AIR MONITORING NETWORK RESULTS FOR 2024

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For more information, visit *www.cdpr.ca.gov/environmental-monitoring/air-monitoring/* or contact us at *Air.Program@cdpr.ca.gov*

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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 is a statutorily required 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 chemicals monitored in the ambient air in 2024, thirteen pesticides were detected at quantifiable concentrations: the four fumigants chloropicrin, 1,3-dichloropropene, methyl bromide, and MITC, and the nine non-fumigants captan, DDVP, EPTC, fenpyroximate, malathion, malathion oa, methomyl, s-metolachor, and pendimethalin. 1,3-dichloropropene and methyl bromide were detected at all four monitoring stations, MITC, chloropicrin, and malathion were detected at three sites, pendimethalin and EPTC were detected at two sites, and captan, s-metolachor, malathion oa, methomyl, fenpyroximate, and DDVP were detected only at one site. DPR compares detections to health thresholds called screening levels (SL) or regulatory targets (RT) to determine if the detection could cause a health effect. The highest magnitudes of pesticide concentrations relative to their SL were 85.3% for MITC subchronic exposure in Shafter, 83.3% for MITC chronic exposure in Shafter, and 76.7% for chloropicrin subchronic exposure in Oxnard. No pesticide concentration exceeded its acute, subchronic, or chronic SL or RT in 2024, meaning that pesticide concentrations found in the air were unlikely to be harmful to human health.

The highest magnitudes of pesticide concentrations relative to their screening levels. The letters in the prentices indicate the associated exposure period: A = Acute, S = Subchronic, C = Chronic, and All = all three periods.

Chemical	Oxnard	Santa Maria	Shafter	Watsonville
1,3-dichloropropene	4% (S)	4% (S)	25% (S)	3% (S)
Chloropicrin	77% (S)	46% (S)	Trace	71% (S)
MITC	11% (C)	12% (C)	86% (S)	Trace
Methyl Bromide	1% (All)	1% (All)	1% (All)	1% (All)
DDVP	Trace	1% (All)	ND	Trace
Malathion	1% (All)	1% (All)	ND	1% (All)

Chemical	Oxnard	Santa Maria	Shafter	Watsonville
Malathion oa	Trace	1% (All)	ND	ND
Captan	5% (A)	Trace	Trace	Trace
EPTC	ND	1% (All)	1% (All)	ND
Fenpyroximate	ND	ND	1% (All)	ND
Methomyl	ND	1% (All)	ND	ND
s-Metolachlor	ND	ND	1% (All)	ND
Pendimethalin	1% (All)	ND	1% (All)	ND
Chlorothalonil	ND	Trace	ND	ND
Dacthal	ND	Trace	ND	ND
Permethrin	ND	Trace	ND	ND
Chlorpyrifos	ND	ND	Trace	ND
Chlorpyrifos oa	ND	ND	Trace	ND
Trifluralin	ND	ND	Trace	ND

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 (subchronic, 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. For some pesticides, DPR also has a threshold to measure against for exposures that could lead to lifetime cancer risk. DPR SL incorporates 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.

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ABBREVIATIONS

1,3-D = 1,3-dichloroprene

AMN = air monitoring network

CARB = California air resources board

CDFA = California department of food and agriculture

DPR = California department of pesticide regulation

HHA = DPR's human health assessment branch

MeBr = methyl bromide

MDL = method detection limit

MITC = methyl isothiocyanate

ND = non-detect

LOQ = limit of quantitation

OA = oxygen analog

PPB = parts per billion

RT = regulatory target

SL = screening level

USEPA = United States environmental protection agency

VOC = volatile organic compound

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, subchronic, chronic, and lifetime (when available) SL or RT.
- 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 sites to continue with AMN monitoring operation in 2021 and beyond. 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 on DPR's *Air Monitoring Network webpage.*

The air samples collected in the AMN are currently analyzed by the California Department of Food and Agriculture's Center for Analytical Chemistry (CDFA). All samples in the AMN have been analyzed by CDFA since 2020. Before 2020, samples were analyzed by either CDFA or the California Air Resources Board's Northern Laboratory Branch. In 2025, CDFA notified DPR that it had identified an error in the analyses conducted on samples collected via air canister between 2011 and 2024 *(CDFA 2025)*. The lab error resulted in the underreporting of 1,3-D and methyl bromide concentrations analyzed only by CDFA The 1,3-D and methyl bromide concentrations in this report were corrected based on the correction factors provided by CDFA *(CDPR 2025).*

Communities Monitored

In 2024, 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 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 2024.

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

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 stainless 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 14th volume of this study and contains the results from January 1 to December 31, 2024. Forty chemicals (pesticides and breakdown products) were monitored in the ambient air in 2024. The chemicals chlorpyrifos, chlorpyrifos oxygen analog (oa), endosulfan, endosulfan sulfate, methidathion, oxydemeton methyl, and pp-dicofol are no longer registered for use in California; however, DPR will continue monitoring these pesticides. Air concentrations throughout this report are expressed in parts per billion (ppb).

Tables 2-5 show the analytical results for the pesticides monitored by the AMN in 2024, and the results for each individual community are available below in Appendices A-D.

Pesticide Detections

A total of 8,192 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 2024. Of these, 221 resulted in quantifiable concentrations and 200 in trace detections. Quantifiable detections refer to concentrations above the limit of quantitation (LOQ), while Trace detections are measured concentrations above the method detection limit (MDL) but below the LOQ.

Of the 40 chemicals monitored in 2024:

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

Table 2. Pesticide detection frequency (and percentage out of valid samples) of quantifiable concentrations per monitoring station in 2024.

Chemical	Oxnard	Santa Maria	Shafter	Watsonville
1,3-dichloropropene	6 (12%)	14 (29%)	15 (29%)	7 (14%)
Captan	3 (6%)	0	0	0
Chloropicrin	18 (35%)	14 (28%)	0	10 (20%)
DDVP	0	2 (4%)	0	0
EPTC	0	1 (2%)	4 (8%)	0
Fenpyroximate	0	0	1 (2%)	0
MITC	10 (20%)	14 (27%)	20 (38%)	0
Malathion	2 (4%)	2 (4%)	0	1 (2%)
Malathion oa	0	1 (2%)	0	0
Methomyl	0	1 (2%)	0	0
Methyl Bromide	8 (16%)	8 (17%)	26 (51%)	9 (18%)
s-Metolachlor	0	0	1 (2%)	0
Pendimethalin	8 (15%)	0	15 (28%)	0

Pesticide Concentrations

Acute Exposure: Highest 24-hour concentrations

Table 3 lists the highest 24-hour concentrations at any site for the pesticides detected at a quantifiable concentration in 2024. None of the pesticides or breakdown products exceeded their respective acute SL or RT. The pesticides with the highest percentage of 24-hour air concentration compared to their acute exposure level were 1,3-D in Shafter with 13% and captan in Oxnard with 5%. All other compounds were less than 2% of their acute SL or RT in 2024. Detailed results for all pesticides and each individual community are available in Appendices A-D.

Table 3. Highest 24-hour air concentrations in ppb and percent of acute SL for pesticides detected at quantifiable concentrations per sampling station in 2024.

Chemical	Oxnard	Santa Maria	Shafter	Watsonville
1,3-dichloropropene	0.956 (2%)	0.395 (1%)	7.189 (13%)	0.444 (1%)
Captan	0.007 (5%)	Trace	Trace	Trace
Chloropicrin	0.839 (1%)	0.449 (1%)	Trace	1.057 (1%)
DDVP	Trace	0.011 (1%)	ND	Trace
EPTC	ND	0.009 (1%)	0.011 (1%)	ND
Fenpyroximate	ND	ND	0.001 (1%)	ND
MITC	0.235 (1%)	0.122 (1%)	3.330 (2%)	Trace
Malathion	0.002 (1%)	0.008 (1%)	ND	0.001 (1%)
Malathion oa	Trace	0.001 (1%)	ND	ND
Methomyl	ND	0.007 (1%)	ND	ND
Methyl Bromide	0.023 (1%)	0.025 (1%)	0.042 (1%)	0.045 (1%)
s-Metolachlor	ND	ND	0.002 (1%)	ND
Pendimethalin	0.006 (1%)	ND	0.004 (1%)	ND

Subchronic Exposure: Highest rolling 4-13-week average concentrations

Subchronic (seasonal) concentrations for 1,3-D and chloropicrin are averaged every 13 weeks (CDPR 2016b), while the remaining 38 chemicals are averaged every 4 weeks. None of the pesticides or breakdown products exceeded their respective subchronic SL or RT in 2024 (Table 4). The pesticides with the highest rolling average percentages compared to their subchronic exposure levels were MITC (86%) in Shafter, and chloropicrin in Oxnard (77%), Watsonville (71%), and Santa Maria (46%), and 1,3-D (25%) in Shafter. All other compounds were 8% or less than their subchronic SL or RT in 2024. Detailed results for all pesticides and each individual community are available in Appendices A-D.

Table 4. Highest 4-13-week rolling average concentrations in ppb and percent of SL for pesticides detected at quantifiable concentrations in 2024.

Chemical	Oxnard	Santa Maria	Shafter	Watsonville
1,3-dichloropropene	0.123 (4%)	0.123 (4%)	0.738 (25%)	0.092 (3%)
Captan	0.004 (3%)	Trace	Trace	Trace
Chloropicrin	0.268 (77%)	0.156 (45%)	Trace	0.246 (70%)
DDVP	Trace	0.003 (1%)	ND	Trace
EPTC	ND	0.002 (1%)	0.003 (1%)	ND
Fenpyroximate	ND	ND	0.001 (1%)	ND
MITC	0.065 (7%)	0.077 (8%)	0.856 (86%)	Trace
Malathion	0.001 (1%)	0.002 (1%)	ND	0.001 (1%)
Malathion oa	Trace	0.001 (1%)	ND	ND
Methomyl	ND	0.002 (1%)	ND	ND
Methyl Bromide	0.018 (1%)	0.018 (1%)	0.034 (1%)	0.025 (1%)
s-Metolachlor	ND	ND	0.001 (1%)	ND
Pendimethalin	0.005 (1%)	ND	0.002 (1%)	ND

Chronic Exposure: Highest 1-year average concentrations

Table 5 presents the annual average concentrations for each chemical detected at a quantifiable concentration and its respective chronic SL. None of the pesticides or breakdown products exceeded their respective chronic SL in 2024. The pesticides with the highest annual average concentrations relative to their chronic SL were MITC in Shafter, Santa Maria, and Oxnard with 83%, 12%, and 11%, respectively; followed by chloropicrin in Oxnard, Watsonville, and Santa Maria with 30%, 25%, and 21%, respectively; followed by 1,3-D in Shafter with 11%. All other combinations of chemicals-location were less than 2% of their chronic SL in 2024. Detailed results for all pesticides and each individual community are available in Appendices A-D.

Table 5. Highest 1-year average air concentrations in ppb and percent of SL for pesticides detected at quantifiable concentrations in 2024.

Chemical	Oxnard	Santa Maria	Shafter	Watsonville
1,3-dichloropropene	0.036 (2%)	0.04 (2%)	0.211 (11%)	0.028 (1%)
Captan	0.001 (1%)	Trace	Trace	Trace
Chloropicrin	0.082 (30%)	0.056 (21%)	Trace	0.068 (25%)
DDVP	Trace	0.001 (1%)	ND	Trace
EPTC	ND	0.001 (1%)	0.001 (1%)	ND
Fenpyroximate	ND	ND	0.001 (1%)	ND
MITC	0.011 (11%)	0.012 (12%)	0.084 (84%)	Trace
Malathion	0.001 (1%)	0.001 (1%)	ND	0.001 (1%)
Malathion oa	Trace	0.001 (1%)	ND	ND
Methomyl	ND	0.001 (1%)	ND	ND
Methyl Bromide	0.006 (1%)	0.006 (1%)	0.01 (1%)	0.006 (1%)
s-Metolachlor	ND	ND	0.001 (1%)	ND
Pendimethalin	0.001 (1%)	ND	0.001 (1%)	ND

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 2024, 1,3-dichloropropene and DDVP were detected at quantifiable concentrations, hence their annual average concentrations and cancer risk estimates were calculated (Table 8). 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 in 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:

$$\text{Cancer Risk} = \text{nBR} * \text{LAC} * \text{CPF}_{\text{H}}$$

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)
- 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 CPF_H values of the pesticides detected at quantifiable concentrations in 2024 are:

- 1,3-D: CPF_{H} = 0.014 $(\text{mg/kg/day})^{-1}$ (CDPR, 2015).
- DDVP: CPF_{H} = 0.35 $(\text{mg/kg/day})^{-1}$ (CDPR, 1996).

Tables 6-7 depict the historic average concentrations and cancer risk estimates for 1,3-dichloropropene and DDVP. In 2016, DPR set the lifetime regulatory target for 1,3-D at 0.56 ppb (2,600 ng/m^3) for residential bystanders (CDPR 2016a).

Table 6. Cumulative average concentration in ppb, cancer risk estimate, cancer risk target, and percentage of risk target for 1,3-dichloropropene at each sampling location as of 2024.

Community	Average Concentration	Cancer Risk Estimate	Cancer Risk Target	Percent of Target
Oxnard	0.10	1.8e-06	1e-05	18 %
Santa Maria	0.11	2.0e-06	1e-05	20 %
Shafter	0.50	9.0e-06	1e-05	90 %
Watsonville	0.087	1.5e-06	1e-05	15 %

Table 7. Cumulative average concentration in ppb, cancer risk estimate, cancer risk target, and percentage of risk target for DDVP at each sampling location as of 2024.

Community	Average Concentration	Cancer Risk Estimate	Cancer Risk Target	Percent of Target
Oxnard	0.0002	1.4e-07	1e-05	1.4 %
Santa Maria	0.0005	4.6e-07	1e-05	4.6 %
Shafter	0.0001	1.1e-07	1e-05	1.1 %
Watsonville	0.0002	1.6e-07	1e-05	1.6 %

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: acephate, bensulide, chlorpyrifos, chlorpyrifos oa, DDVP, DEF, diazinon, diazinon oa, dimethoate, dimethoate oa, malathion, malathion oa, methidathion, oxydemeton methyl, and 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 2024. Both the acute and subchronic 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 2024. 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 HI in 2024.

Community	Acute HI	Subchronic HI	Chronic HI
Oxnard	0.04	0.05	0.02
Santa Maria	0.03	0.03	0.03
Shafter	0.03	0.03	0.02
Watsonville	0.02	0.03	0.02

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 above 65 years of age. The Oxnard Plain is primarily known for strawberry production. The monitoring site 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 provide 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 sampling site in 2024. The chemicals with the highest number of quantifiable detections were chloropicrin (n=18, 35.3%) and MITC (n=10, 19.6%).

Table A–1. Number and percentage of samples per chemical in Oxnard in 2024.

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	51	10	6	19.6 %	11.8 %
Captan	52	11	3	21.2 %	5.8 %
Chloropicrin	51	20	18	39.2 %	35.3 %
DDVP	52	1	0	1.9 %	0 %
MITC	51	23	10	45.1 %	19.6 %
Malathion	52	5	2	9.6 %	3.8 %
Malathion oa	52	4	0	7.7 %	0 %
Methyl Bromide	51	26	8	51 %	15.7 %
Pendimethalin	52	16	8	30.8 %	15.4 %
Acephate	52	0	0	0 %	0 %
Bensulide	52	0	0	0 %	0 %
Chlorothalonil	52	0	0	0 %	0 %
Chlorpyrifos	52	0	0	0 %	0 %

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Chlorpyrifos oa	52	0	0	0 %	0 %
Cypermethrin	52	0	0	0 %	0 %
DEF	52	0	0	0 %	0 %
Dacthal	52	0	0	0 %	0 %
Diazinon	52	0	0	0 %	0 %
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	0	0	0 %	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 %
Methidathion	52	0	0	0 %	0 %
Methomyl	52	0	0	0 %	0 %
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 %
Permethrin	52	0	0	0 %	0 %
Phosmet	52	0	0	0 %	0 %
Propargite	52	0	0	0 %	0 %
Simazine	51	0	0	0 %	0 %
Trifluralin	52	0	0	0 %	0 %
pp-dicofol	52	0	0	0 %	0 %
Total	2,075	116	55	5.6 %	2.7 %

Pesticide Concentrations

Acute (24-hour) Concentrations

The thresholds (SL or RT) for acute exposure levels for all evaluated chemicals are based on 24-hour time-weighted average (TWA) values, except for 1,3-D, which uses a 72-hour TWA, and chloropicrin and MITC, which use 8-hour TWA values. Additionally, 1,3-D, chloropicrin, methyl bromide, and MITC have acute RT rather than SL. In Oxnard, the highest concentration relative to its acute exposure level was that of captan at 4.8%. The remaining chemicals were detected at less than 2% of their SL or RT in 2024.

Table A–2. Highest 24-hour air concentrations in ppb, acute SL, and percent of the acute SL for chemicals with quantifiable or trace detections in Oxnard in 2024.

Chemical	Detection date	Highest 24-h concentration	24-hour acute SL	Percent of acute SL
1,3-dichloropropene	07/25/2024	0.96	55	1.7 %
Captan	03/26/2024	0.007	0.15	4.8 %
Chloropicrin	06/28/2024	0.84	73	1.1 %
Malathion	05/29/2024	0.002	8.3	0.02 %
Methyl Bromide	12/18/2024	0.023	210	0.01 %
MITC	06/20/2024	0.24	220	0.11 %
Pendimethalin	09/30/2024	0.006	150	0.01 %
DDVP		Trace	1.2	
Malathion oa		Trace	8.8	

Subchronic (4-13-week) Concentrations

The subchronic (seasonal) concentrations for 1,3-dichloropropene and chloropicrin are averaged every 13 weeks (CDPR 2016b), while the subchronic concentrations of the remaining 38 chemicals are averaged every 4 weeks (Table A–3). Additionally, methyl bromide has a subchronic RT rather than SL. The pesticide with the highest rolling average percentages compared to their subchronic exposure levels was chloropicrin (76.7%). All other compounds were less than 7% of their subchronic SL or RT.

Table A–3. Highest 4-13-week rolling average air concentrations in ppb, subchronic SL, and percent of the subchronic SL for chemicals with quantifiable or trace detections in Oxnard in 2024.

Chemical	Detection date	Highest 4-13-w concentration	4-13-week subchronic SL	Percent of subchronic SL
1,3-dichloropropene	08/06/2024	0.12	3	4.1 %

Chemical	Detection date	Highest 4-13-w concentration	4-13-week subchronic SL	Percent of subchronic SL
Captan	04/08/2024	0.004	0.11	3.4 %
Chloropicrin	09/09/2024	0.27	0.35	76.7 %
Malathion	05/29/2024	0.001	6	0.01 %
Methyl Bromide	12/23/2024	0.018	5	0.35 %
MITC	07/11/2024	0.065	1	6.5 %
Pendimethalin	10/11/2024	0.005	49	0.01 %
DDVP		Trace	0.24	
Malathion oa		Trace	6.3	

Chronic (annual) Concentrations

Table A–4 shows the annual average concentration for all chemicals monitored at the Oxnard sampling site in 2024. The pesticides with the highest concentrations relative to their chronic exposure levels were chloropicrin at 30.4% and MITC at 11.4%. All other monitored chemicals were less than 2% of their chronic screening level.

