (6,511 ng/m^3)	73 ppb*† (491,000 ng/m^3)	1.3 %
Methyl Bromide	11/03/2023	0.016 ppb (60.6 ng/m^3)	210 ppb* (820,000 ng/m^3)	0.007 %
MITC	10/10/2023	0.052 ppb (154 ng/m^3)	220 ppb*† (660,000 ng/m^3)	0.023 %
Acephate		ND	1.6 ppb (12,000 ng/m^3)	
Bensulide		ND	15.9 ppb (259,000 ng/m^3)	
Captan		Trace	0.15 ppb (1,844 ng/m^3)	
Chlorothalonil		ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos		ND	0.084 ppb (1,200 ng/m^3)	
Chlorpyrifos oa		ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin		Trace	6.6 ppb (113,000 ng/m^3)	
Dacthal		ND	1732 ppb (23,500,000 ng/m^3)	
DDVP		Trace	1.2 ppb (11,000 ng/m^3)	

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
DEF		ND	0.68 ppb (8,800 ng/m^3)	
Diazinon		ND	0.01 ppb (130 ng/m^3)	
Diazinon oa		ND	0.011 ppb (130 ng/m^3)	
Dimethoate		ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate oa		ND	0.49 ppb (4,300 ng/m^3)	
Diuron		ND	17.8 ppb (170,000 ng/m^3)	
Endosulfan		ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate		ND	0.19 ppb (3,300 ng/m^3)	
EPTC		ND	29.7 ppb (230,000 ng/m^3)	
Fenpyroximate		ND	0.87 ppb (15,000 ng/m^3)	
Iprodione		ND	23.2 ppb (313,000 ng/m^3)	
Malathion		Trace	8.3 ppb (112,500 ng/m^3)	
Malathion oa		Trace	8.8 ppb (112,500 ng/m^3)	
Methidathion		ND	0.25 ppb (3,100 ng/m^3)	
Methomyl		ND	4.8 ppb (32,000 ng/m^3)	
Metolachlor (S-Metolachlor)		ND	7.3 ppb (85,000 ng/m^3)	
Norflurazon		Trace	12.6 ppb (170,000 ng/m^3)	
Oryzalin		ND	29.7 ppb (420,000 ng/m^3)	

Chemical	Date	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Oxydemeton Methyl		ND	3.7 ppb (39,200 ng/m^3)	
Oxyfluorfen		Trace	34.5 ppb (510,000 ng/m^3)	
Pendimethalin		ND	150 ppb (1,700,000 ng/m^3)	
Permethrin		Trace	10.5 ppb (168,000 ng/m^3)	
Phosmet		Trace	5.9 ppb (77,000 ng/m^3)	
pp-dicofol		ND	4.5 ppb (68,000 ng/m^3)	
Propargite		Trace	0.98 ppb (14,000 ng/m^3)	
Simazine		ND	13.3 ppb (110,000 ng/m^3)	
Trifluralin		ND	87.5 ppb (1,200,000 ng/m^3)	

* This value is a regulatory target rather than a screening level.
† This value is an 8-hour time-weighted-average (TWA) used to compare the 24-h measured concentration.
‡ This value is a 72-hour TWA used to compare against the 24-hour measured concentration.

Sub-chronic (4- or 13-week) Concentrations

Table D–3 shows the highest rolling 4-week or 13-week average concentrations for all chemicals monitored at the Watsonville AMN monitoring station in 2023. The highest concentration relative to its exposure level was that of chloropicrin at 65%. The other three chemicals for which there were quantifiable detections were less than 3% of their sub-chronic screening levels.

Table D–3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub- chronic screening level for chemicals monitored in Watsonville in 2023.

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
1,3-dichloropropene	11/06/2023	0.092 ppb (417 ng/m^3)	3 ppb (14,000 ng/m^3)	3 %

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
Chloropicrin	11/02/2023	0.22 ppb (1,505 ng/m^3)	0.35 ppb (2,300 ng/m^3)	65.4 %
Methyl Bromide	11/06/2023	0.014 ppb (54.7 ng/m^3)	5 ppb (19,400 ng/m^3)	0.28 %
MITC	10/10/2023	0.029 ppb (87.3 ng/m^3)	1 ppb (3,000 ng/m^3)	2.9 %
Acephate		ND	1.1 ppb (8,500 ng/m^3)	
Bensulide		ND	1.5 ppb (24,000 ng/m^3)	
Captan		Trace	0.11 ppb (1,352 ng/m^3)	
Chlorothalonil		ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos		ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos oa		ND	0.062 ppb (850 ng/m^3)	
Cypermethrin		Trace	4.8 ppb (81,000 ng/m^3)	
Dacthal		ND	34.6 ppb (470,000 ng/m^3)	
DDVP		Trace	0.24 ppb (2,200 ng/m^3)	
DEF		ND	0.68 ppb (8,800 ng/m^3)	
Diazinon		ND	0.01 ppb (130 ng/m^3)	
Diazinon oa		ND	0.011 ppb (130 ng/m^3)	
Dimethoate		ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate oa		ND	0.34 ppb (3,000 ng/m^3)	
Diuron		ND	1.8 ppb (17,000 ng/m^3)	

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
Endosulfan		ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate		ND	0.19 ppb (3,300 ng/m^3)	
EPTC		ND	3.1 ppb (24,000 ng/m^3)	
Fenpyroximate		ND	0.58 ppb (10,000 ng/m^3)	
Iprodione		ND	7.1 ppb (95,600 ng/m^3)	
Malathion		Trace	6 ppb (80,600 ng/m^3)	
Malathion oa		Trace	6.3 ppb (80,600 ng/m^3)	
Methidathion		ND	0.25 ppb (3,100 ng/m^3)	
Methomyl		ND	4.8 ppb (32,000 ng/m^3)	
Metolachlor (S-Metolachlor)		ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon		Trace	1.9 ppb (26,000 ng/m^3)	
Oryzalin		ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl		ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen		Trace	12.2 ppb (180,000 ng/m^3)	
Pendimethalin		ND	49 ppb (560,000 ng/m^3)	
Permethrin		Trace	5.6 ppb (90,000 ng/m^3)	
Phosmet		Trace	2 ppb (26,000 ng/m^3)	
pp-dicofol		ND	3.2 ppb (49,000 ng/m^3)	

Chemical	Date	Highest rolling average concentration	Sub-chronic screening level	Percent of screening level
Propargite		Trace	0.98 ppb (14,000 ng/m^3)	
Simazine		ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin		ND	12.4 ppb (170,000 ng/m^3)	

* This value is a regulatory target rather than a screening level.

Chronic (annual) Concentrations

Table D–4 shows the annual average concentration for all chemicals monitored at the Watsonville monitoring station in 2023. The pesticide with highest concentration relative to its screening level was that of chloropicrin at 22.8%. All other monitored chemicals were less than 5% of their chronic SL.

Table D–4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored in Watsonville in 2023.

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
1,3-dichloropropene	0.03 ppb (136 ng/m^3)	2 ppb (9,000 ng/m^3)	1.5 %
Chloropicrin	0.061 ppb (411 ng/m^3)	0.27 ppb (1,800 ng/m^3)	22.8 %
Methyl Bromide	0.0051 ppb (19.9 ng/m^3)	1 ppb (3,900 ng/m^3)	0.51 %
MITC	0.0045 ppb (13.4 ng/m^3)	0.1 ppb (300 ng/m^3)	4.5 %
Acephate	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	ND	1.5 ppb (24,000 ng/m^3)	
Captan	Trace	0.037 ppb (455 ng/m^3)	
Chlorothalonil	ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.036 ppb (510 ng/m^3)	

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Chlorpyrifos oa	ND	0.037 ppb (510 ng/m^3)	
Cypermethrin	Trace	1.6 ppb (27,000 ng/m^3)	
Dacthal	ND	3.5 ppb (47,000 ng/m^3)	
DDVP	Trace	0.085 ppb (770 ng/m^3)	
DEF	ND	NA	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon oa	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	ND	0.032 ppb (300 ng/m^3)	
Dimethoate oa	ND	0.034 ppb (300 ng/m^3)	
Diuron	ND	0.6 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.019 ppb (330 ng/m^3)	
EPTC	ND	1.1 ppb (8,500 ng/m^3)	
Fenpyroximate	ND	0.058 ppb (1,000 ng/m^3)	
Iprodione	ND	7.1 ppb (95,600 ng/m^3)	
Malathion	Trace	0.6 ppb (8,100 ng/m^3)	
Malathion oa	Trace	0.63 ppb (8,100 ng/m^3)	
Methidathion	ND	0.2 ppb (2,500 ng/m^3)	

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Methomyl	ND	4.8 ppb (32,000 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon	Trace	1.9 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	Trace	3.4 ppb (51,000 ng/m^3)	
Pendimethalin	ND	49 ppb (560,000 ng/m^3)	
Permethrin	Trace	5.6 ppb (90,000 ng/m^3)	
Phosmet	Trace	1.4 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.3 ppb (20,000 ng/m^3)	
Propargite	Trace	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin	ND	3 ppb (41,000 ng/m^3)	

Temporal Trends in Detected Concentrations

The following figures depict the concentrations over time for any chemical detected at a quantifiable concentration in Watsonville in 2023.

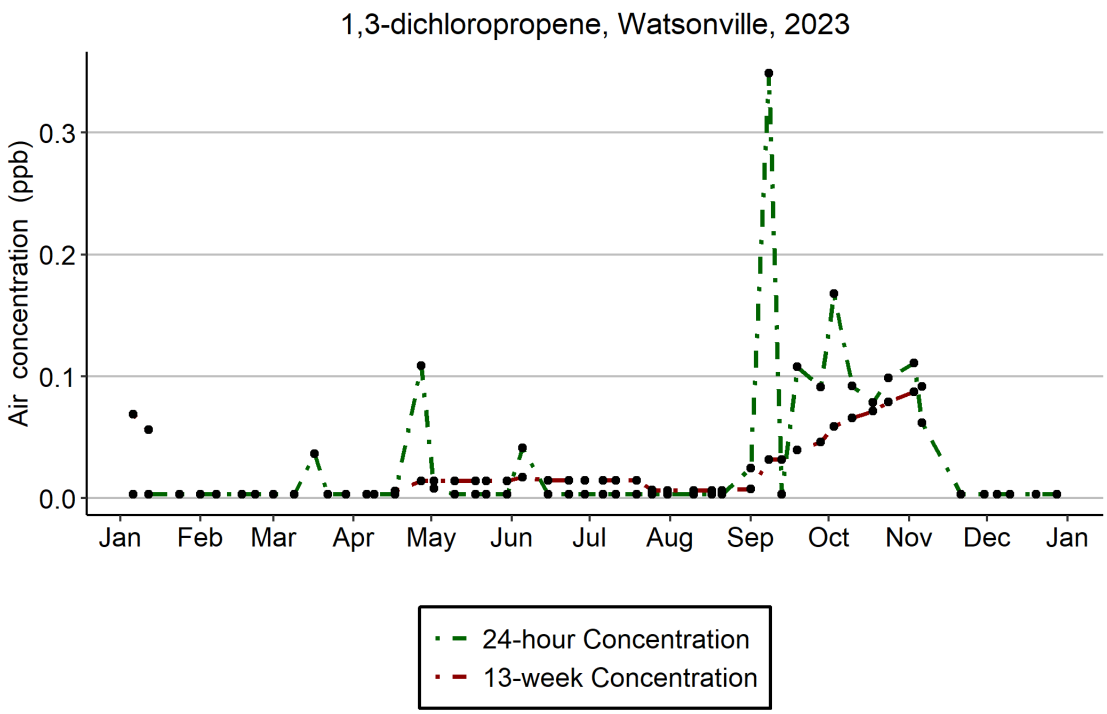

Figure D-1. Temporal trend in 1,3-dichloropropene concentrations in Watsonville in 2023 (Acute RT = 55 ppb ; Sub-chronic SL = 3 ppb).

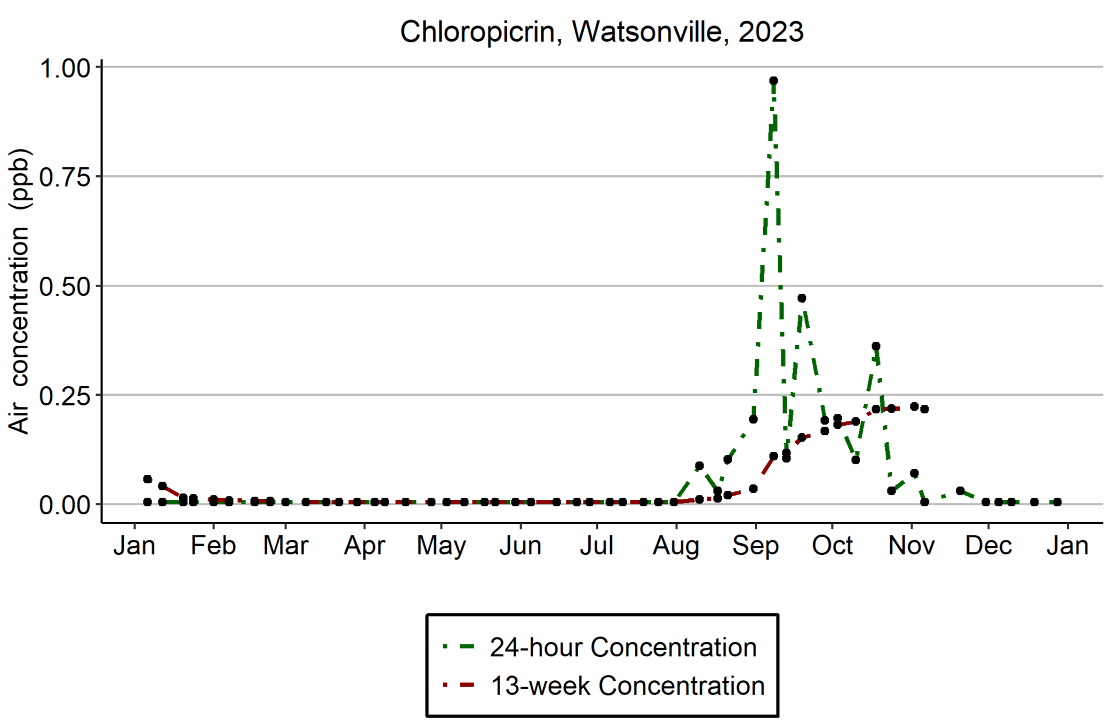

Figure D-2. Temporal trend in Chloropicrin concentrations in Watsonville in 2023 (Acute RT = 73 ppb ; Sub-chronic SL = 0.35 ppb).

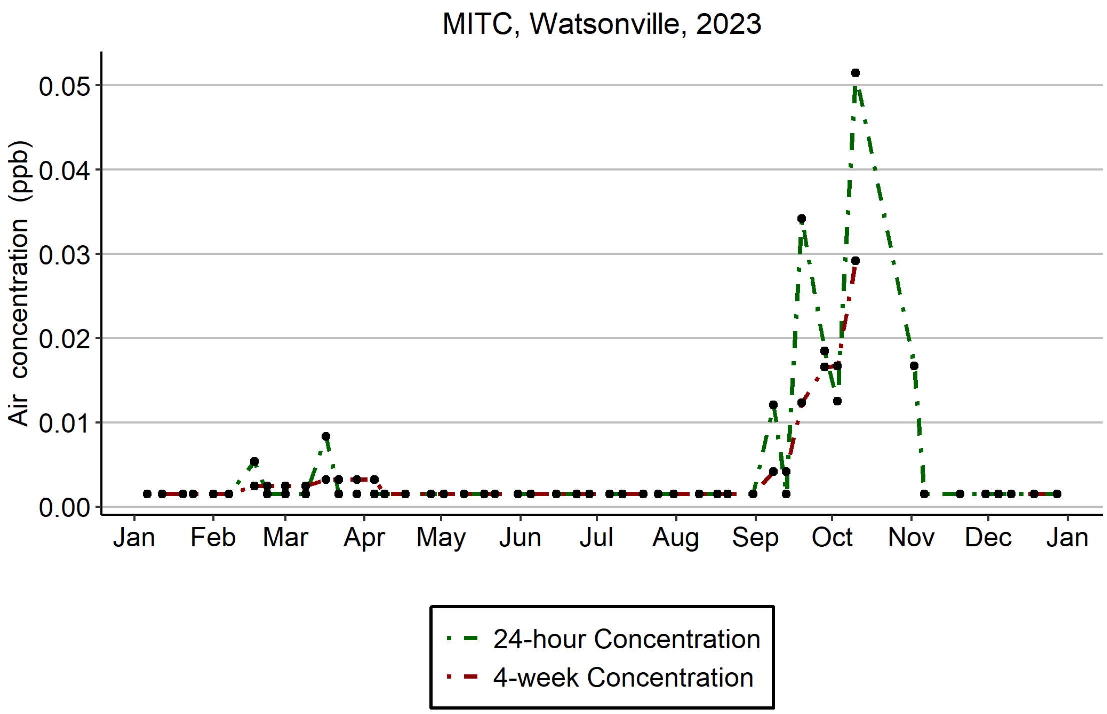

Figure D-3. Temporal trend in MITC concentrations in Watsonville in 2023 (Acute RT = 220 ppb ; Sub-chronic SL = 1 ppb).

