AIR MONITORING NETWORK RESULTS FOR 2020

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Executive Summary

In February 2011, the California Department of Pesticide Regulation (CDPR) implemented a multi-year statewide Air Monitoring Network (AMN) to measure pesticides in various agricultural communities. The AMN is the first long-term multi-year air monitoring study conducted by CDPR. Its objectives are to collect data that assist in (1) assessing potential health risks, (2) evaluating the effectiveness of existing mitigation measures, (3) developing measures to mitigate risks, and (4) evaluating the effectiveness of regulatory requirements. Representative communities were selected using an exhaustive selection process, which is updated periodically to account for trends or changes that affect California's communities. This annual report is the tenth volume of this study and contains AMN results from January 1, 2020 to December 31, 2020.

In 2020, CDPR, with the assistance of staff from the California Air Resources Board (CARB) and the Santa Barbara County Agricultural Commissioner's Office, monitored a total of 31 pesticides and 5 pesticide breakdown products across eight communities throughout California. Pesticides monitored in the AMN were selected primarily based on potential risk to human health. Higher-risk pesticides were prioritized and selected for inclusion in the AMN based on higher use, higher volatility, and higher toxicity.

The AMN originally provided monitoring starting in 2011 for three communities, also referred to as sites. However, through the Budget Act of 2016 our study was expanded to include five additional sites for a total of eight communities by 2018. All eight sites were operational in early 2020; however, monitoring stopped completely in Chualar, Cuyama, Lindsay, Oxnard, and San Joaquin by March 18 due to the health concerns posed by the Coronavirus Disease 2019 (COVID-19). Despite the extensive restrictions posed by COVID-19, CDPR staff continued monitoring the volatile organic compounds 1,3-dichloropropene (1,3-D) and methyl bromide in Shafter and Watsonville for the entire year. The Santa Maria monitoring site remained fully operational (all 36 chemicals were monitored) throughout 2020 with support from the Santa Barbara County Agricultural Commissioner's office staff.

At each operational sampling site, one set of 24-hour composite air samples was collected on a weekly basis. A sample set is the collective term for all samples recovered from one site in one week and consists of three sorbent tubes and one canister (four chemical analytical methods). Sampling start dates were randomly selected each week to produce variation in the sampling day; sampling start times varied from 6:00 AM to 4:00 PM. The air monitors are located in high pesticide-use areas and are designed to capture pesticide emissions; however, monitoring data from these areas may not be representative for all of California.

A total of 4,692 analyses (samples multiplied by number of chemicals analyzed in each sample) were conducted on the air samples collected from all eight AMN sites operating in 2020. Of these analyses, 377 (7.5%) were either quantifiable or trace detections. Quantifiable detections refer to concentrations above the limit of quantitation (LOQ) for the respective pesticide, while trace detections are measured concentrations above the method detection limit (MDL) but below the LOQ. Samples that resulted in a quantifiable detection accounted for 142 (2.5%) of all analyses conducted. Of the 36 pesticides and breakdown products monitored, 10 were detected at quantifiable levels, 19 were only detected at trace levels, and seven were not detected. The chemicals with the highest number of quantifiable detections were 1,3-D MITC, and methyl bromide, and only 1,3-D exceeded its sub-chronic screening level exposure in Shafter.

No state or federal agency has established health standards for pesticides in ambient air. Therefore, CDPR estimates the potential for adverse health effects by comparing the measured air concentration of a pesticide to developed health screening levels or regulatory targets for 1- or 3-day (depending on the pesticide), 4- or 13-week (depending on the pesticide), 1-year, and lifetime exposure periods. CDPR developed health screening levels (SL) based on preliminary assessments of possible health effects, whereas regulatory targets (RT) are established based on complete assessments of possible health risks and supersede SLs. The SL or RT is used as a trigger to conduct a more detailed evaluation. CDPR puts measures in place based on the RT to limit exposures, and avoid adverse effects on human health. Exceeding an RT does not necessarily mean that an adverse health effect has occurred; however, it does indicate that the restrictions on the pesticide may need to be modified.

INTRODUCTION

Background

In February 2011, as part of the California Department of Pesticide Regulation's (CDPR) mandate for continuous evaluation of currently registered pesticides, CDPR 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 goals of the AMN are to provide data that assist 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:

- Identify pesticides in air and determine seasonal, annual, and multi-year concentrations
- Compare concentrations to acute, sub-chronic, chronic, and lifetime (when available) regulatory targets or health screening levels
- 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)

As part of the community selection process for the AMN, CDPR evaluated 1,267 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. CDPR selected eight communities for the AMN, four sampling sites were operational in 2017 and four others were added in 2018. These representative communities were selected using an exhaustive selection process detailed in Air Monitoring Network webpage. This selection report is updated periodically to account for trends or changes that impact California's communities.

At each sampling site, one set of 24-hour air samples was collected on a weekly basis. A sample set is the collective term for all samples recovered from one site in one week and consists of three sorbent tubes and one canister (four chemical analytical methods). The air samples were analyzed for 31 pesticides and 5 pesticide breakdown products. This report is the tenth volume of this study and contains AMN results from January 1, 2020 to December 31, 2020.

Changes to the Air Monitoring Network

In 2010-2011, DPR's Toxic Air Contaminant (TAC) program established air sampling stations in Oxnard, Santa Maria, and Watsonville for weekly air monitoring of 1,3-D and methyl bromide (MeBr). The Santa Maria and Watsonville stations transitioned to AMN sites in 2017, while Oxnard became an AMN site in 2018 (Table 1). Transitioning from TAC to AMN sites also indicates that monitoring was expanded to 36 pesticides.

The Budget Act of 2016 temporarily increased funding of the AMN, enabling CDPR to expand from three original sampling sites in 2011 to a total of eight sites (CDPR 2017). During the temporary expansion of the AMN, CDPR was responsible for the operation of three sites while the California Air Resources Board (CARB) was responsible for operating the remaining five sampling sites. Due to sampling equipment and site procurement delays, the expansion took place in various phases starting on January 1, 2017, and concluding in August 2018 when the last of the eight monitoring sites was added to the AMN. In February 2019, the Shafter sampling site was relocated from Shafter High School to Sequoia Elementary School, and in November 2019, the Santa Maria sampling site was relocated within the community of Santa Maria from a CARB monitoring location across from Santa Maria High School to Bonita Elementary School.

Communities Monitored in 2020

Four communities were selected based on nearby use of the fumigants 1,3-dichloropropene (1,3-D), chloropicrin, methyl isothiocyanate (MITC), and MITC-generators, while four other communities were selected based upon the use of selected organophosphates (CDPR 2017). However, all eight sites were monitored for all 36 chemical compounds. The air monitors are located in high-use areas and are designed to capture pesticide emissions; however, monitoring data from these areas may not be representative for all of California. Complete details on community selection can be found online in the Community Pesticide Monitoring page in CDPR's website.

Table 1. Communities in the Air Monitoring Network in 2020.

Community	County	Date of first sample collection	Site Operator
Chualar	Monterey	01/05/2017	CDPR
Cuyama	Santa Barbara	05/10/2018	CARB
Lindsay	Tulare	04/26/2018	CARB
Oxnard	Ventura	10/24/2011	CARB
San Joaquin	Fresno	02/01/2017	CARB

Community	County	Date of first sample collection	Site Operator
Santa Maria	Santa Barbara	08/11/2010	CDPR
Shafter	Kern	02/09/2011	CARB†
Watsonville	Santa Cruz (border with Monterey)	11/05/2011	CDPR

†Shafter monitoring responsibilities transitioned from CDPR to CARB in April 2018.

Air Sampling in 2020

On March 4, 2020, the Governor of California issued a State of Emergency due to the health concerns posed by the Coronavirus Disease 2019 (COVID-19), followed by a Stay Home Order on March 19, 2020. Consequently, monitoring stopped completely in Cuyama and Oxnard on March 12, and in Chualar, Lindsay, and San Joaquin on March 18. In Shafter and Watsonville, 1,3-D and MeBr were monitored during all 53 weeks in 2020, while monitoring was discontinued for the other 34 chemicals on March 12. In Santa Maria, all 36 chemicals were monitored during all 53 weeks.

Pesticides Monitored

As part of the AMN, CDPR monitored for 36 chemicals: 31 pesticides and 5 breakdown products. As noted above the number of chemicals monitored varied per site in 2020 as follows:

- Cuyama and Oxnard: 36 chemicals monitored from January 1 to March 12. No chemical was monitored from March 13 to December 31.
- Chualar, Lindsay, and San Joaquin: 36 chemicals monitored from January 1 to March 18. No chemical was monitored from March 19 to December 31.
- Shafter and Watsonville: 1,3-D and methyl bromide were monitored all year from January 1 to December 31. The other 34 chemicals were only monitored from January 1 to March 12.
- Santa Maria: 36 chemicals were monitored all year from January 1 to December 31.

Chemicals were selected based primarily on potential health risk (CDPR 2013). Four analytical methods were used to analyze the collected air samples (details in Appendices I-J):

1. Volatile Organic Compounds (VOC) for 1,3-D and MeBr: samples taken using SUMMA 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 32 Chemicals: samples taken using Teflon cartridges with XAD-4 resin

In previous years, the primary laboratory responsible for analyzing the AMN samples was the California Air Resources Board's Organic Laboratory Section (CARB-OLS). However, starting in 2020, the responsibility for sample analysis gradually shifted to the California Department of Food and Agriculture's Center for Analytical Chemistry (CDFA-CAC). As a result, most of the AMN samples in 2020 were analyzed by CDFA-CAC. It's important to note that CDFA-CAC employs a more sensitive method of detection limit (MDL), leading to a higher likelihood of detecting pesticides at low concentrations.

RESULTS

Tables 2–7 show the analytical results for the pesticides monitored by the AMN in 2020. The results for each individual community are available below in Appendices A-H.

Pesticide Detections

A total of 4,692 analyses (samples multiplied by the number of chemicals analyzed in each sample) were conducted on the air samples collected from the eight AMN sites operating from January 1, 2020 to December 31, 2020. Of these, 8 % (377) resulted in detectable concentrations, which included both quantifiable and trace detections. Quantifiable detections refer to concentrations above the limit of quantitation (LOQ) for the respective pesticide, while trace detections are measured concentrations above the Method Detection Limit (MDL) but below the LOQ. Samples with quantifiable detections accounted for 3.2 % (152) of all analyses conducted.

Of the 36 pesticides and breakdown products monitored, 10 were detected at quantifiable levels, 19 were detected only at trace levels, and seven were not detected. Table 2 lists the total number of valid samples by type for each pesticide and breakdown product in all AMN sites in 2020. The number of quantifiable detections for 1,3-D was higher than previous years due to the laboratory's method of detection limit (MDL). In previous years, 70% of our samples were analyzed by CARB's lab (MDL = 0.10), whereas 61% of samples were analyzed by CDFA (MDL = 0.01) in 2020. The chemicals with the highest number of quantifiable detections were 1,3-dichloropropene (n = 89, 43.6%), MITC (n = 33, 26.2%), and MeBr (n = 10, 4.9%).

Table 2. Number and percentage of positive samples per chemical in all AMN sites in 2020.