Table A–4. Annual average air concentrations in ppb, chronic SL, and percent of the chronic SL for chemicals with quantifiable or trace detections in Oxnard in 2024.

Chemical	Annual 1-y concentration	1-year chronic SL	Percent of chronic SL
1,3-dichloropropene	0.036	2	1.8 %
Captan	0.001	0.037	1.5 %
Chloropicrin	0.082	0.27	30.4 %
Malathion	0.001	0.6	0.022 %
Methyl Bromide	0.006	1	0.6 %
MITC	0.011	0.1	11.4 %
Pendimethalin	0.001	49	0.001 %
DDVP	Trace	0.085	
Malathion oa	Trace	0.63	

Trends in Detected Concentrations

Concentrations over time for chemicals detected at quantifiable concentrations in Oxnard in 2024.

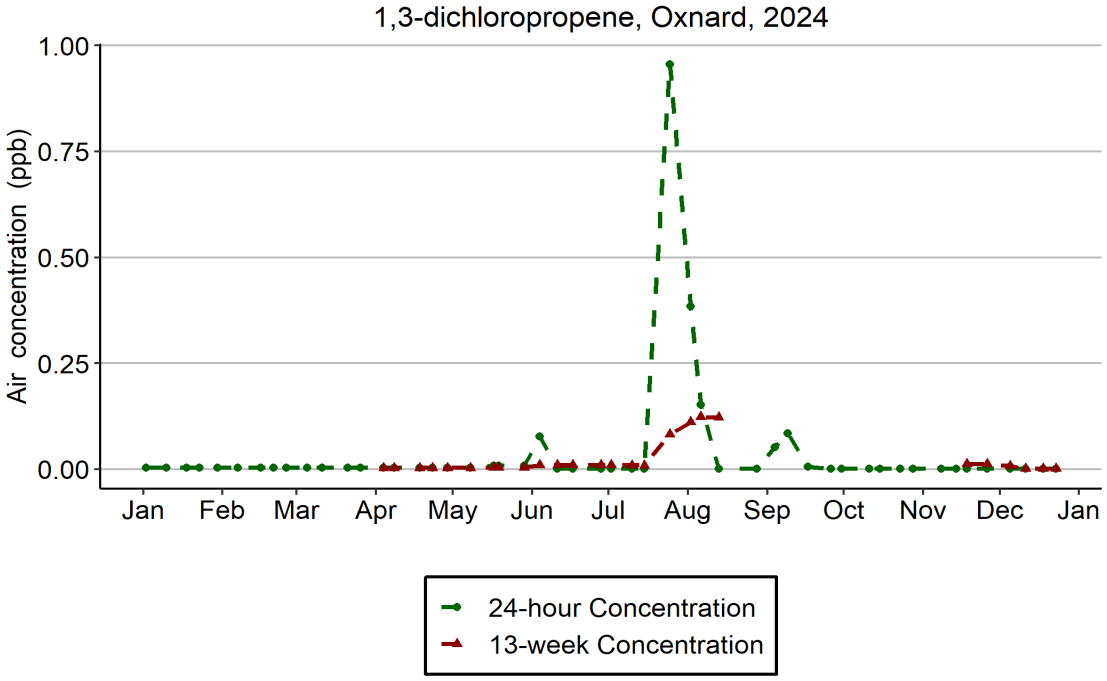

Figure A-1. Temporal trend in 1,3-dichloropropene concentrations in Oxnard in 2024 (Acute RT = 55 ppb ; Subchronic SL = 3 ppb).

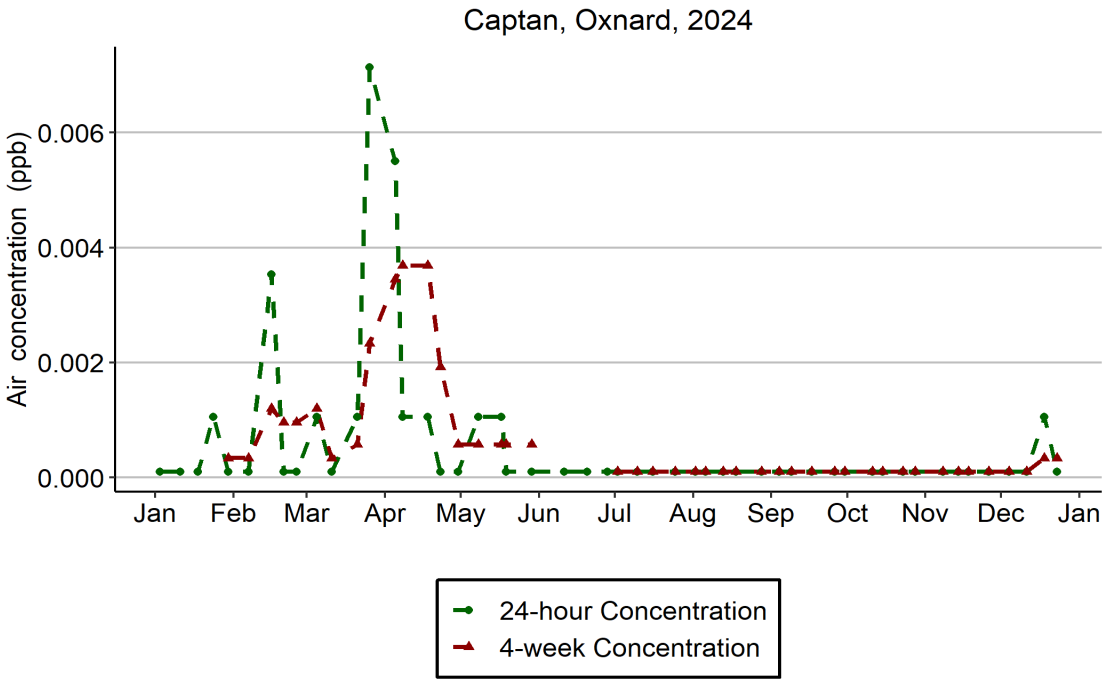

Figure A-2. Temporal trend in captan concentrations in Oxnard in 2024 (Acute SL = 0.15 ppb ; Subchronic SL = 0.11 ppb).

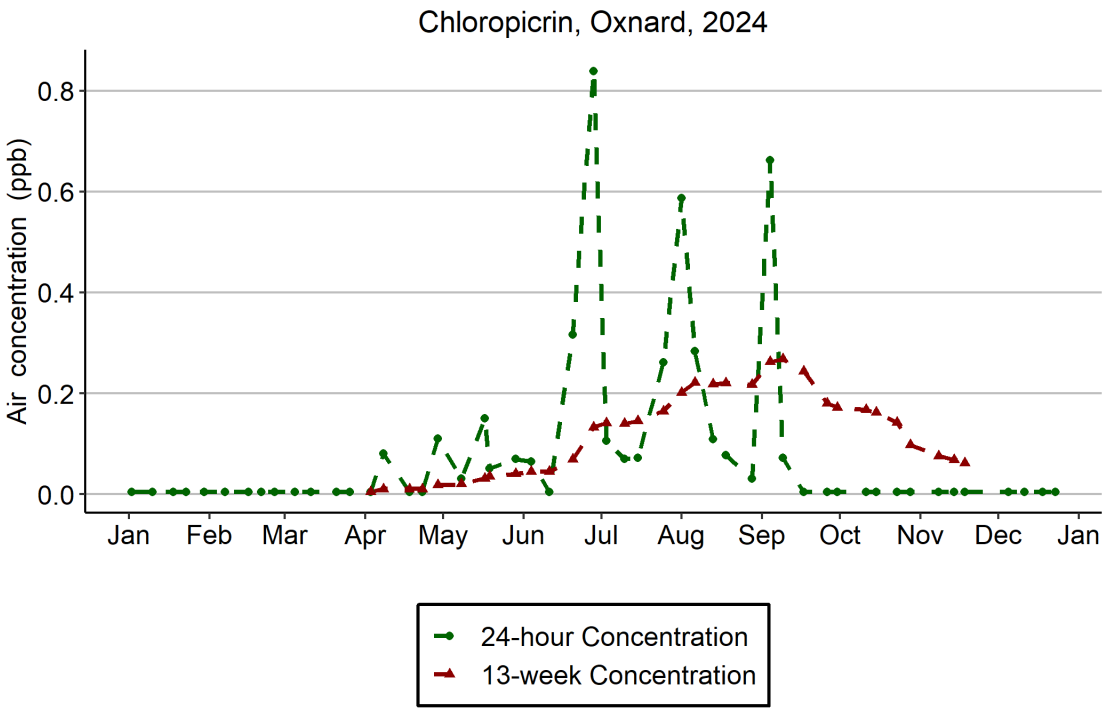

Figure A-3. Temporal trend in Chloropicrin concentrations in Oxnard in 2024 (Acute RT = 73 ppb ; Subchronic SL = 0.35 ppb).

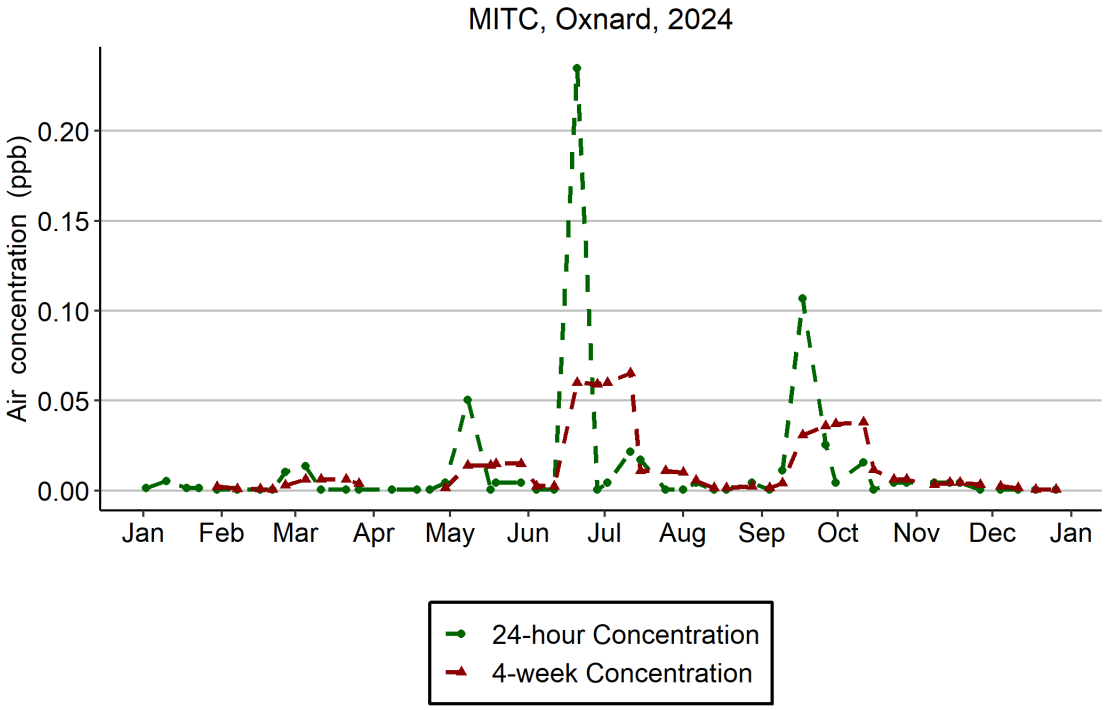

Figure A-4. Temporal trend in MITC concentrations in Oxnard in 2024 (Acute RT = 220 ppb ; Subchronic SL = 1 ppb).

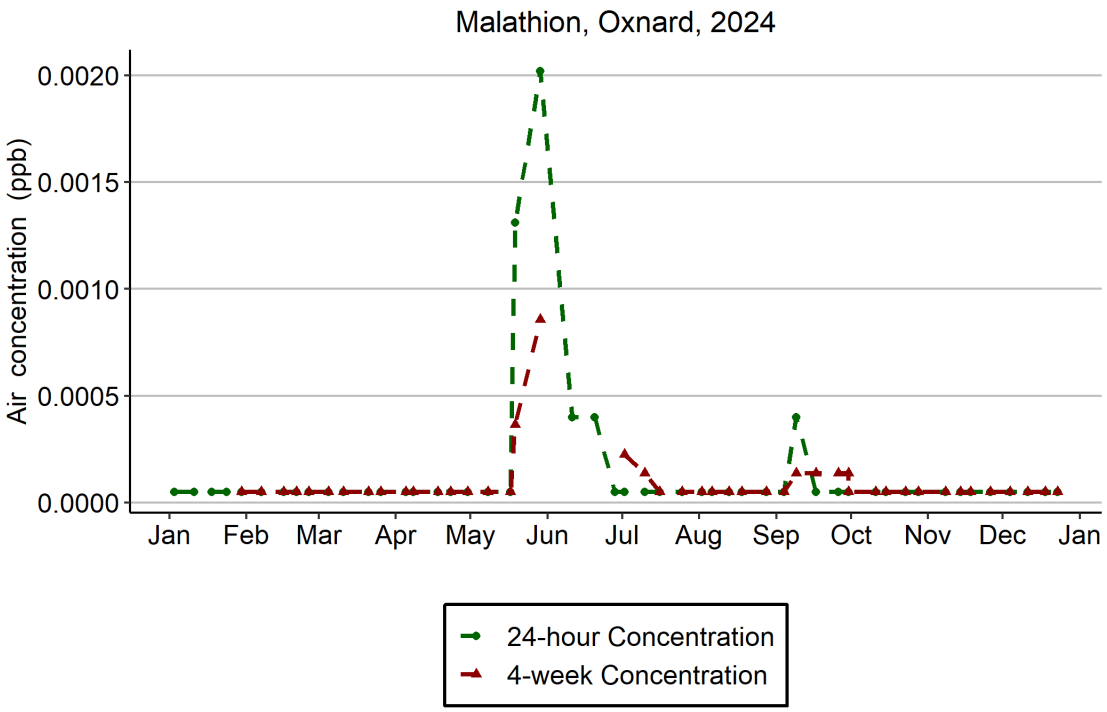

Figure A-5. Temporal trend in Malathion concentrations in Oxnard in 2024 (Acute SL = 8.3 ppb ; Subchronic SL = 6 ppb).

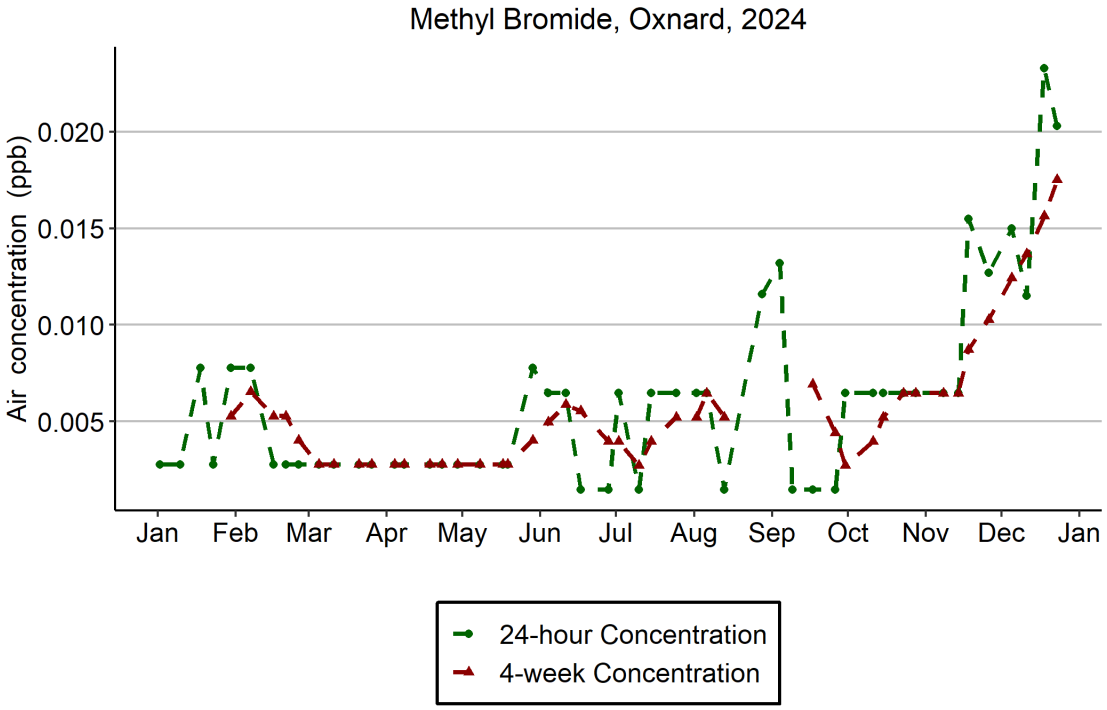

Figure A-6. Temporal trend in Methyl Bromide concentrations in Oxnard in 2024 (Acute RT = 210 ppb ; Subchronic RT = 5 ppb).

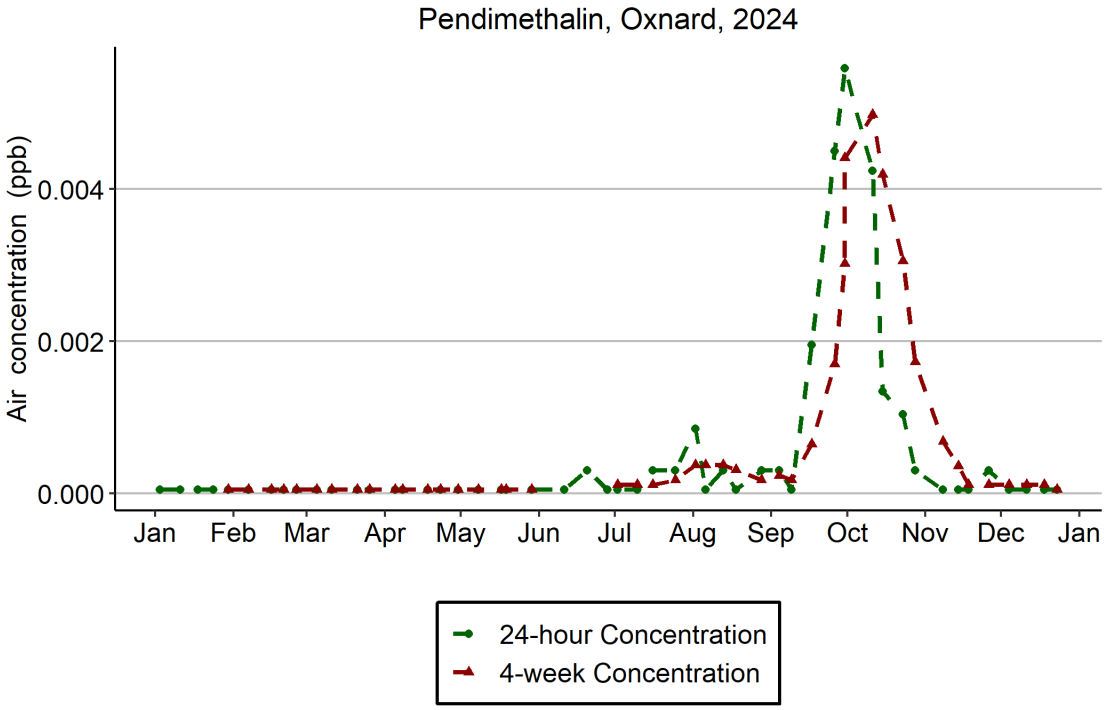

Figure A-7. Temporal trend in Pendimethalin concentrations in Oxnard in 2024 (Acute SL = 150 ppb ; Subchronic SL = 49 ppb).