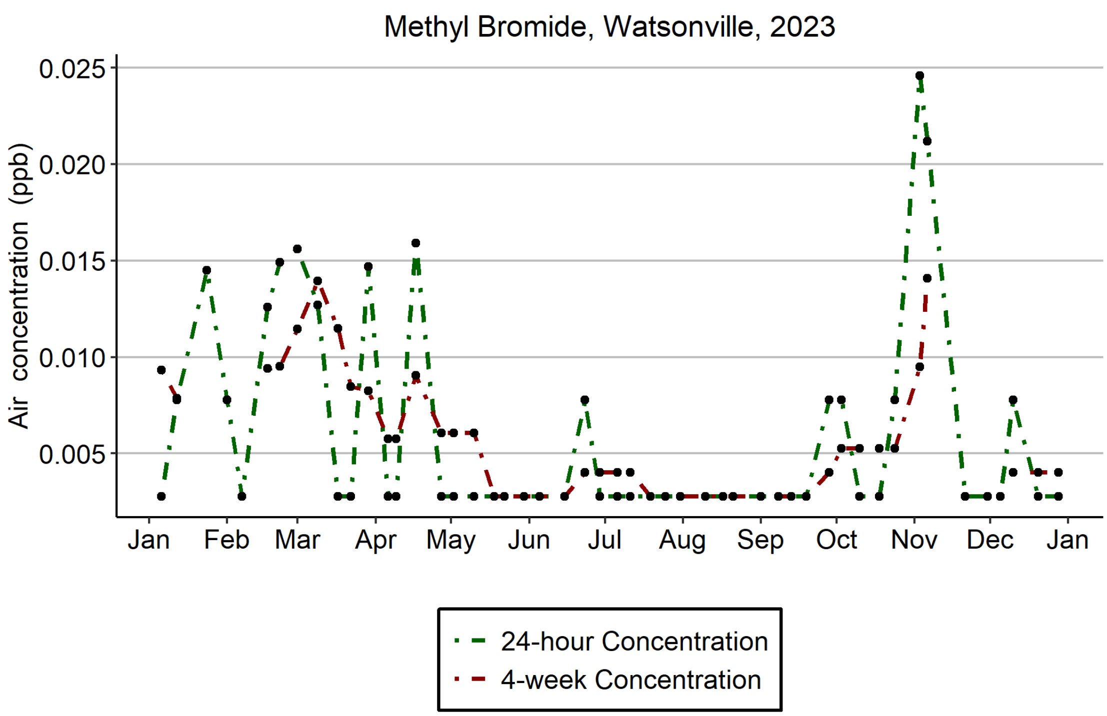

Figure D-4. Temporal trend in Methyl Bromide concentrations in Watsonville in 2023 (Acute RT = 210 ppb ; Sub-chronic RT = 5 ppb).

APPENDIX E: FIELD METHODS

Materials and Methods

Current Air Sampling Methods

As part of the Air Monitoring Network (AMN), the California Department of Pesticide Regulation (DPR) monitors for 31 pesticides and 5 breakdown products. Chemicals included in the AMN were selected based primarily on potential health risk (CDPR 2013). Four sampling methods were used for the collection of air samples.

Volatile Organic Compounds (VOC)

Ambient air was drawn through 1/16" internal diameter PTFE (Teflon) tubing into a 6-liter SUMMA canister for a 24-hour period. Air samplers included an automatically initiated 60-second purge period to clear the sampling lines immediately prior to sample collection. Two sampling instruments were used: Nutech (model 2703) was used in Santa Barbara, Shafter, and Watsonville, and the flow rate for this sampler was 3.5 mL/min (± 10%). Likewise, Xonteck (model 901) was used in Oxnard, and the flow rate for this sampler was 7.5 mL/min (± 10%).

Multi-Pesticide Residue

Ambient air was drawn through a customized XAD-4 media using channel 1 of a custom-built 3-channel pesticide sampling version of a Speciation Air Sampling System manufactured by Met One Instruments, hereafter referred to as Met One pesticide sampler. Channel 1 provided a sustained flow of 15.0 L/min ± 10%. The average of the flow measurements collected at 5-minute intervals was used to directly calculate the volume sampled which was reported by the instrument. This allowed for more certainty than that of the previous method of calculation which used the average from only two data points (measurements at the start and finish of sample collection). The Met One pesticide sampler includes a solar shield of a sufficient size to shield the multi-pesticide cartridges from direct sunlight exposure during the sampling period.

Methyl Isothiocyanate (MITC)

Ambient air was drawn through Anasorb CSC coconut charcoal sorbent tubes (SKC # 226-16-02) using channel 2 of the Met One pesticide sampler. Channel 2 provided a sustained flow of 1.5 L/min ± 10%. The average of the flow measurements collected at 5-minute intervals was used to directly calculate the volume sampled which was reported by the sampler. This feature allowed for more certainty than the previous method of calculation, which used the average from only two data points (measurements at the start and end of sample collection). The glass sorption tubes containing the sampling media and any collected analyte were shielded from sunlight by the sampler's radiation shield.

Chloropicrin

Ambient air was drawn through XAD-4 sorbent tubes (SKC # 226-175) using channel 3 of the Met One pesticide sampler. Channel 3 provided a sustained flow of 50 mL/min ± 10%. The average of the flow measurements collected at 5-minute intervals was used to directly calculate the volume sampled which was reported by the machine. This feature allowed for more certainty than the previous method of calculation, which used the average from only two data points (measurements at the start and finish of sample collection). The glass sorption tubes containing the sampling media and any collected analyte were shielded from sunlight by the sampler's radiation shield.

Legacy AMN equipment (2011-2018)

In the event of unforeseen complications with current equipment, DPR has the option to use legacy methodologies and equipment, allowing staff to collect samples during the scheduled timeframe without compromising the sample's integrity.

Should the Xonteck equipment fail or become unavailable, ambient air was drawn into a 6-L air sample canister (cat. # 24142) pre-evacuated to a pressure of -30 in.Hg for VOC analysis as a backup method. A Restek flow controller (cat. # 24160) was attached to the canister inlet to achieve a flow rate of 3.0 mL/min (± 10%) for a continuous 24-h sampling period. The air sampling inlet of the flow controller was placed at a sampling height of 3-10 meters, depending on the monitoring station location, with a sufficient amount of 1/16" internal diameter PTFE (Teflon®) tubing to reach the canister. Bios Defender 530® or DC-Lite® flow meters were used to check the flow rate at the start and finish of the sampling period.

Should the Met One equipment fail or become unavailable, ambient air was drawn through the XAD-4 media using an SKC® AirChek HV30 air pump as a backup method. The pump was calibrated at a flow rate of 15 L/min (± 10%) for a continuous 24-h period. The cartridges were connected to the pump using a combination of threaded ABS plastic fittings, nitrile o-rings, and approximately 8 feet of Tygon tubing which were all downstream of the sample media. The Teflon® tube containing the sample media was kept sealed prior to sampling at which time the inlet of the cartridge itself was open to the ambient air. Bios Defender 530® or DC-Lite® flow meters were used to obtain flow rates at the start and finish of the sampling period.

Field Sampling Procedure

One 24-h sample was collected each week at each of the four sites. The starting day varied each week with the actual dates being randomly selected as much as possible. Actual sampling start times were left to the discretion of the field sampling personnel. Chain of custody (COC) forms, sample analysis request forms, and sample labels including the study number and unique sample identification numbers were supplied to field sampling personnel to be attached to sample tubes, cartridges, and canister tags prior to sampling.

Each of the four sample types detailed above were set up and started as closely as possible to the same time, except for the occasional make-up sample needed to replace an invalid sample. These make-up samples were typically run on the day following an invalidation event. Reasons why samples might be deemed invalid include, but are not limited to, the following: sampling period out of range, ending flow or pressure out of acceptable range, power interruptions, glass tube breakage during removal (i.e., damaged sampling media), and inoperative sampling equipment. The starting flow rates were measured prior to air sample collection and if any were determined to be out of the acceptable 10%, the equipment was recalibrated. As the air sampling commenced at each monitoring station, the sample tracking number, date, time, staff initials, weather conditions, and air sampler flow rate were documented on a COC form.

Quality Control Methods

In addition to the primary samples, DPR collected quality control (QC) samples including trip blanks and duplicates (co-located) samples at a rate of at least 10% of primary samples. Table F-5 and Table F-6 summarize the results of these QC procedures and are specific to samples analyzed by CDFA's CAC lab only.

A trip blank sample provides information on possible contamination of field collected samples. For the manufactured pre-packed XAD-4 and charcoal sample tubes, trip blank sample ends were broken open, capped, and placed on dry ice with the field samples. The multi-pesticide residue XAD cartridges were opened in the field, capped, and placed on dry ice to be stored and shipped with the field samples. No air canister trip blanks were collected. Trip blanks were collected from the monitoring stations in Shafter and Watsonville at least once every month of sampling. Trip blank samples containing detectable amounts of any of the pesticides would indicate a problem with contamination during transport or during laboratory extraction.

Additionally, a duplicate sample is a sample that is co-located with a regular field sample to evaluate the overall precision in sample measurement and analysis. The sampling stations at Shafter and Watsonville were designated as quality control sites, hence a second set of sampling equipment was installed at these locations.

APPENDIX F: LABORATORY ANALYSIS

Analytical Methods

A total of four analytical methods were used and analyzed by California Department of Food and Agriculture's Center for Analytical Chemistry (CDFA-CAC):

VOC

Air samples collected in summa canisters were analyzed for the presence of the fumigants 1,3-dichloropropene and methyl bromide (Table F-1) using a gas chromatography-mass spectrometry (GC-MS) methodology similar to US EPA's Method TO-15 established by CDFA-CAC (CDFA 2013). Analysis of 1,3-D includes results for both cis- and trans- isomers, which were then consolidated and reported as a total 1,3-D concentration for use in this report.

Table F-1. Target analytes in volatile organic compound analysis.

Pesticide	Pesticide Group	Chemical Class
1,3-dichloropropene	Fumigant	Halogenated organic
Methyl bromide	Fumigant	Halogenated organic

MITC

Samples were collected on Anasorb CSC coconut charcoal sorbent tubes (SKC # 226-16-02) and analyzed by CDFA-CAC staff. MITC residues adsorbed onto the activated charcoal were extracted from the charcoal with 1% carbon disulfide in ethyl acetate and analyzed via GC-MS (Table F-2). Full method validation data was obtained and verified by CDFA-CAC (CDFA 2018).

Chloropicrin

Samples were collected on XAD-4 sorbent tubes (SKC # 226-175) and analyzed by CDFA-CAC staff. Chloropicrin residues adsorbed onto the XAD-4 resin were extracted from the resin with methylene chloride and analyzed via GC-MS (Table F-2, CDFA 2020). Full method validation data was obtained and verified by CDFA-CAC (CDFA 2020).

Table F-2. Target analytes in individual analyte residue analysis.

Pesticide	Pesticide Group	Chemical Class
MITC	Fumigant	-
Chloropicrin	Fumigant	Halogenated organic

Multi-Pesticide Residue

Prior to sampling, CDFA-CAC staff washed, rinsed, and packed 30 mL of XAD-4 sorbent material into a custom-built Teflon cartridge to collect 36 analytes via multi-pesticide residue analysis. Multi-pesticide residue analysis using XAD-4 resin was performed via GC-MS and liquid chromatography mass spectrometry (LC-MS) using ethyl acetate (CDFA 2021). This analysis can detect a variety of fungicides, insecticides, herbicides, and defoliants. The breakdown products (oxygen analogs) of chlorpyrifos, diazinon, dimethoate, endosulfan, and malathion were also included in the multi-pesticide residue analysis method (Table F-3).

Table F-3. Target analytes in multi-pesticide residue analysis.

Chemical	**Chemical Class**	**Pesticide Group**
Acephate	Organophosphate	Insecticide
Bensulide	Organophosphate	Herbicide
Chlorothalonil	Chloronitrile	Fungicide
Captan	Phthalimide	Fungicide
Chlorpyrifos	Organophosphate	Insecticide
Chlorpyrifos oxygen analog (OA)	Organophosphate	Degradate
Chlorthal-dimethyl (Dacthal, DCPA)	Phthalate	Herbicide
Cypermethrin	Pyrethroid	Insecticide
DDVP	Organophosphate	Insecticide
DEF (SSS-tributyl phosphorotrithioate)	Organophosphate	Defoliant
Diazinon	Organophosphate	Insecticide
Diazinon OA	Organophosphate	Degradate
Dicofol	Organochlorine	Insecticide
Dimethoate	Organophosphate	Insecticide
Dimethoate OA	Organophosphate	Degradate
Diuron	Urea	Herbicide
Endosulfan	Organochlorine	Insecticide
Endosulfan Sulfate	Organochlorine	Degradate
EPTC	Carbamate	Herbicide
Fenpyroximate	Pyrazole	Insecticide
Iprodione	Dicarboximide	Fungicide
Malathion	Organophosphate	Insecticide
Malathion OA	Organophosphate	Degradate
Methidathion	Organophosphate	Insecticide
Methomyl	Carbamate	Insecticide

Chemical	Chemical Class	Pesticide Group
Metolachlor	Chloracetanilide	Herbicide
Norflurazon	Pyridazinone	Herbicide
Oryzalin	Dinitroaniline	Herbicide
Oxydemeton methyl	Organophosphate	Insecticide
Oxyfluorfen	Diphenyl ether	Herbicide
Pendimethalin	Dinitroaniline	Herbicide
Permethrin	Pyrethroid	Insecticide
Phosmet	Organophosphate	Insecticide
Propargite	Organosulfite	Insecticide
Simazine	Triazine	Herbicide
Trifluralin	Dinitroaniline	Herbicide

Laboratory Methods

Method Calibration

The laboratory established method calibration by analyzing a series of standard samples (samples containing known amounts of analyte dissolved in a solvent). The linear range of calibration was determined by analyzing standards of increasing concentration. Within the linear range, the calibration was determined by conducting a regression analysis of standard concentrations measured by the instrument (peak height or peak area of the chromatogram) using at least five concentrations (CDFA 2018, CDFA 2020). The minimum acceptable correlation coefficient of the calibration was given in the standard operating procedure for each method, but in general was at least 0.95. For gaseous VOC sample analysis, CDFA-CAC uses standard calibration mixture, or mixtures, containing all analytes of interest. The standards are slightly higher in concentration than the typical sample and must be within the dynamic range of the GC-MS system (CDFA 2013).