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	204	89	89	43.6 %	43.6 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Acephate	126	1	1	0.79 %	0.79 %
Bensulide	126	2	0	1.6 %	0 %
Chloropicrin	126	14	6	11.1 %	4.8 %
Chlorothalonil	126	30	2	23.8 %	1.6 %
Chlorpyrifos	126	0	0	0 %	0 %
Chlorpyrifos OA	126	0	0	0 %	0 %
Cypermethrin	126	1	0	0.79 %	0 %
Dacthal	126	43	2	34.1 %	1.6 %
DDVP	126	18	2	14.3 %	1.6 %
DEF	126	0	0	0 %	0 %
Diazinon	126	2	0	1.6 %	0 %
Diazinon OA	126	2	0	1.6 %	0 %
Dimethoate	126	2	0	1.6 %	0 %
Dimethoate OA	126	1	0	0.79 %	0 %
Diuron	126	4	0	3.2 %	0 %
Endosulfan	126	0	0	0 %	0 %
Endosulfan Sulfate	126	2	0	1.6 %	0 %
EPTC	126	0	0	0 %	0 %
Iprodione	126	2	0	1.6 %	0 %
Malathion	126	31	6	24.6 %	4.8 %
Malathion OA	126	31	0	24.6 %	0 %
Methidathion	126	1	0	0.79 %	0 %
Methyl Bromide	204	10	10	4.9 %	4.9 %
Metolachlor (S-Metolachlor)	126	2	0	1.6 %	0 %
MITC	126	60	33	47.6 %	26.2 %
Norflurazon	126	3	0	2.4 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Oryzalin	126	2	0	1.6 %	0 %
Oxydemeton Methyl	126	1	0	0.79 %	0 %
Oxyfluorfen	126	2	0	1.6 %	0 %
Permethrin	126	2	0	1.6 %	0 %
Phosmet	126	1	0	0.79 %	0 %
pp-dicofol	126	0	0	0 %	0 %
Propargite	126	0	0	0 %	0 %
Simazine	126	4	0	3.2 %	0 %
Trifluralin	126	14	1	11.1 %	0.79 %
Total	4,692	377	152	8 %	3.2 %

Table 3 summarizes the total number of valid samples for all chemicals by community. The percentages of quantifiable and trace detections for monitored chemicals across all eight communities ranged from 2% to 15.5% of all monitored samples. Shafter had the highest percentage of quantifiable or trace detections (15.5%) and the highest percentage of samples with quantifiable detections (10.9%).

Table 3. Number and percentage of positive samples per location in 2020.

Community	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Chualar	432	21	3	4.9 %	0.69 %
Cuyama	394	9	1	2.3 %	0.25 %
Lindsay	392	12	2	3.1 %	0.51 %
Oxnard	358	7	1	2 %	0.28 %
San Joaquin	392	21	12	5.4 %	3.1 %
Santa Maria	1,768	205	53	11.6 %	3 %
Shafter	476	74	52	15.5 %	10.9 %
Watsonville	480	28	28	5.8 %	5.8 %
Total	4,692	377	152	8 %	3.2 %

Table 4 summarizes the detections of the monitored chemicals as weekly sample sets by location. Number of sample sets is defined as a weekly sampling event where chemicals were monitored in the air for 24 hours. Each sampling event consisted of monitoring 36 chemicals, but this changed in March due to COVID-19. A total of 213 sample sets were taken from all eight communities, with 162 (76.1%) samples containing at least one detection.

Table 4. Detections of monitored chemicals by location, as weekly sample sets in 2020.

Community	Number of sample sets	Sets with at least one Quantifiable or Trace detection	Sets with at least one Quantifiable or Trace detection %
Chualar	12	12	100 %
Cuyama	11	9	81.8 %
Lindsay	11	8	72.7 %
Oxnard	10	5	50 %
San Joaquin	11	10	90.9 %
Santa Maria	53	50	94.3 %
Shafter	52	41	78.8 %
Watsonville	53	27	50.9 %
Total	213	162	76.1 %

Pesticide Concentrations

Acute Exposure: Highest 24-hour concentrations among all sites

The following 19 chemicals were detected only at trace levels: bensulide, cypermethrin, diazinon, diazinon oxygen analog (OA), dimethoate, dimethoate OA, diuron, endosulfan sulfate, iprodione, malathion OA, methidathion, metolachlor (s-metolachlor), norflurazon, oryzalin, oxydemeton methyl, oxyfluorfen, permethrin, phosmet, and simazine.

The following seven chemicals were not detected at any monitoring location: chlorpyrifos, chlorpyrifos OA, DEF, endosulfan, EPTC, pp-dicofol, and propargite.

Table 5 lists the highest 24-hour concentrations at any site for the pesticides detected at a quantifiable concentration in 2020. None of the pesticides or breakdown products exceeded their respective acute (24- or 72-hour) screening levels (SL) or regulatory targets (RT) during 2020 monitoring. Of all monitored pesticides, the pesticide with the highest percentage of 24-hour air concentration compared to its acute screening level was 1,3-D (33.7%), followed by chloropicrin (0.81%), and DDVP (0.81%). All other compounds were less than 0.5% of their acute screening levels or regulatory targets during monitoring in 2020.

Table 5. Highest 24-h air concentrations, acute screening levels, and percent of screening level of pesticides detected at quantifiable concentrations in 2020.

Community	Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Shafter	1,3-dichloropropene	37.5 ppb (170,199 ng/m^3)	110 ppb (505,000 ng/m^3)‡	33.7 %
Santa Maria	Acephate	0.002 ppb (12.5 ng/m^3)	1.6 ppb (12,000 ng/m^3)	0.1 %
Santa Maria	Chloropicrin	0.59 ppb (3,966 ng/m^3)	73 ppb (491,000 ng/m^3)*†	0.81 %
Shafter	Chlorothalonil	0.003 ppb (36.3 ng/m^3)	3.1 ppb (34,000 ng/m^3)	0.11 %
Chualar	Dacthal	0.001 ppb (14.2 ng/m^3)	1,732 ppb (23,500,000 ng/m^3)	0.00006 %
Santa Maria	DDVP	0.01 ppb (88.9 ng/m^3)	1.2 ppb (11,000 ng/m^3)	0.81 %
Santa Maria	Malathion	0.003 ppb (35.6 ng/m^3)	8.3 ppb (112,500 ng/m^3)	0.032 %
Shafter	Methyl Bromide	0.048 ppb (186 ng/m^3)	210 ppb (820,000 ng/m^3)*	0.023 %
San Joaquin	MITC	1.1 ppb (3,174 ng/m^3)	220 ppb (660,000 ng/m^3)*†	0.48 %
Santa Maria	Trifluralin	0.002 ppb (25.5 ng/m^3)	87.5 ppb (1,200,000 ng/m^3)	0.0021 %

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

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

Table 6 lists the highest observed rolling 4- or 13-week average concentrations for any chemical detected at a quantifiable concentration among all sites in 2020. The pesticide with the highest rolling 4-week average was MITC, with an estimated concentration of 0.47 ppb (47.2%) which did not exceed its sub-chronic SL. 1,3-D was the pesticide with the highest rolling 13-week average concentration with an estimated concentration of 4.5 ppb (147%). This concentration exceeded its sub-chronic SL exposure.

Table 6. Highest rolling average concentrations, sub-chronic screening levels, and percent of screening levels of any pesticide detected at a quantifiable concentration in 2020.

Community	Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Shafter	1,3-dichloropropene	13-week	4.5 ppb (20,620 ng/m^3)	3 ppb (14,000 ng/m^3)	147 %
San Joaquin	MITC	4-week	0.47 ppb (1,416 ng/m^3)	1 ppb (3,000 ng/m^3)	47.2 %
Santa Maria	Chloropicrin	13-week	0.11 ppb (728 ng/m^3)	0.35 ppb (2,300 ng/m^3)	31.7 %
Santa Maria	DDVP	4-week	0.0035 ppb (31.2 ng/m^3)	0.24 ppb (2,200 ng/m^3)	1.4 %
Shafter	Methyl Bromide	4-week	0.023 ppb (90.2 ng/m^3)	5 ppb (19,400 ng/m^3)†	0.47 %
Shafter	Chlorothalonil	4-week	0.002 ppb (22.6 ng/m^3)	3.1 ppb (34,000 ng/m^3)	0.066 %
Santa Maria	Acephate	4-week	0.00053 ppb (3.4 ng/m^3)	1.1 ppb (8,500 ng/m^3)	0.04 %

Community	Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Santa Maria	Malathion	4-week	0.0014 ppb (17.2 ng/m^3)	6 ppb (80,600 ng/m^3)	0.021 %
Santa Maria	Trifluralin	4-week	0.00088 ppb (12.1 ng/m^3)	12.4 ppb (170,000 ng/m^3)	0.0071 %
Chualar	Dacthal	4-week	0.00069 ppb (9.6 ng/m^3)	34.6 ppb (470,000 ng/m^3)	0.002 %

*Rolling or moving averages of weeks 1-4, weeks 2-5, weeks 3-6, etc.; or weeks 1-13, weeks 2-14, weeks 3-15, etc.
†This is a regulatory target rather than a screening level.

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

Table 7 presents the highest observed annual average concentrations for each chemical detected at a quantifiable concentration alongside its respective chronic SL in 2020. Given that chronic SL are based on 1-year exposures and monitoring was discontinued in March in several locations, we only calculated the percent of chronic SL for 1,3-D and MeBr monitored in Santa Maria, Shafter, and Watsonville. Likewise, the percent of chronic SL for the remaining 34 chemicals were only calculated from our Santa Maria sampling location. The highest annual average concentration relative to its chronic SL was observed for 1,3-D (90.7%), followed by chloropicrin (18.3%), and DDVP (0.9%).

Table 7. Highest annual average air concentrations, chronic screening levels, and percent of screening level of pesticides detected at quantifiable concentrations in 2020.

Community	Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Shafter	1,3-dichloropropene	1.8 ppb (8,163 ng/m^3)	2 ppb (9,000 ng/m^3)	90.7 %
Santa Maria	Chloropicrin	0.049 ppb (329 ng/m^3)	0.27 ppb (1,800 ng/m^3)	18.3 %
Santa Maria	MITC	0.0055 ppb (16.3 ng/m^3)	0.1 ppb (300 ng/m^3)	5.4 %
Santa Maria	DDVP	0.00075 ppb (6.7 ng/m^3)	0.085 ppb (770 ng/m^3)	0.87 %
Shafter	Methyl Bromide	0.0068 ppb (26.4 ng/m^3)	1 ppb (3,900 ng/m^3)	0.68 %

Community	Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Santa Maria	Malathion	0.00042 ppb (5.2 ng/m^3)	0.6 ppb (8,100 ng/m^3)	0.064 %
Santa Maria	Trifluralin	0.00027 ppb (3.7 ng/m^3)	3 ppb (41,000 ng/m^3)	0.009 %
Santa Maria	Acephate	0.000085 ppb (0.57 ng/m^3)	1.1 ppb (8,500 ng/m^3)	0.0067 %

Lifetime Exposure: Cancer risk estimates

The AMN program monitors for 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 2020, 1,3-D, chlorothalonil, and DDVP had quantifiable concentrations, hence their cumulative annual average concentrations and cancer risk estimates were calculated (Tables 8-10). These calculations use the average concentration based on all data available from the specified site. It is important to note that these shorter timeframes are less suitable for comparison to a 70-year target and are for illustrative purposes only. These values differ from those presented in the calculated annual concentrations above because those are a simple mean (average), while a time-weighted-average is used for the cancer risk estimates. Cancer risk is expressed as a probability for the occurrence of cancer (e.g., 1 in 1,000,000 or 10^{-6}, 1 in 100,000 or 10^{-5}, etc.). Risk in the range of 10^{-5} to 10^{-6} or less is generally considered to be at the limit of what is considered 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 $(mg/kg/day)^{-1}$

CDPR 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. Moreover, CDPR has estimated the following CPF_H values for three of the seven monitored pesticides; all three were detected in 2020:

- 1,3-D: $CPF_H = 0.014$ $(mg/kg/day)^{-1}$ (CDPR 2015)
- Chlorothalonil: $CPF_H = 0.016$ $(mg/kg/day)^{-1}$ (CDPR 2018)
- DDVP: $CPF_H = 0.350$ $(mg/kg/day)^{-1}$ (CDPR 1996)

In 2016, CDPR set the lifetime average concentration regulatory target for 1,3-dichloropropene at 2,600 ng/m^3 (0.56 ppb) (CDPR 2016a). Tables 8-10 depict the historic average concentrations and cancer risk estimates for 1,3-D, chlorothalonil, and DDVP.