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 site 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 sampling location.

Pesticide Detections

Table B–1 lists the number and percentage of analyses resulting in detections at the Santa Maria AMN sampling site in 2024. The chemical with the highest number of quantifiable detections was 1,3-D (n=14, 29.2%), followed by chloropicrin (n=14, 28%), and MITC (n=14, 27.5%).

Table B–1. Number and percentage of samples per chemical in Santa Maria in 2024.

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	48	15	14	31.2 %	29.2 %
Captan	50	4	0	8 %	0 %
Chloropicrin	50	25	14	50 %	28 %
Chlorothalonil	50	4	0	8 %	0 %
DDVP	50	7	2	14 %	4 %
Dacthal	50	5	0	10 %	0 %
EPTC	50	1	1	2 %	2 %
MITC	51	19	14	37.3 %	27.5 %
Malathion	50	15	2	30 %	4 %
Malathion oa	50	2	1	4 %	2 %
Methomyl	50	2	1	4 %	2 %
Methyl Bromide	48	16	8	33.3 %	16.7 %
Permethrin	50	2	0	4 %	0 %

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Acephate	50	0	0	0 %	0 %
Bensulide	50	0	0	0 %	0 %
Chlorpyrifos	50	0	0	0 %	0 %
Chlorpyrifos oa	50	0	0	0 %	0 %
Cypermethrin	50	0	0	0 %	0 %
DEF	50	0	0	0 %	0 %
Diazinon	50	0	0	0 %	0 %
Diazinon oa	50	0	0	0 %	0 %
Dimethoate	50	0	0	0 %	0 %
Dimethoate oa	50	0	0	0 %	0 %
Diuron	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 %
Methidathion	50	0	0	0 %	0 %
S-Metolachlor	50	0	0	0 %	0 %
Norflurazon	50	0	0	0 %	0 %
Oryzalin	50	0	0	0 %	0 %
Oxydemeton Methyl	50	0	0	0 %	0 %
Oxyfluorfen	50	0	0	0 %	0 %
Pendimethalin	50	0	0	0 %	0 %
Phosmet	50	0	0	0 %	0 %
Propargite	50	0	0	0 %	0 %
Simazine	50	0	0	0 %	0 %
Trifluralin	50	0	0	0 %	0 %
pp-dicofol	50	0	0	0 %	0 %
Total	1,997	117	57	5.9 %	2.9 %

Pesticide Concentrations

Acute (24-hour) Concentrations

The thresholds (SL or RT) for acute exposure levels for all evaluated chemicals are based on 24-hour time-weighted average (TWA) values, except for 1,3-D, which uses a 72-hour TWA, and chloropicrin and MITC, which use 8-hour TWA values. Additionally, 1,3-D, chloropicrin, methyl bromide, and MITC have acute RT rather than SL.In Santa Maria, all chemicals with quantifiable concentrations were detected at less than 1% of their SL or RT in 2024.

Table B–2 Highest 24-hour air concentrations in ppb, acute SL, and percent of the acute SL for chemicals with quantifiable or trace detections in Santa Maria in 2024.

Chemical	Detection date	Highest 24-h concentration	24-hour acute SL	Percent of acute SL
1,3-dichloropropene	09/30/2024	0.4	55	0.72 %
Chloropicrin	09/30/2024	0.45	73	0.62 %
DDVP	07/05/2024	0.011	1.2	0.88 %
EPTC	03/26/2024	0.010	29.7	0.032 %
Malathion	04/29/2024	0.008	8.3	0.099 %
Malathion oa	04/29/2024	0.001	8.8	0.010 %
Methomyl	05/17/2024	0.008	4.8	0.16 %
Methyl Bromide	11/24/2024	0.025	210	0.012 %
MITC	09/30/2024	0.12	220	0.055 %
Captan		Trace	0.15	
Chlorothalonil		Trace	3.1	
Dacthal		Trace	1,732	
Permethrin		Trace	10.5	

Subchronic (4-13-week) Concentrations

The subchronic (seasonal) concentrations for 1,3-dichloropropene and chloropicrin are averaged every 13 weeks (CDPR 2016b), while the subchronic concentrations of the remaining 38 chemicals are averaged every 4 weeks (Table B–3). Additionally, methyl bromide has a subchronic RT rather than SL. The pesticides with the highest rolling average percentages compared to their subchronic exposure levels were chloropicrin (44.6%) and MITC (7.6%). All other compounds were 1% or less than their subchronic SL.

Table B–3. Highest 4-13-week rolling average air concentrations in ppb, subchronic SL, and percent of the subchronic SL for chemicals with quantifiable or trace detections in Santa Maria in 2024.

Chemical	Detection date	Highest 4-13-w concentration	4-13-week subchronic SL	Percent of subchronic SL
1,3-dichloropropene	12/04/2024	0.12	3	4.1 %
Chloropicrin	11/15/2024	0.16	0.35	44.6 %
DDVP	07/05/2024	0.003	0.24	1.1 %
EPTC	03/26/2024	0.003	3.1	0.08 %
Malathion	05/21/2024	0.002	6	0.04 %
Malathion oa	04/29/2024	0.001	6.3	0.004 %
Methomyl	05/21/2024	0.002	4.8	0.043 %
Methyl Bromide	12/04/2024	0.018	5	0.36 %
MITC	10/16/2024	0.077	1	7.6 %
Captan		Trace	0.11	
Chlorothalonil		Trace	3.1	
Dacthal		Trace	34.6	
Permethrin		Trace	5.6	

Chronic (annual) Concentrations

Table B–4 shows the annual average concentration for all chemicals monitored at the Santa Maria sampling site in 2024. The pesticide with highest concentration relative to its chronic exposure level was that of chloropicrin at 20.8%, followed by MITC at 12.2%. All other monitored chemicals were less than 2% of their chronic screening level.

Table B–4. Annual average air concentrations in ppb, chronic SL, and percent of the chronic SL for chemicals with quantifiable or trace detections in Santa Maria in 2024.

Chemical	Annual 1-y concentration	1-year chronic SL	Percent of chronic SL
1,3-dichloropropene	0.04	2	2 %
Chloropicrin	0.056	0.27	20.8 %
DDVP	0.001	0.085	0.63 %
EPTC	0.001	1.1	0.031 %

Chemical	Annual 1-y concentration	1-year chronic SL	Percent of chronic SL
Malathion	0.001	0.6	0.067 %
Malathion oa	0.001	0.63	0.012 %
Methomyl	0.001	4.8	0.001 %
Methyl Bromide	0.001	1	0.59 %
MITC	0.012	0.1	12.2 %
Captan	Trace	0.037	
Chlorothalonil	Trace	3.1	
Dacthal	Trace	3.5	
Permethrin	Trace	5.6	

Trends in Detected Concentrations

Concentrations over time for chemicals detected at quantifiable concentrations in Santa Maria in 2024.

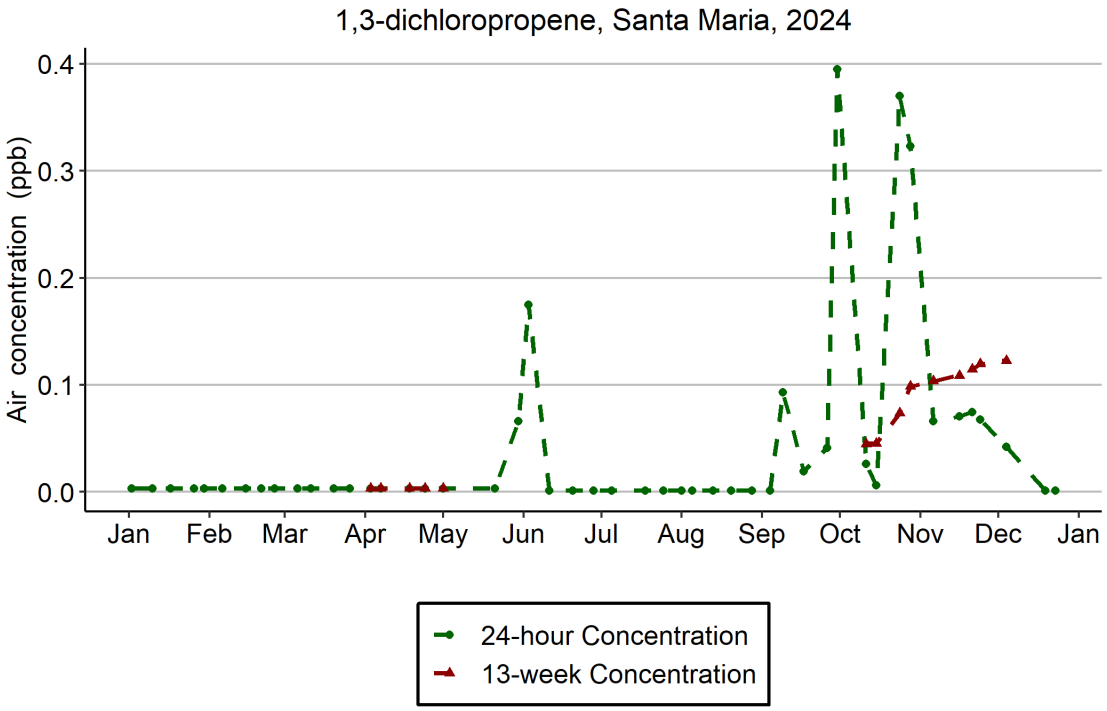

Figure B-1. Temporal trend in 1,3-dichloropropene concentrations in Santa Maria in 2024 (Acute RT = 55 ppb ; Subchronic SL = 3 ppb).

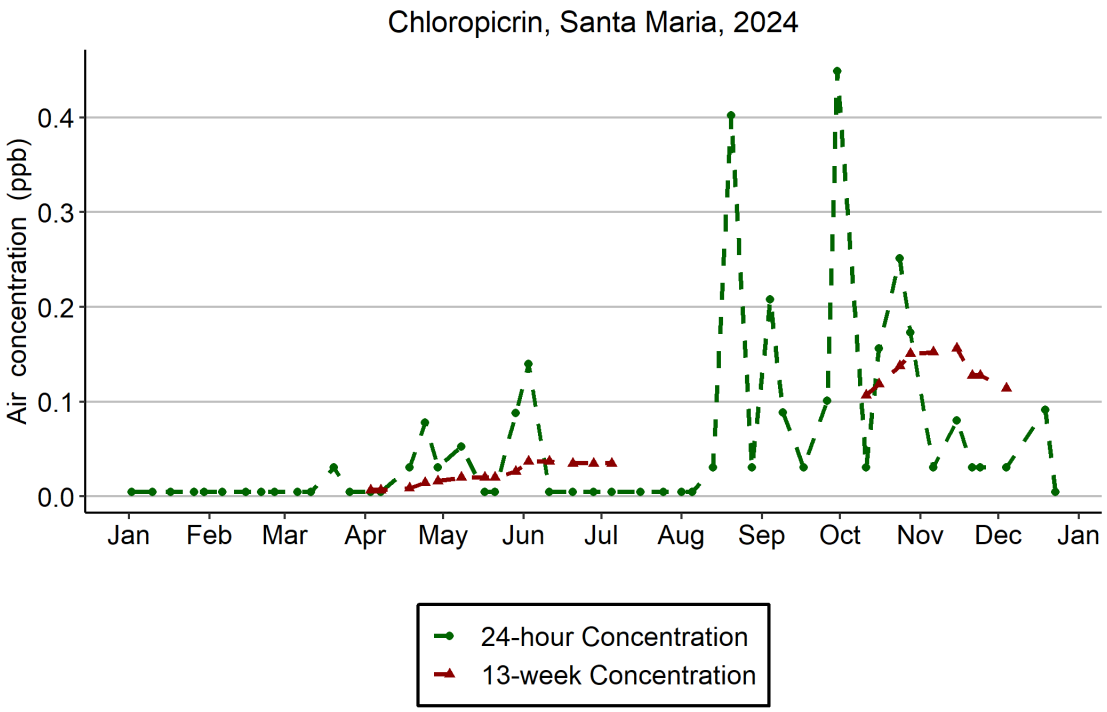

Figure B-2. Temporal trend in Chloropicrin concentrations in Santa Maria in 2024 (Acute RT = 73 ppb ; Subchronic SL = 0.35 ppb).

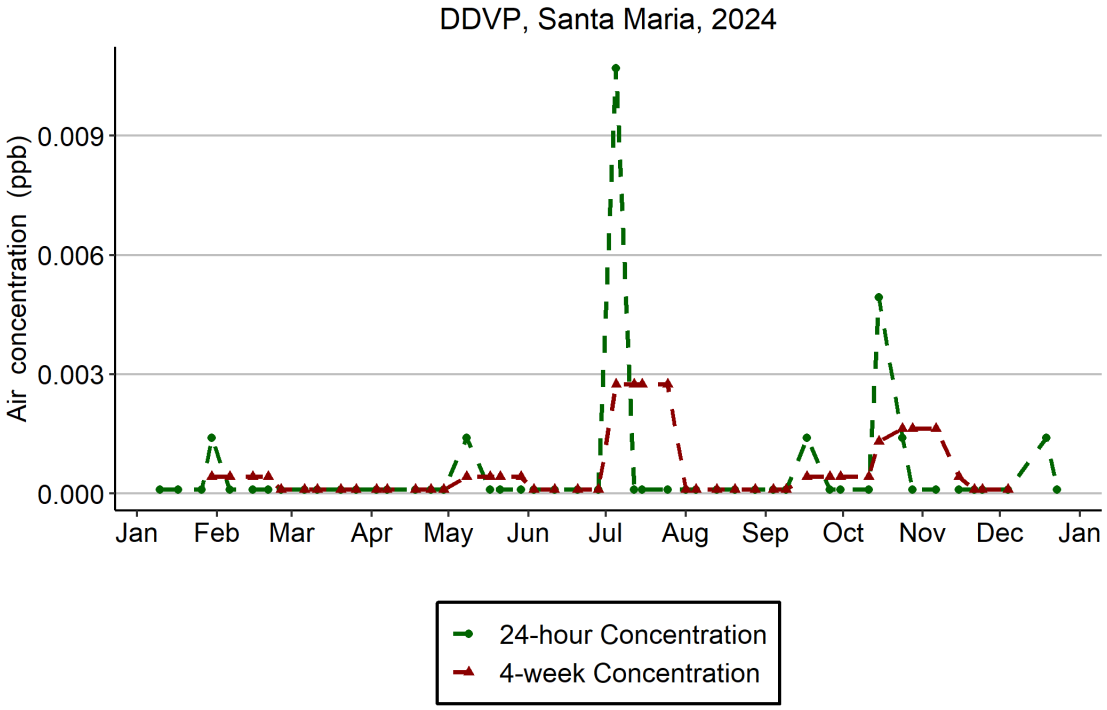

Figure B-3. Temporal trend in DDVP concentrations in Santa Maria in 2024 (Acute SL = 1.2 ppb ; Subchronic SL = 0.24 ppb).

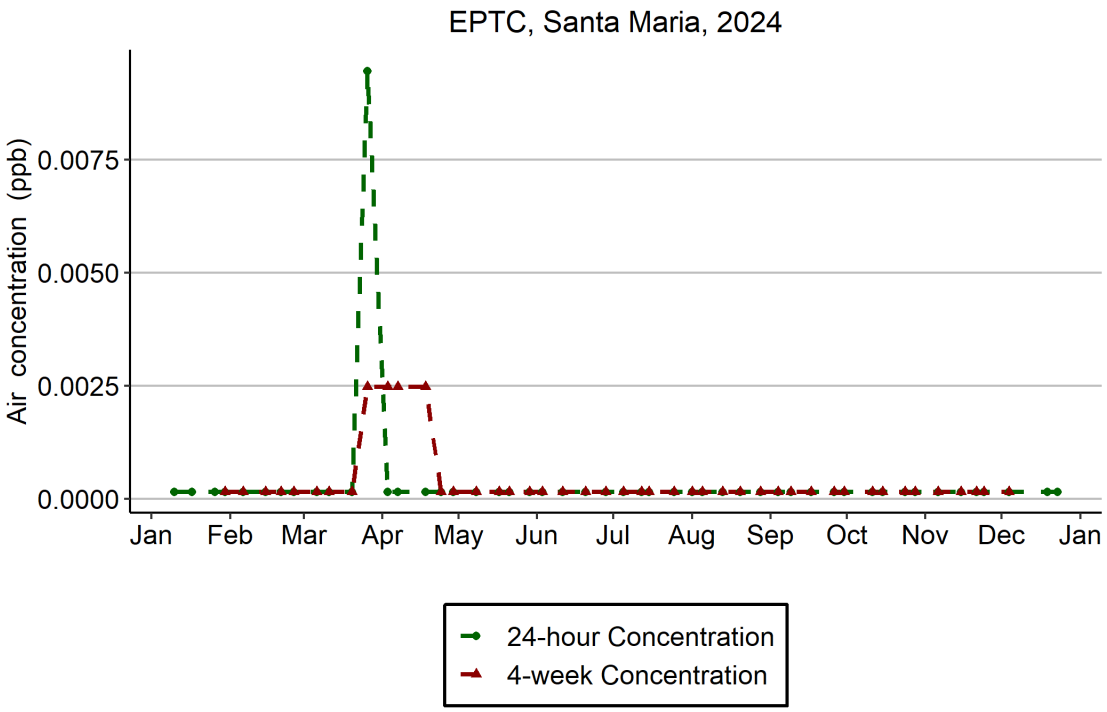

Figure B-4. Temporal trend in EPTC concentrations in Santa Maria in 2024 (Acute SL = 29.7 ppb ; Subchronic SL = 3.1 ppb).

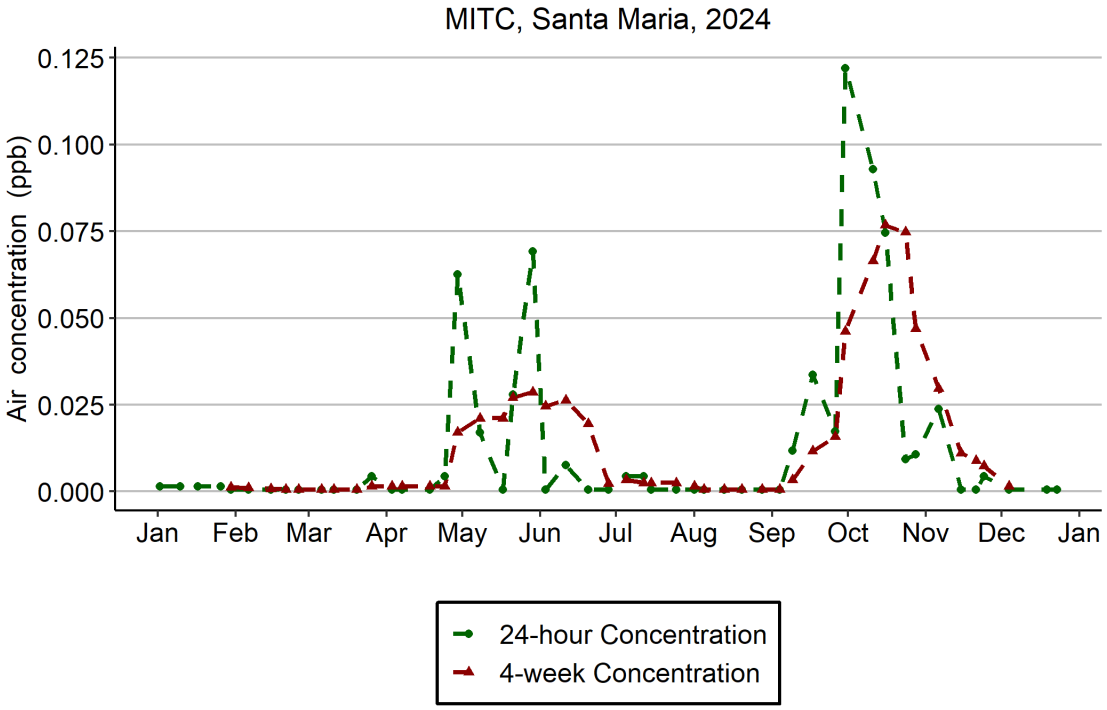

Figure B-5. Temporal trend in MITC concentrations in Santa Maria in 2024 (Acute RT = 220 ppb ; Subchronic SL = 1 ppb).