Method Detection Limits and Limits of Quantitation

The method detection limit (MDL) is the lowest concentration of a pesticide (analyte) that a chemical method can reliably detect (Table F-4). CDFA-CAC laboratory determined the MDL for each analyte by analyzing a standard at a concentration with a signal to noise ratio of 2.5 to 5. This standard was analyzed at least 7 times, and the MDL is determined by calculating the standard deviation and multiplying it by the t-value at the 99% confidence interval of the mean. The limit of quantitation (LOQ) is the level at which concentrations may be reliably measured and is set at a certain factor above the MDL (Table F-4). The level of interference determines the magnitude of this factor, the more interference, the higher the factor.

Table F-4. Method detection limit (MDL) and limit of quantitation (LOQ) established by CDFA's Center for Analytical Chemistry.

Chemical	MDL (ppb)	LOQ (ppb)	MDL (ng/m^3)	LOQ (ng/m^3)
1,3-dichloropropene	0.00655	0.0100	29.7	45.4
Acephate	0.00040	0.0012	2.9	9.3
Bensulide	0.00020	0.0006	3.3	9.3
Captan	0.00020	0.0019	3.0	23.1
Chloropicrin	0.00950	0.0517	63.6	347.2
Chlorothalonil	0.00020	0.0021	2.2	23.1
Chlorpyrifos	0.00010	0.0016	2.0	23.1
Chlorpyrifos oa	0.00010	0.0007	2.0	9.3
Cypermethrin	0.00020	0.0014	3.4	23.1
DDVP	0.00020	0.0026	1.8	23.1
DEF	0.00020	0.0007	2.0	9.3
Dacthal	0.00020	0.0007	2.1	9.3
Diazinon	0.00020	0.0007	2.1	9.3
Diazinon oa	0.00020	0.0008	1.9	9.3
Dimethoate	0.00020	0.0010	2.3	9.3
Dimethoate oa	0.00030	0.0011	2.9	9.3
Diuron	0.00020	0.0010	2.2	9.3
EPTC	0.00030	0.0012	2.0	9.3
Endosulfan	0.00010	0.0014	2.0	23.1
Endosulfan Sulfate	0.00010	0.0013	2.1	23.1
Fenpyroximate	0.00040	0.0014	2.6	9.3
Iprodione	0.00020	0.0007	2.7	9.3
MITC	0.00300	0.0077	8.9	23.1
Malathion	0.00010	0.0007	1.8	9.3
Malathion oa	0.00010	0.0007	1.9	9.3
Methidathion	0.00020	0.0007	2.8	9.3
Methomyl	0.00020	0.0008	2.3	9.3

Chemical	MDL (ppb)	LOQ (ppb)	MDL (ng/m^3)	LOQ (ng/m^3)
Methyl Bromide	0.00555	0.0100	21.6	38.8
Metolachlor (S-Metolachlor)	0.00020	0.0008	2.1	9.3
Norflurazon	0.00010	0.0007	2.0	9.3
Oryzalin	0.00020	0.0007	2.5	9.3
Oxydemeton Methyl	0.00020	0.0009	2.5	9.3
Oxyfluorfen	0.00010	0.0016	1.7	23.1
Pendimethalin	0.00010	0.0005	2.2	9.3
Permethrin	0.00020	0.0014	2.5	23.1
Phosmet	0.00010	0.0007	1.8	9.3
Propargite	0.00020	0.0016	2.6	23.1
Simazine	0.00020	0.0011	1.9	9.3
Trifluralin	0.00010	0.0017	1.7	23.1
pp-dicofol	0.00010	0.0015	1.6	23.1

Air Concentration Calculations

For the sorbent tube and cartridge samples, air concentrations are calculated as an amount of pesticide captured from a volume of air moving through the sampling media. Analytical results are presented in micrograms per sample (µg/sample). The concentrations are converted from µg/sample to nanograms per cubic meter (ng/m^3) of sample air using the following calculation:

$$\mathrm{ng/m^3} = \frac{\mathrm{Results\ (\mu g)\ x\ 1000\ (ng/\mu g)\ x\ 1000\ (L/m^3)}}{\mathrm{Run\ time\ (min)\ x\ Flow\ rate\ (L/min)}}$$

The VOC concentrations were reported as part per billion by volume (ppb) and converted to ng/m^3 using the following calculation:

$$\mathrm{ng/m^3} = \frac{\mathrm{Results\ (ppb)\ x\ (ng)/(ppb\ x\ g)\ x\ Molecular\ weight\ (g/mole)}}{\mathrm{0.02445\ (m^3/mole)}}$$

In the equation above, 0.02445 m^3 (24.45 L) is the volume of a mole of a gas when the pressure is at 1 atmosphere and the temperature is at 25°C. Additionally, given that 1 ppb = 1 ng/g, we add the unit ng/(g.ppb) for conversion purposes.

Per standard DPR practice, when an active ingredient is detected but the concentration is lower than its quantitation limit, this pesticide is considered to have a “Trace” amount and is presumed to contain a concentration halfway between the MDL and the LOQ (Trace = (MDL+LOQ)/2). Likewise, non-detected (ND) pesticides are presumed to contain one-half their MDL value (ND = MDL/2).

Data Validation/Quality Assurance

Method Validation

The method validation consisted of five sample sets and five fortification (spike) levels for chloropicrin and multi-residue analyses, and three sample sets and seven fortification levels for MITC (CDFA 2008, 2018, 2020). An acceptable range of spike recoveries was established by analyzing laboratory spike sample, and the mean percent recovery and standard deviation were determined based on these data points. The control limits were established as the mean percent recovery ± 3 standard deviations.

General Continuing Quality Control

Samples were stored at DPR’s Bradshaw Regional Office under the care of the laboratory liaison until scheduled delivery to the CDFA-CAC laboratory. Storage stability was evaluated for the longest anticipated holding period with at least four sampling intervals and two replicate samples at each sampling interval. All analytes analyzed by CDFA-CAC laboratory have storage stability data for a minimum of 28 days. Each extraction set consisted of 1 to 24 actual samples and quality control (QC) samples which included a reagent blank, a matrix blank, and a matrix spiked sample. Any subsequent matrix spiked samples outside the control limits required the set of samples associated with that spike to be reanalyzed.

Quality Control Results

Laboratory matrix spikes and matrix blanks were included with every set of samples extracted and analyzed at the CDFA-CAC laboratory and are part of the laboratory’s QC program. The matrix spikes are conducted to assess accuracy and precision; the blanks are used to check for contamination at the laboratory or contamination of the media packed in the sorption tubes or cartridges. The blank matrix materials were not fortified but were extracted and analyzed along with the matrix spikes and field samples. Table F-5 lists the average for the QC samples that were extracted and analyzed with the air samples for the entire monitoring period. Average laboratory matrix spike recoveries ranged from 79% to 98% for all chemicals analyzed. Field blanks and duplicate samples are part of DPR’s field and laboratory QC program. The trip blanks were blank matrix samples that were transported to and from the field locations but were not placed on air pumps. These samples were a control to check for contamination during transportation. Table F-5 shows that all field blanks resulted in non-detections.

Table F-5. Quality control/quality assurance results from 2023 analyzed by CDFA-CAC.

Chemical	Lab Spikes Number	Lab Spikes Recovery	Lab Blanks Number	Lab Blanks Detection	Field Blanks Number	Field Blanks Detection
1,3-dichloropropene	52	98 %	52	ND	33	ND
Acephate	27	92 %	27	ND	17	ND
Bensulide	27	90 %	27	ND	17	ND
Captan	27	85 %	27	ND	17	ND
Chloropicrin	31	94 %	31	ND	17	ND
Chlorothalonil	27	85 %	26	ND	17	ND
Chlorpyrifos	27	89 %	27	ND	17	ND
Chlorpyrifos OA	27	90 %	27	ND	17	ND
Cypermethrin	27	89 %	27	ND	17	ND
Dacthal	27	88 %	26	ND	17	ND
DDVP	27	83 %	26	ND	17	ND
DEF	27	92 %	27	ND	17	ND
Diazinon	27	90 %	27	ND	17	ND
Diazinon OA	27	92 %	27	ND	17	ND
Dimethoate	27	90 %	27	ND	17	ND
Dimethoate OA	27	92 %	27	ND	17	ND
Diuron	27	92 %	27	ND	17	ND
Endosulfan I	27	87 %	27	ND	17	ND
Endosulfan Sulfate	27	88 %	27	ND	17	ND
EPTC	27	79 %	26	ND	17	ND
Fenpyroximate	27	93 %	27	ND	17	ND
Iprodione	27	86 %	27	ND	17	ND
Malathion	27	91 %	27	ND	17	ND
Malathion OA	27	92 %	27	ND	17	ND
Methidathion	27	91 %	27	ND	17	ND
Methomyl	27	89 %	27	ND	17	ND
Methyl Bromide	52	98 %	52	ND	33	ND
Metolachlor	27	90 %	27	ND	17	ND
MITC	44	85 %	44	ND	17	ND
Norflurazon	27	91 %	27	ND	17	ND

Chemical	Lab Spikes Number	Lab Spikes Recovery	Lab Blanks Number	Lab Blanks Detection	Field Blanks Number	Field Blanks Detection
Oryzalin	27	89 %	27	ND	17	ND
Oxydemeton methyl	27	83 %	27	ND	17	ND
Oxyfluorfen	27	91 %	27	ND	17	ND
Pendimethalin	27	93 %	27	ND	17	ND
Permethrin	27	90 %	27	ND	17	ND
Phosmet	27	91 %	27	ND	17	ND
pp-Dicofol	27	89 %	27	ND	17	ND
Propargite	27	88 %	27	ND	17	ND
Simazine	27	90 %	27	ND	17	ND
Trifluralin	27	88 %	26	ND	17	ND

Table F-6 summarizes the results of duplicate samples. A duplicate sample is a sample that is co-located with another sample in the field. These samples serve to evaluate the overall precision in sample measurement and analysis. Consistent with previous repoRT, there were many non-detection pairs among co-located samples. For sample pairs in which both samples produced a quantifiable detection these concentrations were compared to find the relative difference, expressed as a percentage.

Table F-6. Results for the co-located sample pairs in 2023. Values indicate the total number of events where the Primary sample and its Duplicate sample fell in the specific paired category.

Paired category: Primary / Duplicate	1,3-D	Methyl bromide	Chloropicrin	MITC	Multi-residue
ND / ND	16	16	20	17	884
ND / Trace	0	0	0	0	2
ND / >LOQ	1	0	0	1	0
Trace / ND	0	2	0	1	1
Trace / Trace	0	0	1	0	9
Trace / >LOQ	0	0	0	0	2
>LOQ / ND	0	0	0	0	0
>LOQ / Trace	0	1	0	0	1
>LOQ / >LOQ	7	1	3	4	2

ND = Not detected ; Trace = Detection below the quantitation limit ; LOQ = Limit of quantification.

Lost and Invalid Samples

A valid sample is a sample that meets all the sampling criteria for its corresponding sampling method. For example, A VOC sample collected by Nutech2703 ambient air sampler should run for 24 hours and the ending pressure must be between -4 and -10 inHg. These criteria for each sampling method and each sampling medium are explained in detail in Appendix E.

In 2023, 17 samples were lost or invalidated during the year. Table F-7 lists the location, operator, date, and type of samples.

Table F-7. Invalid samples in 2023.

Community	Operator	Date	Sample type
Oxnard	V-CAC	1/5/2023	MITC sorbent tube was damaged.
Oxnard	V-CAC	3/3/2023	Multi-residue sampling instrument was off.
Oxnard	V-CAC	7/7/2023	Multi-residue sampling instrument was off.
Oxnard	V-CAC	10/11/2023	MITC. CDFA lab mistake during sample extraction.
Oxnard	V-CAC	10/19/2023	MITC. CDFA lab mistake during sample extraction.
Oxnard	V-CAC	12/15/2023	Multi-residue sampling instrument was off.
Santa Maria	SB-CAC	4/20/2023	Chloropicrin, MITC, & Multi-residue. Power outage.
Santa Maria	SB-CAC	5/18/2023	1,3-D/MeBr sampling instrument was off.
Shafter	DPR	10/20/2023	MITC. CDFA lab mistake during sample extraction.
Shafter	DPR	10/25/2023	MITC. CDFA lab mistake during sample extraction.
Shafter	DPR	12/21/2023	1,3-D/MeBr sampling instrument was off.
Ohlone	DPR	1/21/2023	1,3-D/MeBr & Multi-residue. Power outage.
Ohlone	DPR	10/19/2023	MITC. CDFA lab mistake during sample extraction.
Ohlone	DPR	10/25/2023	MITC. CDFA lab mistake during sample extraction.

Appendix G: HEALTH EVALUATION AND CALCULATIONS

Calculation of Sub-chronic Rolling Averages

In 2016, DPR updated the calculation of sub-chronic concentrations for 1,3-dichloropropene and chloropicrin from 4-week rolling average concentrations to 13-week rolling average concentrations to be compared with their sub-chronic screening levels (SL) and regulatory targets (RT) (CDPR 2016b). This determination was based on evaluations conducted by DPR's Human Health Assessment Branch that investigated seasonal reference concentrations for 1,3-D in 2015 and chloropicrin in 2012 (CDPR 2012, CDPR 2015).

Health Evaluation Methods

Pesticides can cause a variety of health effects when present at concentrations above health-protective levels. The pesticides included in the Air Monitoring Network (AMN) were selected in part because (1) risk assessments indicate the high potential for exposure, or (2) they are high priority for risk assessment due to toxicity and/or exposure concerns. Some of the pesticides in the AMN can cause adverse effects such as respiratory illnesses, damage to the nervous system, cancer, and birth defects (CDPR 2013). No state or federal agency has established health standards for pesticides in air. Therefore, DPR in consultation with the Office of Environmental Health Hazard Assessment developed health SL or regulatory targets to place the results in a health-based context.

Health SL are based on a preliminary assessment of possible health effects and are used as triggers for DPR to conduct a more detailed evaluation. An air concentration that measures less than the SL for a given pesticide would not be considered a significant health concern and the pesticide would not undergo further evaluation at this time. A measured concentration above the SL would not necessarily indicate a significant health concern, but would indicate the need for a further, more refined evaluation. DPR (2013) summarizes more information on DPR-determined SL including information on deriving SL for each pesticide.

DPR puts measures in place based on the regulatory target to limit exposures so that adverse effects can be avoided. Exceeding a regulatory target does not necessarily mean an adverse health effect occurs, but it does indicate that the restrictions on the pesticide use may need to be modified. DPR normally establishes a regulatory target after completing a formal risk assessment of a chemical's toxicity and potential exposures. DPR management determines a regulatory target using its risk assessment, as well as risk assessments from other agencies, pesticide use patterns, potential effects on use of alternative pesticides, and other factors. A regulatory target is based on a more comprehensive evaluation than a health SL. Therefore, a regulatory target supersedes a health SL (i.e., a specific pesticide and exposure duration will have either a regulatory target or a health SL, but not both). Out of the 40 pesticides monitored in the AMN, 1,3-dichloropropene, chloropicrin, methyl bromide, and MITC have regulatory targets for one or more exposure periods.

Cumulative Exposures

Cumulative exposure and risk were estimated using a hazard quotient and hazard index approach for pesticides classified as organophosphates, which are a class of chemical compounds that can cause adverse health effects on humans, such as inhibiting cholinesterase, an enzyme in the nervous system. The potential risk of the measured concentrations of a pesticide in air was evaluated by comparing the air concentration measured over a specified time (e.g., 24 hours, 4 weeks, 1 year) with the SL derived for a similar exposure (i.e., acute, sub-chronic, chronic). The ratio of measured air concentration of a pesticide to a reference concentration or SL for that pesticide is called the hazard quotient (HQ). In this case,

$$\mathrm{HQ} = \frac{\text{Air Concentration Detected } (\mathrm{ng/m^3})}{\text{Screening Level } (\mathrm{ng/m^3})}$$

If HQ is greater than 1, then the air concentration exceeds the SL. Such a result would indicate the need for a further, more refined evaluation. Similarly, the risk from multiple pesticides (cumulative risk) is evaluated using the hazard index (HI) approach, which sums of the HQs for the pesticides monitored.