Table 8. Cumulative annual average concentration, cancer risk estimate, target, and percent of cancer risk target for 1,3-dichloropropene at each sampling location as of 2020.

Community	1,3-D concentration	Cancer Risk Estimate	Cancer Risk Target	Percent of Target
Chualar	0.041 ppb (185 ng/m^3)	7.25E-07	1.00E-05	7.3 %
Cuyama	0.05 ppb (227 ng/m^3)	8.90E-07	1.00E-05	8.9 %
Lindsay	0.05 ppb (227 ng/m^3)	8.90E-07	1.00E-05	8.9 %
Oxnard	0.13 ppb (573 ng/m^3)	2.24E-06	1.00E-05	22.4 %
San Joaquin	0.082 ppb (371 ng/m^3)	1.45E-06	1.00E-05	14.5 %
Santa Maria	0.13 ppb (582 ng/m^3)	2.28E-06	1.00E-05	22.8 %
Shafter	0.52 ppb (2367 ng/m^3)	9.28E-06	1.00E-05	92.8 %
Watsonville	0.1 ppb (457 ng/m^3)	1.79E-06	1.00E-05	17.9 %

Table 9. Cumulative annual average concentration, cancer risk estimate, target, and percent of cancer risk target for chlorothalonil at each sampling location as of 2020.

Community	Chlorothalonil concentration	Cancer Risk Estimate	Cancer Risk Target	Percent of Target
Chualar	0.00015 ppb (1.69 ng/m^3)	7.58E-09	1.00E-05	0.08 %
Cuyama	0.000095 ppb (1.05 ng/m^3)	4.69E-09	1.00E-05	0.05 %
Lindsay	0.0003 ppb (3.33 ng/m^3)	1.49E-08	1.00E-05	0.15 %
Oxnard	0.00036 ppb (3.95 ng/m^3)	1.77E-08	1.00E-05	0.18 %
San Joaquin	0.00034 ppb (3.79 ng/m^3)	1.70E-08	1.00E-05	0.17 %
Santa Maria	0.00018 ppb (1.93 ng/m^3)	8.63E-09	1.00E-05	0.09 %
Shafter	0.00079 ppb (8.63 ng/m^3)	3.87E-08	1.00E-05	0.39 %
Watsonville	0.000059 ppb (0.65 ng/m^3)	2.91E-09	1.00E-05	0.03 %

Table 10. Cumulative annual average concentration, cancer risk estimate, target, and percent of cancer risk target for DDVP at each sampling location as of 2020.

Community	DDVP concentration	Cancer Risk Estimate	Cancer Risk Target	Percent of Target
Chualar	0.00017 ppb (1.55 ng/m^3)	1.52E-07	1.00E-05	1.5 %
Cuyama	0.000081 ppb (0.73 ng/m^3)	7.20E-08	1.00E-05	0.7 %
Lindsay	0.000092 ppb (0.83 ng/m^3)	8.15E-08	1.00E-05	0.8 %
Oxnard	0.00017 ppb (1.54 ng/m^3)	1.51E-07	1.00E-05	1.5 %
San Joaquin	0.0008 ppb (6.85 ng/m^3)	6.71E-07	1.00E-05	6.7 %
Santa Maria	0.00043 ppb (3.84 ng/m^3)	3.77E-07	1.00E-05	3.8 %
Shafter	0.00012 ppb (1.05 ng/m^3)	1.03E-07	1.00E-05	1.0 %
Watsonville	0.00019 ppb (1.7 ng/m^3)	1.67E-07	1.00E-05	1.7 %

Cumulative Exposure Estimates for Organophosphates

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

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

The organophosphate cumulative exposure was estimated using a Hazard Quotient (HQ) and Hazard Index (HI) approach that relies on the ratio between the detected air concentration and the screening level (Appendix K). Cumulative exposures were estimated including all 15 organophosphates for each community and exposure period.

Table 11 summarizes the highest calculated HI for each community and time period during monitoring in 2020. Both the acute and sub-chronic HI values were calculated for each individual sample set, from which the maximum observed HI was reported. Given that chronic values are based on 1-year exposures and organophosphate monitoring was discontinued in March, we only calculated the chronic HI in Santa Maria. All HI were below 0.1 in all sampling locations in 2020. This indicates that even for the combined 15 organophosphate compounds, a summed screening level was not exceeded.

Table 11. Organophosphate cumulative exposure: acute, subchronic, and chronic hazard indices (HI) across all AMN sites in 2020.

Community	Acute HI	Subchronic HI	Chronic HI
Chualar	0.004	0.006	---
Cuyama	0.004	0.006	---
Lindsay	0.004	0.006	---
Oxnard	0.004	0.006	---
San Joaquin	0.004	0.006	---
Santa Maria	0.087	0.041	0.020
Shafter	0.076	0.024	---
Watsonville	0.004	0.006	---

Summary

Due to the health concerns posed by COVID-19, sampling events were reduced in some sites and halted all together in other sites in 2020. In Shafter and Watsonville, only 1,3-D and methyl bromide were monitored all year, and Santa Maria was the only site where all 36 chemicals were monitored all year from January 1 to December 31, 2020.

Ten pesticides were detected at quantifiable concentrations out of 36 chemicals monitored for by the AMN in 2020, including all four fumigants 1,3-D, chloropicrin, MeBr, and MITC. The organophosphates acephate, DDVP, and malathion were also detected at quantifiable concentrations along with chlorothalonil (chloronitrile), dacthal (phthalate), and trifluralin (dinitroaniline).

Of the 10 pesticides detected at quantifiable concentrations, MITC was the only pesticide detected in all eight AMN locations. Methyl Bromide and 1,3-D were detected in San Joaquin, Santa Maria, Shafter, and Watsonville. Acephate, chloropicrin, DDVP, malathion, and trifluralin were detected only in Santa Maria. Chlorothalonil and dacthal were detected only in Shafter and Chualar, respectively.

The highest Hazard Index (HI) calculated for any site at any exposure period was 0.087, indicating a low risk from organophosphate cumulative exposure.

Of the 31 pesticides and 5 breakdown products monitored in 2020, only 1,3-D exceeded its respective screening level in Shafter for the sub-chronic timeframe. The 13-week average concentration was mainly driven by a single elevated air concentration of 37.5 ppb (170,199 ng/m^3) observed on October 16. As of August 2023, CDPR proposed regulations to mitigate 1,3-D acute and lifetime exposure to non-occupational bystanders that will go into effect in 2024, CDPR will propose additional regulations in 2024 to mitigate 1,3-D lifetime exposures to occupational bystanders in California.

APPENDIX A: CHUALAR RESULTS

Chualar is a census-designated place (0.6 square miles in area) located approximately 10 miles south-southeast of Salinas in Monterey County. The elevation is 115 feet, and it receives on average 16 inches of precipitation annually. Average temperatures range from 53° to 72°F in the summer and 41° to 63°F in the winter. Based on the 2010 census, the population of Chualar was 1,190 of which 36.1% were below 18 years of age and 5.0% were above 65 years of age. The major crops in the immediate area around Chualar are strawberries, lettuce, and tomatoes. The monitoring site is located at a privately owned water well situated on the eastern side of the community. Due to COVID-19 restrictions, monitoring stopped completely in Chualar after the first 12 sampling weeks. Therefore, 1,3-D and MeBr sub-chronic exposures were calculated based on a 12-week concentration (rather than 13 weeks), while annual averages and percent chronic screening levels were not calculated.

Pesticide Detections

Table A–1 lists the number and percentage of analyses resulting in detections at the Chualar sampling site. The active ingredient with the highest percentage of detections was dacthal (100%, n = 12), while the highest percentage of quantifiable detections was also observed for dacthal (16.7%, n = 2) followed by MITC (8.3%, n = 1).

Table A–1. Number and percentage of positive samples per chemical in Chualar in 2020.

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	12	0	0	0 %	0 %
Acephate	12	0	0	0 %	0 %
Bensulide	12	1	0	8.3 %	0 %
Chloropicrin	12	0	0	0 %	0 %
Chlorothalonil	12	1	0	8.3 %	0 %
Chlorpyrifos	12	0	0	0 %	0 %
Chlorpyrifos OA	12	0	0	0 %	0 %
Cypermethrin	12	0	0	0 %	0 %
Dacthal	12	12	2	100 %	16.7 %
DDVP	12	0	0	0 %	0 %
DEF	12	0	0	0 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Diazinon	12	0	0	0 %	0 %
Diazinon OA	12	0	0	0 %	0 %
Dimethoate	12	0	0	0 %	0 %
Dimethoate OA	12	0	0	0 %	0 %
Diuron	12	1	0	8.3 %	0 %
Endosulfan	12	0	0	0 %	0 %
Endosulfan Sulfate	12	1	0	8.3 %	0 %
EPTC	12	0	0	0 %	0 %
Iprodione	12	0	0	0 %	0 %
Malathion	12	0	0	0 %	0 %
Malathion OA	12	1	0	8.3 %	0 %
Methidathion	12	0	0	0 %	0 %
Methyl Bromide	12	0	0	0 %	0 %
Metolachlor (S-Metolachlor)	12	0	0	0 %	0 %
MITC	12	1	1	8.3 %	8.3 %
Norflurazon	12	1	0	8.3 %	0 %
Oryzalin	12	1	0	8.3 %	0 %
Oxydemeton Methyl	12	0	0	0 %	0 %
Oxyfluorfen	12	0	0	0 %	0 %
Permethrin	12	0	0	0 %	0 %
Phosmet	12	0	0	0 %	0 %
pp-dicofol	12	0	0	0 %	0 %
Propargite	12	0	0	0 %	0 %
Simazine	12	1	0	8.3 %	0 %
Trifluralin	12	0	0	0 %	0 %
Total	432	21	3	4.9 %	0.69 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table A–2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Chualar AMN sampling location in 2020. The pesticide with the highest concentration relative to its screening level was that of MITC at 0.0043%, followed by dacthal at 0.00006%. No other chemicals had quantifiable detections at Chualar in 2020.

Table A–2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Chualar in 2020.