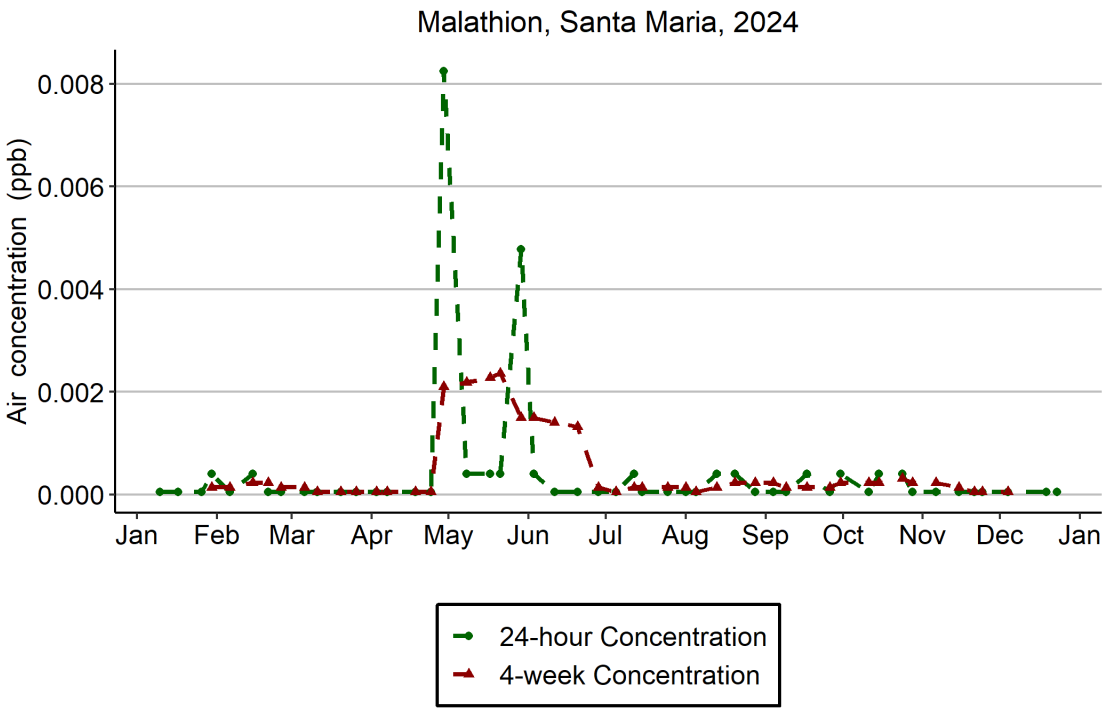

Figure B-6. Temporal trend in Malathion concentrations in Santa Maria in 2024 (Acute SL = 8.3 ppb ; Subchronic SL = 6 ppb).

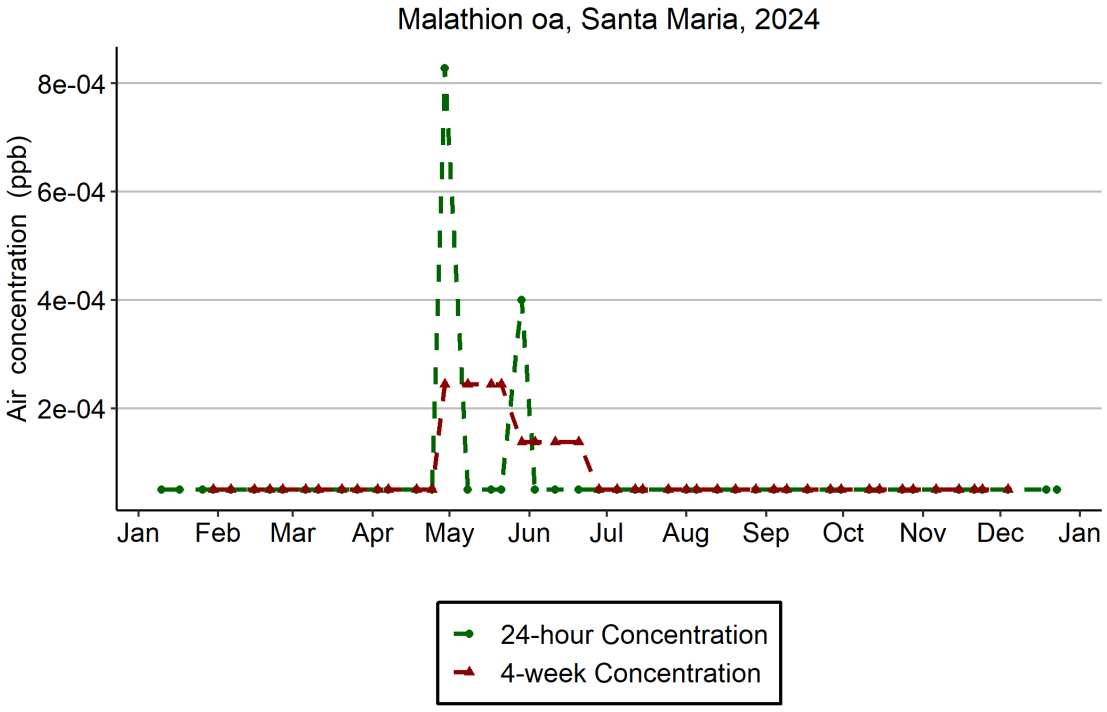

Figure B-7. Temporal trend in Malathion oa concentrations in Santa Maria in 2024 Acute SL = 8.8 ppb ; Subchronic SL = 6.3 ppb).

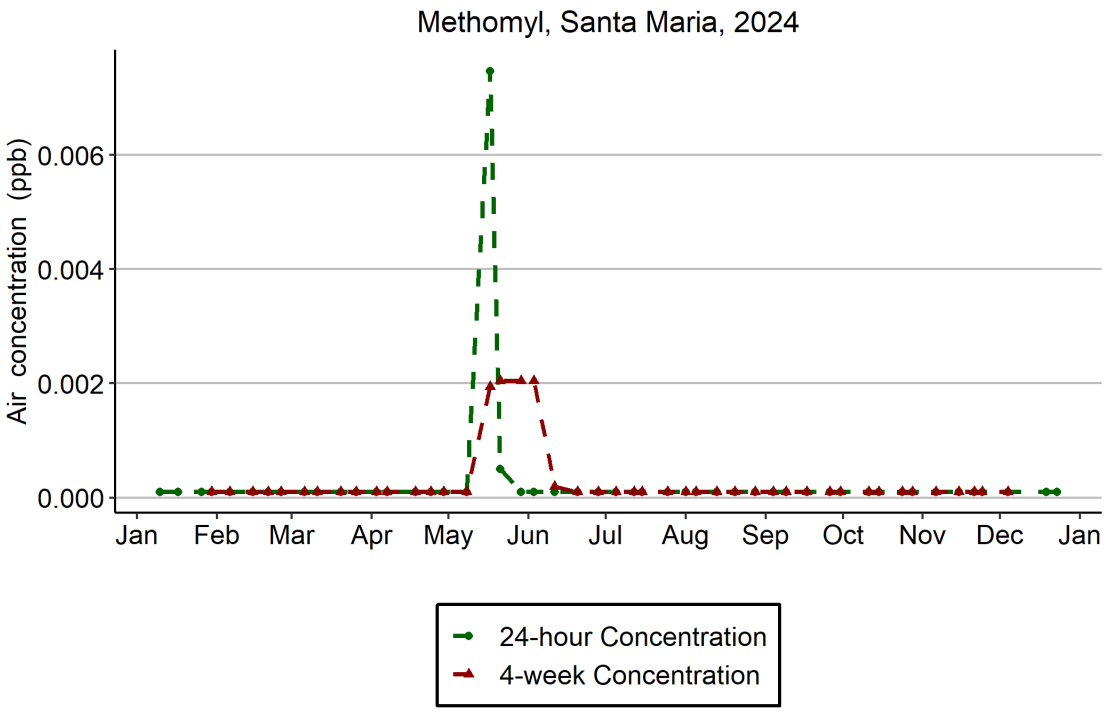

Figure B-8. Temporal trend in Methomyl concentrations in Santa Maria in 2024 (Acute SL = 4.8 ppb ; Subchronic SL = 4.8 ppb).

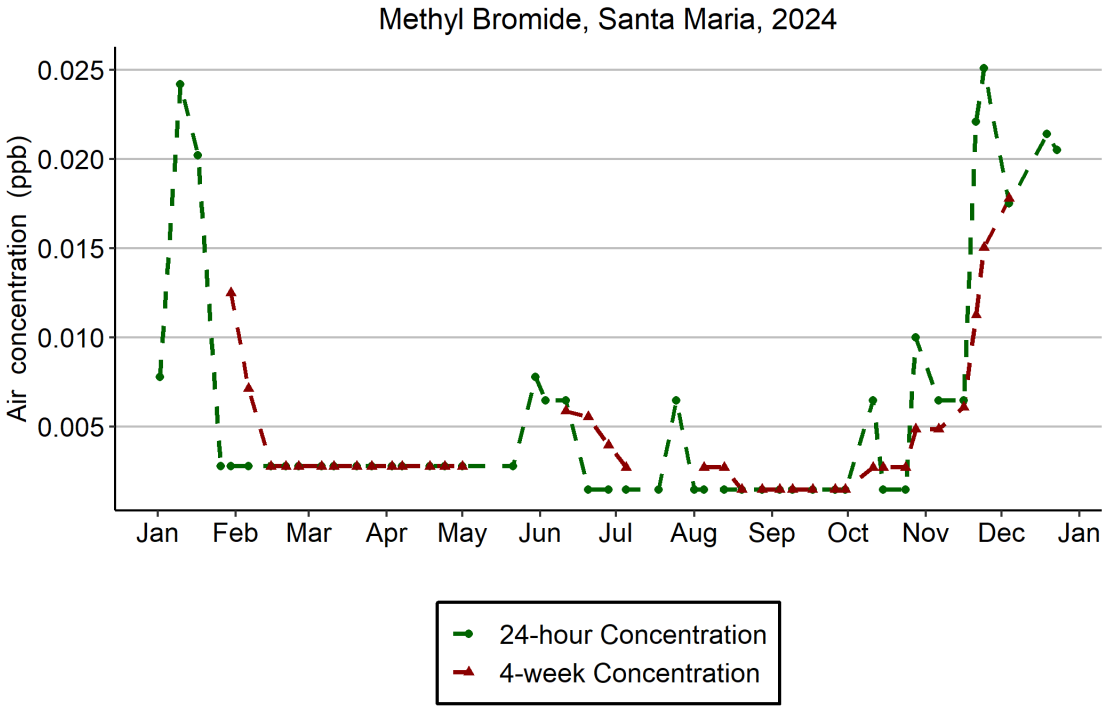

Figure B-9. Temporal trend in Methyl Bromide concentrations in Santa Maria in 2024 (Acute RT = 210 ppb ; Subchronic RT = 5 ppb).

APPENDIX C: SHAFTER RESULTS

Shafter

The Shafter sampling site has been a monitoring site since 2011. Shafter is 18 square miles in area located 18 miles 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 site was originally 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 of this monitoring location. On February 22, 2019, the monitoring site was relocated to the northwest corner of Sequoia Elementary School, a half mile north from the original sampling location. On January 1, 2021, DPR re-assumed operation of this monitoring location.

Pesticide Detections

Table C–1 lists the number and percentage of analyses resulting in detections at the Shafter AMN sampling site in 2024. The chemical with the highest number of quantifiable detections was methyl bromide (n=26, 51%), followed by MITC (n=20, 37.7%), and 1,3-D (n=15, 29.4%).

Table C–1 Number and percentage of samples per chemical in Shafter in 2024.

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	51	15	15	29.4 %	29.4 %
Captan	53	2	0	3.8 %	0 %
Chloropicrin	53	2	0	3.8 %	0 %
Chlorpyrifos	53	1	0	1.9 %	0 %
Chlorpyrifos oa	53	1	0	1.9 %	0 %
EPTC	53	7	4	13.2 %	7.5 %
Fenpyroximate	53	1	1	1.9 %	1.9 %
MITC	53	36	20	67.9 %	37.7 %
Methyl Bromide	51	34	26	66.7 %	51 %
S-Metolachlor	53	2	1	3.8 %	1.9 %
Pendimethalin	53	36	15	67.9 %	28.3 %
Trifluralin	53	1	0	1.9 %	0 %
Acephate	53	0	0	0 %	0 %

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Bensulide	53	0	0	0 %	0 %
Chlorothalonil	53	0	0	0 %	0 %
Cypermethrin	53	0	0	0 %	0 %
DDVP	53	0	0	0 %	0 %
DEF	53	0	0	0 %	0 %
Dacthal	53	0	0	0 %	0 %
Diazinon	53	0	0	0 %	0 %
Diazinon oa	53	0	0	0 %	0 %
Dimethoate	53	0	0	0 %	0 %
Dimethoate oa	53	0	0	0 %	0 %
Diuron	53	0	0	0 %	0 %
Endosulfan	53	0	0	0 %	0 %
Endosulfan Sulfate	53	0	0	0 %	0 %
Iprodione	53	0	0	0 %	0 %
Malathion	53	0	0	0 %	0 %
Malathion oa	53	0	0	0 %	0 %
Methidathion	53	0	0	0 %	0 %
Methomyl	53	0	0	0 %	0 %
Norflurazon	53	0	0	0 %	0 %
Oryzalin	53	0	0	0 %	0 %
Oxydemeton Methyl	53	0	0	0 %	0 %
Oxyfluorfen	53	0	0	0 %	0 %
Permethrin	53	0	0	0 %	0 %
Phosmet	53	0	0	0 %	0 %
Propargite	53	0	0	0 %	0 %
Simazine	53	0	0	0 %	0 %
pp-dicofol	53	0	0	0 %	0 %
Total	2,116	138	82	6.5 %	3.9 %

Pesticide Concentrations

Acute (24-hour) Concentrations

The thresholds (SL or RT) for acute exposure levels for all evaluated chemicals are based on 24-hour time-weighted average (TWA) values, except for 1,3-D, which uses a 72-hour TWA, and chloropicrin and MITC, which use 8-hour TWA values. Additionally, 1,3-D, chloropicrin, methyl bromide, and MITC have acute RT rather than SL. In Shafter, the highest concentration relative to its acute exposure level was that of 1,3-D at 13.1%. The remaining chemicals for which there were quantifiable detections were detected at less than 2% of their SL or RT in 2024.

Table C–2. Highest 24-hour air concentrations in ppb, acute SL, and percent of the acute SL for chemicals with quantifiable or trace detections in Shafter in 2024.

Chemical	Detection date	Highest 24-h concentration	24-hour acute SL	Percent of acute SL
1,3-dichloropropene	02/22/2024	7.2	55	13.1 %
EPTC	08/29/2024	0.011	29.7	0.036 %
Fenpyroximate	05/29/2024	0.001	0.87	0.1 %
Methyl Bromide	07/09/2024	0.042	210	0.02 %
s-Metolachlor	03/01/2024	0.002	7.3	0.027 %
MITC	08/07/2024	3.3	220	1.5 %
Pendimethalin	01/18/2024	0.004	150	0.002 %
Captan		Trace	0.15	
Chloropicrin		Trace	73	
Chlorpyrifos		Trace	0.084	
Chlorpyrifos oa		Trace	0.088	
Trifluralin		Trace	87.5	

Subchronic (4-13-week) Concentrations

The subchronic (seasonal) concentrations for 1,3-dichloropropene and chloropicrin are averaged every 13 weeks (CDPR 2016b), while the subchronic concentrations of the remaining 38 chemicals are averaged every 4 weeks (Table C–3). Additionally, methyl bromide has a subchronic RT rather than SL. The pesticides with the highest rolling average percentages compared to their subchronic exposure levels were MITC (85.3%) and 1,3-D (24.6%). All other compounds were less than 1% of their subchronic SL.

Table C–3. Highest 4-13-week rolling average air concentrations in ppb, subchronic SL, and percent of the subchronic SL for chemicals with quantifiable or trace detections in Shafter in 2024.

Chemical	Detection date	Highest 4-13-w concentration	4-13-week subchronic SL	Percent of subchronic SL
1,3-dichloropropene	04/03/2024	0.74	3	24.6 %
EPTC	09/03/2024	0.003	3.1	0.11 %
Fenpyroximate	05/29/2024	0.001	0.58	0.045 %
Methyl Bromide	07/24/2024	0.034	5	0.68 %
s-Metolachlor	03/01/2024	0.001	1.3	0.044 %
MITC	08/29/2024	0.86	1	85.3 %
Pendimethalin	01/28/2024	0.002	49	0.004 %
Captan		Trace	0.11	
Chloropicrin		Trace	0.35	
Chlorpyrifos		Trace	0.059	
Chlorpyrifos oa		Trace	0.062	
Trifluralin		Trace	12.4	

Chronic (annual) Concentrations

Table C–4 shows the annual average concentration for all chemicals monitored at the Shafter sampling site in 2024. The pesticide with highest concentration relative to its chronic exposure level was that of MITC at 83.3%, followed by 1,3-D at 10.5%. All other monitored chemicals were less than 2% of their chronic screening level.

Table C–4. Annual average air concentrations in ppb, chronic SL, and percent of the chronic SL for chemicals with quantifiable or trace detections in Shafter in 2024.

Chemical	Annual 1-y concentration	1-year chronic SL	Percent of chronic SL
1,3-dichloropropene	0.21	2	10.5 %
EPTC	0.001	1.1	0.059 %
Fenpyroximate	0.001	0.058	0.11 %
Methyl Bromide	0.015	1	1.5 %
s-Metolachlor	0.001	1.3	0.011 %
MITC	0.084	0.1	83.3 %
Pendimethalin	0.001	49	0.001 %

Chemical	Annual 1-y concentration	1-year chronic SL	Percent of chronic SL
Captan	Trace	0.037	
Chloropicrin	Trace	0.27	
Chlorpyrifos	Trace	0.036	
Chlorpyrifos oa	Trace	0.037	
Trifluralin	Trace	3	

Trends in Detected Concentrations

Concentrations over time for chemicals detected at quantifiable concentrations in Shafter in 2024.