HI = HQ1 (pesticide 1) + HQ2 (pesticide 2) + HQ3 (pesticide 3) + … (and so forth)

An HI greater than 1 indicates that the cumulative toxicity of the multiple pesticides should be further evaluated and that potential health impacts may have been missed by only considering the pesticides individually.

Appendix H: COMPARISON TO PREVIOUS YEARS OF AMN DATA

All AMN Sites

This report covers results of the monitoring by the Air Monitoring Network (AMN), which has been collecting samples since 2011. Annual AMN reports from 2011 to 2022 can be found in DPR's website and are available upon request.

The initial number of pesticides monitored by the AMN was 39 in 2011 (34 pesticides and 5 breakdown products). On January 1, 2012, acrolein was removed from AMN monitoring because it is mainly produced as a byproduct of automobile emissions and other combustion sources not related to pesticidal uses (ATSDR, 2007), and uncertainties related to the laboratory methodology. On March 21, 2012, DPR canceled the registration of all products containing methyl iodide at the request of the registrant. Therefore, monitoring for methyl iodide as part of the AMN stopped on June 20, 2012. In December 2016, carbon disulfide was removed from the list of monitored chemicals due to detections originating from non-pesticidal sources and the voluntary withdrawal of registration of pesticide products that produce carbon disulfide. In April 2022, the active ingredients captan, fenpyroximate, methomyl, pendimethalin were added to the AMN list of monitored chemicals.

Table H-1 shows the number of individual pesticides and breakdown products monitored each year. This data is further broken down into whether pesticides were detected at quantifiable levels during monitoring in that year.

Table H-1. Summary of pesticide detection trends aggregated by chemical from 2011 to 2023.

Year	Total monitored chemicals	Non-detected chemicals	Quantifiable and Trace detections	Quantifiable detections
2011	39	10	29	9
2012	38	14	24	11
2013	37	13	24	14
2014	37	14	23	11
2015	37	11	26	14
2016	37	12	25	11
2017	36	9	27	10
2018	36	8	28	11
2019	36	11	25	10
2020	36	7	29	10
2021	36	14	22	10
2022	40	21	19	13
2023	40	21	19	8

Historic Air Concentrations in Oxnard

Table H-2. Percentage of analyses performed resulting in a quantifiable or trace detection in Oxnard in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	2 %	0 %	18 %	16 %	15 %
Bensulide	0 %	10 %	0 %	0 %	0 %
Captan	--	--	--	19 %	24 %
Chloropicrin	14 %	0 %	45 %	35 %	44 %
Chlorothalonil	18 %	20 %	0 %	0 %	0 %
Chlorpyrifos oa	2 %	0 %	0 %	0 %	0 %
DDVP	16 %	0 %	4 %	6 %	4 %
Dacthal	6 %	0 %	31 %	0 %	0 %
Diazinon	0 %	0 %	0 %	0 %	2 %
MITC	20 %	40 %	30 %	12 %	31 %
Malathion	29 %	0 %	17 %	10 %	4 %
Malathion oa	33 %	0 %	10 %	10 %	2 %
Methyl Bromide	0 %	0 %	35 %	84 %	29 %
Oxyfluorfen	0 %	0 %	2 %	8 %	2 %
Pendimethalin	--	--	--	38 %	33 %
Simazine	0 %	0 %	2 %	0 %	0 %

Table H-3. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Oxnard in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.51 ppb (2,315 ng/m^3)	ND	0.72 ppb (3,260 ng/m^3)	0.59 ppb (2,659 ng/m^3)	1.6 ppb (7,128 ng/m^3)
Bensulide	ND	Trace	ND	ND	ND
Captan	--	--	--	0.0021 ppb (26 ng/m^3)	0.0025 ppb (30.4 ng/m^3)
Chloropicrin	1 ppb (6,939 ng/m^3)	ND	2.6 ppb (17,771 ng/m^3)	0.52 ppb (3,522 ng/m^3)	1.1 ppb (7,239 ng/m^3)

Chemical	2019	2020	2021	2022	2023
Chlorothalonil	Trace	Trace	ND	ND	ND
Chlorpyrifos oa	Trace	ND	ND	ND	ND
DDVP	Trace	ND	Trace	Trace	Trace
Dacthal	0.0015 ppb (20.6 ng/m^3)	ND	0.00013 ppb (1.8 ng/m^3)	ND	ND
Diazinon	ND	ND	ND	ND	Trace
MITC	0.028 ppb (84 ng/m^3)	0.0078 ppb (23.4 ng/m^3)	0.18 ppb (527 ng/m^3)	0.036 ppb (108 ng/m^3)	0.086 ppb (258 ng/m^3)
Malathion	0.0084 ppb (113 ng/m^3)	ND	0.009 ppb (121 ng/m^3)	0.018 ppb (246 ng/m^3)	0.0016 ppb (22.1 ng/m^3)
Malathion oa	0.0015 ppb (19.1 ng/m^3)	ND	0.0015 ppb (18.9 ng/m^3)	0.0015 ppb (18.8 ng/m^3)	Trace
Methyl Bromide	ND	ND	0.029 ppb (113 ng/m^3)	0.034 ppb (132 ng/m^3)	Trace
Oxyfluorfen	ND	ND	Trace	Trace	Trace
Pendimethalin	--	--	--	0.016 ppb (185 ng/m^3)	0.012 ppb (138 ng/m^3)
Simazine	ND	ND	Trace	ND	ND

Table H-4. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Oxnard in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.085 ppb (388 ng/m^3)	ND	0.091 ppb (413 ng/m^3)	0.028 ppb (129 ng/m^3)	0.17 ppb (751 ng/m^3)
Bensulide	ND	Trace	ND	ND	ND
Captan	--	--	--	0.00084 ppb (10.5 ng/m^3)	0.0012 ppb (14.5 ng/m^3)
Chloropicrin	0.2 ppb (1,359 ng/m^3)	ND	0.42 ppb (2,845 ng/m^3)	0.11 ppb (771 ng/m^3)	0.33 ppb (2,195 ng/m^3)
Chlorothalonil	Trace	Trace	ND	ND	ND
Chlorpyrifos oa	Trace	ND	ND	ND	ND
DDVP	Trace	ND	Trace	Trace	Trace

Chemical	2019	2020	2021	2022	2023
Dacthal	0.00058 ppb (8.2 ng/m^3)	ND	0.00045 ppb (5.7 ng/m^3)	ND	ND
Diazinon	ND	ND	ND	ND	Trace
MITC	0.014 ppb (40.7 ng/m^3)	0.005 ppb (15 ng/m^3)	0.046 ppb (139 ng/m^3)	0.011 ppb (33.3 ng/m^3)	0.03 ppb (91.2 ng/m^3)
Malathion	0.0046 ppb (62.3 ng/m^3)	ND	0.0025 ppb (34.4 ng/m^3)	0.0062 ppb (84.3 ng/m^3)	0.00053 ppb (7.4 ng/m^3)
Malathion oa	0.00077 ppb (9.9 ng/m^3)	ND	0.00067 ppb (8.9 ng/m^3)	0.00086 ppb (11.4 ng/m^3)	Trace
Methyl Bromide	ND	ND	0.031 ppb (120 ng/m^3)	0.036 ppb (139 ng/m^3)	Trace
Oxyfluorfen	ND	ND	Trace	Trace	Trace
Pendimethalin	--	--	--	0.0063 ppb (72.3 ng/m^3)	0.0087 ppb (99.6 ng/m^3)
Simazine	ND	ND	Trace	ND	ND

Table H-5. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Oxnard in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.059 ppb (270 ng/m^3)	ND	0.032 ppb (145 ng/m^3)	0.032 ppb (144 ng/m^3)	0.044 ppb (200 ng/m^3)
Bensulide	ND	Trace	ND	ND	ND
Captan	--	--	--	0.00031 ppb (4 ng/m^3)	0.00038 ppb (4.9 ng/m^3)
Chloropicrin	0.066 ppb (442 ng/m^3)	ND	0.13 ppb (843 ng/m^3)	0.037 ppb (252 ng/m^3)	0.1 ppb (696 ng/m^3)
Chlorothalonil	Trace	Trace	ND	ND	ND
Chlorpyrifos oa	Trace	ND	ND	ND	ND
DDVP	Trace	ND	Trace	Trace	Trace
Dacthal	0.00008 ppb (1.5 ng/m^3)	ND	0.00019 ppb (2.4 ng/m^3)	ND	ND
Diazinon	ND	ND	ND	ND	Trace

Chemical	2019	2020	2021	2022	2023
MITC	0.003 ppb (8.8 ng/m^3)	0.0033 ppb (9.8 ng/m^3)	0.0068 ppb (20.3 ng/m^3)	0.0037 ppb (11 ng/m^3)	0.0096 ppb (28.6 ng/m^3)
Malathion	0.00069 ppb (9.4 ng/m^3)	ND	0.00029 ppb (4 ng/m^3)	0.00057 ppb (7.9 ng/m^3)	0.00009 ppb (1.4 ng/m^3)
Malathion oa	0.00016 ppb (2 ng/m^3)	ND	0.0001 ppb (1.6 ng/m^3)	0.00012 ppb (1.9 ng/m^3)	Trace
Methyl Bromide	ND	ND	0.0077 ppb (30 ng/m^3)	0.012 ppb (46.1 ng/m^3)	Trace
Oxyfluorfen	ND	ND	Trace	Trace	Trace
Pendimethalin	--	--	--	0.00092 ppb (11.3 ng/m^3)	0.0009 ppb (11.1 ng/m^3)
Simazine	ND	ND	Trace	ND	ND

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Table H-6. Percentage of analyses performed resulting in a quantifiable or trace detection in Santa Maria in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	2 %	49 %	53 %	36 %	22 %
Acephate	2 %	2 %	0 %	0 %	0 %
Captan	--	--	--	16 %	0 %
Chloropicrin	6 %	29 %	30 %	47 %	35 %
Chlorothalonil	6 %	29 %	2 %	4 %	0 %
Chlorpyrifos	0 %	0 %	0 %	2 %	0 %
Cypermethrin	2 %	2 %	0 %	0 %	0 %
DDVP	25 %	37 %	31 %	35 %	33 %
Dacthal	43 %	53 %	63 %	43 %	2 %
Diazinon	0 %	2 %	0 %	2 %	0 %
Diazinon oa	0 %	2 %	2 %	0 %	0 %
Dimethoate	0 %	2 %	0 %	0 %	0 %
Dimethoate oa	2 %	2 %	0 %	0 %	0 %

Chemical	2019	2020	2021	2022	2023
Diuron	0 %	2 %	0 %	0 %	0 %
Iprodione	0 %	2 %	0 %	0 %	0 %
MITC	22 %	37 %	35 %	31 %	29 %
Malathion	49 %	61 %	59 %	51 %	47 %
Malathion oa	39 %	57 %	8 %	6 %	8 %
Methidathion	0 %	2 %	2 %	0 %	0 %
Methomyl	--	--	--	3 %	0 %
Methyl Bromide	0 %	4 %	63 %	80 %	29 %
Metolachlor (S-Metolachlor)	0 %	2 %	2 %	0 %	0 %
Norflurazon	0 %	2 %	2 %	0 %	0 %
Oryzalin	0 %	2 %	2 %	0 %	0 %
Oxydemeton Methyl	0 %	2 %	2 %	0 %	0 %
Oxyfluorfen	0 %	0 %	10 %	6 %	4 %
Pendimethalin	--	--	--	11 %	18 %
Permethrin	0 %	4 %	2 %	2 %	0 %
Phosmet	0 %	2 %	2 %	0 %	0 %
Simazine	0 %	4 %	2 %	0 %	0 %
Trifluralin	24 %	24 %	31 %	12 %	6 %

Table H-7. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Santa Maria in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.13 ppb (590 ng/m^3)	1.4 ppb (6,422 ng/m^3)	1 ppb (4,558 ng/m^3)	0.26 ppb (1,184 ng/m^3)	0.55 ppb (2,510 ng/m^3)
Acephate	Trace	0.0017 ppb (12.5 ng/m^3)	ND	ND	ND
Captan	--	--	--	Trace	ND
Chloropicrin	0.44 ppb (2,992 ng/m^3)	0.59 ppb (3,966 ng/m^3)	0.62 ppb (4,191 ng/m^3)	0.67 ppb (4,508 ng/m^3)	1.2 ppb (8,137 ng/m^3)
Chlorothalonil	Trace	Trace	Trace	Trace	ND

Chemical	2019	2020	2021	2022	2023
Chlorpyrifos	ND	ND	ND	Trace	ND
Cypermethrin	Trace	Trace	ND	ND	ND
DDVP	0.0026 ppb (23.6 ng/m^3)	0.0098 ppb (88.9 ng/m^3)	Trace	0.0076 ppb (68.6 ng/m^3)	0.0071 ppb (64 ng/m^3)
Dacthal	Trace	Trace	Trace	0.00074 ppb (10.1 ng/m^3)	Trace
Diazinon	ND	Trace	ND	Trace	ND
Diazinon oa	ND	Trace	Trace	ND	ND
Dimethoate	ND	Trace	ND	ND	ND
Dimethoate oa	Trace	Trace	ND	ND	ND
Diuron	ND	Trace	ND	ND	ND
Iprodione	ND	Trace	ND	ND	ND
MITC	0.12 ppb (375 ng/m^3)	0.042 ppb (124 ng/m^3)	0.13 ppb (400 ng/m^3)	0.24 ppb (715 ng/m^3)	1.2 ppb (3,588 ng/m^3)
Malathion	0.0071 ppb (96.5 ng/m^3)	0.0026 ppb (35.6 ng/m^3)	0.0014 ppb (19.4 ng/m^3)	0.0031 ppb (42.2 ng/m^3)	0.0023 ppb (31.2 ng/m^3)
Malathion oa	0.00098 ppb (12.5 ng/m^3)	Trace	Trace	Trace	Trace
Methidathion	ND	Trace	Trace	ND	ND
Methomyl	--	--	--	0.0016 ppb (10.5 ng/m^3)	ND
Methyl Bromide	ND	0.024 ppb (93.2 ng/m^3)	0.079 ppb (307 ng/m^3)	0.34 ppb (1,340 ng/m^3)	0.015 ppb (56.7 ng/m^3)
Metolachlor (S-Metolachlor)	ND	Trace	Trace	ND	ND
Norflurazon	ND	Trace	Trace	ND	ND
Oryzalin	ND	Trace	Trace	ND	ND
Oxydemeton Methyl	ND	Trace	Trace	ND	ND
Oxyfluorfen	ND	ND	Trace	Trace	Trace
Pendimethalin	--	--	--	0.00089 ppb (10.2 ng/m^3)	0.001 ppb (12 ng/m^3)
Permethrin	ND	Trace	Trace	Trace	ND

Chemical	2019	2020	2021	2022	2023
Phosmet	ND	Trace	Trace	ND	ND
Simazine	ND	Trace	Trace	ND	ND
Trifluralin	Trace	0.0019 ppb (25.5 ng/m^3)	0.0082 ppb (112 ng/m^3)	Trace	Trace