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
MITC	0.009 ppb (28.2 ng/m^3)	220 ppb (660,000 ng/m^3)*†	0.0043 %
Dacthal	0.001 ppb (14.2 ng/m^3)	1,732 ppb (23,500,000 ng/m^3)	0.00006 %
1,3-dichloropropene	ND	110 ppb (505,000 ng/m^3)**	
Acephate	ND	1.6 ppb (12,000 ng/m^3)	
Bensulide	Trace	15.9 ppb (259,000 ng/m^3)	
Chloropicrin	ND	73 ppb (491,000 ng/m^3)*†	
Chlorothalonil	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.084 ppb (1,200 ng/m^3)‡	
Chlorpyrifos OA	ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin	ND	6.6 ppb (113,000 ng/m^3)	
DDVP	ND	1.2 ppb (11,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate OA	ND	0.49 ppb (4,300 ng/m^3)	
Diuron	Trace	17.8 ppb (170,000 ng/m^3)	
Endosulfan	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	Trace	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	29.7 ppb (230,000 ng/m^3)	
Iprodione	ND	23.18 ppb (313,000 ng/m^3)	
Malathion	ND	8.3 ppb (112,500 ng/m^3)	
Malathion OA	Trace	8.8 ppb (112,500 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor (S-Metolachlor)	ND	7.3 ppb (85,000 ng/m^3)	
Norflurazon	Trace	12.6 ppb (170,000 ng/m^3)	
Oryzalin	Trace	29.7 ppb (420,000 ng/m^3)	

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

*This value is a regulatory target rather than a screening level
†This value is an 8-hour time-weighted-average (TWA) used to compare against the 24-h measured concentration
**This value is a 72-hour TWA used to compare against the 24-hour measured concentration.
‡ CDPR's risk management directive for Chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m^3), 1-hour TWA on May 28, 2019. However, the current sample duration does not allow for a direct comparison between the acute regulatory target concentration and the measured sample values.

Sub-chronic (4- or 12-week) Concentrations

Table A–3 shows the highest observed rolling 4-week average concentrations for all chemicals monitored at the Chualar AMN sampling location in 2020. The pesticide with highest concentration relative to its screening level was MITC at 0.3%, followed by dacthal at 0.002%.

Table A–3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored in Chualar in 2020.

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
MITC	4-week	0.0029 ppb (9.1 ng/m^3)	1 ppb (3,000 ng/m^3)	0.3 %

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Dacthal	4-week	0.00069 ppb (9.6 ng/m^3)	34.6 ppb (470,000 ng/m^3)	0.002 %
1,3-dichloropropene	12-week	ND	3 ppb (14,000 ng/m^3)	
Acephate	4-week	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	4-week	Trace	1.5 ppb (24,000 ng/m^3)	
Chloropicrin	12-week	ND	0.35 ppb (2,300 ng/m^3)	
Chlorothalonil	4-week	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	4-week	ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos OA	4-week	ND	0.062 ppb (850 ng/m^3)	
Cypermethrin	4-week	ND	4.8 ppb (81,000 ng/m^3)	
DDVP	4-week	ND	0.24 ppb (2,200 ng/m^3)	
DEF	4-week	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	4-week	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	4-week	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	4-week	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	4-week	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	4-week	Trace	1.8 ppb (17,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Endosulfan	4-week	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	4-week	Trace	0.19 ppb (3,300 ng/m^3)	
EPTC	4-week	ND	3.1 ppb (24,000 ng/m^3)	
Iprodione	4-week	ND	7.08 ppb (95,600 ng/m^3)	
Malathion	4-week	ND	6 ppb (80,600 ng/m^3)	
Malathion OA	4-week	Trace	6.3 ppb (80,600 ng/m^3)	
Methidathion	4-week	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	4-week	ND	5 ppb† (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	4-week	ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon	4-week	Trace	1.9 ppb (26,000 ng/m^3)	
Oryzalin	4-week	Trace	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	4-week	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	4-week	ND	12.2 ppb (180,000 ng/m^3)	
Permethrin	4-week	ND	5.6 ppb (90,000 ng/m^3)	
Phosmet	4-week	ND	2 ppb (26,000 ng/m^3)	
pp-dicofol	4-week	ND	3.2 ppb (49,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Propargite	4-week	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	4-week	Trace	3.8 ppb (31,000 ng/m^3)	
Trifluralin	4-week	ND	12.4 ppb (170,000 ng/m^3)	

*Rolling averages of weeks 1-4, weeks 2-5, weeks 3-6, etc.
†This value is a regulatory target rather than a screening level.

Chronic (annual) Concentrations

Due to COVID-19 restrictions, monitoring stopped completely in Chualar after the first 12 sampling weeks. Therefore, annual averages and percent chronic screening levels could not be calculated.

Temporal Trends in Detected Concentrations

The following figures depict the concentrations over time for monitoring results in 2020 for any chemical detected at a quantifiable concentration in Chualar. Screening levels are abbreviated as SL, whereas regulatory targets are abbreviated as RT.

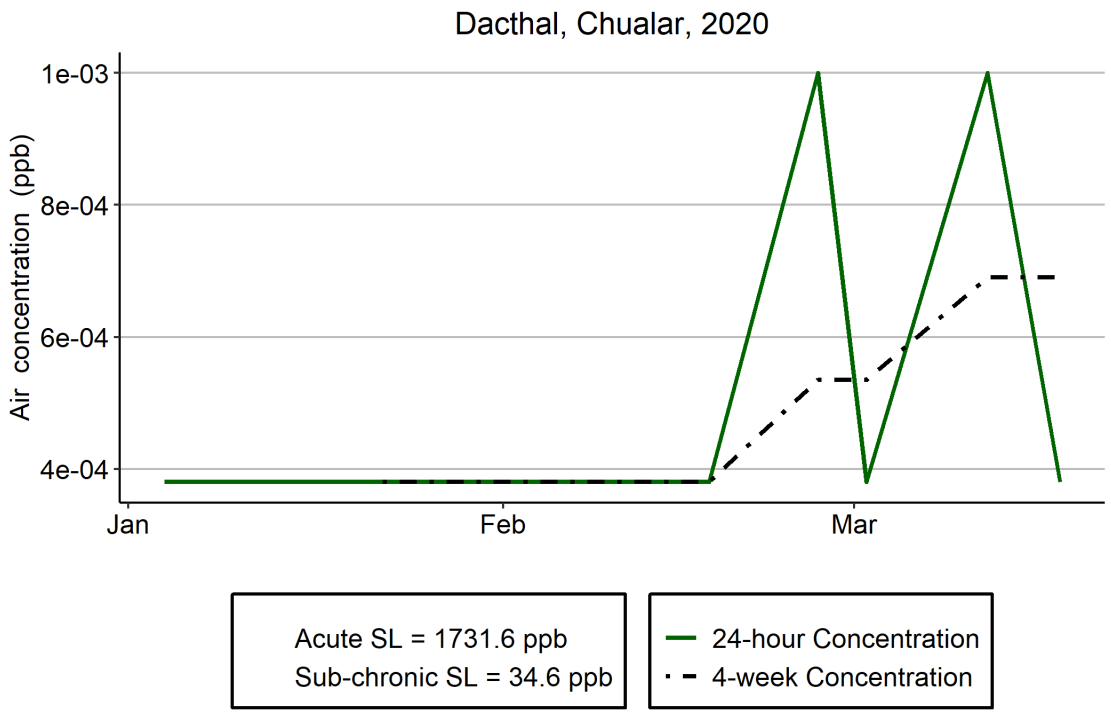

Figure A-1. Temporal trend in Dacthal concentrations in Chualar in 2020.

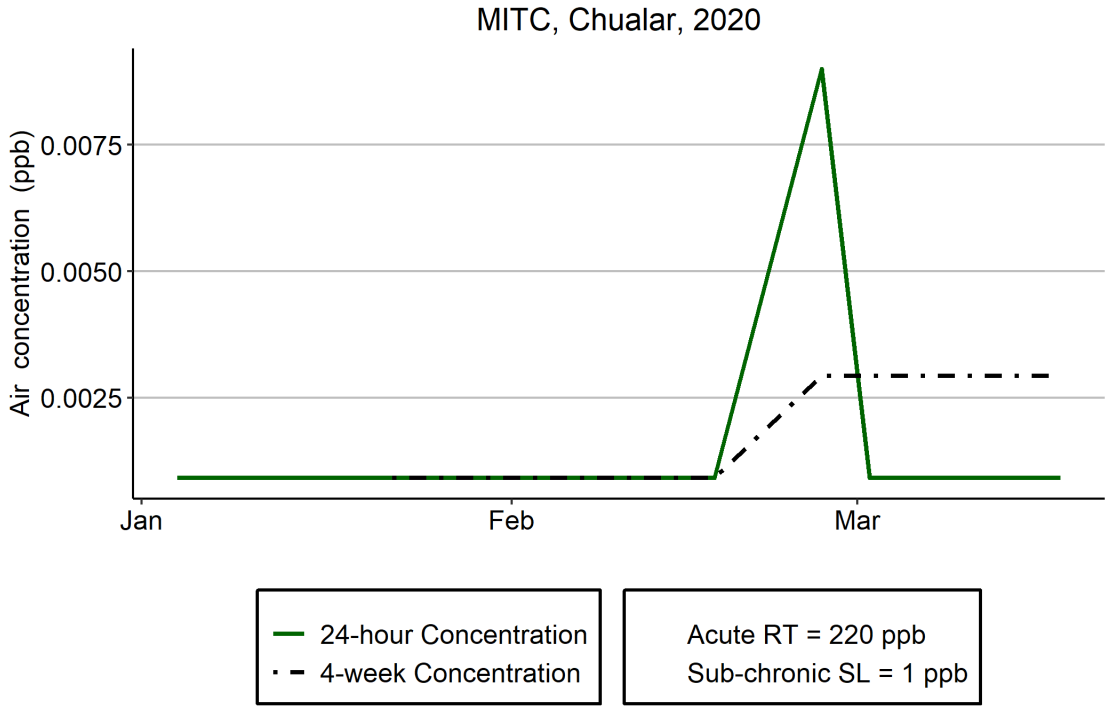

Figure A-2. Temporal trend in MITC concentrations in Chualar in 2020.

APPENDIX B: CUYAMA RESULTS

Cuyama is a census-designated place located in Santa Barbara County and is 0.46 square miles in area. The average elevation is 2,293 feet and it receives an average of 13.3 inches of precipitation annually. Daily average temperatures range from 59° to 81°F in the summer and 46° to 69°F in the winter. Based on the 2010 census, the population of Cuyama was 57, of which 24.6% were under 18 years of age and 8.8% were over 65 years of age. The major crops in the immediate area around Cuyama are apricots, peaches, and plums. The monitoring site is located at Cuyama Elementary School and the California Air Resources Board (CARB) conducted the monitoring. Due to COVID-19 restrictions, monitoring stopped completely in Cuyama after the first 11 sampling weeks. Therefore, 1,3-D and MeBr sub-chronic exposures were calculated based on a 11-week concentrations (rather than 13 weeks), while annual averages and percent chronic screening levels were not calculated.

Pesticide Detections

Table B–1 lists the number and percentage of analyses resulting in detections at the Cuyama sampling site. The only detected active ingredient was MITC with 9 detections (81.8%), of which one detection (9.1%) was quantifiable.

Table B–1. Number and percentage of positive samples per chemical in Cuyama in 2020.