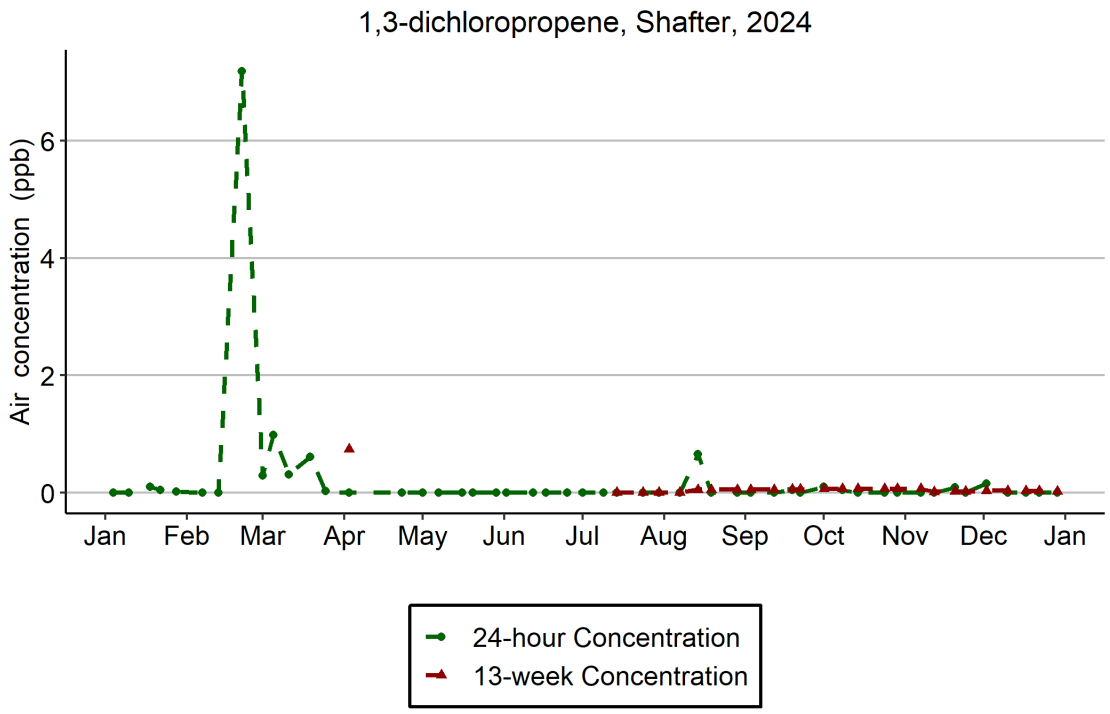

Figure C-1. Temporal trend in 1,3-dichloropropene concentrations in Shafter in 2024 (Acute RT = 55 ppb ; Subchronic SL = 3 ppb).

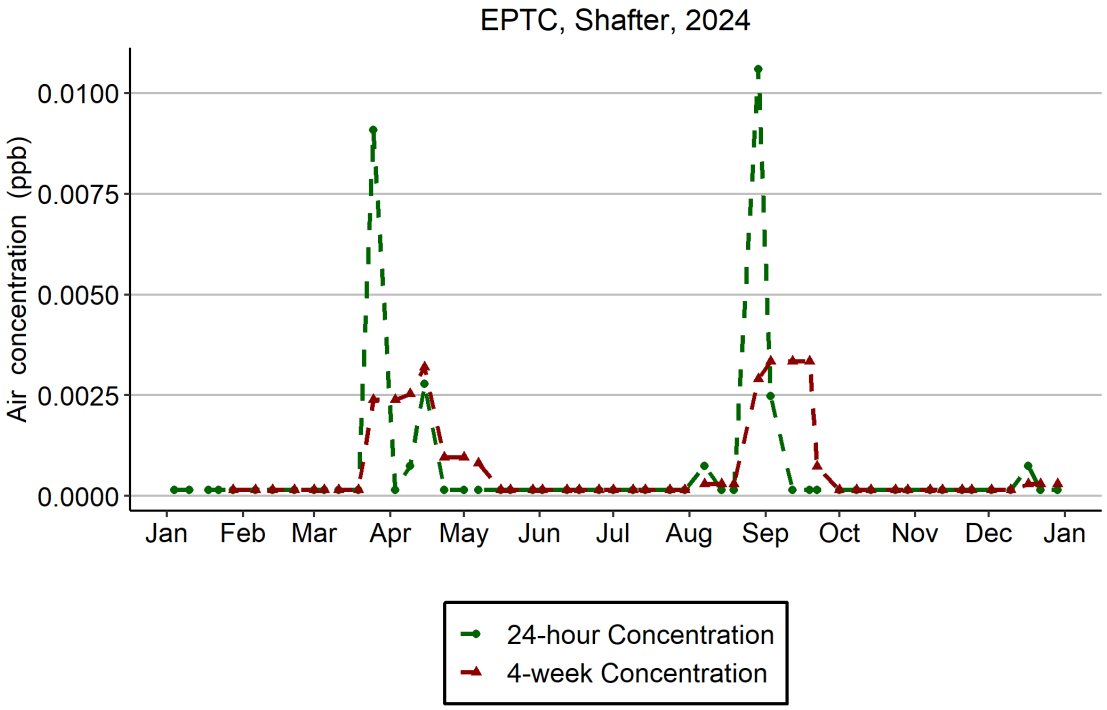

Figure C-2. Temporal trend in EPTC concentrations in Shafter in 2024 (Acute SL = 29.7 ppb ; Subchronic SL = 3.1 ppb).

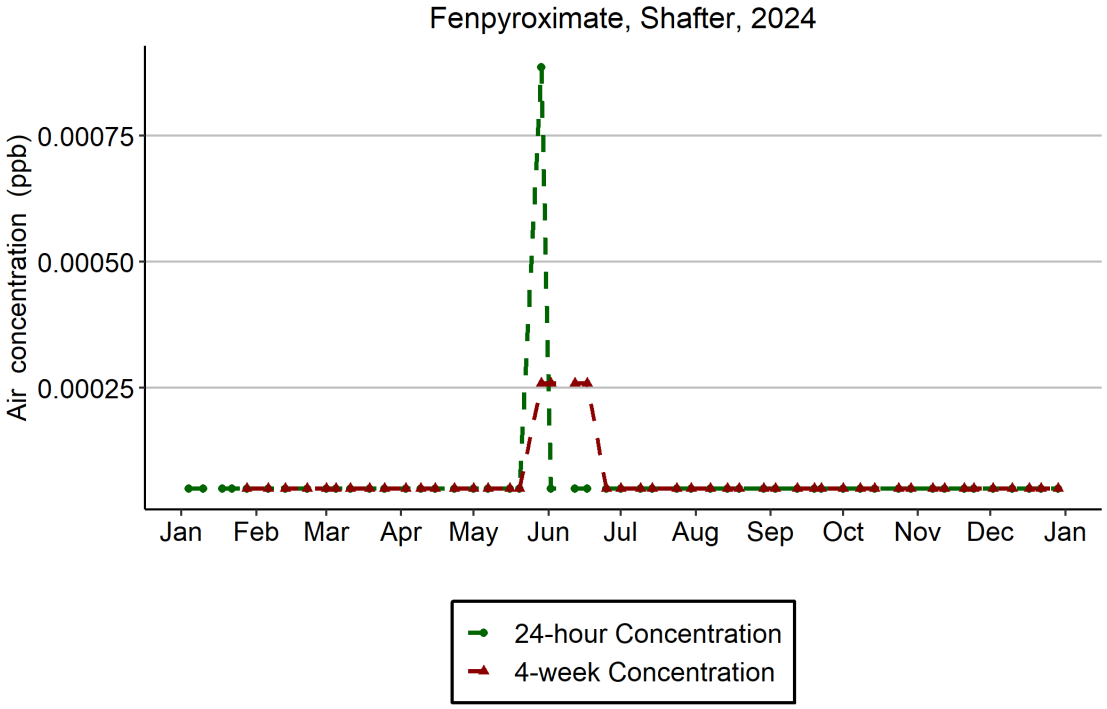

Figure C-3. Temporal trend in Fenpyroximate concentrations in Shafter in 2024 (Acute SL = 0.9 ppb ; Subchronic SL = 0.6 ppb).

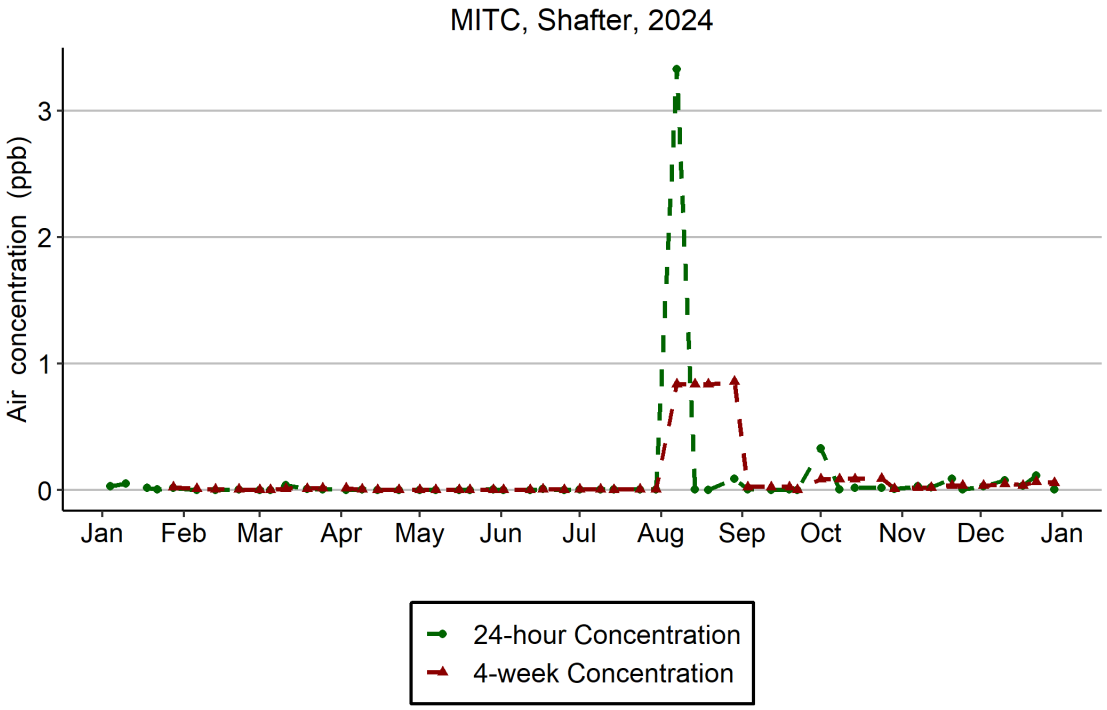

Figure C-4. Temporal trend in MITC concentrations in Shafter in 2024 (Acute RT = 220 ppb ; Subchronic SL = 1 ppb).

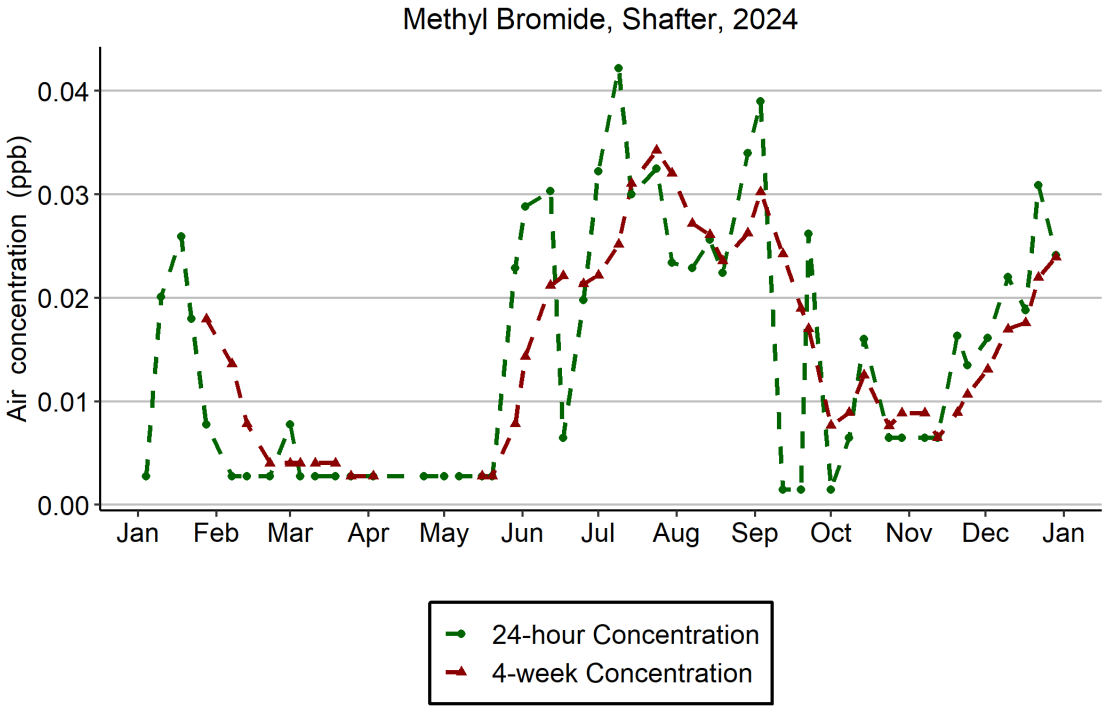

Figure C-5. Temporal trend in Methyl Bromide concentrations in Shafter in 2024 (Acute RT = 210 ppb ; Subchronic RT = 5 ppb).

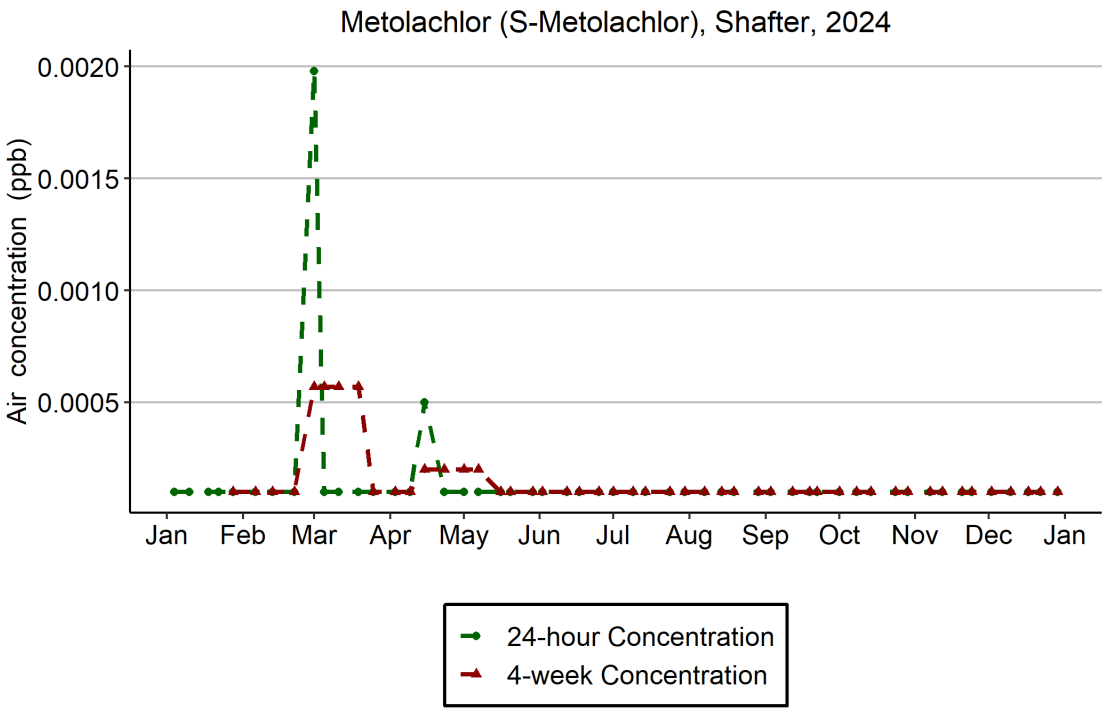

Figure C-6. Temporal trend in S-Metolachlor concentrations in Shafter in 2024 (Acute SL = 7.3 ppb ; Subchronic SL = 1.3 ppb).

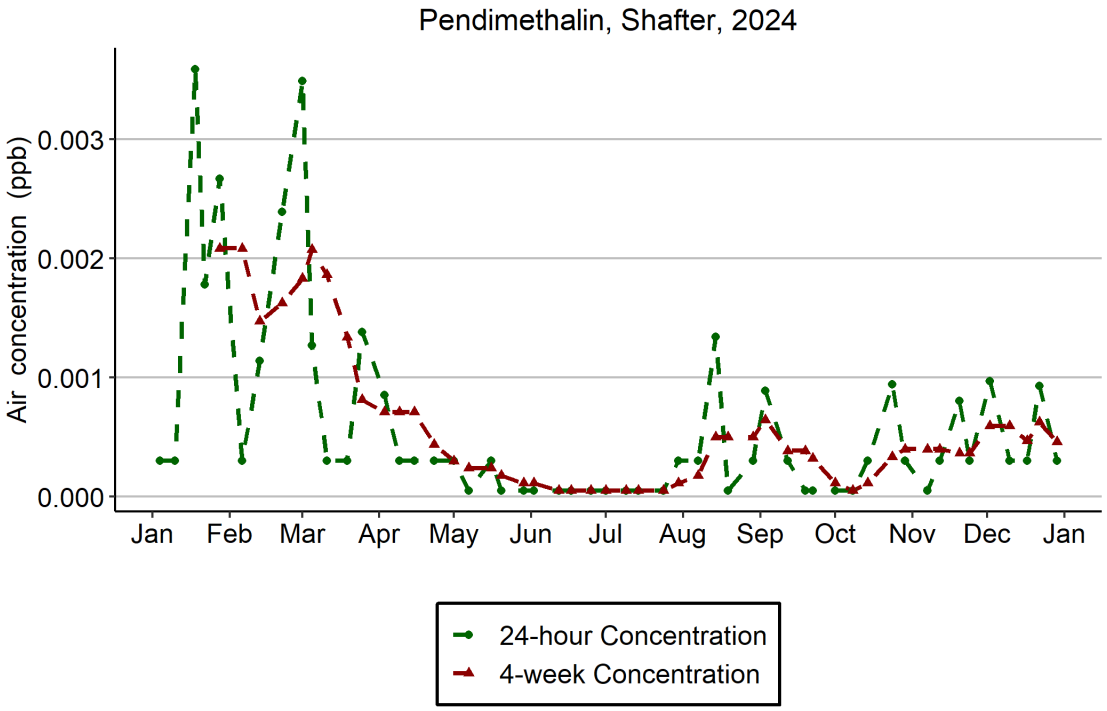

Figure C-7. Temporal trend in Pendimethalin concentrations in Shafter in 2024 (Acute SL = 150 ppb ; Subchronic SL = 49 ppb).

APPENDIX D: WATSONVILLE RESULTS

Watsonville

Watsonville is a small city of seven 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 site is located at Ohlone Elementary School which is 2.5 miles south of the Watsonville/Pajaro area. 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 sampling site in 2024. The chemical with the highest number of quantifiable detections was chloropicrin (n=10, 19.6%), followed by methyl bromide (n=9, 17.6%), and 1,3-D (n=7, 13.7%).

Table D–1 Number and percentage of samples per chemical in Watsonville in 2024.