Table H-8. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Santa Maria in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.056 ppb (255 ng/m^3)	0.36 ppb (1,618 ng/m^3)	0.28 ppb (1,287 ng/m^3)	0.078 ppb (353 ng/m^3)	0.077 ppb (348 ng/m^3)
Acephate	Trace	0.00045 ppb (3.4 ng/m^3)	ND	ND	ND
Captan	--	--	--	Trace	ND
Chloropicrin	0.078 ppb (523 ng/m^3)	0.11 ppb (728 ng/m^3)	0.094 ppb (631 ng/m^3)	0.11 ppb (767 ng/m^3)	0.2 ppb (1,355 ng/m^3)
Chlorothalonil	Trace	Trace	Trace	Trace	ND
Chlorpyrifos	ND	ND	ND	Trace	ND
Cypermethrin	Trace	Trace	ND	ND	ND
DDVP	0.0013 ppb (11.9 ng/m^3)	0.0035 ppb (31.2 ng/m^3)	Trace	0.0037 ppb (33.1 ng/m^3)	0.0025 ppb (22.9 ng/m^3)
Dacthal	Trace	Trace	Trace	0.00052 ppb (6.8 ng/m^3)	Trace
Diazinon	ND	Trace	ND	Trace	ND
Diazinon oa	ND	Trace	Trace	ND	ND
Dimethoate	ND	Trace	ND	ND	ND
Dimethoate oa	Trace	Trace	ND	ND	ND
Diuron	ND	Trace	ND	ND	ND
Iprodione	ND	Trace	ND	ND	ND
MITC	0.043 ppb (130 ng/m^3)	0.012 ppb (34.4 ng/m^3)	0.025 ppb (73.8 ng/m^3)	0.068 ppb (202 ng/m^3)	0.45 ppb (1,345 ng/m^3)
Malathion	0.002 ppb (26.9 ng/m^3)	0.0013 ppb (17.2 ng/m^3)	0.00077 ppb (10.5 ng/m^3)	0.001 ppb (14.2 ng/m^3)	0.0013 ppb (17.7 ng/m^3)

Chemical	2019	2020	2021	2022	2023
Malathion oa	0.00036 ppb (4.8 ng/m^3)	Trace	Trace	Trace	Trace
Methidathion	ND	Trace	Trace	ND	ND
Methomyl	--	--	--	0.00047 ppb (3.5 ng/m^3)	ND
Methyl Bromide	ND	0.015 ppb (58.2 ng/m^3)	0.06 ppb (232 ng/m^3)	0.13 ppb (513 ng/m^3)	0.013 ppb (50.2 ng/m^3)
Metolachlor (S-Metolachlor)	ND	Trace	Trace	ND	ND
Norflurazon	ND	Trace	Trace	ND	ND
Oryzalin	ND	Trace	Trace	ND	ND
Oxydemeton Methyl	ND	Trace	Trace	ND	ND
Oxyfluorfen	ND	ND	Trace	Trace	Trace
Pendimethalin	--	--	--	0.00038 ppb (5.7 ng/m^3)	0.00048 ppb (7.3 ng/m^3)
Permethrin	ND	Trace	Trace	Trace	ND
Phosmet	ND	Trace	Trace	ND	ND
Simazine	ND	Trace	Trace	ND	ND
Trifluralin	Trace	0.00088 ppb (12.1 ng/m^3)	0.003 ppb (40.6 ng/m^3)	Trace	Trace

Table H-9. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Santa Maria in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.052 ppb (234 ng/m^3)	0.14 ppb (640 ng/m^3)	0.096 ppb (436 ng/m^3)	0.036 ppb (164 ng/m^3)	0.026 ppb (118 ng/m^3)
Acephate	Trace	0.00008 ppb (0.57 ng/m^3)	ND	ND	ND
Captan	--	--	--	Trace	ND
Chloropicrin	0.032 ppb (216 ng/m^3)	0.046 ppb (306 ng/m^3)	0.039 ppb (263 ng/m^3)	0.049 ppb (330 ng/m^3)	0.083 ppb (561 ng/m^3)
Chlorothalonil	Trace	Trace	Trace	Trace	ND

Chemical	2019	2020	2021	2022	2023
Chlorpyrifos	ND	ND	ND	Trace	ND
Cypermethrin	Trace	Trace	ND	ND	ND
DDVP	0.0004 ppb (3.5 ng/m^3)	0.00074 ppb (6.7 ng/m^3)	Trace	0.00076 ppb (6.8 ng/m^3)	0.00065 ppb (5.8 ng/m^3)
Dacthal	Trace	Trace	Trace	0.00026 ppb (3.2 ng/m^3)	Trace
Diazinon	ND	Trace	ND	Trace	ND
Diazinon oa	ND	Trace	Trace	ND	ND
Dimethoate	ND	Trace	ND	ND	ND
Dimethoate oa	Trace	Trace	ND	ND	ND
Diuron	ND	Trace	ND	ND	ND
Iprodione	ND	Trace	ND	ND	ND
MITC	0.0061 ppb (18.1 ng/m^3)	0.0059 ppb (17.7 ng/m^3)	0.011 ppb (34 ng/m^3)	0.012 ppb (36.4 ng/m^3)	0.044 ppb (133 ng/m^3)
Malathion	0.00037 ppb (5 ng/m^3)	0.00039 ppb (5.2 ng/m^3)	0.00032 ppb (4.4 ng/m^3)	0.00035 ppb (4.9 ng/m^3)	0.00036 ppb (5.1 ng/m^3)
Malathion oa	0.00016 ppb (2.1 ng/m^3)	Trace	Trace	Trace	Trace
Methidathion	ND	Trace	Trace	ND	ND
Methomyl	--	--	--	0.00014 ppb (1.4 ng/m^3)	ND
Methyl Bromide	ND	0.006 ppb (23.4 ng/m^3)	0.017 ppb (66.7 ng/m^3)	0.023 ppb (89.5 ng/m^3)	0.0044 ppb (17 ng/m^3)
Metolachlor (S-Metolachlor)	ND	Trace	Trace	ND	ND
Norflurazon	ND	Trace	Trace	ND	ND
Oryzalin	ND	Trace	Trace	ND	ND
Oxydemeton Methyl	ND	Trace	Trace	ND	ND
Oxyfluorfen	ND	ND	Trace	Trace	Trace
Pendimethalin	--	--	--	0.0001 ppb (1.7 ng/m^3)	0.00011 ppb (2 ng/m^3)
Permethrin	ND	Trace	Trace	Trace	ND

Chemical	2019	2020	2021	2022	2023
Phosmet	ND	Trace	Trace	ND	ND
Simazine	ND	Trace	Trace	ND	ND
Trifluralin	Trace	0.00027 ppb (3.7 ng/m^3)	0.00049 ppb (6.9 ng/m^3)	Trace	Trace

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Table H-10. Percentage of analyses performed resulting in a quantifiable or trace detection in Shafter in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	10 %	71 %	69 %	61 %	22 %
Captan	--	--	--	3 %	0 %
Chloropicrin	2 %	0 %	4 %	4 %	4 %
Chlorothalonil	43 %	91 %	24 %	15 %	0 %
Chlorpyrifos	4 %	0 %	0 %	0 %	0 %
Cypermethrin	2 %	0 %	0 %	0 %	0 %
DDVP	10 %	0 %	4 %	10 %	2 %
Dacthal	2 %	9 %	0 %	0 %	0 %
Diazinon	0 %	9 %	0 %	0 %	0 %
Diazinon oa	0 %	9 %	2 %	0 %	0 %
Dimethoate	0 %	9 %	0 %	0 %	0 %
Diuron	4 %	9 %	2 %	0 %	0 %
EPTC	10 %	0 %	6 %	2 %	12 %
Endosulfan Sulfate	0 %	9 %	0 %	0 %	0 %
Fenpyroximate	--	--	--	5 %	0 %
Iprodione	2 %	0 %	0 %	0 %	0 %
MITC	59 %	82 %	40 %	44 %	42 %
Malathion	6 %	0 %	0 %	0 %	2 %
Malathion oa	4 %	9 %	2 %	0 %	2 %
Methyl Bromide	0 %	12 %	55 %	79 %	33 %

Chemical	2019	2020	2021	2022	2023
Metolachlor (S-Metolachlor)	0 %	9 %	0 %	0 %	0 %
Norflurazon	0 %	9 %	0 %	0 %	0 %
Oxyfluorfen	2 %	9 %	6 %	4 %	0 %
Pendimethalin	--	--	--	58 %	73 %
Permethrin	2 %	0 %	0 %	0 %	0 %
Simazine	0 %	9 %	0 %	0 %	0 %
Trifluralin	6 %	18 %	4 %	2 %	0 %

Table H-11. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Shafter in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	3.2 ppb (14,524 ng/m^3)	47.2 ppb (214,451 ng/m^3)	2.9 ppb (13,130 ng/m^3)	1.5 ppb (6,605 ng/m^3)	8 ppb (36,286 ng/m^3)
Captan	--	--	--	Trace	ND
Chloropicrin	0.1 ppb (694 ng/m^3)	ND	Trace	Trace	Trace
Chlorothalonil	Trace	0.0033 ppb (36.3 ng/m^3)	Trace	Trace	ND
Chlorpyrifos	Trace	ND	ND	ND	ND
Cypermethrin	Trace	ND	ND	ND	ND
DDVP	Trace	ND	0.0033 ppb (30.2 ng/m^3)	Trace	Trace
Dacthal	Trace	Trace	ND	ND	ND
Diazinon	ND	Trace	ND	ND	ND
Diazinon oa	ND	Trace	Trace	ND	ND
Dimethoate	ND	Trace	ND	ND	ND
Diuron	Trace	Trace	Trace	ND	ND
EPTC	0.0046 ppb (35.6 ng/m^3)	ND	0.016 ppb (128 ng/m^3)	0.0027 ppb (20.7 ng/m^3)	Trace

Chemical	2019	2020	2021	2022	2023
Endosulfan Sulfate	ND	Trace	ND	ND	ND
Fenpyroximate	--	--	--	0.0019 ppb (32.5 ng/m^3)	ND
Iprodione	Trace	ND	ND	ND	ND
MITC	0.11 ppb (316 ng/m^3)	0.054 ppb (162 ng/m^3)	0.13 ppb (388 ng/m^3)	0.18 ppb (551 ng/m^3)	2.3 ppb (6,806 ng/m^3)
Malathion	Trace	ND	ND	ND	Trace
Malathion oa	Trace	Trace	Trace	ND	Trace
Methyl Bromide	ND	0.048 ppb (186 ng/m^3)	0.047 ppb (182 ng/m^3)	0.068 ppb (264 ng/m^3)	0.016 ppb (63.7 ng/m^3)
Metolachlor (S-Metolachlor)	ND	Trace	ND	ND	ND
Norflurazon	ND	Trace	ND	ND	ND
Oxyfluorfen	Trace	Trace	Trace	Trace	ND
Pendimethalin	--	--	--	0.0027 ppb (30.8 ng/m^3)	0.0025 ppb (28.3 ng/m^3)
Permethrin	Trace	ND	ND	ND	ND
Simazine	ND	Trace	ND	ND	ND
Trifluralin	Trace	Trace	0.00027 ppb (3.8 ng/m^3)	Trace	ND

Table H-12. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Shafter in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.45 ppb (2,056 ng/m^3)	5.7 ppb (25,982 ng/m^3)	5.7 ppb (25,821 ng/m^3)	0.14 ppb (651 ng/m^3)	0.66 ppb (2,987 ng/m^3)
Captan	--	--	--	Trace	ND
Chloropicrin	0.023 ppb (156 ng/m^3)	ND	Trace	Trace	Trace
Chlorothalonil	Trace	0.0021 ppb (22.6 ng/m^3)	Trace	Trace	ND
Chlorpyrifos	Trace	ND	ND	ND	ND

Chemical	2019	2020	2021	2022	2023
Cypermethrin	Trace	ND	ND	ND	ND
DDVP	Trace	ND	0.00091 ppb (8.2 ng/m^3)	Trace	Trace
Dacthal	Trace	Trace	ND	ND	ND
Diazinon	ND	Trace	ND	ND	ND
Diazinon oa	ND	Trace	Trace	ND	ND
Dimethoate	ND	Trace	ND	ND	ND
Diuron	Trace	Trace	Trace	ND	ND
EPTC	0.00064 ppb (5 ng/m^3)	ND	0.0042 ppb (32.7 ng/m^3)	0.00078 ppb (5.9 ng/m^3)	Trace
Endosulfan Sulfate	ND	Trace	ND	ND	ND
Fenpyroximate	--	--	--	0.0008 ppb (10.3 ng/m^3)	ND
Iprodione	Trace	ND	ND	ND	ND
MITC	0.14 ppb (424 ng/m^3)	0.031 ppb (92.2 ng/m^3)	0.034 ppb (100 ng/m^3)	0.099 ppb (298 ng/m^3)	0.67 ppb (2,010 ng/m^3)
Malathion	Trace	ND	ND	ND	Trace
Malathion oa	Trace	Trace	Trace	ND	Trace
Methyl Bromide	ND	0.023 ppb (90.2 ng/m^3)	0.041 ppb (161 ng/m^3)	0.062 ppb (241 ng/m^3)	0.014 ppb (54.9 ng/m^3)
Metolachlor (S-Metolachlor)	ND	Trace	ND	ND	ND
Norflurazon	ND	Trace	ND	ND	ND
Oxyfluorfen	Trace	Trace	Trace	Trace	ND
Pendimethalin	--	--	--	0.0015 ppb (18.2 ng/m^3)	0.0016 ppb (18.2 ng/m^3)
Permethrin	Trace	ND	ND	ND	ND
Simazine	ND	Trace	ND	ND	ND
Trifluralin	Trace	Trace	0.00026 ppb (3.7 ng/m^3)	Trace	ND

Table H-13. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Shafter in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.13 ppb (599 ng/m^3)	2.1 ppb (9,615 ng/m^3)	0.21 ppb (937 ng/m^3)	0.07 ppb (317 ng/m^3)	0.24 ppb (1,083 ng/m^3)
Captan	--	--	--	Trace	ND
Chloropicrin	0.018 ppb (123 ng/m^3)	ND	Trace	Trace	Trace
Chlorothalonil	Trace	0.0014 ppb (14.8 ng/m^3)	Trace	Trace	ND
Chlorpyrifos	Trace	ND	ND	ND	ND
Cypermethrin	Trace	ND	ND	ND	ND
DDVP	Trace	ND	0.00018 ppb (1.6 ng/m^3)	Trace	Trace
Dacthal	Trace	Trace	ND	ND	ND
Diazinon	ND	Trace	ND	ND	ND
Diazinon oa	ND	Trace	Trace	ND	ND
Dimethoate	ND	Trace	ND	ND	ND
Diuron	Trace	Trace	Trace	ND	ND
EPTC	0.00028 ppb (2.1 ng/m^3)	ND	0.00048 ppb (3.6 ng/m^3)	0.0002 ppb (1.4 ng/m^3)	Trace
Endosulfan Sulfate	ND	Trace	ND	ND	ND
Fenpyroximate	--	--	--	0.00026 ppb (2.2 ng/m^3)	ND
Iprodione	Trace	ND	ND	ND	ND
MITC	0.015 ppb (44.5 ng/m^3)	0.02 ppb (59.7 ng/m^3)	0.012 ppb (35.6 ng/m^3)	0.017 ppb (51.6 ng/m^3)	0.068 ppb (204 ng/m^3)
Malathion	Trace	ND	ND	ND	Trace
Malathion oa	Trace	Trace	Trace	ND	Trace
Methyl Bromide	ND	0.0068 ppb (26.4 ng/m^3)	0.012 ppb (46.6 ng/m^3)	0.014 ppb (53.4 ng/m^3)	0.0051 ppb (19.9 ng/m^3)
Metolachlor	ND	Trace	ND	ND	ND
Norflurazon	ND	Trace	ND	ND	ND

Chemical	2019	2020	2021	2022	2023
Oxyfluorfen	Trace	Trace	Trace	Trace	ND
Pendimethalin	--	--	--	0.00041 ppb (5.8 ng/m^3)	0.00049 ppb (6.9 ng/m^3)
Permethrin	Trace	ND	ND	ND	ND
Simazine	ND	Trace	ND	ND	ND
Trifluralin	Trace	Trace	0.000069 ppb (1.1 ng/m^3)	Trace	ND