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	10	0	0	0 %	0 %
Acephate	11	0	0	0 %	0 %
Bensulide	11	0	0	0 %	0 %
Chloropicrin	11	0	0	0 %	0 %
Chlorothalonil	11	0	0	0 %	0 %
Chlorpyrifos	11	0	0	0 %	0 %
Chlorpyrifos OA	11	0	0	0 %	0 %
Cypermethrin	11	0	0	0 %	0 %
Dacthal	11	0	0	0 %	0 %
DDVP	11	0	0	0 %	0 %
DEF	11	0	0	0 %	0 %
Diazinon	11	0	0	0 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Diazinon OA	11	0	0	0 %	0 %
Dimethoate	11	0	0	0 %	0 %
Dimethoate OA	11	0	0	0 %	0 %
Diuron	11	0	0	0 %	0 %
Endosulfan	11	0	0	0 %	0 %
Endosulfan Sulfate	11	0	0	0 %	0 %
EPTC	11	0	0	0 %	0 %
Iprodione	11	0	0	0 %	0 %
Malathion	11	0	0	0 %	0 %
Malathion OA	11	0	0	0 %	0 %
Methidathion	11	0	0	0 %	0 %
Methyl Bromide	10	0	0	0 %	0 %
Metolachlor (S-Metolachlor)	11	0	0	0 %	0 %
MITC	11	9	1	81.8 %	9.1 %
Norflurazon	11	0	0	0 %	0 %
Oryzalin	11	0	0	0 %	0 %
Oxydemeton Methyl	11	0	0	0 %	0 %
Oxyfluorfen	11	0	0	0 %	0 %
Permethrin	11	0	0	0 %	0 %
Phosmet	11	0	0	0 %	0 %
pp-dicofol	11	0	0	0 %	0 %
Propargite	11	0	0	0 %	0 %
Simazine	11	0	0	0 %	0 %
Trifluralin	11	0	0	0 %	0 %
Total	394	9	1	2.3 %	0.25 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table B–2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Cuyama AMN sampling location in 2020. The highest concentration relative to its screening level was that of MITC at 0.004%.

Table B–2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Cuyama in 2020.

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
MITC	0.009 ppb (25.9 ng/m^3)	220 ppb (660,000 ng/m^3)*†	0.004 %
1,3-dichloropropene	ND	110 ppb (505,000 ng/m^3)**	
Acephate	ND	1.6 ppb (12,000 ng/m^3)	
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chloropicrin	ND	73 ppb (491,000 ng/m^3)*†	
Chlorothalonil	ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.084 ppb (1,200 ng/m^3)‡	
Chlorpyrifos OA	ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin	ND	6.6 ppb (113,000 ng/m^3)	
Dacthal	ND	1,732 ppb (23,500,000 ng/m^3)	
DDVP	ND	1.2 ppb (11,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate OA	ND	0.49 ppb (4,300 ng/m^3)	
Diuron	ND	17.8 ppb (170,000 ng/m^3)	
Endosulfan	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	29.7 ppb (230,000 ng/m^3)	
Iprodione	ND	23.18 ppb (313,000 ng/m^3)	
Malathion	ND	8.3 ppb (112,500 ng/m^3)	
Malathion OA	ND	8.8 ppb (112,500 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor (S-Metolachlor)	ND	7.3 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	

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

*This value is a regulatory target rather than a screening level
† This value is an 8-hour time-weighted-average (TWA) used to compare against the 24-h measured concentration
**This value is a 72-hour TWA used to compare against the 24-hour measured concentration.
‡CDPR's risk management directive for Chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m^3), 1-hour TWA on May 28, 2019. However, the current sample duration does not allow for a direct comparison between the acute regulatory target concentration and the measured sample values.

Sub-chronic (4- or 11-week) Concentrations

Table B–3 shows the highest observed rolling 4-week average concentrations for all chemicals monitored at the Cuyama AMN sampling location in 2020. The highest concentration relative to its screening level was that of MITC at 0.57%.

Table B–3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored in Cuyama in 2020.

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
MITC	4-week	0.0058 ppb (17.2 ng/m^3)	1 ppb (3,000 ng/m^3)	0.57 %

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
1,3-dichloropropene	11-week	ND	3 ppb (14,000 ng/m^3)	
Acephate	4-week	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	4-week	ND	1.5 ppb (24,000 ng/m^3)	
Chloropicrin	11-week	ND	0.35 ppb (2,300 ng/m^3)	
Chlorothalonil	4-week	ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	4-week	ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos OA	4-week	ND	0.062 ppb (850 ng/m^3)	
Cypermethrin	4-week	ND	4.8 ppb (81,000 ng/m^3)	
Dacthal	4-week	ND	34.6 ppb (470,000 ng/m^3)	
DDVP	4-week	ND	0.24 ppb (2,200 ng/m^3)	
DEF	4-week	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	4-week	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	4-week	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	4-week	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	4-week	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	4-week	ND	1.8 ppb (17,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Endosulfan	4-week	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	4-week	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	4-week	ND	3.1 ppb (24,000 ng/m^3)	
Iprodione	4-week	ND	7.08 ppb (95,600 ng/m^3)	
Malathion	4-week	ND	6 ppb (80,600 ng/m^3)	
Malathion OA	4-week	ND	6.3 ppb (80,600 ng/m^3)	
Methidathion	4-week	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	4-week	ND	5 ppb† (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	4-week	ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon	4-week	ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin	4-week	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	4-week	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	4-week	ND	12.2 ppb (180,000 ng/m^3)	
Permethrin	4-week	ND	5.6 ppb (90,000 ng/m^3)	
Phosmet	4-week	ND	2 ppb (26,000 ng/m^3)	
pp-dicofol	4-week	ND	3.2 ppb (49,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Propargite	4-week	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	4-week	ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin	4-week	ND	12.4 ppb (170,000 ng/m^3)	

*Rolling averages of weeks 1-4, weeks 2-5, weeks 3-6, etc.
†This value is a regulatory target rather than a screening level.

Chronic (annual) Concentrations

Due to COVID-19 restrictions, monitoring in Cuyama stopped after the first 11 sampling weeks. Therefore, annual averages and percent chronic screening levels could not be calculated.

Temporal Trends in Detected Concentrations

The following figure depicts the concentrations over time for monitoring results in 2020 for any chemical detected at a quantifiable concentration in Cuyama. Screening levels are abbreviated as SL, whereas regulatory targets are abbreviated as RT.

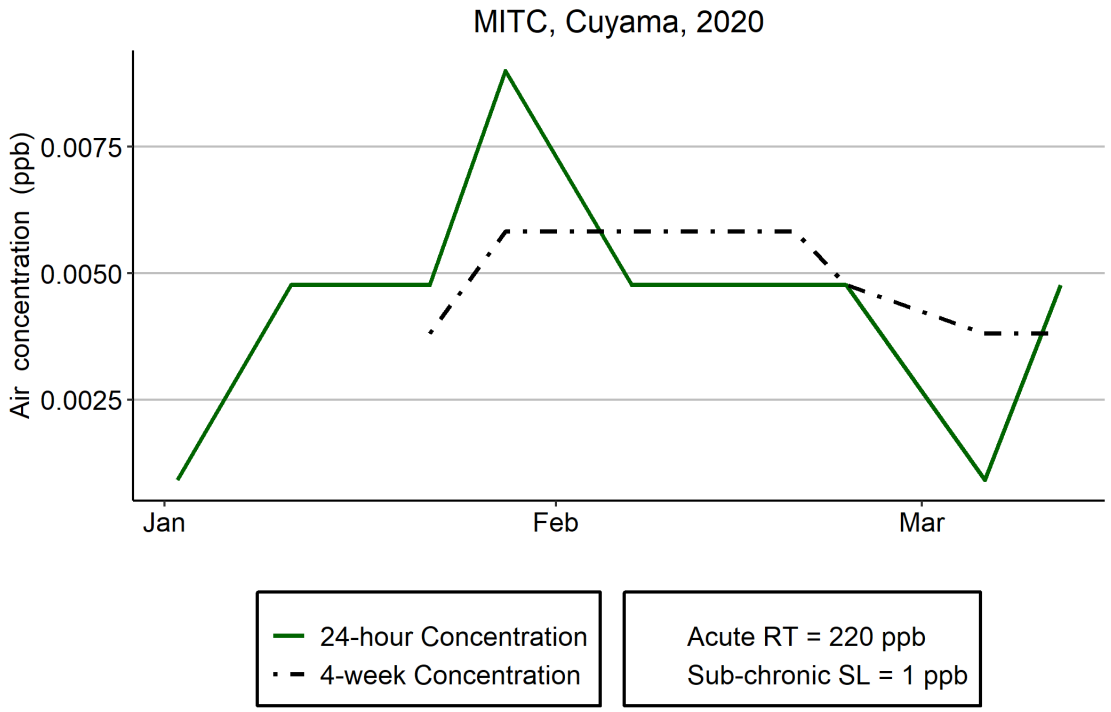

Figure B-1. Temporal trend in MITC concentrations in Cuyama in 2020.

APPENDIX C: LINDSAY RESULTS

Lindsay is 2.73 square miles in area and is located in Tulare County. The average elevation is 387 feet, and it receives approximately 11.6 inches of precipitation annually. Daily average temperatures range from 56° to 80°F in the summer and 35° to 64°F in the winter. Based on the 2010 census, the population of Lindsay was 11,768, of which 38.4% were under 18 years of and 7.5% were above 65 years of age. The major crops around Lindsay are oranges and grapes. The monitoring site is located at Reagan Elementary School and is conducted by the California Air Resources Board. Due to COVID-19 restrictions, monitoring stopped completely in Lindsay after the first 11 sampling weeks. Therefore, 1,3-D and MeBr sub-chronic exposures were calculated based on a 11-week concentrations (rather than 13 weeks), while annual averages and percent chronic screening levels were not calculated.

Pesticide Detections

Table C–1 lists the number and percentage of analyses resulting in detections at the Lindsay sampling site. The active ingredient with the highest percentage of detections was MITC (72.7%, n = 8), followed by chlorothalonil (18.2%, n = 2), and malathion (9.1%, n = 1). Of these, percentage of quantifiable detections was only recorded for MITC (18.2%, n = 2).

Table C–1. Number and percentage of positive samples per chemical in Lindsay in 2020.

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	9	0	0	0 %	0 %
Acephate	11	0	0	0 %	0 %
Bensulide	11	0	0	0 %	0 %
Chloropicrin	11	0	0	0 %	0 %
Chlorothalonil	11	2	0	18.2 %	0 %
Chlorpyrifos	11	0	0	0 %	0 %
Chlorpyrifos OA	11	0	0	0 %	0 %
Cypermethrin	11	0	0	0 %	0 %
Dacthal	11	0	0	0 %	0 %
DDVP	11	0	0	0 %	0 %
DEF	11	0	0	0 %	0 %
Diazinon	11	0	0	0 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Diazinon OA	11	0	0	0 %	0 %
Dimethoate	11	0	0	0 %	0 %
Dimethoate OA	11	0	0	0 %	0 %
Diuron	11	0	0	0 %	0 %
Endosulfan	11	0	0	0 %	0 %
Endosulfan Sulfate	11	0	0	0 %	0 %
EPTC	11	0	0	0 %	0 %
Iprodione	11	0	0	0 %	0 %
Malathion	11	1	0	9.1 %	0 %
Malathion OA	11	1	0	9.1 %	0 %
Methidathion	11	0	0	0 %	0 %
Methyl Bromide	9	0	0	0 %	0 %
Metolachlor (S-Metolachlor)	11	0	0	0 %	0 %
MITC	11	8	2	72.7 %	18.2 %
Norflurazon	11	0	0	0 %	0 %
Oryzalin	11	0	0	0 %	0 %
Oxydemeton Methyl	11	0	0	0 %	0 %
Oxyfluorfen	11	0	0	0 %	0 %
Permethrin	11	0	0	0 %	0 %
Phosmet	11	0	0	0 %	0 %
pp-dicofol	11	0	0	0 %	0 %
Propargite	11	0	0	0 %	0 %
Simazine	11	0	0	0 %	0 %
Trifluralin	11	0	0	0 %	0 %
Total	392	12	2	3.1 %	0.51 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table C–2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Lindsay AMN sampling location in 2020. The highest concentration relative to its screening level was that of MITC at 0.009%.