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	51	10	7	19.6 %	13.7 %
Captan	50	1	0	2 %	0 %
Chloropicrin	51	14	10	27.5 %	19.6 %
DDVP	50	1	0	2 %	0 %
MITC	51	7	0	13.7 %	0 %
Malathion	50	1	1	2 %	2 %
Methyl Bromide	51	16	9	31.4 %	17.6 %
Acephate	50	0	0	0 %	0 %
Bensulide	50	0	0	0 %	0 %
Chlorothalonil	50	0	0	0 %	0 %
Chlorpyrifos	50	0	0	0 %	0 %
Chlorpyrifos oa	50	0	0	0 %	0 %
Cypermethrin	50	0	0	0 %	0 %
DEF	50	0	0	0 %	0 %
Dacthal	50	0	0	0 %	0 %

Chemical	Number of valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Diazinon	50	0	0	0 %	0 %
Diazinon oa	50	0	0	0 %	0 %
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 %
Malathion oa	50	0	0	0 %	0 %
Methidathion	50	0	0	0 %	0 %
Methomyl	50	0	0	0 %	0 %
S-Metolachlor	50	0	0	0 %	0 %
Norflurazon	50	0	0	0 %	0 %
Oryzalin	50	0	0	0 %	0 %
Oxydemeton Methyl	50	0	0	0 %	0 %
Oxyfluorfen	50	0	0	0 %	0 %
Pendimethalin	50	0	0	0 %	0 %
Permethrin	50	0	0	0 %	0 %
Phosmet	50	0	0	0 %	0 %
Propargite	50	0	0	0 %	0 %
Simazine	50	0	0	0 %	0 %
Trifluralin	50	0	0	0 %	0 %
pp-dicofol	50	0	0	0 %	0 %
Total	2,004	50	27	2.5 %	1.3 %

Pesticide Concentrations

Acute (24-hour) Concentrations

The thresholds (SL or RT) for acute exposure levels for all evaluated chemicals are based on 24-hour time-weighted average (TWA) values, except for 1,3-D, which uses a 72-hour TWA, and chloropicrin and MITC, which use 8-hour TWA values. Additionally, 1,3-D, chloropicrin, methyl bromide, and MITC have acute RT rather than SL. In Watsonville, all chemicals were detected at less than 2% of their SL or RT in 2024.

Table D–2. Highest 24-hour air concentrations in ppb, acute SL, and percent of the acute SL for chemicals with quantifiable or trace detections in Watsonville in 2024.

Chemical	Detection date	Highest 24-h concentration	24-hour acute SL	Percent of acute SL
1,3-dichloropropene	09/05/2024	0.44	55	0.81 %
Chloropicrin	10/22/2024	1.1	73	1.4 %
Malathion	09/15/2024	0.001	8.3	0.011 %
Methyl Bromide	11/21/2024	0.045	210	0.022 %
Captan		Trace	0.15	
DDVP		Trace	1.2	
MITC		Trace	220	

Subchronic (4-13-week) Concentrations

The subchronic (seasonal) concentrations for 1,3-dichloropropene and chloropicrin are averaged every 13 weeks (CDPR 2016b), while the subchronic concentrations of the remaining 38 chemicals are averaged every 4 weeks (Table D–3). Additionally, methyl bromide has a subchronic RT rather than SL. The pesticides with the highest rolling average percentages compared to their subchronic exposure levels were chloropicrin (70.2%) and 1,3-D (3.1%). Malathion and methyl bromide were less than 1% of their subchronic SL.

Table D–3. Highest 4-13-week rolling average air concentrations in ppb, subchronic SL, and percent of the subchronic SL for chemicals with quantifiable or trace detections in Watsonville in 2024.

Chemical	Detection date	Highest 4-13-w concentration	4-13-week subchronic SL	Percent of subchronic SL
1,3-dichloropropene	10/17/2024	0.092	3	3.1 %
Chloropicrin	11/06/2024	0.25	0.35	70.2 %
Malathion	09/15/2024	0.001	6	0.005 %

Chemical	Detection date	Highest 4-13-w concentration	4-13-week subchronic SL	Percent of subchronic SL
Methyl Bromide	12/08/2024	0.025	5	0.5 %
Captan		Trace	0.11	
DDVP		Trace	0.24	
MITC		Trace	1	

Chronic (annual) Concentrations

Table D–4 shows the annual average concentration for all chemicals monitored at the Watsonville sampling site in 2024. The pesticide with highest concentration relative to its chronic exposure level was that of chloropicrin at 25.1%. All other monitored chemicals were less than 2% of their chronic screening level.

Table D–4. Annual average air concentrations in ppb, chronic SL, and percent of the chronic SL for chemicals with quantifiable or trace detections in Watsonville in 2024.

Chemical	Annual 1-y concentration	1-year chronic SL	Percent of chronic SL
1,3-dichloropropene	0.028	2	1.4 %
Chloropicrin	0.068	0.27	25.1 %
Malathion	0.001	0.6	0.011 %
Methyl Bromide	0.006	1	0.61 %
Captan	Trace	0.037	
DDVP	Trace	0.085	
MITC	Trace	0.1	

Trends in Detected Concentrations

Concentrations over time for chemicals detected at quantifiable concentrations in Watsonville in 2024.

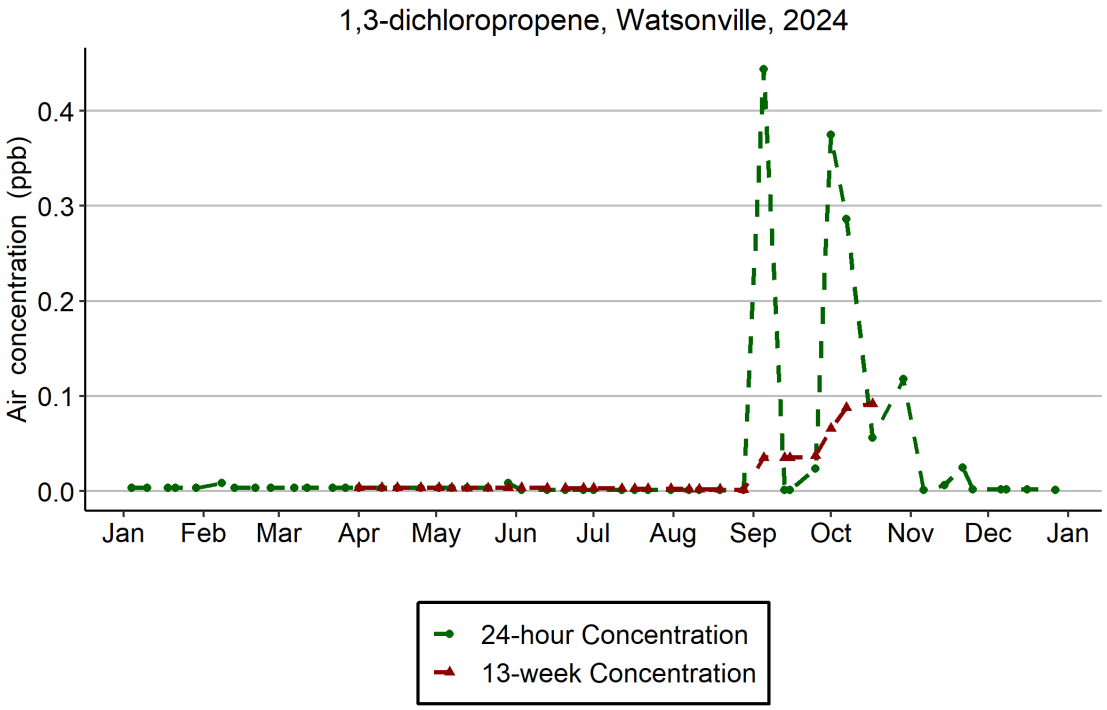

Figure C-1. Temporal trend in 1,3-dichloropropene concentrations in Watsonville in 2024 (Acute RT = 55 ppb ; Subchronic SL = 3 ppb).

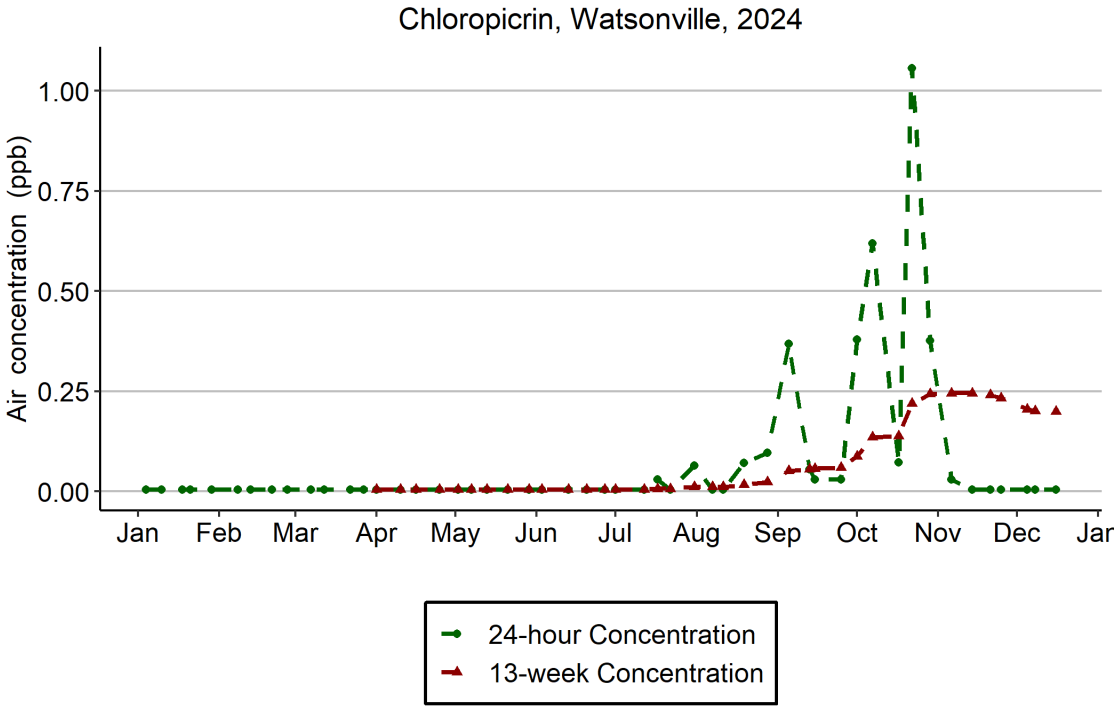

Figure C-2. Temporal trend in Chloropicrin concentrations in Watsonville in 2024 (Acute RT = 73 ppb ; Subchronic SL = 0.35 ppb).

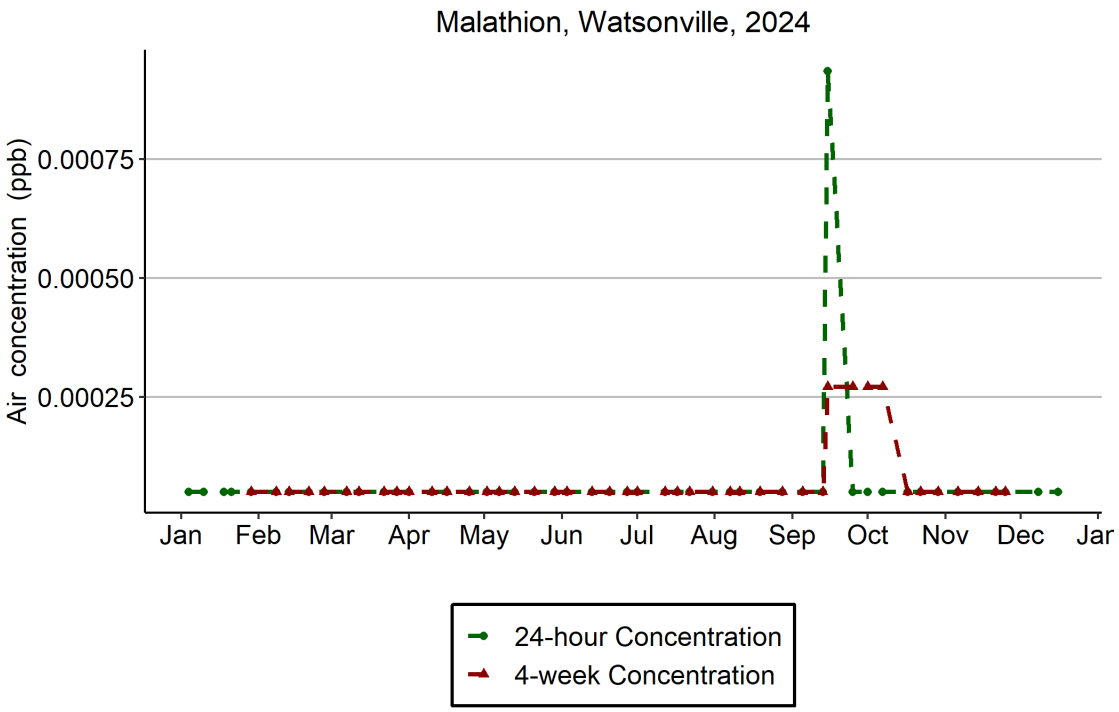

Figure C-3. Temporal trend in Malathion concentrations in Watsonville in 2024 (Acute SL = 8.3 ppb ; Subchronic SL = 6 ppb).

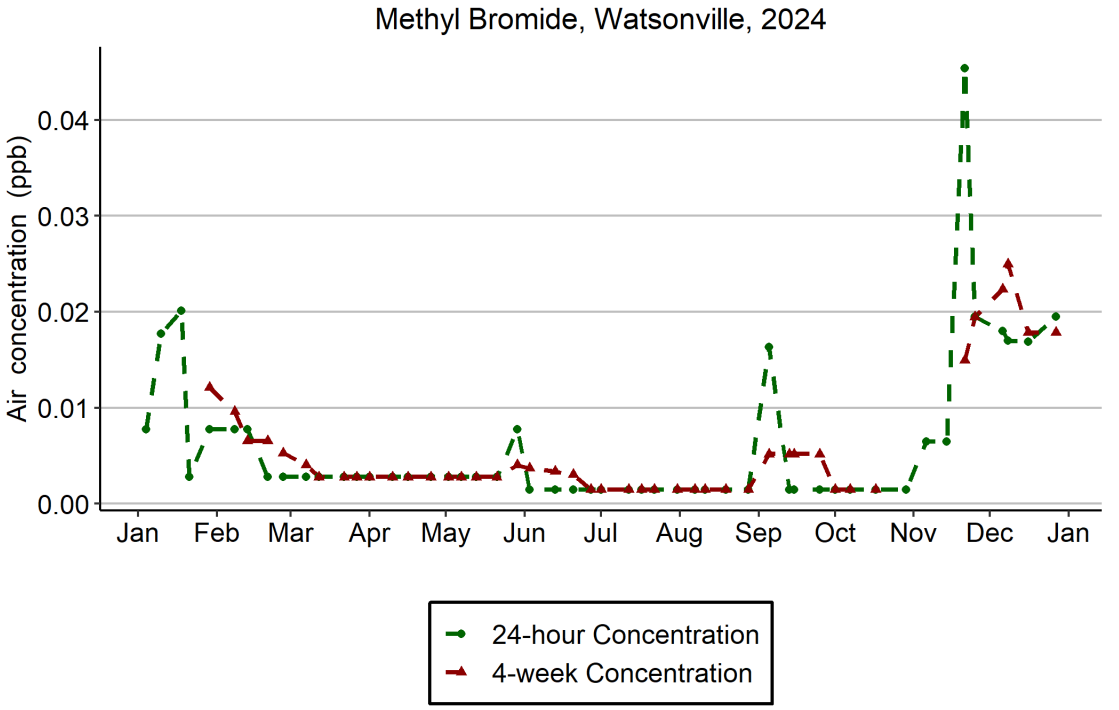

Figure C-4. Temporal trend in Methyl Bromide concentrations in Watsonville in 2024 (Acute RT = 210 ppb ; Subchronic RT = 5 ppb).

APPENDIX E: FIELD METHODS

Materials and Methods

The AMN monitors the ambient air for 40 chemicals selected based on their potential health risk (CDPR 2013). Samples were collected during 24 consecutive hours using four sampling methods:

VOC

1,3-D and MeBr were collected using a Nutech 2703 sampler or a Xonteck 901 sampler. Ambient air was drawn through 1/16" internal diameter PTFE (Teflon) tubing into a 6-liter stainless steel canister. The flow rate of the Nutech sampler was set up at 3.1 mL/min ± 10%, while the flow rate of the Xonteck sampler was set up at 7.5 mL/min ± 10%. In the event of unforeseen complications with the equipment, a Restek passive air sampler (catalog # 24160) was used at a flow rate of 3.0 mL/min ± 10%.

Chloropicrin

Chloropicrin was collected using a SKC AirChek Connect Pump (part # 220-4000) or a specialized MetOne Pesticide Sampler. Ambient air was drawn through SKC sorbent tubes (part # 226-175) at a flow rate of 50 mL/min ± 10%. The glass sorbent tube contained XAD-4 absorbent resin and was shielded from sunlight. In the event of unforeseen complications with the equipment, the monitoring station had an extra set of SKC AirChek Connect pumps as back up equipment.

MITC

MITC was collected using a SKC AirChek Connect Pump (part # 220-4000) or a specialized MetOne Pesticide Sampler. Ambient air was drawn through SKC sorbent tubes (part # 226-16-02) at a flow rate of 1.5 L/min ± 10%. The glass sorbent tube contained Anasorb coconut shell charcoal and was shielded from sunlight. In the event of unforeseen complications with the equipment, the monitoring station had an extra set of SKC AirChek Connect pumps back up equipment.

Multi-Residue

The 36 chemicals listed in Table F-2 were collected using a Flite4 Air Pump (part # 901-4011) or specialized MetOne Pesticide Sampler. Ambient air was drawn through a custom-built Teflon cartridge at a flow rate of 15.0 L/min ± 10%. The cartridge contained XAD-4 sorbent material and was shielded from sunlight. In the event of unforeseen complications with the equipment, the monitoring station had an extra set of SKC pumps as back up equipment.

Field Sampling Procedure

One 24-hour sample was collected weekly at each sampling site. The starting day varied each week with the actual dates being randomly selected. Sampling start times were left to the discretion of the field sampling personnel. Chain of custody forms, field data sheets, 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 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 set up 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 using Alicat flow meters. Alicat Scientific Mass Flow Meters (MB-100SCCM and MB-20SLPM) were used to check the flow rate at the start and finish of the sampling period. As the air sampling commenced at each monitoring site, the sample tracking number, date, time, staff initials, weather conditions, and air sampler flow rate were documented on a field data sheet.

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-4 and Table F-5 summarize the results of these quality control procedures.

A trip blank sample provides information on possible contamination of field collected samples. For sorbent tubes, trip blanks were broken at both ends, capped, and placed on dry ice with the field samples. For stainless steel canisters, trip blanks were collected weekly at the warehouse. Canisters were pressurized to 10 psi with purified compressed air. Canisters and tubes 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 stainless steel canisters were analyzed for the presence of the fumigants 1,3-dichloropropene and methyl bromide (Table F-1) using a gas chromatography (GS) mass selective detector (CDFA 2022). 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.

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 mass spectrometry (Table F-1). Full method validation data was obtained and verified by CDFA-CAC (CDFA 2020).

MITC

Samples were collected on Anasorb CSC coconut charcoal sorbent tubes (SKC # 226-16-02) and analyzed by CDFA-CAC staff. Methyl isothiocyanate (MITC) residues adsorbed onto the activated charcoal were extracted from the charcoal with 1% carbon disulfide in ethyl acetate and analyzed via GC mass spectrometry (Table F-1). Full method validation data was obtained and verified by CDFA-CAC (CDFA 2023).