Historic Air Concentrations in Watsonville

Table H-14. Percentage of analyses performed resulting in a quantifiable or trace detection in Watsonville in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	4 %	49 %	46 %	27 %	28 %
Captan	--	--	--	0 %	2 %
Chloropicrin	24 %	0 %	29 %	29 %	27 %
Chlorothalonil	2 %	0 %	0 %	0 %	0 %
Cypermethrin	0 %	0 %	0 %	0 %	2 %
DDVP	25 %	0 %	12 %	4 %	6 %
Dacthal	18 %	0 %	6 %	6 %	0 %
Diuron	2 %	0 %	0 %	0 %	0 %
EPTC	2 %	0 %	0 %	0 %	0 %
MITC	30 %	9 %	19 %	21 %	16 %
Malathion	14 %	0 %	0 %	12 %	8 %
Malathion oa	16 %	0 %	0 %	2 %	4 %
Methyl Bromide	0 %	2 %	29 %	73 %	32 %
Norflurazon	0 %	0 %	0 %	0 %	2 %
Oxyfluorfen	0 %	0 %	2 %	4 %	2 %
Permethrin	0 %	0 %	0 %	0 %	2 %
Phosmet	0 %	0 %	0 %	0 %	2 %

Chemical	2019	2020	2021	2022	2023
Propargite	0 %	0 %	0 %	0 %	2 %
Trifluralin	4 %	0 %	0 %	0 %	0 %

Table H-15. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Watsonville in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.29 ppb (1,316 ng/m^3)	1 ppb (4,729 ng/m^3)	0.5 ppb (2,282 ng/m^3)	0.45 ppb (2,053 ng/m^3)	0.35 ppb (1,586 ng/m^3)
Captan	--	--	--	ND	Trace
Chloropicrin	0.85 ppb (5,741 ng/m^3)	ND	0.31 ppb (2,074 ng/m^3)	0.34 ppb (2,310 ng/m^3)	0.97 ppb (6,511 ng/m^3)
Chlorothalonil	Trace	ND	ND	ND	ND
Cypermethrin	ND	ND	ND	ND	Trace
DDVP	Trace	ND	Trace	Trace	Trace
Dacthal	Trace	ND	Trace	Trace	ND
Diuron	Trace	ND	ND	ND	ND
EPTC	Trace	ND	ND	ND	ND
MITC	0.055 ppb (164 ng/m^3)	0.0096 ppb (28.7 ng/m^3)	0.063 ppb (188 ng/m^3)	0.12 ppb (347 ng/m^3)	0.052 ppb (154 ng/m^3)
Malathion	0.0042 ppb (56 ng/m^3)	ND	ND	Trace	Trace
Malathion oa	Trace	ND	ND	Trace	Trace
Methyl Bromide	ND	0.023 ppb (89.3 ng/m^3)	0.95 ppb (3,693 ng/m^3)	0.035 ppb (136 ng/m^3)	0.016 ppb (60.6 ng/m^3)
Norflurazon	ND	ND	ND	ND	Trace
Oxyfluorfen	ND	ND	Trace	Trace	Trace
Permethrin	ND	ND	ND	ND	Trace
Phosmet	ND	ND	ND	ND	Trace
Propargite	ND	ND	ND	ND	Trace
Trifluralin	Trace	ND	ND	ND	ND

Table H-16. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Watsonville in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.082 ppb (374 ng/m^3)	0.45 ppb (2,031 ng/m^3)	0.24 ppb (1,101 ng/m^3)	0.16 ppb (741 ng/m^3)	0.092 ppb (417 ng/m^3)
Captan	--	--	--	ND	Trace
Chloropicrin	0.15 ppb (1,042 ng/m^3)	ND	0.097 ppb (652 ng/m^3)	0.092 ppb (620 ng/m^3)	0.22 ppb (1,505 ng/m^3)
Chlorothalonil	Trace	ND	ND	ND	ND
Cypermethrin	ND	ND	ND	ND	Trace
DDVP	Trace	ND	Trace	Trace	Trace
Dacthal	Trace	ND	Trace	Trace	ND
Diuron	Trace	ND	ND	ND	ND
EPTC	Trace	ND	ND	ND	ND
MITC	0.024 ppb (71 ng/m^3)	0.0035 ppb (10.5 ng/m^3)	0.02 ppb (58.6 ng/m^3)	0.039 ppb (115 ng/m^3)	0.029 ppb (87.3 ng/m^3)
Malathion	0.0012 ppb (15.7 ng/m^3)	ND	ND	Trace	Trace
Malathion oa	Trace	ND	ND	Trace	Trace
Methyl Bromide	ND	0.015 ppb (58.2 ng/m^3)	0.3 ppb (1171 ng/m^3)	0.037 ppb (142 ng/m^3)	0.014 ppb (54.7 ng/m^3)
Norflurazon	ND	ND	ND	ND	Trace
Oxyfluorfen	ND	ND	Trace	Trace	Trace
Permethrin	ND	ND	ND	ND	Trace
Phosmet	ND	ND	ND	ND	Trace
Propargite	ND	ND	ND	ND	Trace
Trifluralin	Trace	ND	ND	ND	ND

Table H-17. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Watsonville in 2019-2023.

Chemical	2019	2020	2021	2022	2023
1,3-dichloropropene	0.057 ppb (260 ng/m^3)	0.15 ppb (670 ng/m^3)	0.075 ppb (340 ng/m^3)	0.037 ppb (169 ng/m^3)	0.03 ppb (136 ng/m^3)
Captan	--	--	--	ND	Trace
Chloropicrin	0.052 ppb (348 ng/m^3)	ND	0.029 ppb (197 ng/m^3)	0.028 ppb (186 ng/m^3)	0.061 ppb (411 ng/m^3)
Chlorothalonil	Trace	ND	ND	ND	ND
Cypermethrin	ND	ND	ND	ND	Trace
DDVP	Trace	ND	Trace	Trace	Trace
Dacthal	Trace	ND	Trace	Trace	ND
Diuron	Trace	ND	ND	ND	ND
EPTC	Trace	ND	ND	ND	ND
MITC	0.0046 ppb (13.6 ng/m^3)	0.0022 ppb (6.7 ng/m^3)	0.0038 ppb (11.4 ng/m^3)	0.0077 ppb (22.9 ng/m^3)	0.0045 ppb (13.4 ng/m^3)
Malathion	0.00017 ppb (2.3 ng/m^3)	ND	ND	Trace	Trace
Malathion oa	Trace	ND	ND	Trace	Trace
Methyl Bromide	ND	0.0055 ppb (21.4 ng/m^3)	0.026 ppb (101 ng/m^3)	0.011 ppb (43.4 ng/m^3)	0.0051 ppb (19.9 ng/m^3)
Norflurazon	ND	ND	ND	ND	Trace
Oxyfluorfen	ND	ND	Trace	Trace	Trace
Permethrin	ND	ND	ND	ND	Trace
Phosmet	ND	ND	ND	ND	Trace
Propargite	ND	ND	ND	ND	Trace
Trifluralin	Trace	ND	ND	ND	ND

APPENDIX I: REFERENCES

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APPENDIX J

Commenters:

1. Kathleen Kilpatrick (KK)
2. Environmental Working Group (EWG)
3. California Rural Legal Assistance Foundation, Californians for Pesticide Reform, and Pesticide Action Network (CRLAF/CPR/PAN)
4. Western Plant Health Association (WPH)

No.	COMMENT	RESPONSE	ACTION
1	**From:** KK, EWG, CRLAF/CPR/PAN Thank you for the opportunity to comment on the 2023 air monitoring report from DPR's four monitors sited at schools in California. I share the frustration of my colleagues in CPR with how this data was used to misrepresent results and associated risks. I also share their concern that that data may be used to justify inaction regarding re-evaluating risks to human health and the environment from hazardous pesticides currently used in California. The Environmental Working Group, or EWG, a nonprofit research and policy organization with an office in Sacramento, CA and headquarters in Washington, D.C. respectfully submits these comments to the California Department of Pesticide Regulation. The impact to Californian's health from pesticide exposure is an area where EWG has for decades researched and advocated for changes to reduce harm. The health harm due to pesticide exposure from nearby farm fields remains a public health and environmental justice issue that requires action. EWG's recent peer-reviewed publication, which evaluated Ventura county's pesticide use found greater pesticide application near communities with higher percentages of the population that identify as Latino, Black and Asian American. Last month EWG collaborated with Californians for Pesticide Reform, UC Irvine's Center for Land, Environment, and Natural Resources, and	The AMN report is one of the many avenues that inform DPR's continuous evaluation process and strives to consistently deliver representative, comprehensive, and accurate monitoring data. Our goal is to provide transparent results and clear, concise, and unbiased analysis based on the monitoring data that contribute to protecting human health and the environment, aligning with DPR's mission. We have carefully reviewed your feedback, and we will keep using stakeholder comments to correct errors and provide clarifications on the monitoring data and report. As always, we value and encourage your comments.	No action or changes are required for this comment.

No.	COMMENT	RESPONSE	ACTION
	Golden Gate University in a publication documenting the environmental racism of California pesticide application. Thank you for the opportunity to provide comment on the 2023 Air Monitoring Network Report. We appreciate the Department's investment of time and resources in collecting and analyzing this air monitoring data and releasing the draft 2023 report in a timely manner. We appreciate that the Executive Summary begins by listing the 8 pesticides monitored which were detected, states the number of AMN sites where these pesticides were detected and discloses the fact that the highest chloropicrin sub-chronic level was 93% of DPR's screening level. We urge you to carefully review these comments. We appreciate all the time and resources that DPR puts into maintaining the AMN sites. A more straightforward and comprehensive presentation of the data will better serve both the public and the Department. Please contact Anne Katten if you need clarification on any of these points.		
2	**From:** EWG, CRLAF/CPR/PAN The Air Monitoring Network provides essential data and information necessary to protect public health from the potential toxic effects of pesticide exposure, yet the results analysis and communication have not been completed in the public interest. EWG urges DPR to present the data within the air monitoring report in a more meaningful and scientifically appropriate manner. The current form of data analyses and presentation does not meet scientific standards, and as such the results were inaccurately characterized in a DPR press release. The incorrect statements in DPR's press release led to numerous news outlets incorrectly reporting the findings.	DPR is dedicated to producing scientific reports regarding pesticide concentrations in California, and to provide transparent results that contribute to protecting human health and the environment. The AMN Report Press Release summarized the report's overall findings, citing data from the report, and that our monitoring found generally low levels of pesticides in the air that were all below screening levels. The press release also announced the public availability of the report, public comment opportunities, and a virtual meeting for community residents to share more information on the pesticide concentrations detected in their communities.	No action or changes are required for this comment.

No.	COMMENT	RESPONSE	ACTION
	Furthermore, in making the overall percent detections the headline in this year's news release for the AMN data, the Department took the percentage of detections of total analytes completely out of context as well as misstating it as percent samples with detections. This false statement was then amplified in a number of news stories. Then the Department merely changed the online news release text to "sample analyses" without an explanation of the initial error, and did not reissue the news release to the public with the correction. This was not an adequate acknowledgement or correction, and it reflects badly on the credibility of the Department.		
3	**From:** KK, EWG, CRLAF/CPR/PAN *The Erroneous Denominator and Other General Critiques* Attempting to pass off each pesticide in a single sampling event as a separate sample goes beyond faulty math and into the realm of deliberate miscalculation. *Restructure the "Pesticide Detections" section to better report the data* Based on the pesticide air monitoring data, the number of air samples that detected pesticides was nearly 80 percent, yet that finding is on the third page of the results section, while it should be reported in the first paragraph. As currently written, the first paragraph of the "Pesticide Detections" section should be removed or put into an appendix. Describing the detection frequencies based on the total analyses (n= 8,085), when the denominator should be the number of weekly samples that were analyzed for any pesticide (n=207), is incorrect and can lead to a misinterpretation of the number of air samples that contained pesticides. As such, we recommend presenting table 4, which accurately calculates the sample detection frequency, first within the report and beginning this section with description of those	Thank you for your comments. Our air monitoring network is designed to monitor ambient air over long periods of time to evaluate exposure and inform mitigation. While we do report on number of detections, the intent of our monitoring is to compare detections to health protective screening levels (SLs) or regulatory targets (RTs). Screening levels are developed by DPR scientists through scientific evaluation to conservatively estimate when a pesticide air concentration may have any impact on human health. We use SLs and RTs to help us prioritize our mitigation to focus on pesticide exposures and uses that have the greatest potential impact on human health. We are adding a new Table 2 showing Quantifiable and Trace detections for individual pesticides by monitoring station and removing Tables 3 and 4. This change removes unregistered pesticides from being tallied with registered pesticides. This focuses the report on comparisons of each chemical detected to SLs and RTs.	Tables 2-4 were removed and replaced with a new Table 2 on pages 9 and 10.

No.	COMMENT	RESPONSE	ACTION
	results. We then recommend discussing the pesticides that were detected as is currently done in the report, as well as keeping what is currently Table 2. Table 3 should be deleted, or put into an appendix, as again, using the denominator as total number of analyses is not appropriate. *Comments on presentation of results* Once again, we object strenuously to leading off the discussion of results in both this report and the PREC presentation with a statement that 4.7% of sample analyses resulted in quantifiable detections. This is highly deceptive and completely misleading. Both this statement and Table 3 should be stricken from the report. We note that Table 3's heading and second column go beyond being misleading and are wrong in referring to total samples rather than total analyses. Table 4 presents the percent of sample sets at each location with at least one detection. This is key information which should also be included in the Executive Summary. In total sample sets analyzed at each AMN site, 58.8% (Watsonville), 80.8% (Santa Maria), 84.6% (Shafter), 90.4% (Oxnard) had at least one pesticide detection. *Ohlone Monitor Results: a Closer Look:* Having been alerted not to fall for the 2% "quantifiable detections", I noted, instead, that 58.8% (almost 3/5) of the weekly sampling events produced at least one detectable pesticide, and detections of 14 different kinds. That this is 20% below the average for the 4 monitoring sites failed to reassure.		
4	**From:** CRLAF/CPR/PAN Moreover, 17.5% of the pesticides and breakdown products monitored are no longer registered for use in California so are not expected to be detected. When we expressed concern about	We agree that context should be added for the seven pesticides that are no longer registered in California. Text was added to the report on page 9. In addition, as discussed in the response to comment #3, Tables 2 – 4 were removed and replaced with a table that shows	Tables 2-4 were removed and replaced with a new Table 2 on pages 9 and 10.

No.	COMMENT	RESPONSE	ACTION
	this misleading statistic in comments on the previous draft AMN report, the Department's response in the Final 2022 AMN report was: "The scientific objectives of the AMN, as outlined in the Introduction, emphasize DPR's focus on monitoring pesticides in the ambient air and comparing measured concentrations to screening levels or regulatory targets. It is important to note that the count and percentage of detections serve only to provide an overview of the patterns identified in the report. Therefore, they should be interpreted solely in that context". This answer does not respond to our concerns about the misleading nature of the overall percent detections number. We appreciate that the pesticides with the highest number of quantifiable detections are highlighted at the top of Table 2. Table 2 should also identify the pesticides and breakdown products which are no longer registered so not expected to be detected, with an asterisk and table footnote. These 7 chemicals comprise 17.5% of the chemicals monitored (chlorpyrifos, chlorpyrifos OA, endosulfan, endosulfan sulfate, methidathion, oxydemeton methyl and ppdicofol), and also comprise one third of the 21 chemicals not detected in 2023. Since they are no longer registered, detections are not expected. We understand that these chemicals continue to be included because they are high toxicity and are part of the 36-pesticide residue screen. We have no objection to including them in air monitoring as long as it is explained that detections are not expected.	each pesticide's quantifiable and trace detections for each monitoring site. This addresses the concerns about the overall percent detections, given that aggregated detections are no longer reported.	Text was added to the report on page 9.
5	**From:** KK, EWG, CRLAF/CPR/PAN The percent of detections of all pesticides analyzed at all sites uses a deceptive highly inflated denominator because use of most pesticides is concentrated in certain months in specific geographic areas. In addition, not all the pesticides monitored	DPR's air monitoring program is designed to identify and evaluate detections of pesticides to assist in (1) assessing potential health risks, (2) evaluating the effectiveness of existing mitigation measures, (3) developing measures to mitigate risks, and (4) evaluating the effectiveness of regulatory requirements. The AMN evaluates the potential for health impacts related to	No action or changes are required for this comment.