Table C–2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Lindsay in 2020.

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
MITC	0.02 ppb (61.1 ng/m^3)	220 ppb (660,000 ng/m^3)*†	0.009 %
1,3-dichloropropene	ND	110 ppb (505,000 ng/m^3)**	
Acephate	ND	1.6 ppb (12,000 ng/m^3)	
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chloropicrin	ND	73 ppb (491,000 ng/m^3)*†	
Chlorothalonil	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.084 ppb (1,200 ng/m^3)‡	
Chlorpyrifos OA	ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin	ND	6.6 ppb (113,000 ng/m^3)	
Dacthal	ND	1,732 ppb (23,500,000 ng/m^3)	
DDVP	ND	1.2 ppb (11,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate OA	ND	0.49 ppb (4,300 ng/m^3)	
Diuron	ND	17.8 ppb (170,000 ng/m^3)	
Endosulfan	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	29.7 ppb (230,000 ng/m^3)	
Iprodione	ND	23.18 ppb (313,000 ng/m^3)	
Malathion	Trace	8.3 ppb (112,500 ng/m^3)	
Malathion OA	Trace	8.8 ppb (112,500 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor (S-Metolachlor)	ND	7.3 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	

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

*This value is a regulatory target rather than a screening level
†This value is an 8-hour time-weighted-average (TWA) used to compare against the 24-h measured concentration
**This value is a 72-hour TWA used to compare against the 24-hour measured concentration.
‡CDPR's risk management directive for Chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m^3), 1-hour TWA on May 28, 2019. However, the current sample duration does not allow for a direct comparison between the acute regulatory target concentration and the measured sample values

Sub-chronic (4- or 11-week) Concentrations

Table C–3 shows the highest observed rolling 4-week average concentrations for all chemicals monitored at the Lindsay AMN sampling location in 2020. The highest concentration relative to its screening level was that of MITC at 1.1%.

Table C–3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored in Lindsay in 2020.

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
MITC	4-week	0.011 ppb (32.9 ng/m^3)	1 ppb (3,000 ng/m^3)	1.1 %

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
1,3-dichloropropene	11-week	ND	3 ppb (14,000 ng/m^3)	
Acephate	4-week	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	4-week	ND	1.5 ppb (24,000 ng/m^3)	
Chloropicrin	11-week	ND	0.35 ppb (2,300 ng/m^3)	
Chlorothalonil	4-week	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	4-week	ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos OA	4-week	ND	0.062 ppb (850 ng/m^3)	
Cypermethrin	4-week	ND	4.8 ppb (81,000 ng/m^3)	
Dacthal	4-week	ND	34.6 ppb (470,000 ng/m^3)	
DDVP	4-week	ND	0.24 ppb (2,200 ng/m^3)	
DEF	4-week	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	4-week	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	4-week	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	4-week	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	4-week	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	4-week	ND	1.8 ppb (17,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Endosulfan	4-week	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	4-week	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	4-week	ND	3.1 ppb (24,000 ng/m^3)	
Iprodione	4-week	ND	7.08 ppb (95,600 ng/m^3)	
Malathion	4-week	Trace	6 ppb (80,600 ng/m^3)	
Malathion OA	4-week	Trace	6.3 ppb (80,600 ng/m^3)	
Methidathion	4-week	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	4-week	ND	5 ppb† (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	4-week	ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon	4-week	ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin	4-week	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	4-week	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	4-week	ND	12.2 ppb (180,000 ng/m^3)	
Permethrin	4-week	ND	5.6 ppb (90,000 ng/m^3)	
Phosmet	4-week	ND	2 ppb (26,000 ng/m^3)	
pp-dicofol	4-week	ND	3.2 ppb (49,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Propargite	4-week	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	4-week	ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin	4-week	ND	12.4 ppb (170,000 ng/m^3)	

*Rolling averages of weeks 1-4, weeks 2-5, weeks 3-6, etc.
†This value is a regulatory target rather than a screening level.

Chronic (annual) Concentrations

Due to COVID-19 restrictions, monitoring in Lindsay stopped after the first 11 sampling weeks. Therefore, annual averages and percent chronic screening levels could not be calculated.

Temporal Trends in Detected Concentrations

The following figure depicts the concentrations over time for monitoring results in 2020 for any chemical detected at a quantifiable concentration in Lindsay. Screening levels are abbreviated as SL, whereas regulatory targets are abbreviated as RT.

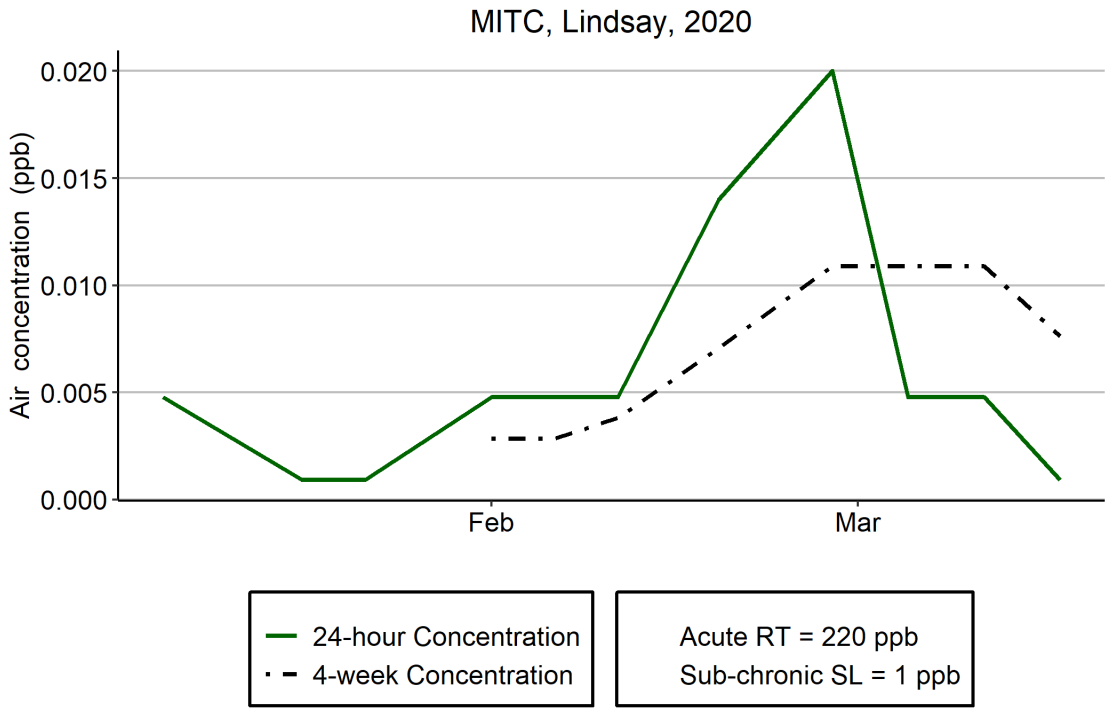

Figure C-1. Temporal trend in MITC concentrations in Lindsay in 2020.

APPENDIX D: OXNARD RESULTS

Oxnard is located in Ventura County and is 39.21 square miles in area. The average elevation is 52 feet and receives an average of 15.62 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 2010 census, the population of Oxnard was 197,899, of which 29.8% were under 18 years of age and 8.3% 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 conducted by the California Air Resources Board (CARB). Due to COVID-19 restrictions, monitoring stopped completely in Oxnard after the first 10 sampling weeks. Therefore, 1,3-D and MeBr sub-chronic exposures were calculated based on a 10-week concentrations (rather than 13 weeks), while annual averages and percent chronic screening levels were not calculated.

Pesticide Detections

Table D–1 lists the number and percentage of analyses resulting in detections at the Oxnard sampling site. The active ingredient with the highest percentage of detections was MITC (40%, n = 4), followed by chlorothalonil (20%, n = 2), and bensulide (10%, n = 1). The only quantifiable detection was recorded for MITC (10%, n = 1).

Table D–1. Number and percentage of positive samples per chemical in Oxnard in 2020.

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	9	0	0	0 %	0 %
Acephate	10	0	0	0 %	0 %
Bensulide	10	1	0	10 %	0 %
Chloropicrin	10	0	0	0 %	0 %
Chlorothalonil	10	2	0	20 %	0 %
Chlorpyrifos	10	0	0	0 %	0 %
Chlorpyrifos OA	10	0	0	0 %	0 %
Cypermethrin	10	0	0	0 %	0 %
Dacthal	10	0	0	0 %	0 %
DDVP	10	0	0	0 %	0 %
DEF	10	0	0	0 %	0 %
Diazinon	10	0	0	0 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Diazinon OA	10	0	0	0 %	0 %
Dimethoate	10	0	0	0 %	0 %
Dimethoate OA	10	0	0	0 %	0 %
Diuron	10	0	0	0 %	0 %
Endosulfan	10	0	0	0 %	0 %
Endosulfan Sulfate	10	0	0	0 %	0 %
EPTC	10	0	0	0 %	0 %
Iprodione	10	0	0	0 %	0 %
Malathion	10	0	0	0 %	0 %
Malathion OA	10	0	0	0 %	0 %
Methidathion	10	0	0	0 %	0 %
Methyl Bromide	9	0	0	0 %	0 %
Metolachlor (S-Metolachlor)	10	0	0	0 %	0 %
MITC	10	4	1	40 %	10 %
Norflurazon	10	0	0	0 %	0 %
Oryzalin	10	0	0	0 %	0 %
Oxydemeton Methyl	10	0	0	0 %	0 %
Oxyfluorfen	10	0	0	0 %	0 %
Permethrin	10	0	0	0 %	0 %
Phosmet	10	0	0	0 %	0 %
pp-dicofol	10	0	0	0 %	0 %
Propargite	10	0	0	0 %	0 %
Simazine	10	0	0	0 %	0 %
Trifluralin	10	0	0	0 %	0 %
Total	358	7	1	2 %	0.28 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table D–2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Oxnard AMN sampling location in 2020. The highest concentration relative to its screening level was that of MITC at 0.0035%.

Table D–2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Oxnard in 2020.

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
MITC	0.008 ppb (23.4 ng/m^3)	220 ppb (660,000 ng/m^3)*†	0.0035 %
1,3-dichloropropene	ND	110 ppb (505,000 ng/m^3)**	
Acephate	ND	1.6 ppb (12,000 ng/m^3)	
Bensulide	Trace	15.9 ppb (259,000 ng/m^3)	
Chloropicrin	ND	73 ppb (491,000 ng/m^3)*†	
Chlorothalonil	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.084 ppb (1,200 ng/m^3)‡	
Chlorpyrifos OA	ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin	ND	6.6 ppb (113,000 ng/m^3)	
Dacthal	ND	1,732 ppb (23,500,000 ng/m^3)	
DDVP	ND	1.2 ppb (11,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate OA	ND	0.49 ppb (4,300 ng/m^3)	
Diuron	ND	17.8 ppb (170,000 ng/m^3)	
Endosulfan	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	29.7 ppb (230,000 ng/m^3)	
Iprodione	ND	23.18 ppb (313,000 ng/m^3)	
Malathion	ND	8.3 ppb (112,500 ng/m^3)	
Malathion OA	ND	8.8 ppb (112,500 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor (S-Metolachlor)	ND	7.3 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	

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

*This value is a regulatory target rather than a screening level
†This value is an 8-hour time-weighted-average (TWA) used to compare against the 24-h measured concentration
**This value is a 72-hour TWA used to compare against the 24-hour measured concentration.
‡CDPR's risk management directive for Chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m3), 1-hour TWA on May 28, 2019. However, the current sample duration does not allow for a direct comparison between the acute regulatory target concentration and the measured sample values.