Table F-1. Target analytes in VOC and individual analysis.

Pesticide	Pesticide Group	Chemical Class
1,3-dichloropropene	Fumigant	Halogenated organic
Methyl bromide	Fumigant	Halogenated organic
Chloropicrin	Fumigant	Halogenated organic
MITC	Fumigant	Organosulfur compound

Multi-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-2).

Table F-2. 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
Cypermethrin	Pyrethroid	Insecticide
Dacthal	Phthalate	Herbicide
DDVP	Organophosphate	Insecticide
DEF	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
S-Metolachlor	Chloroacetanilide	Herbicide

Chemical	Chemical Class	Pesticide Group
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 chemical (analyte) that a chemical method can reliably detect. 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 (Table F-3). 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. Also known as reporting limits, 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-3). The level of interference determines the magnitude of this factor, the more interference, the higher the factor.

Table F-3. Method detection limit (MDL) and limit of quantitation (LOQ) in ppb in 2024.

Chemical	From	To	MDL	LOQ
1,3-dichloropropene	01/02/2024	05/30/2024	0.0065	0.0100
1,3-dichloropropene	06/02/2024	11/16/2024	0.0025	0.0100
1,3-dichloropropene	11/18/2024	12/17/2024	0.0034	0.0100
1,3-dichloropropene	12/18/2024	12/29/2024	0.0028	0.0100
Acephate	01/03/2024	12/29/2024	0.0004	0.0012
Bensulide	01/03/2024	12/29/2024	0.0002	0.0006
Captan	01/03/2024	12/29/2024	0.0002	0.0019
Chloropicrin	01/02/2024	12/29/2024	0.0095	0.0517
Chlorothalonil	01/03/2024	12/29/2024	0.0002	0.0021
Chlorpyrifos	01/03/2024	12/29/2024	0.0001	0.0016
Chlorpyrifos oa	01/03/2024	12/29/2024	0.0001	0.0007
Cypermethrin	01/03/2024	12/29/2024	0.0002	0.0014
DDVP	01/03/2024	12/29/2024	0.0002	0.0026
DEF	01/03/2024	12/29/2024	0.0002	0.0007
Dacthal	01/03/2024	12/29/2024	0.0002	0.0007
Diazinon	01/03/2024	12/29/2024	0.0002	0.0007
Diazinon oa	01/03/2024	12/29/2024	0.0002	0.0008
Dimethoate	01/03/2024	12/29/2024	0.0002	0.0010
Dimethoate oa	01/03/2024	12/29/2024	0.0003	0.0011
Diuron	01/03/2024	12/29/2024	0.0002	0.0010
EPTC	01/03/2024	12/29/2024	0.0003	0.0012
Endosulfan	01/03/2024	12/29/2024	0.0001	0.0014
Endosulfan Sulfate	01/03/2024	12/29/2024	0.0001	0.0013
Fenpyroximate	01/03/2024	12/29/2024	0.0001	0.0005
Iprodione	01/03/2024	12/29/2024	0.0002	0.0007
MITC	01/02/2024	01/26/2024	0.0030	0.0077
MITC	01/28/2024	12/29/2024	0.0011	0.0077

Chemical	From	To	MDL	LOQ
Malathion	01/03/2024	12/29/2024	0.0001	0.0007
Malathion oa	01/03/2024	12/29/2024	0.0001	0.0007
Methidathion	01/03/2024	12/29/2024	0.0002	0.0007
Methomyl	01/03/2024	12/29/2024	0.0002	0.0008
Methyl Bromide	01/02/2024	05/30/2024	0.0056	0.0100
Methyl Bromide	06/02/2024	11/16/2024	0.0029	0.0100
Methyl Bromide	11/18/2024	12/17/2024	0.0026	0.0100
Methyl Bromide	12/18/2024	12/29/2024	0.0034	0.0100
Metolachlor	01/03/2024	12/29/2024	0.0002	0.0008
Norflurazon	01/03/2024	12/29/2024	0.0001	0.0007
Oryzalin	01/03/2024	12/29/2024	0.0002	0.0007
Oxydemeton Methyl	01/03/2024	12/29/2024	0.0002	0.0009
Oxyfluorfen	01/03/2024	12/29/2024	0.0001	0.0016
Pendimethalin	01/03/2024	12/29/2024	0.0001	0.0005
Permethrin	01/03/2024	12/29/2024	0.0002	0.0014
Phosmet	01/03/2024	12/29/2024	0.0001	0.0007
Propargite	01/03/2024	12/29/2024	0.0002	0.0016
Simazine	01/03/2024	12/29/2024	0.0002	0.0011
Trifluralin	01/03/2024	12/29/2024	0.0001	0.0017
pp-dicofol	01/03/2024	12/29/2024	0.0001	0.0015

Air Concentration Calculations

The VOC concentrations were reported in parts per billion by volume (ppb). 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). Concentrations were converted from µg/sample to ppb using the following calculation:

$$\frac{Concentration\ (\mu g)\ x\ 24.45\ (L/mole)\ x\ 1000\ (ng/\mu g)\ x\ (ppb\ x\ g/ng)}{Run\ time\ (min)\ x\ \ Flow\ rate\ (L/min)\ x\ Molecular\ weight\ (g/mole)}$$

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, 1 ppb = 1 ng/g were added for conversion purposes. Additionally, concentrations can be converted from ppb to ng/m^3 using the following calculation:

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

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 2020, 2021, 2023). 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 spikes and 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 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 materials were not fortified but were extracted and analyzed along with the spikes and field samples. Average laboratory spike recoveries ranged from 79% to 97% for all chemicals analyzed. Field blanks and duplicate samples are part of DPR's field and laboratory QC program. The trip blanks were blank 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-4 shows that all field blanks resulted in non-detections.

Table F-4. Quality control/quality assurance results from 2024 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-dichlropropene	59	96 %	59	ND	51	50 ND
Acephate	17	90 %	17	ND	13	ND
Bensulide	17	88 %	17	ND	13	ND
Captan	17	94 %	17	ND	13	ND
Chloropicrin	34	97 %	34	ND	13	ND
Chlorothalonil	17	85 %	17	ND	13	ND
Chlorpyrifos	17	90 %	17	ND	13	ND
Chlorpyrifos OA	17	88 %	17	ND	13	ND
Cypermethrin	17	90 %	17	ND	13	ND
Dacthal	17	91 %	17	ND	13	ND
DDVP	17	83 %	17	ND	13	ND
DEF	17	91 %	17	ND	13	ND
Diazinon	17	86 %	17	ND	13	ND
Diazinon OA	17	89 %	17	ND	13	ND
Dimethoate	17	88 %	17	ND	13	ND
Dimethoate OA	17	89 %	17	ND	13	ND
Diuron	17	89 %	17	ND	13	ND
Endosulfan	17	91 %	17	ND	13	ND
Endosulfan Sulfate	17	92 %	17	ND	13	ND
EPTC	17	79 %	17	ND	13	ND
Fenpyroximate	17	93 %	17	ND	13	ND
Iprodione	17	91 %	17	ND	13	ND
Malathion	17	93 %	17	ND	13	ND
Malathion OA	17	90 %	17	ND	13	ND
Methidathion	17	88 %	17	ND	13	ND
Methomyl	17	82 %	17	ND	13	ND
Methyl Bromide	59	97 %	59	ND	51	50 ND
Metolachlor	17	87 %	17	ND	13	ND
MITC	27	84 %	27	ND	13	ND

Chemical	Lab Spikes Number	Lab Spikes Recovery	Lab Blanks Number	Lab Blanks Detection	Field Blanks Number	Field Blanks Detection
Norflurazon	17	89 %	17	ND	13	ND
Oryzalin	17	91 %	17	ND	13	ND
Oxydemeton methyl	17	79 %	17	ND	13	ND
Oxyfluorfen	17	97 %	17	ND	13	ND
Pendimethalin	17	88 %	17	ND	13	ND
Permethrin	17	94 %	17	ND	13	ND
Phosmet	17	88 %	17	ND	13	ND
pp-Dicofol	17	91 %	17	ND	13	ND
Propargite	17	89 %	17	ND	13	ND
Simazine	17	88 %	17	ND	13	ND
Trifluralin	17	89 %	17	ND	13	ND

Table F-5 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 reports, 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-5. Results for the co-located sample pairs in 2024. 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	36	11	15	7	639
ND / Trace	1	0	0	1	0
ND / >LOQ	2	0	0	0	0
Trace / ND	0	2	0	1	2
Trace / Trace	0	2	2	3	2
Trace / >LOQ	0	0	0	0	2
>LOQ / ND	0	0	0	0	0
>LOQ / Trace	0	0	0	0	0
>LOQ / >LOQ	4	5	2	6	3

Lost and Invalid Samples

A valid sample is a sample that meets all the sampling criteria for its corresponding sampling method. These criteria for each sampling method and each sampling medium are explained in Appendix E. In 2024, 20 samples were lost or invalid during the year. Table F-6 lists the location, operator, date, and type of samples.

Table F-6. Lost or invalid samples in 2024. Canister samples include 1,3-D and MeBr while Multi-residue samples include the 36 chemicals listed in Table F-2.

Community	Operator	Date	Sample type
Oxnard	V-CAC	04/06/2024	MITC. Invalid sample.
Oxnard	V-CAC	06/05/2024	Multi-residue. Invalid sample.
Oxnard	V-CAC	08/19/2024	Canister. Invalid sample.
Oxnard	V-CAC	11/27/2024	Chloropicrin. Invalid sample.
Santa Maria	SB-CAC	01/03/2024	Multi-Residue. Invalid sample.
Santa Maria	SB-CAC	04/30/2024	Canister. Invalid sample.
Santa Maria	SB-CAC	05/09/2024	Canister. Invalid sample.
Santa Maria	SB-CAC	07/13/2024	Chloropicrin & Canister. Invalid samples.
Santa Maria	SB-CAC	12/09/2024	Station hit by a car. No sampling this week.
Shafter	DPR	04/10/2024	Canister. Invalid sample.
Shafter	DPR	04/16/2024	Canister. Invalid sample.
Watsonville	DPR	05/14/2024	MITC. Invalid sample.
Watsonville	DPR	10/23/2024	Canister. Invalid sample.
Watsonville	DPR	12/06/2024	Multi-Residue. Invalid sample. Lab error.
Watsonville	DPR	12/28/2024	Chloropicrin & Multi-residue. Invalid samples.

APPENDIX G: HEALTH EVALUATION AND CALCULATIONS

Health Evaluation Methods

The pesticides included in the 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 if exposed at a high enough concentration (CDPR 2013). Therefore, DPR developed health screening levels (SL) and regulatory targets (RT) to place the results in a health-based context.

SL are concentrations at which no health effects are expected to occur for all populations 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. A RT is similar to a SL but is associated with regulatory actions. DPR puts measures in place based on the RT to limit exposures so that adverse effects can be avoided. Exceeding a RT 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 management determines a RT using its risk assessment, as well as risk assessments from other agencies, pesticide use patterns, potential effects on the use of alternative pesticides, and other factors. A specific chemical and exposure duration will have either a RT or a SL, but not both.

Out of the 40 chemicals monitored in the AMN, 1,3-D, chloropicrin, methyl bromide, and MITC have acute RT, whereas only methyl bromide has a subchronic RT.

Table G-1. Screening levels (SL) and regulatory targets (RT in bold) in parts per billion (ppb) in 2024.

Chemical	Acute period	Acute SL (ppb)	Subchronic period	Subchronic SL (ppb)	Chronic period	Chronic SL (ppb)
1,3-dichloropropene	72 hours	**55**	13 weeks	3	1 year	2
Acephate	24 hours	1.6	4 weeks	1.13	1 year	1.13
Bensulide	24 hours	16	4 weeks	1.48	1 year	1.48
Captan	24 hours	0.15	4 weeks	0.11	1 year	0.037
Chloropicrin	8 hours	**73**	13 weeks	0.35	1 year	0.27
Chlorothalonil	24 hours	3.13	4 weeks	3.13	1 year	3.13
Chlorpyrifos	24 hours	0.084	4 weeks	0.059	1 year	0.036
Chlorpyrifos oa	24 hours	0.088	4 weeks	0.062	1 year	0.037
Cypermethrin	24 hours	6.64	4 weeks	4.76	1 year	1.59
Dacthal	24 hours	1,732	4 weeks	35	1 year	3.46
DDVP	24 hours	1.22	4 weeks	0.244	1 year	0.085

Chemical	Acute period	Acute SL (ppb)	Subchronic period	Subchronic SL (ppb)	Chronic period	Chronic SL (ppb)
DEF	24 hours	0.684	4 weeks	0.684	-	-
Diazinon	24 hours	0.01	4 weeks	0.01	1 year	0.01
Diazinon oa	24 hours	0.011	4 weeks	0.011	1 year	0.011
Dimethoate	24 hours	0.459	4 weeks	0.32	1 year	0.032
Dimethoate oa	24 hours	0.493	4 weeks	0.344	1 year	0.034
Diuron	24 hours	18	4 weeks	1.78	1 year	0.598
Endosulfan	24 hours	0.198	4 weeks	0.198	1 year	0.02
Endosulfan Sulfate	24 hours	0.191	4 weeks	0.191	1 year	0.019
EPTC	24 hours	30	4 weeks	3.1	1 year	1.1
Fenpyroximate	24 hours	0.87	4 weeks	0.58	1 year	0.058
Iprodione	24 hours	23	4 weeks	7.08	1 year	7.08
Malathion	24 hours	8.33	4 weeks	5.97	1 year	0.6
Malathion oa	24 hours	8.76	4 weeks	6.27	1 year	0.63
Methidathion	24 hours	0.251	4 weeks	0.251	1 year	0.202
Methomyl	24 hours	4.8	4 weeks	4.8	1 year	4.8
Methyl Bromide	24 hours	**210**	4 weeks	**5**	1 year	1
s-Metolachlor	24 hours	7.33	4 weeks	1.29	1 year	1.29
MITC	8 hours	**220**	4 weeks	1	1 year	0.1
Norflurazon	24 hours	13	4 weeks	1.92	1 year	1.92
Oryzalin	24 hours	30	4 weeks	16	1 year	16
Oxydemeton Methyl	24 hours	3.74	4 weeks	0.058	1 year	0.058
Oxyfluorfen	24 hours	34	4 weeks	12	1 year	3.45
Pendimethalin	24 hours	150	4 weeks	49	1 year	49
Permethrin	24 hours	11	4 weeks	5.63	1 year	5.63
Phosmet	24 hours	5.94	4 weeks	2	1 year	1.39
pp-dicofol	24 hours	4.49	4 weeks	3.24	1 year	1.32
Propargite	24 hours	0.977	4 weeks	0.977	1 year	0.977
Simazine	24 hours	13	4 weeks	3.76	1 year	3.76
Trifluralin	24 hours	88	4 weeks	12	1 year	2.99

Subchronic Rolling Averages

In 2016, DPR updated the calculation of subchronic concentrations for 1,3-dichloropropene and chloropicrin from 4-week rolling average concentrations to 13-week rolling average concentrations to be compared with their subchronic SL and 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 and chloropicrin in 2012 and 2015, respectively (CDPR 2012, CDPR 2015).

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, subchronic, 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:

$$HQ = \frac{Air\ Concentration\ Detected}{Screening\ Level}$$

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: AMN HISTORIC AIR CONCENTRATIONS

All Sites

This report covers results from the twelfth year of monitoring by the Air Monitoring Network (AMN), which has been collecting samples since 2011. Annual AMN reports from 2011 to 2023 can be found on the *Air Monitoring Reports page at 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 is mainly produced as a byproduct of automobile emissions and other combustion sources not related to pesticidal uses. 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 2024.

Year	Total monitored chemicals	Non-detected chemicals	Quantifiable & 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
2024	40	21	19	13

Oxnard

The following tables summarize results in ppb for five years of air monitoring in Oxnard.

Table H-2. Percentage of analyses performed resulting in a quantifiable or trace detection in Oxnard in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	0 %	18 %	16 %	15 %	20 %
Bensulide	10 %	0 %	0 %	0 %	0 %
Captan	--	--	19 %	24 %	21 %
Chloropicrin	0 %	45 %	35 %	44 %	39 %
Chlorothalonil	20 %	0 %	0 %	0 %	0 %
DDVP	0 %	4 %	6 %	4 %	2 %
Dacthal	0 %	31 %	0 %	0 %	0 %
Diazinon	0 %	0 %	0 %	2 %	0 %
MITC	40 %	30 %	12 %	31 %	45 %
Malathion	0 %	17 %	10 %	4 %	10 %
Malathion oa	0 %	10 %	10 %	2 %	8 %
Methyl Bromide	0 %	35 %	84 %	29 %	51 %
Oxyfluorfen	0 %	2 %	8 %	2 %	0 %
Pendimethalin	--	--	38 %	33 %	31 %
Simazine	0 %	2 %	0 %	0 %	0 %

Table H-3. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Oxnard in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	ND	0.72	0.59	1.6	0.96
Bensulide	Trace	ND	ND	ND	ND
Captan	--	--	0.002	0.003	0.007
Chloropicrin	ND	2.6	0.52	1.1	0.84
Chlorothalonil	Trace	ND	ND	ND	ND
DDVP	ND	Trace	Trace	Trace	Trace

Chemical	2020	2021	2022	2023	2024
Dacthal	ND	0.001	ND	ND	ND
Diazinon	ND	ND	ND	Trace	ND
MITC	0.008	0.18	0.036	0.086	0.24
Malathion	ND	0.009	0.018	0.002	0.002
Malathion oa	ND	0.002	0.002	Trace	Trace
Methyl Bromide	ND	0.036	0.043	Trace	0.023
Oxyfluorfen	ND	Trace	Trace	Trace	ND
Pendimethalin	--	--	0.016	0.012	0.006
Simazine	ND	Trace	ND	ND	ND

Table H-4. Highest 4-13-week rolling average concentrations for pesticides with at least one detectable concentration in Oxnard in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloro propene	ND	0.091	0.028	0.17	0.12
Bensulide	Trace	ND	ND	ND	ND
Captan	--	--	0.001	0.001	0.004
Chloropicrin	ND	0.42	0.11	0.33	0.27
Chlorothalonil	Trace	ND	ND	ND	ND
DDVP	ND	Trace	Trace	Trace	Trace
Dacthal	ND	0.001	ND	ND	ND
Diazinon	ND	ND	ND	Trace	ND
MITC	0.005	0.046	0.011	0.03	0.065
Malathion	ND	0.003	0.006	0.001	0.001
Malathion oa	ND	0.001	0.001	Trace	Trace
Methyl Bromide	ND	0.031	0.036	Trace	0.018
Oxyfluorfen	ND	Trace	Trace	Trace	ND
Pendimethalin	--	--	0.006	0.009	0.005
Simazine	ND	Trace	ND	ND	ND

Table H-5. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Oxnard in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	ND	0.032	0.032	0.044	0.036
Bensulide	Trace	ND	ND	ND	ND
Captan	--	--	0.001	0.001	0.001
Chloropicrin	ND	0.13	0.037	0.1	0.082
Chlorothalonil	Trace	ND	ND	ND	ND
DDVP	ND	Trace	Trace	Trace	Trace
Dacthal	ND	0.001	ND	ND	ND
Diazinon	ND	ND	ND	Trace	ND
MITC	0.001	0.001	0.004	0.010	0.011
Malathion	ND	0.001	0.001	0.001	0.001
Malathion oa	ND	0.001	0.001	Trace	Trace
Methyl Bromide	ND	0.009	0.014	Trace	0.006
Oxyfluorfen	ND	Trace	Trace	Trace	ND
Pendimethalin	--	--	0.001	0.001	0.001
Simazine	ND	Trace	ND	ND	ND

Santa Maria

The following tables summarize results in ppb for five years of air monitoring in Santa Maria.