No.	COMMENT	RESPONSE	ACTION
	are used near all of the monitoring sites because pesticide use varies by crop and region. After repeated requests to do so, these reports still fail to reveal which pesticides were used in proximal time and space to the monitors. Also, the detection frequency results should also be contextualized based on temporal use of pesticides. For example, during the spraying season for a given pesticide, the detection frequencies may be 100 percent, but since there may be several months when a pesticide is not used, this would shift the overall detection frequency. *Additional methodological considerations* While we understand the current approach to random sampling one day per week, this may result in sampling bias that misses concerning pesticide exposures. Additionally, it may be possible for growers to know when sampling is planned to occur, and therefore change application protocols. We believe a more effective approach may be to time sampling based on when known pesticide applications are to occur, to ensure that actual real-world exposure scenarios are accurately captured. Samples should be collected daily on days of and directly following nearby pesticide application.	short-term, medium-term, and long-term pesticide exposures. In order to evaluate these exposures, samples are taken at each site weekly for the entire year. Therefore, DPR does not base its monitoring and data reporting on assumptions about whether a pesticide was applied or the proximity of the application(s) to monitoring locations. Relying on the assumption that a chemical was not applied could potentially lead to undetected concentrations. To achieve an unbiased and representative outcome within the available resources, the AMN sampling schedule is prepared at the start of each year. This process entails randomly selecting one sampling date per week and dates are not shared with anyone outside DPR's Air Program or our sampling partners. Random sampling is widely accepted in the scientific community and has statistically demonstrated to be a robust approach for obtaining an unbiased representation of the data. In our current approach and to address the concern raised as part of this comment, a 24-hour sampled concentration is assumed to represent the entire week. For instance, the 24-hour concentration of 37 ppb sampled on 10/16/2020 at the Shafter monitoring site is assumed to be repeated every day for the entire week from 10/11/2020 to 10/17/2020. Additionally, the AMN focuses on long-term (annual and multi-year) trends. DPR and CARB conduct intensive monitoring through seasonal studies where the ambient air is sampled daily for several consecutive weeks that are focused on sub-chronic and acute exposures. The timing for these studies is selected based on historical use. Modeling tools, which incorporate pesticide use data and atmospheric conditions as inputs, are also used in more refined evaluations of pesticides fill in gaps in monitoring and to evaluate the conditions that led to elevated detections of pesticides.	

No.	COMMENT	RESPONSE	ACTION
6	**From:** CRLAF/CPR/PAN It would be helpful if there were summary tables added for each pesticide detected at quantifiable levels, with the highest acute and sub-chronic and average annual air concentrations and number of detections at each AMN site, in addition to or instead of tables of the highest levels. The tables of highest acute and seasonal air concentrations and average annual air concentrations of each chemical at each AMN site include important information that should be presented earlier in the report, with highlights integrated into the concluding summary.	Summary tables with the highest 24-hour, 4- or 13-week, and yearly concentrations for each pesticide are found in Appendices A-D. Text was added to the primary body of the report to inform the reader that data can be found in those appendices.	Text was added on pages 11-13.
7	**From:** CRLAF/CPR/PAN Useful tables included in the DPR PREC presentation which we recommend adding to this report after combining with 1,3 D results are: Number of Quantifiable Detections (by pesticide and %) at Each Location (slide 14) Highest Acute Concentrations and % Screening Level by Location (slide 16) Highest Subchronic Concentrations and % Screening Level by Location (slide 17) Annual (Chronic) Concentrations and % Screening Level by Location (slide 18)	The tables used during DPR' PREC presentation are summarized for conciseness. Appendices A-D of the AMN report (pages 18-68) contain detailed information for all detections at each sampling station. . We agree that the format that you recommend is informative, therefore we will implement those tables in the next AMN report for 2024.	No action or changes are required for this comment.
8	**From:** CRLAF/CPR/PAN	DPR is closely monitoring chloropicrin concentrations at each site. DPR is in the process of a more detailed evaluation of chloropicrin use data, historical weather patterns, and field conditions.	No action or changes are required for this comment.

No.	COMMENT	RESPONSE	ACTION
	We note below that the highest chloropicrin acute concentrations were very similar at Santa Maria, Oxnard and Watsonville.		
9	**From:** KK When pesticides are identified as detected, risks are often mischaracterized, with no attempt to explain the significance of trace amounts of chemicals that should not be present at all.	All reporting limits are set below SL or RT for each of the pesticides, hence trace detections do not exceed SL or RT. Trace detections are included in the calculations to compare average concentrations to sub-chronic and chronic SL or RT. Details of those calculations are found on page 77. Therefore, our analysis evaluates the potential impact of all measurements, including trace amounts, on human health and the environment.	No action or changes are required for this comment.
10	**From:** KK, CRLAF/CPR/PAN Let's start with fumigants. Telone (aka 1,3-D) was present at quantifiable levels in over a quarter of samples, chloropicrin in over a fifth; MITC, another fumigant and toxic air contaminant, was quantifiable in one in 7 samples. *Acute 24-hour Exposure and Screening Levels* We are concerned that the highest Chloropicrin 24-hour concentration measured at the Santa Maria AMN site (1.2 ppb) and similar high concentrations at the Oxnard AMN site (1.1 ppb) and Watsonville AMN site (0.99 ppb) exceed the 24-hour reference level of 0.92 ppb for protection of children established in the chloropicrin TAC report and DPR risk assessment and supported by OEHHA. We are also concerned that Table H-9 of Santa Maria highest acute air levels shows an upward trend for both chloropicrin and MITC. We are also concerned that Table H-13 shows that the highest acute air levels of MITC have been trending upward at the Shafter AMN site since 2020.	DPR evaluates the potential for health effects by comparing air concentrations to SLs or RTs. The analysis included in determining the sub-chronic and chronic values accounts for the number of quantifiable detections as well as the magnitude of each of those detections. The comparison to SL or RT helps us determine if mitigation measures are working, and if we need to improve or add new protective measures. If a pesticide concentration exceeds a SL or RT, it initiates a rigorous evaluation of that pesticide. No pesticide exceeded its acute, subchronic, or chronic exposure level in 2023. DPR scientists are aware of chloropicrin and MITC sub-chronic and chronic SL and are closely monitoring these pesticides across all sites.	No action or changes are required for this comment.

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	Sub-chronic Exposure We are concerned that the highest sub-chronic MITC rolling concentrations at both Shafter and Santa Maria sites were almost 7-fold higher than peak sub-chronic concentrations measured in 2022, and the highest sub-chronic chloropicrin concentration rose over 2-fold at the Watsonville AMN site and almost doubled at the Santa Maria site between 2022 and 2023.[9] We are also concerned that Table H-14 shows that the highest seasonal air levels of MITC have been trending upward at the Shafter AMN site since 2020. These changes and trends should be mentioned in the report. *Chronic Exposure (1-year average concentrations)* It is concerning to note that the annual average MITC air concentration rose 4-fold at the Shafter AMN site and 3.7-fold at the Santa Maria AMN site from 2022 to 2023, and that the annual chloropicrin air concentration more than doubled at the Watsonville AMN site. We note with concern that Table H-9 of Santa Maria highest acute air levels shows an upward trend for both chloropicrin and MITC. We are also concerned that Tables H-13 and H-14 show that highest acute and seasonal air levels of MITC have been trending upward at the Shafter AMN site since 2020.		
11	**From:** KK *A Misnomer: Watsonville Has No Monitor* My focus will be on the monitor familiar and local to me, referred in this document as the "Watsonville" monitor. We call it the Ohlone monitor because it is not in Watsonville, nor does it necessarily represent pesticide levels in and around the city of Watsonville or in the Pajaro Valley. Although labeled Watsonville, the monitor at Ohlone Elementary is almost four miles away from town, on a bluff above the Pajaro	The data collected by our monitoring stations is representative of the location where the air was sampled and the surrounding communities. We added a column in Table 1 to be more precise about the location where the air was sampled, including Royal Oaks. Furthermore, DPR is in the process of analyzing the pesticide use patterns and the impact of meteorological conditions on the concentration of pesticides in the vicinity of Pajaro Valley.	We added a column in Table 1 on page 8.

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	Valley that faces the sea and the mouth of the Pajaro River. Our valley spans two counties; our school district stretches across the county line and over the ridges on either side. The levels of pesticides recorded on that playground behemoth are unlikely to accurately reflect those present in the valley, which, as are most ag communities, is unmonitored. The Pajaro Valley is roughly wedge-shaped, ringed on three sides by hills and mountains, unevenly divided by the Pajaro River, which separates the two counties. Minus artichokes, ag crops overlap with those around Ohlone: strawberries and cane berries, a diversity of row crops and yes, there are still apple orchards. Fumigated berry fields still predominate, although organic acreage is expanding. Ohlone Elementary is just over the rise on the southwest edge. Behind it are a small residential community and a golf course. To the southeast of the school and monitor is a conventionally farmed berry field, and in front, facing the Pacific, a large organic berry field. More fields span the coast curving south and northwest, farmed variously in strawberries, artichokes, brassicas, and various leafy greens. Winds on the bluff are variable, but, as is the nature of wind, often come from the sea. Prevailing winds blow mostly toward the Pajaro Valley, and not from it. Looking at the geology, geography, and the diversity of crops, it should be obvious that air sampling from the Ohlone monitor is not necessarily representative of Watsonville.		
12	**From:** KK Methyl bromide was found 16 times, 9 of which were quantifiable, 32% of samples. Why was it even there at all? *Methyl Bromide and the Ohlone Monitor, a Little Backstory:* At our visit to the monitor last May, I was surprised to learn that the technicians collecting samples had no idea why the monitor is sited there. Parents from this school, as well as 5 others,	The Center for Race, Poverty & the Environment, California Rural Legal Assistance, Inc., California Rural Legal Assistance Foundation, Inc., and Farmworker Justice Fund, Inc. on behalf of Latino parents and children attending six schools in California near locations where methyl bromide (MeBr) was applied (including Ohlone Elementary School) filed a complaint in 1999 with the US EPA alleging a violation of civil rights (Title VI	No action or changes are required for this comment.

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	launched a lawsuit in 1999, citing environmental injustice based on disproportionate pesticide exposures to their children attending schools in largely Latino communities. The fumigant of concern then was methyl bromide, and one excuse offered for the long, drawn-out duration of the suit was the (very gradual) phase-out of that toxic chemical. It took 12 years for CalEPA to toss those parents, in lieu of a bone, a huge, bulky air monitor in a corner of the school playground, surrounded by acres of strawberry fields. By then, most of those kids were out of school, and another generation was starting. Methyl bromide use was declining and Telone (1,3-D), chloropicrin, and MITC were moving in to replace some of its functions. Since 2016 was supposed to be the year of final phase-out, learning that methyl bromide was found in 32% of samples was a bit of a shock.	of the Civil Rights Act of 1964). The US EPA made a preliminary finding of unintentional adverse disparate impact to Latino school children and communicated the findings to DPR on April 22, 2011. Between 2001 and 2011, DPR adopted new regulations or amended existing regulations intended to limit MeBr exposure, initiated long-term air monitoring of MeBr to estimate exposure and guide future mitigation efforts, and initiated community education and outreach efforts in the Latino community. In 2011, after US EPA communicated its findings to DPR, DPR agreed to expand air monitoring efforts by adding a site near one of the schools named in the complaint and to continue monitoring at multiple other sites through 2013. As part of DPR's mission to protect public health and the environment and following the community ranking procedure, DPR has voluntarily continue monitoring MeBr and 1,3-D at the Ohlone Elementary School and added chloropicrin as the third pesticide to be monitored in August 2014. In January 2017, DPR expanded the monitoring at this station and added it to the AMN study, increasing the number of chemicals to 36 and then in May 2022, to a total of 40. Due to the ozone depletion effects of MeBr, many of the pesticidal uses were phased out beginning in 2005 under the Montreal Protocol and Federal Clean Air Act. The use of MeBr for field fumigations in California ceased in 2017 when a critical use exemption specifying pre-plant fumigation expired. However, MeBr may still be used for quarantine and pre-shipment purposes for post-harvest commodities and field fumigations that follow CDFA NIPM 7. As was previously mentioned, the scientific objectives of the AMN focus on determining concentrations and comparing them to SLs and RTs. All the ambient air	

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		concentrations detected for methyl bromide were less than 1% of their SL or RT in 2023; therefore, this report does not include an analysis of potential sources of any detections. However, DPR has tracked 253 detections of MeBr (despite the marginal concentrations detected) since 2021, conducted a comprehensive investigation, and will publish findings on DPR's website.	
13	**From:** KK Organophosphates (OPs) are noted for their link to neurological impacts on developing brains, as researched in the CHAMACOS study in the Salinas Valley, and corroborated by a growing number of other studies. At least three OPs were detected at Ohlone School: malathion in two forms for a combined 6 times, DDVP 3 times, and phosmet, once. If those were different days, one in 5 sampling events had traces of an OP. Six more pesticides made the hit list: two pyrethroids, two herbicides, a fungicide, and an unclassified insecticide. All are possible or probable carcinogens, as are almost all of the above-mentioned toxins; for some, this may be what earned them a place on the monitoring list. Aside from the 4 fumigants and 2 OPs, none is particularly drift-prone, which means that air is not where they are most likely to be found. Some cling to soil particles and/or are persistent in the environment. Almost all are also groundwater contaminants, and it should be noted that Ohlone and the neighborhood behind it are on a small, local water system, as is most of north Monterey County. What we, the so-called residential bystanders know is that we live surrounded by a chemical soup of unknown impact to our health and to the future of life on this planet. Even if they are low, exposures are chronic, and in combinations with unknown interactions. Emerging science is revealing that some of us are more vulnerable physiologically and genetically. Mechanisms of	SL and RT are developed for individual pesticide exposures. No scientific methods exist to evaluate exposure to all pesticides, but DPR scientists are evaluating methods to study the cumulative impacts of groups of pesticides that affect the human body in the same way. DPR currently evaluates cumulative exposure from a group of pesticides called organophosphate pesticides. Our scientists calculate the collective impact of 15 organophosphates in each community using a 2-step procedure. First, we estimated a Hazard Quotient (HQ) for each OP by dividing the detected air concentration by its SL. Secondly, the OP cumulative exposure is calculated using a Hazard Index (HI) approach where all OP' HQs are added (Appendix G). Table 8 summarizes the highest calculated HI for each community and time period during monitoring, where HI equal or greater than 1.0 suggests the need for further evaluation. The highest Hazard Index in 2023 was 0.06 across all communities, showing that a summed SL was not exceeded for the combined 15 organophosphates compounds. In terms of carcinogens, the AMN program monitors six pesticides (this list is currently under revision) that are designated as known or probable carcinogens (Table 6-7). These calculations use the average concentration based on all years of data available from each	No action or changes are required for this comment.

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	action for carcinogenesis and reproductive and developmental harm are being found at exposure levels not yet determined. And chemicals are still mostly tested for effects of a single active ingredient. My analysis offered here is based mostly on one table in a single appendix. (I'm still waiting for the paper copy to arrive in the mail.) A cursory review of other appendices and the many tables and graphs did not alter my concerns. Providing graphs to accompany the trend tables is one suggestion for future reports. Correlations of the monitoring data with PUR figures for pesticide use in surrounding areas could help identify sources and potential mitigations. Explanations for recurrent and excessive detections should be forthcoming. Thanks for the opportunity to examine the data. From where I live, it's not a pretty picture.	community in Table 1. This shows that at DPR we are working on calculating and keep track of pesticide concentrations over time.	
14	**From:** KK Only Telone, chloropicrin, and the fungicide Captan were listed on the school notification for possible use on the nearby conventionally farmed field so yes, they drifted in from somewhere further away. Did they arrive on the sea wind from fields to the west, on upwelling breeze from the valley below, were they tracked in from homes of fieldworkers where pesticides are know to accumulate in dust? Teachers at schools by fields are characterized by DPR as equivalent to "residential bystanders" and not workers. Does working in an "enclosed space" protect them and the students from this myriad of toxins? This report fails to answer these questions.	Please see the response to comment #5 for a description of the objectives of the AMN. Captan, 1,3-D, and chloropicrin, as well as the other pesticides in the AMN, did not exceed SL or RT. The AMN does not propose hypotheses regarding any potential sources, because this requires a more refined evaluation. If concentrations exceed SL or RT, this will indicate that there is a need for a more refined evaluation. The refined evaluation typically will include a detailed analysis of pesticide use data, historical weather patterns, and field conditions. The evaluation may include an analysis conducted with air dispersion modeling. That refined evaluation will be presented in a separate report and may present hypotheses regarding any potential sources of detections.	No action or changes are required for this comment.