Sub-chronic (4- or 10-week) Concentrations

Table D–3 shows the highest observed rolling 4-week average concentrations for all chemicals monitored at the Oxnard AMN sampling location in 2020. The only chemical detected at quantifiable concentrations was MITC with a percent of screening level of 0.46%.

Table D–3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored in Oxnard in 2020.

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
MITC	4-week	0.0046 ppb (13.7 ng/m^3)	1 ppb (3,000 ng/m^3)	0.46 %

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
1,3-dichloropropene	10-week	ND	3 ppb (14,000 ng/m^3)	
Acephate	4-week	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	4-week	Trace	1.5 ppb (24,000 ng/m^3)	
Chloropicrin	10-week	ND	0.35 ppb (2,300 ng/m^3)	
Chlorothalonil	4-week	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	4-week	ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos OA	4-week	ND	0.062 ppb (850 ng/m^3)	
Cypermethrin	4-week	ND	4.8 ppb (81,000 ng/m^3)	
Dacthal	4-week	ND	34.6 ppb (470,000 ng/m^3)	
DDVP	4-week	ND	0.24 ppb (2,200 ng/m^3)	
DEF	4-week	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	4-week	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	4-week	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	4-week	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	4-week	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	4-week	ND	1.8 ppb (17,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Endosulfan	4-week	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	4-week	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	4-week	ND	3.1 ppb (24,000 ng/m^3)	
Iprodione	4-week	ND	7.08 ppb (95,600 ng/m^3)	
Malathion	4-week	ND	6 ppb (80,600 ng/m^3)	
Malathion OA	4-week	ND	6.3 ppb (80,600 ng/m^3)	
Methidathion	4-week	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	4-week	ND	5 ppb† (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	4-week	ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon	4-week	ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin	4-week	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	4-week	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	4-week	ND	12.2 ppb (180,000 ng/m^3)	
Permethrin	4-week	ND	5.6 ppb (90,000 ng/m^3)	
Phosmet	4-week	ND	2 ppb (26,000 ng/m^3)	
pp-dicofol	4-week	ND	3.2 ppb (49,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Propargite	4-week	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	4-week	ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin	4-week	ND	12.4 ppb (170,000 ng/m^3)	

*Rolling averages of weeks 1-4, weeks 2-5, weeks 3-6, etc.
†This value is a regulatory target rather than a screening level

Chronic (annual) Concentrations

Due to COVID-19 restrictions, monitoring in Oxnard stopped after the first 10 sampling weeks. Therefore, annual averages and percent chronic screening levels could not be calculated.

Temporal Trends in Detected Concentrations

The following figure depicts the concentrations over time for monitoring results in 2020 for any chemical detected at a quantifiable concentration in Oxnard. Screening levels are abbreviated as SL, whereas regulatory targets are abbreviated as RT.

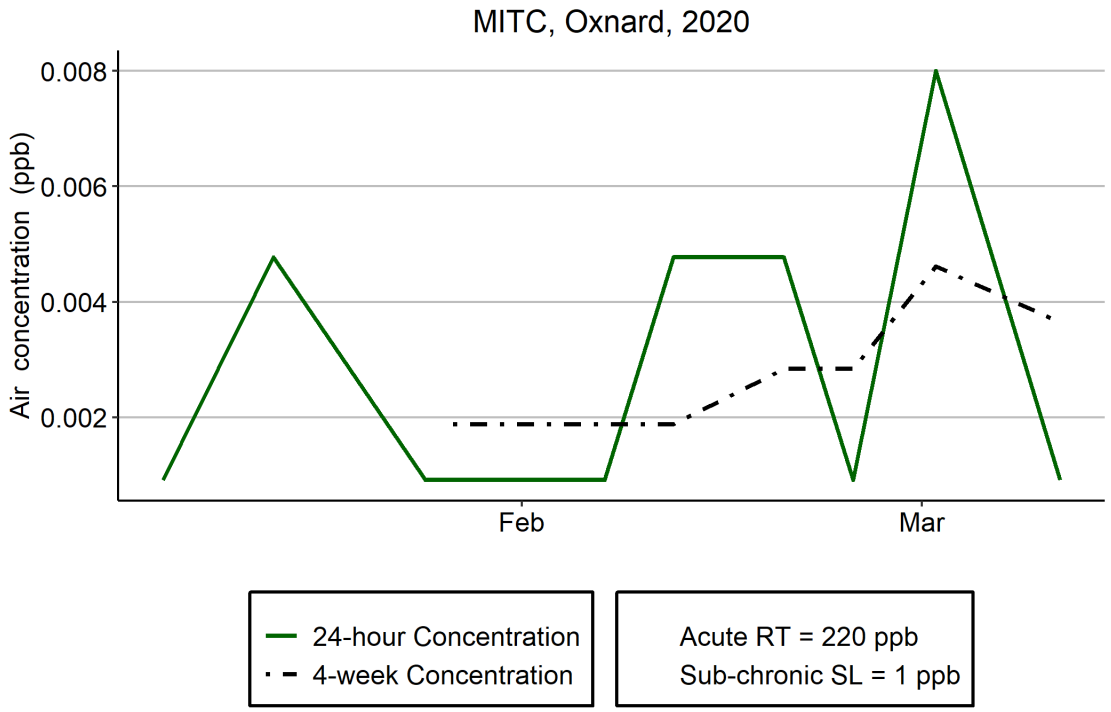

Figure D-1. Temporal trend in MITC concentrations in Oxnard in 2020.

APPENDIX E: SAN JOAQUIN RESULTS

San Joaquin is located in Fresno County and is 1.20 square miles in area. The average elevation is 174 feet, and it receives an average of 12.5 inches of precipitation annually. Daily average temperatures range from 56° to 97°F in the summer and 36° to 63°F in the winter. Based on the 2010 census, the population of the city of San Joaquin was 4,001, of which 41.3% were under 18 years of age and 4.4% were above 65 years of age. Agriculture in the area includes grapes, oranges, and nectarines. The monitoring site is located at San Joaquin Elementary School. Monitoring was conducted by the California Air Resources Board. Due to COVID-19 restrictions, monitoring stopped completely in San Joaquin after the first 11 sampling weeks. Therefore, 1,3-D and MeBr sub-chronic exposures were calculated based on a 11-week concentrations (rather than 13 weeks), while annual averages and percent chronic SL were not calculated.

Pesticide Detections

Table E–1 lists the number and percentage of analyses resulting in detections at the San Joaquin sampling site. The active ingredient with the highest percentage of detections was MITC (90.9%, n = 10), followed by dacthal (36.4%, n = 4), and 1,3-D (22.2%, n = 2). The highest percentage of quantifiable detections was observed for MITC (81.8%, n = 9), followed by 1,3-D (22.2%, n = 2), and MeBr (11.1%, n = 1).

Table E–1. Number and percentage of positive samples per chemical in San Joaquin in 2020.

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	9	2	2	22.2 %	22.2 %
Acephate	11	0	0	0 %	0 %
Bensulide	11	0	0	0 %	0 %
Chloropicrin	11	0	0	0 %	0 %
Chlorothalonil	11	1	0	9.1 %	0 %
Chlorpyrifos	11	0	0	0 %	0 %
Chlorpyrifos OA	11	0	0	0 %	0 %
Cypermethrin	11	0	0	0 %	0 %
Dacthal	11	4	0	36.4 %	0 %
DDVP	11	0	0	0 %	0 %
DEF	11	0	0	0 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Diazinon	11	0	0	0 %	0 %
Diazinon OA	11	0	0	0 %	0 %
Dimethoate	11	0	0	0 %	0 %
Dimethoate OA	11	0	0	0 %	0 %
Diuron	11	1	0	9.1 %	0 %
Endosulfan	11	0	0	0 %	0 %
Endosulfan Sulfate	11	0	0	0 %	0 %
EPTC	11	0	0	0 %	0 %
Iprodione	11	1	0	9.1 %	0 %
Malathion	11	0	0	0 %	0 %
Malathion OA	11	0	0	0 %	0 %
Methidathion	11	0	0	0 %	0 %
Methyl Bromide	9	1	1	11.1 %	11.1 %
Metolachlor (S-Metolachlor)	11	0	0	0 %	0 %
MITC	11	10	9	90.9 %	81.8 %
Norflurazon	11	0	0	0 %	0 %
Oryzalin	11	0	0	0 %	0 %
Oxydemeton Methyl	11	0	0	0 %	0 %
Oxyfluorfen	11	1	0	9.1 %	0 %
Permethrin	11	0	0	0 %	0 %
Phosmet	11	0	0	0 %	0 %
pp-dicofol	11	0	0	0 %	0 %
Propargite	11	0	0	0 %	0 %
Simazine	11	0	0	0 %	0 %
Trifluralin	11	0	0	0 %	0 %
Total	392	21	12	5.4 %	3.1 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table E–2 shows the highest 24-hour concentrations observed for all chemicals monitored at the San Joaquin AMN sampling location in 2020. The highest concentration relative to its screening level was that of 1,3-D at 1.4%, followed by MITC at 0.48%, and MeBr at 0.014%.

Table E–2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in San Joaquin in 2020.

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
1,3-dichloropropene	1.6 ppb (7,126 ng/m^3)	110 ppb (505,000 ng/m^3)**	1.4 %
MITC	1.1 ppb (3,174 ng/m^3)	220 ppb (660,000 ng/m^3)*†	0.48 %
Methyl Bromide	0.03 ppb (116 ng/m^3)	210 ppb (820,000 ng/m^3)*	0.014 %
Acephate	ND	1.6 ppb (12,000 ng/m^3)	
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chloropicrin	ND	73 ppb (491,000 ng/m^3)*†	
Chlorothalonil	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.084 ppb (1,200 ng/m^3)‡	
Chlorpyrifos OA	ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin	ND	6.6 ppb (113,000 ng/m^3)	
Dacthal	Trace	1,732 ppb (23,500,000 ng/m^3)	
DDVP	ND	1.2 ppb (11,000 ng/m^3)	

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate OA	ND	0.49 ppb (4,300 ng/m^3)	
Diuron	Trace	17.8 ppb (170,000 ng/m^3)	
Endosulfan	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	29.7 ppb (230,000 ng/m^3)	
Iprodione	Trace	23.18 ppb (313,000 ng/m^3)	
Malathion	ND	8.3 ppb (112,500 ng/m^3)	
Malathion OA	ND	8.8 ppb (112,500 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	7.3 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	

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

*This value is a regulatory target rather than a screening level
†This value is an 8-hour time-weighted-average (TWA) used to compare against the 24-h measured concentration
**This value is a 72-hour TWA used to compare against the 24-hour measured concentration.
‡CDPR's risk management directive for Chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m^3), 1-hour TWA on May 28, 2019. However, the current sample duration does not allow for a direct comparison between the acute regulatory target concentration and the measured sample values

Sub-chronic (4- or 11-week) Concentrations

Table E–3 shows the highest observed rolling 4-week or 11-week average concentrations for all chemicals monitored at the San Joaquin AMN sampling location in 2020. The highest concentration relative to its screening level was that of MITC at 47.2%, followed by 1,3-D at 8.18%, and MeBr at 0.38%.

Table E–3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored in San Joaquin in 2020.