Table H-6. Percentage of analyses performed resulting in a quantifiable or trace detection in Santa Maria in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	49 %	53 %	36 %	22 %	31 %
Acephate	2 %	0 %	0 %	0 %	0 %
Captan	--	--	16 %	0 %	8 %
Chloropicrin	29 %	30 %	47 %	35 %	50 %
Chlorothalonil	29 %	2 %	4 %	0 %	8 %
Chlorpyrifos	0 %	0 %	2 %	0 %	0 %

Chemical	2020	2021	2022	2023	2024
Cypermethrin	2 %	0 %	0 %	0 %	0 %
DDVP	37 %	31 %	35 %	33 %	14 %
Dacthal	53 %	63 %	43 %	2 %	10 %
Diazinon	2 %	0 %	2 %	0 %	0 %
Diazinon oa	2 %	2 %	0 %	0 %	0 %
Dimethoate	2 %	0 %	0 %	0 %	0 %
Dimethoate oa	2 %	0 %	0 %	0 %	0 %
Diuron	2 %	0 %	0 %	0 %	0 %
EPTC	0 %	0 %	0 %	0 %	2 %
Iprodione	2 %	0 %	0 %	0 %	0 %
MITC	37 %	35 %	31 %	29 %	37 %
Malathion	61 %	59 %	51 %	47 %	30 %
Malathion oa	57 %	8 %	6 %	8 %	4 %
Methidathion	2 %	2 %	0 %	0 %	0 %
Methomyl	--	--	3 %	0 %	4 %
Methyl Bromide	4 %	63 %	80 %	29 %	33 %
Metolachlor	2 %	2 %	0 %	0 %	0 %
Norflurazon	2 %	2 %	0 %	0 %	0 %
Oryzalin	2 %	2 %	0 %	0 %	0 %
Oxydemeton Methyl	2 %	2 %	0 %	0 %	0 %
Oxyfluorfen	0 %	10 %	6 %	4 %	0 %
Pendimethalin	--	--	11 %	18 %	0 %
Permethrin	4 %	2 %	2 %	0 %	4 %
Phosmet	2 %	2 %	0 %	0 %	0 %
Simazine	4 %	2 %	0 %	0 %	0 %
Trifluralin	24 %	31 %	12 %	6 %	0 %

Table H-7. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Santa Maria in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	1.4	1	0.26	0.55	0.4
Acephate	0.002	ND	ND	ND	ND
Captan	--	--	Trace	ND	Trace
Chloropicrin	0.59	0.62	0.67	1.2	0.45
Chlorothalonil	Trace	Trace	Trace	ND	Trace
Chlorpyrifos	ND	ND	Trace	ND	ND
Cypermethrin	Trace	ND	ND	ND	ND
DDVP	0.010	Trace	0.008	0.007	0.011
Dacthal	Trace	Trace	0.001	Trace	Trace
Diazinon	Trace	ND	Trace	ND	ND
Diazinon oa	Trace	Trace	ND	ND	ND
Dimethoate	Trace	ND	ND	ND	ND
Dimethoate oa	Trace	ND	ND	ND	ND
Diuron	Trace	ND	ND	ND	ND
EPTC	ND	ND	ND	ND	0.010
Iprodione	Trace	ND	ND	ND	ND
MITC	0.042	0.13	0.24	1.2	0.12
Malathion	0.003	0.001	0.003	0.002	0.008
Malathion oa	Trace	Trace	Trace	Trace	0.001
Methidathion	Trace	Trace	ND	ND	ND
Methomyl	--	--	0.002	ND	0.008
Methyl Bromide	0.03	0.1	0.44	0.023	0.025
Metolachlor	Trace	Trace	ND	ND	ND
Norflurazon	Trace	Trace	ND	ND	ND
Oryzalin	Trace	Trace	ND	ND	ND
Oxydemeton Methyl	Trace	Trace	ND	ND	ND

Chemical	2020	2021	2022	2023	2024
Oxyfluorfen	ND	Trace	Trace	Trace	ND
Pendimethalin	--	--	0.001	0.001	ND
Permethrin	Trace	Trace	Trace	ND	Trace
Phosmet	Trace	Trace	ND	ND	ND
Simazine	Trace	Trace	ND	ND	ND
Trifluralin	0.002	0.008	Trace	Trace	ND

Table H-8. Highest 4-13-week rolling average concentrations for pesticides with at least one detectable concentration in Santa Maria in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	0.36	0.28	0.078	0.077	0.12
Acephate	0.001	ND	ND	ND	ND
Captan	--	--	Trace	ND	Trace
Chloropicrin	0.11	0.094	0.11	0.2	0.16
Chlorothalonil	Trace	Trace	Trace	ND	Trace
Chlorpyrifos	ND	ND	Trace	ND	ND
Cypermethrin	Trace	ND	ND	ND	ND
DDVP	0.004	Trace	0.004	0.003	0.003
Dacthal	Trace	Trace	0.001	Trace	Trace
Diazinon	Trace	ND	Trace	ND	ND
Diazinon oa	Trace	Trace	ND	ND	ND
Dimethoate	Trace	ND	ND	ND	ND
Dimethoate oa	Trace	ND	ND	ND	ND
Diuron	Trace	ND	ND	ND	ND
EPTC	ND	ND	ND	ND	0.003
Iprodione	Trace	ND	ND	ND	ND
MITC	0.012	0.025	0.068	0.45	0.077
Malathion	0.001	0.001	0.001	0.001	0.002

Chemical	2020	2021	2022	2023	2024
Malathion oa	Trace	Trace	Trace	Trace	0.001
Methidathion	Trace	Trace	ND	ND	ND
Methomyl	--	--	0.001	ND	0.002
Methyl Bromide	0.015	0.06	0.13	0.013	0.018
Metolachlor	Trace	Trace	ND	ND	ND
Norflurazon	Trace	Trace	ND	ND	ND
Oryzalin	Trace	Trace	ND	ND	ND
Oxydemeton Methyl	Trace	Trace	ND	ND	ND
Oxyfluorfen	ND	Trace	Trace	Trace	ND
Pendimethalin	--	--	0.001	0.001	ND
Permethrin	Trace	Trace	Trace	ND	Trace
Phosmet	Trace	Trace	ND	ND	ND
Simazine	Trace	Trace	ND	ND	ND
Trifluralin	0.001	0.003	Trace	Trace	ND

Table H-9. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Santa Maria in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	0.14	0.096	0.036	0.026	0.04
Acephate	0.001	ND	ND	ND	ND
Captan	--	--	Trace	ND	Trace
Chloropicrin	0.046	0.039	0.049	0.083	0.056
Chlorothalonil	Trace	Trace	Trace	ND	Trace
Chlorpyrifos	ND	ND	Trace	ND	ND
Cypermethrin	Trace	ND	ND	ND	ND
DDVP	0.001	Trace	0.001	0.001	0.001
Dacthal	Trace	Trace	0.001	Trace	Trace
Diazinon	Trace	ND	Trace	ND	ND

Chemical	2020	2021	2022	2023	2024
Diazinon oa	Trace	Trace	ND	ND	ND
Dimethoate	Trace	ND	ND	ND	ND
Dimethoate oa	Trace	ND	ND	ND	ND
Diuron	Trace	ND	ND	ND	ND
EPTC	ND	ND	ND	ND	0.001
Iprodione	Trace	ND	ND	ND	ND
MITC	0.006	0.011	0.012	0.044	0.012
Malathion	0.001	0.001	0.001	0.001	0.001
Malathion oa	Trace	Trace	Trace	Trace	0.001
Methidathion	Trace	Trace	ND	ND	ND
Methomyl	--	--	0.001	ND	0.001
Methyl Bromide	0.006	0.021	0.029	0.005	0.006
Metolachlor	Trace	Trace	ND	ND	ND
Norflurazon	Trace	Trace	ND	ND	ND
Oryzalin	Trace	Trace	ND	ND	ND
Oxydemeton Methyl	Trace	Trace	ND	ND	ND
Oxyfluorfen	ND	Trace	Trace	Trace	ND
Pendimethalin	--	--	0.001	0.001	ND
Permethrin	Trace	Trace	Trace	ND	Trace
Phosmet	Trace	Trace	ND	ND	ND
Simazine	Trace	Trace	ND	ND	ND
Trifluralin	0.001	0.001	Trace	Trace	ND

Shafter

The following tables summarize results in ppb for five years of air monitoring in Shafter. In 2020, only 1,3-dichloropropene and methyl bromide were sampled all year (52 weeks).

Table H-10. Percentage of analyses performed resulting in a quantifiable or trace detection in Shafter in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	71 %	69 %	61 %	22 %	29 %
Captan	--	--	3 %	0 %	4 %
Chloropicrin	0 %	4 %	4 %	4 %	4 %
Chlorothalonil	91 %	24 %	15 %	0 %	0 %
Chlorpyrifos	0 %	0 %	0 %	0 %	2 %
Chlorpyrifos oa	0 %	0 %	0 %	0 %	2 %
DDVP	0 %	4 %	10 %	2 %	0 %
Dacthal	9 %	0 %	0 %	0 %	0 %
Diazinon	9 %	0 %	0 %	0 %	0 %
Diazinon oa	9 %	2 %	0 %	0 %	0 %
Dimethoate	9 %	0 %	0 %	0 %	0 %
Diuron	9 %	2 %	0 %	0 %	0 %
EPTC	0 %	6 %	2 %	12 %	13 %
Endosulfan Sulfate	9 %	0 %	0 %	0 %	0 %
Fenpyroximate	--	--	5 %	0 %	2 %
MITC	82 %	40 %	44 %	42 %	68 %
Malathion	0 %	0 %	0 %	2 %	0 %
Malathion oa	9 %	2 %	0 %	2 %	0 %
Methyl Bromide	12 %	55 %	79 %	33 %	67 %
Metolachlor	9 %	0 %	0 %	0 %	4 %
Norflurazon	9 %	0 %	0 %	0 %	0 %
Oxyfluorfen	9 %	6 %	4 %	0 %	0 %
Pendimethalin	--	--	58 %	73 %	68 %
Simazine	9 %	0 %	0 %	0 %	0 %
Trifluralin	18 %	4 %	2 %	0 %	2 %

Table H-11. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Shafter in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	47.2	2.9	1.5	8	7.2
Captan	--	--	Trace	ND	Trace
Chloropicrin	ND	Trace	Trace	Trace	Trace
Chlorothalonil	0.003	Trace	Trace	ND	ND
Chlorpyrifos	ND	ND	ND	ND	Trace
Chlorpyrifos oa	ND	ND	ND	ND	Trace
DDVP	ND	0.003	Trace	Trace	ND
Dacthal	Trace	ND	ND	ND	ND
Diazinon	Trace	ND	ND	ND	ND
Diazinon oa	Trace	Trace	ND	ND	ND
Dimethoate	Trace	ND	ND	ND	ND
Diuron	Trace	Trace	ND	ND	ND
EPTC	ND	0.016	0.003	Trace	0.011
Endosulfan Sulfate	Trace	ND	ND	ND	ND
Fenpyroximate	--	--	0.002	ND	0.001
MITC	0.054	0.13	0.18	2.3	3.3
Malathion	ND	ND	ND	Trace	ND
Malathion oa	Trace	Trace	ND	Trace	ND
Methyl Bromide	0.048	0.059	0.086	0.022	0.042
Metolachlor	Trace	ND	ND	ND	0.002
Norflurazon	Trace	ND	ND	ND	ND
Oxyfluorfen	Trace	Trace	Trace	ND	ND
Pendimethalin	--	--	0.003	0.003	0.004
Simazine	Trace	ND	ND	ND	ND
Trifluralin	Trace	0.001	Trace	ND	Trace

Table H-12. Highest 4-13-week rolling average concentrations for pesticides with at least one detectable concentration in Shafter in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	5.7	5.7	0.14	0.66	0.74
Captan	--	--	Trace	ND	Trace
Chloropicrin	ND	Trace	Trace	Trace	Trace
Chlorothalonil	0.002	Trace	Trace	ND	ND
Chlorpyrifos	ND	ND	ND	ND	Trace
Chlorpyrifos oa	ND	ND	ND	ND	Trace
DDVP	ND	0.001	Trace	Trace	ND
Dacthal	Trace	ND	ND	ND	ND
Diazinon	Trace	ND	ND	ND	ND
Diazinon oa	Trace	Trace	ND	ND	ND
Dimethoate	Trace	ND	ND	ND	ND
Diuron	Trace	Trace	ND	ND	ND
EPTC	ND	0.004	0.001	Trace	0.003
Endosulfan Sulfate	Trace	ND	ND	ND	ND
Fenpyroximate	--	--	0.001	ND	0.001
MITC	0.031	0.034	0.099	0.67	0.86
Malathion	ND	ND	ND	Trace	ND
Malathion oa	Trace	Trace	ND	Trace	ND
Methyl Bromide	0.023	0.041	0.062	0.014	0.034
Metolachlor	Trace	ND	ND	ND	0.001
Norflurazon	Trace	ND	ND	ND	ND
Oxyfluorfen	Trace	Trace	Trace	ND	ND
Pendimethalin	--	--	0.002	0.002	0.002
Simazine	Trace	ND	ND	ND	ND
Trifluralin	Trace	0.001	Trace	ND	Trace

Table H-13. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Shafter in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	2.1	0.21	0.07	0.24	0.21
Captan	--	--	Trace	ND	Trace
Chloropicrin	ND	Trace	Trace	Trace	Trace
Chlorothalonil	0.001	Trace	Trace	ND	ND
Chlorpyrifos	ND	ND	ND	ND	Trace
Chlorpyrifos oa	ND	ND	ND	ND	Trace
DDVP	ND	0.001	Trace	Trace	ND
Dacthal	Trace	ND	ND	ND	ND
Diazinon	Trace	ND	ND	ND	ND
Diazinon oa	Trace	Trace	ND	ND	ND
Dimethoate	Trace	ND	ND	ND	ND
Diuron	Trace	Trace	ND	ND	ND
EPTC	ND	0.001	0.001	Trace	0.001
Endosulfan Sulfate	Trace	ND	ND	ND	ND
Fenpyroximate	--	--	0.001	ND	0.001
MITC	0.02	0.012	0.017	0.068	0.084
Malathion	ND	ND	ND	Trace	ND
Malathion oa	Trace	Trace	ND	Trace	ND
Methyl Bromide	0.007	0.015	0.017	0.006	0.015
Metolachlor	Trace	ND	ND	ND	0.001
Norflurazon	Trace	ND	ND	ND	ND
Oxyfluorfen	Trace	Trace	Trace	ND	ND
Pendimethalin	--	--	0.001	0.001	0.001
Simazine	Trace	ND	ND	ND	ND
Trifluralin	Trace	0.001	Trace	ND	Trace

Watsonville

The following tables summarize results in ppb for five years of air monitoring in Watsonville. In 2020, only 1,3-dichloropropene and methyl bromide were sampled all year (52 weeks).

Table H-14. Percentage of analyses performed resulting in a quantifiable or trace detection in Watsonville in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	49 %	46 %	27 %	28 %	20 %
Captan	--	--	0 %	2 %	2 %
Chloropicrin	0 %	29 %	29 %	27 %	27 %
Cypermethrin	0 %	0 %	0 %	2 %	0 %
DDVP	0 %	12 %	4 %	6 %	2 %
Dacthal	0 %	6 %	6 %	0 %	0 %
MITC	9 %	19 %	21 %	16 %	14 %
Malathion	0 %	0 %	12 %	8 %	2 %
Malathion oa	0 %	0 %	2 %	4 %	0 %
Methyl Bromide	2 %	29 %	73 %	32 %	31 %
Norflurazon	0 %	0 %	0 %	2 %	0 %
Oxyfluorfen	0 %	2 %	4 %	2 %	0 %
Permethrin	0 %	0 %	0 %	2 %	0 %
Phosmet	0 %	0 %	0 %	2 %	0 %
Propargite	0 %	0 %	0 %	2 %	0 %

Table H-15. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Watsonville in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	1	0.5	0.45	0.35	0.44
Captan	--	--	ND	Trace	Trace
Chloropicrin	ND	0.31	0.34	0.97	1.1
Cypermethrin	ND	ND	ND	Trace	ND
DDVP	ND	Trace	Trace	Trace	Trace
Dacthal	ND	Trace	Trace	ND	ND

Chemical	2020	2021	2022	2023	2024
MITC	0.010	0.063	0.12	0.052	Trace
Malathion	ND	ND	Trace	Trace	0.001
Malathion oa	ND	ND	Trace	Trace	ND
Methyl Bromide	0.029	1.2	0.044	0.025	0.045
Norflurazon	ND	ND	ND	Trace	ND
Oxyfluorfen	ND	Trace	Trace	Trace	ND
Permethrin	ND	ND	ND	Trace	ND
Phosmet	ND	ND	ND	Trace	ND
Propargite	ND	ND	ND	Trace	ND

Table H-16. Highest 4-13-week rolling average concentrations for pesticides with at least one detectable concentration in Watsonville in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	0.45	0.24	0.16	0.092	0.092
Captan	--	--	ND	Trace	Trace
Chloropicrin	ND	0.097	0.092	0.22	0.25
Cypermethrin	ND	ND	ND	Trace	ND
DDVP	ND	Trace	Trace	Trace	Trace
Dacthal	ND	Trace	Trace	ND	ND
MITC	0.004	0.02	0.039	0.029	Trace
Malathion	ND	ND	Trace	Trace	0.001
Malathion oa	ND	ND	Trace	Trace	ND
Methyl Bromide	0.015	0.3	0.037	0.014	0.025
Norflurazon	ND	ND	ND	Trace	ND
Oxyfluorfen	ND	Trace	Trace	Trace	ND
Permethrin	ND	ND	ND	Trace	ND
Phosmet	ND	ND	ND	Trace	ND
Propargite	ND	ND	ND	Trace	ND

Table H-17. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Watsonville in 2020-2024.

Chemical	2020	2021	2022	2023	2024
1,3-dichloropropene	0.15	0.075	0.037	0.03	0.028
Captan	--	--	ND	Trace	Trace
Chloropicrin	ND	0.029	0.028	0.061	0.068
Cypermethrin	ND	ND	ND	Trace	ND
DDVP	ND	Trace	Trace	Trace	Trace
Dacthal	ND	Trace	Trace	ND	ND
MITC	0.002	0.004	0.008	0.005	Trace
Malathion	ND	ND	Trace	Trace	0.001
Malathion oa	ND	ND	Trace	Trace	ND
Methyl Bromide	0.006	0.032	0.013	0.006	0.006
Norflurazon	ND	ND	ND	Trace	ND
Oxyfluorfen	ND	Trace	Trace	Trace	ND
Permethrin	ND	ND	ND	Trace	ND
Phosmet	ND	ND	ND	Trace	ND
Propargite	ND	ND	ND	Trace	ND

APPENDIX I: REFERENCES

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