No.	COMMENT	RESPONSE	ACTION
15	**From:** CRLAF/CPR/PAN *Cancer risk estimates* It is deeply troubling to see that cumulative average air concentrations at all 4 AMN sites continue to exceed OEHHA Cancer No Significant Risk Level (NSRL) for 1,3 D.	The scientific objectives of the AMN focus on determining concentrations and comparing them to SL or RT. The cumulative average of 1,3-D concentrations at the four AMN sites are all below DPR's cancer-risk regulatory target of 0.56 ppb. Additionally, no exposure level (acute, subchronic, and chronic) was exceeded for 1,3-D in 2023. Regulations that went into effect on January 1, 2024 to address cancer and acute risks to non-occupational/residential bystanders have shown a 29 percent decrease in emissions due to changes in fumigation methods required by the 2024 regulations. Another regulation to address cancer risk to occupational bystanders, jointly and mutually developed with OEHHA is expected to go into effect on January 1, 2026. The additional mitigation outlined in that regulation, such as establishing buffer zone distances for various application methods, is expected to result in further decreases in 1,3-D emissions.	No action or changes are required for this comment.
16	**From:** EWG EWG recommends that it is in the public interest for DPR to reevaluate its pesticide screening levels to incorporate more recent toxicological data and evaluations from other organizations or agencies. We suggest several more specific comments to DPR below. *Improvements to comparing air concentrations to health-based screening levels* EWG recognizes that there are no existing standards or legal limits for pesticides in air in California, or nationwide, and applauds DPR for deriving health-based screening levels for the pesticides tested. However, consistent rereview of these	DPR's Human Health Assessment (HHA) Branch develops screening levels (SL) and regulatory targets (RT) for pesticides based on well-established, scientifically vetted methodologies. DPR continuously evaluates new data to ensure the most up to date scientific data is used in evaluations and scientific studies. AMN in cooperation with HHA is currently reviewing new toxicology data and updated approaches to revise all screening levels and to develop new screening levels for pesticides added to AMN.	No action or changes are required for this comment.

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	screening levels, especially when regulatory changes occur or new data emerges, would greatly improve their utility. For example, the Office of Environmental Health Hazard assessment recently calculated a cancer based no significant risk level for 1,3-D that is more health protective than the current value used by DPR. At the bare minimum, an additional comparison for 1,3-D with the OEHHA value should be included in the report. Another example is DCPA, for which the EPA recently reduced the reference dose by a factor of ten based on new evidence that lower doses of DCPA, when exposed during pregnancy, reduced fetal thyroid hormone levels[4]. Although DCPA was not detected at quantifiable levels, a reevaluation of the screening level is warranted, and serves as an example for when and how other screening levels should be reevaluated.		
17	**From:** EWG Specific consideration for the susceptibility of children to the harmful effects of pesticides should be included in the derivation of screening levels and calculations of cancer risk, especially since the air monitoring stations are present at schools and the locations for the sites were partially determined based on the population of children within the communities.	DPR scientists use a conservative approach taking into consideration children and uncertainty factors when establishing SL and RT.	No action or changes are required for this comment.
18	**From:** EWG Additionally, a cumulative cancer risk approach should be utilized as is done with toxic air contaminants, and EWG recommends utilizing a cancer risk threshold of 1 x 10^{6}, not 1 X 10^{5}.	DPR's language for the selected cancer risk level is in line with the range considered by other agencies, including US EPA, OEHHA, and World Health Organization, to be "negligible" or "low risk" (i.e. 10^{-5} to 10^{-6}).	No action or changes are required for this comment.

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19	**From:** CRLAF/CPR/PAN, EWG Captan and malathion should be added to the list of carcinogenic pesticides being monitored. Both are listed as carcinogens under Proposition 65 and Safe Harbor NSRLs have been set. Other chemicals, including captan and malathion, should also be added to the cancer risk estimates as they are listed on California's Proposition 65 list.	DPR continuously evaluates new data, to ensure the most up to date scientific data is used in evaluations and in reviewing scientific studies. DPR is working on updating the AMN carcinogen list and exposure levels, and these will be provided along with detailed documentation and justification for each value.	No action or changes are required for this comment.
20	**From:** CRLAF/CPR/PAN We understand that none of the detections exceeded DPR's screening levels or regulatory levels. However, the conclusion that the pesticide air levels monitored are "unlikely to be harmful to human health" is too far reaching because 1,3 D and chloropicrin air levels exceed target levels recommended by OEHHA at one or more locations. The statement "Screening levels are set well below the level at which health effects are expected to occur" is also clearly false for the MITC and Chloropicrin Acute 24-hour screening levels of 220 ppb and 73 ppb. The MITC acute screening level was set over OEHHA's objections because 220 ppb was the "no effects" level in a toxicology study, leaving no margin of error[1]. The DPR TAC report and risk assessment also established an 8-hour reference level of 22 ppb for protection against irritation to the eyes and respiratory system. We conclude that this should be adjusted to 7.3 ppb as a 24- hour target exposure level. We raised these concerns in comments on the 2019 and 2020-2022 Air Monitoring Reports, but no change has been made.	DPR is the leading state agency in pesticide monitoring and evaluations in the United States. DPR's Human Health Assessment (HHA) branch develops screening levels (SL) and regulatory targets (RT) for pesticides based on well-established, scientifically vetted methodologies. The current SLs were established more than 13 years ago. Since then, new toxicology studies became available for many of the AMN chemicals. In addition, HHA adopted new inhalation dosimetry methodology in its evaluations of inhaled toxicants, which reflects an improvement in scientific understanding compared to DPR's earlier default methodology used in 2011. The air program in cooperation with HHA is currently reviewing new toxicology data and updated approaches to revise all screening levels and to develop new screening levels for pesticides added to AMN. Furthermore, DPR has detailed the scientific reasoning for the selection of the chloropicrin and MITC acute regulatory targets in each pesticide's risk management directive. DPR's regulatory goal was to ensure that the use of these pesticides did not result in exposures that	No action or changes are required for this comment.

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	This Department response to our previous comments about the MITC Acute Screening Level in the finalized 2022 AMN report did not address any of the specific concerns we raised: "DPR's Regulatory Targets are established following a formal risk assessment of the chemical's toxicity and potential exposures, superseding Screening Levels." The acute regulatory target for chloropicrin of 73 ppb used in DPR AMN reports as a 24-hour average exposure target level was set in a Risk Management Directive (RMD) as an 8 hour average, so at the very least we conclude that it should be adjusted to 24.3 ppb as a 24 hour level. Furthermore, this 73 ppb target level was set in a RMD over the objection of OEHHA. The chloropicrin TAC report and risk assessment, which are also supported by OEHHA, include a 24 hour reference level of 0.92 ppb for protection of children. This Department response to our previous comments about the Chloropicrin Acute Screening Level does not address any of the specific concerns we raised: "This report does not encompass a discussion of toxicological studies or the factors considered in Risk Characterization Documents or Risk Management Directives, nor does it involve adjustments to the established 8-hour (e.g., 73 ppb as an 8-hour average for Chloropicrin) or 72-hour (e.g., 55 ppb as a 72-hour average for 1,3-D) levels." *Acute 24-hour Exposure and Screening Levels* Table 5 correctly notes that the Acute screening levels for Chloropicrin and MITC are 8-hour TWA levels rather than 24-hour TWAs. An adjustment should be made, however, because an 8 hour TWA concentration may not be protective for a 24 hour exposure. As detailed above, these regulatory target levels were set over the objections of OEHHA and are substantially higher than the reference levels derived in DPR Toxic Air Contaminant and Risk Characterizations.	cause recognizable eye or respiratory irritation. Both regulatory targets, as detailed in their respective risk management directives are set below levels at which health effects are expected to occur. Both levels are based on no observable effects levels. Click here for more information on the MITC regulatory target and here on the chloropicrin regulatory target. As a policy, DPR does not make adjustments to the established 8-hour regulatory targets for MITC and chloropicrin or the established 72-hour regulatory target for 1,3-D because the established exposure durations are resultant of toxicological endpoints, described in each pesticide's risk management directive.	

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21	**From:** CRLAF/CPR/PAN *Sub-chronic Exposure* We note that the response to our previous comment about change in averaging time for 1,3 D and chloropicrin does not address our concern that this change was not reviewed by OEHHA or subject to any other peer review: “In 2017, DPR’s HHA branch published the outcomes of their dedicated efforts, utilizing available data and evolving science to update Screening Levels for 1,3-D and Chloropicrin. Their analysis revealed that the appropriate sub-chronic Screening Level for 1,3-D is 3 ppb over a 13-week period. Similarly, for chloropicrin, the data indicated that the appropriate sub-chronic Screening Level is 0.35 ppb over a 13-week period.”	DPR is the leading state agency in pesticide monitoring and evaluations in the US, and the screening levels and regulatory targets utilized in the AMN report, including 1,3-D and Chloropicrin, have been established by expert toxicologists in DPR’s Human Health Assessment (HHA) branch. HHA develops exposure levels for pesticides based on well established, scientifically vetted methodologies, including the selection of toxicity endpoints, consideration of the uncertainties inherent to modern inhalation dosimetry, and the specific approaches used for detection. The air program in cooperation with HHA is currently reviewing new toxicology data and updated inhalation dosimetry approaches to revise all screening levels established in 2011 and to develop new screening levels for pesticides added to AMN.	No action or changes are required for this comment.
22	**From:** CRLAF/CPR/PAN *Cancer risk estimates* The chloropicrin reference concentration of 0.24 ppt for controlling cancer risk to the 1 in a million level was established in the DPR Chloropicrin TAC and Risk Characterization documents as the negligible risk level and was supported in review by OEHHA and the TAC Scientific Review Panel. DPR subsequently made a unilateral decision that chloropicrin cancer data was equivocal and that an additional study was needed to assess cancer risk. The second phase of this study is currently in process after repeated delays. In the meantime, we are left with great uncertainty about the cancer risk from exposure to chloropicrin.	This comment is outside the scope of AMN report. More details about chloropicrin can be found in this link in pages 2-4.	No action or changes are required for this comment.

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23	**From:** CRLAF/CPR/PAN *Appendix H: Comparison to Previous Years of AMN Data* Tables H-2 and H-3 which show trends of percent detections for total analyses should be deleted because this statistic is misleading and irrelevant.	We agree and Tables H-2 and H-3 were removed from the report for similar reasons that Tables 2-4 were removed from the report (see response to Comment #2).	Tables H-2 and H-3 were removed from page 84.
24	**From:** CRLAF/CPR/PAN These tables of historic air concentrations at each AMN site should list captan, fenproxymate, methomyl and pendimethalin as "-" or "not measured", not ND between 2019 and 2021 because they were not monitored until 2022.	Thank you for pointing this out. Non-detects (ND) for captan, fenpyroximate, methomyl and pendimethalin prior to 2022 were replaced with "--" since they were not monitored.	Changes were made on pages 84-101.

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25	**From:** WPH On behalf of the Western Plant Health Association (WPH), I am submitting these comments regarding the 2023 DPR Air Monitoring Network (AMN) report that was recently released. We believe the AMN report is an important tool in providing scientifically sound and objective information on the use of pesticides by farmers in California, and we appreciate the opportunity to comment on the report. WPH represents the interests of pesticide and fertilizer manufacturers, agricultural biotechnology providers, and agricultural retailers in California, Arizona, and Hawaii. DPR's AMN was begun in 2011 with the objective of scientifically establishing the concentration levels of pesticides in the atmosphere. The goal has been to help validate that pesticides are not contributing to air quality issues, or identify where and what products are exceeding health-protective screening levels and therefore may require additional mitigations. It is important to recognize the objective analysis that has been utilized from the start of the AMN and that DPR has maintained throughout the course of the program. We believe it is important to note that the integrity of the data and results is not simply based on DPRs collection and interpretation of data, but through DPRs collaboration with other independent agencies including the California Air Resources Board and the California Department of Food and Agriculture. WPH supports the scientific protocols that DPR has utilized for sampling frequency, site and community selection, sampling protocols, and data analysis. Utilizing these protocols, the 2023 results demonstrate that farmers are applying pesticides safely. As the results note, of the 40 pesticides and breakdown products monitored, the data found that 95% of all samples analyses had no detectable pesticides. Twenty-one of the pesticides were not detected at all, and 11 were detected at very low, trace levels which indicates unlikely risks to or impact on people's health. Of the seven pesticides that were detected at quantifiable levels, the detections fell below health-protective screening levels and regulatory targets. While these seven pesticides had quantifiable	Comment acknowledged.	No action or changes are required for this comment.

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	detections, no pesticide concentration exceeded its acute, sub-chronic, or chronic health-protective screening level or regulatory action level. As the report notes, this means that no pesticide concentrations found in the air were likely to be harmful to human health. WPH's intent in noting the results is not to infer that because of the positive results of the AMN that farmers should not continue to work to improve the use of products for the protection of workers and communities. But it demonstrates that the combined efforts of DPR, agricultural commissioners, agricultural groups and farmers has been successful, and that farmers do take the safe use of pesticide products of the utmost importance. The results also validate that current regulatory guidelines and programs are protective of California's residents. WPH believes it is important to recognize this effort, and thank DPR and its partner's ongoing efforts in helping to assure the safe use of pesticides. WPH does have some observations about delivering the results of the AMN. It appears that there are interests that for whatever reason simply will not accept the positive results of the AMN, and therefore will be critical of DPR identifying those results. We ask that DPR continue to release the balanced, objective information that the findings demonstrate, rather than what it appears some groups advocate for, burying the positive results in the back of the report and "leading with the negative." If DPR is to maintain its position of objective analyst, it should continue the balanced reporting that is currently utilized. We would not advocate for DPR to obscure negative results if identified, and so we ask that DPR not dismiss or "bury" positive results. DPR is scheduled to hold a webinar on December 12th to review the report and receive public comments related to the AMN. Again, despite indications that some individuals and groups will not view the AMN results objectively, we believe it is important that DPR provide the factual results of the AMN to the public. We would recommend that DPR provide more context to what the results mean and especially how and what the health-protective screening levels mean and how they are established. We recognize that this is a scientifically complex discussion, but if DPR could develop a		

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	layperson friendly explanation, it may be helpful to community members and to farmers. We would encourage DPR to explain the difference between a health-protective screening level and a regulatory action level. It is our observation that many participants to presentations do not understand the difference and believe that a quantifiable detection below the health-protective screening level is the same as a regulatory enforcement action level of detection. We believe that this kind of misunderstanding is contributing to fear by community members who are not receiving a valid explanation from other sources or are trying to interpret this information on their own. WPH also requests the participation of the California Council on Science and Technology (CCST) in the December webinar. DPR has provided some background on the CCST, and that the CCST's Fumigant Alternative Study will be used to supplement DPR's additional analysis of fumigants which is anticipated to be released in January. However, we believe it would be helpful to understand the role of the CCST in DPR's supplemental evaluation of fumigants, and the work that CCST has done in this area from representatives of that organization. While this will not satisfy individuals who simply will not accept the results of the AMN report, we are hopeful that the majority of individuals who participate are looking for objective information and so would benefit from CCST's participation. From the initiation of the AMN program the objective has been to "track trends in air concentrations over time." The monitoring and sampling protocols that DPR has utilized has achieved this objective, without compromising the program's scientific integrity. We recognize DPR's scientist's efforts to deliver an objective report, which helps provide regulatory bodies and farmers' guidance on areas that may require greater attention. We thank DPR for your consideration of our comments. If you have any questions, please feel free to call on us.		