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
MITC	4-week	0.47 ppb (1,416 ng/m^3)	1 ppb (3,000 ng/m^3)	47.2 %

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
1,3-dichloropropene	11-week	0.19 ppb (862 ng/m^3)	3 ppb (14,000 ng/m^3)	6.2 %
Methyl Bromide	4-week	0.019 ppb (72.8 ng/m^3)	5 ppb† (19,400 ng/m^3)	0.38 %
Acephate	4-week	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	4-week	ND	1.5 ppb (24,000 ng/m^3)	
Chloropicrin	11-week	ND	0.35 ppb (2,300 ng/m^3)	
Chlorothalonil	4-week	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	4-week	ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos OA	4-week	ND	0.062 ppb (850 ng/m^3)	
Cypermethrin	4-week	ND	4.8 ppb (81,000 ng/m^3)	
Dacthal	4-week	Trace	34.6 ppb (470,000 ng/m^3)	
DDVP	4-week	ND	0.24 ppb (2,200 ng/m^3)	
DEF	4-week	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	4-week	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	4-week	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	4-week	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	4-week	ND	0.34 ppb (3,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Diuron	4-week	Trace	1.8 ppb (17,000 ng/m^3)	
Endosulfan	4-week	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	4-week	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	4-week	ND	3.1 ppb (24,000 ng/m^3)	
Iprodione	4-week	Trace	7.08 ppb (95,600 ng/m^3)	
Malathion	4-week	ND	6 ppb (80,600 ng/m^3)	
Malathion OA	4-week	ND	6.3 ppb (80,600 ng/m^3)	
Methidathion	4-week	ND	0.25 ppb (3,100 ng/m^3)	
Metolachlor (S-Metolachlor)	4-week	ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon	4-week	ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin	4-week	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	4-week	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	4-week	Trace	12.2 ppb (180,000 ng/m^3)	
Permethrin	4-week	ND	5.6 ppb (90,000 ng/m^3)	
Phosmet	4-week	ND	2 ppb (26,000 ng/m^3)	
pp-dicofol	4-week	ND	3.2 ppb (49,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Propargite	4-week	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	4-week	ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin	4-week	ND	12.4 ppb (170,000 ng/m^3)	

*Rolling averages of weeks 1-4, weeks 2-5, weeks 3-6, etc.
†This value is a regulatory target rather than a screening level

Chronic (annual) Concentrations

Due to COVID-19 restrictions, monitoring in San Joaquin stopped after the first 11 sampling weeks. Therefore, annual averages and percent chronic screening levels were not be calculated.

Temporal Trends in Detected Concentrations

The following figures depict the concentrations over time for monitoring results in 2020 for any chemical detected at a quantifiable concentration in San Joaquin. Screening levels are abbreviated as SL, whereas regulatory targets are abbreviated as RT.

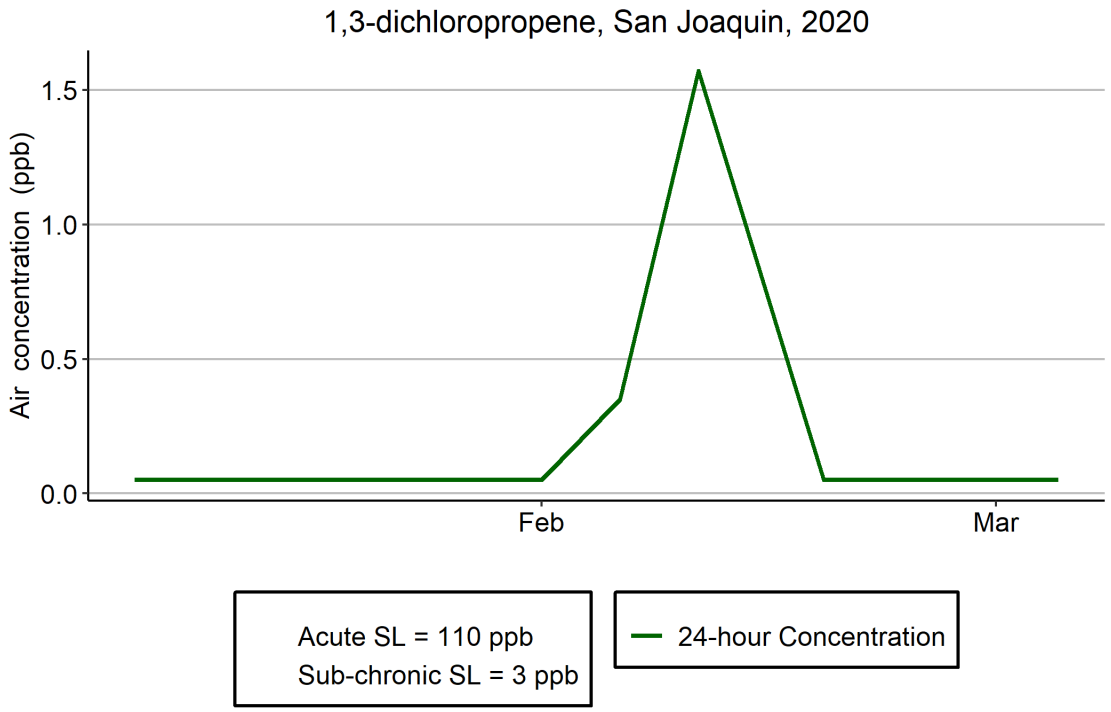

Figure E-1. Temporal trend in 1,3-dichloropropene concentrations in San Joaquin in 2020.

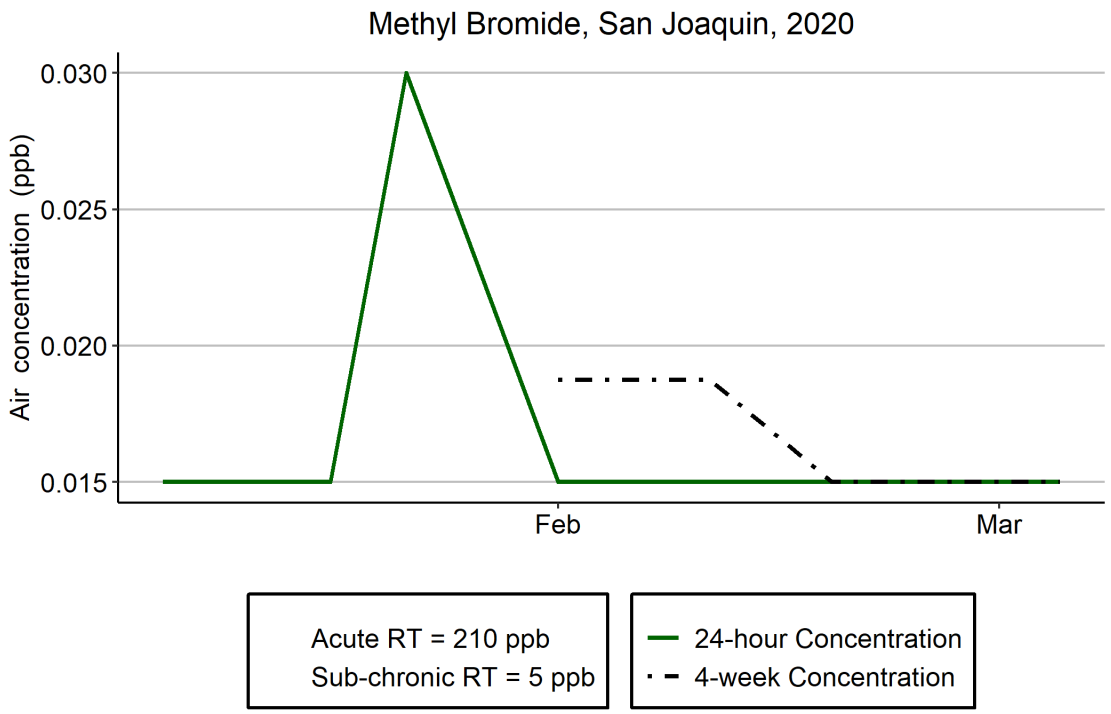

Figure E-2. Temporal trend in Methyl Bromide concentrations in San Joaquin in 2020.

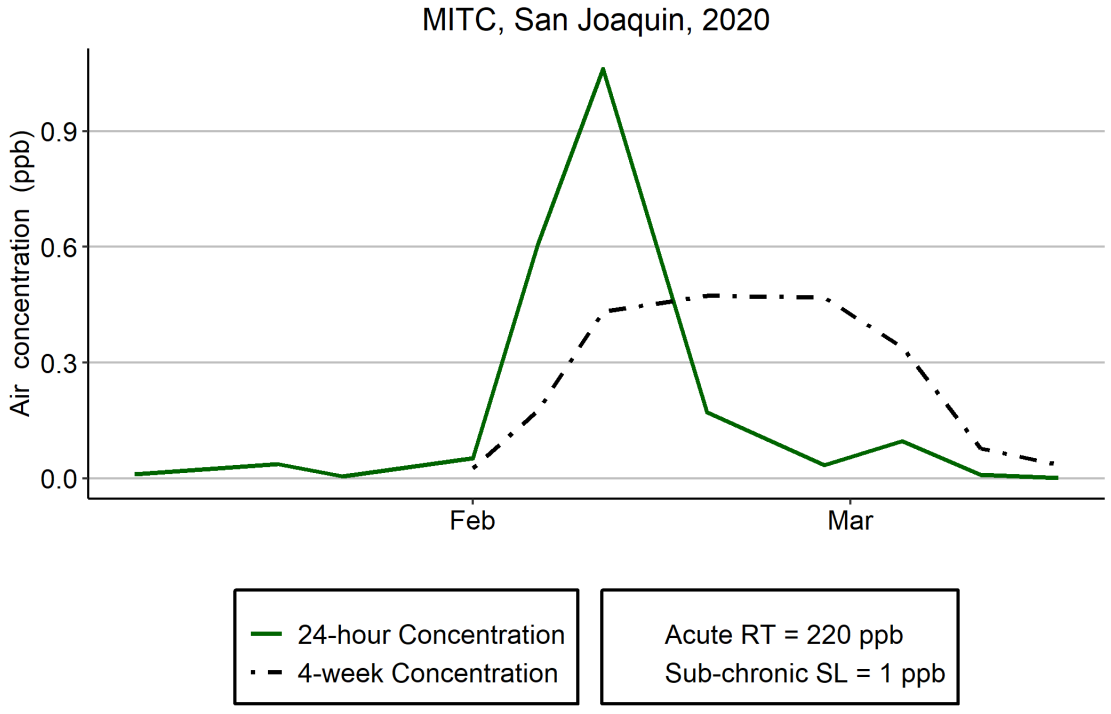

Figure E-3. Temporal trend in MITC concentrations in San Joaquin in 2020.

APPENDIX F: SANTA MARIA RESULTS

Santa Maria is located in Santa Barbara County and is 23.42 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 99,553 based on the 2010 census, of which 31.45% were below 18 years of age and 9.43% 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 CDPR contract with the Santa Barbara County Agricultural Commissioner's (SB CAC) office. SB CAC staff follow strict standard operating procedures established by CDPR's Air Program, ensuring that samples are collected, handled, and transported appropriately to maintain consistency and integrity of the samples. CDPR Air Program staff provides annual training and continuous support to SB CAC staff for operation and monitoring at this sampling location.

Pesticide Detections

Table F-1 lists the number and percentage of analyses resulting in detections at the Santa Maria sampling site. The active ingredient with the highest percentage of detections was Malathion (61.2%, n = 30), followed by malathion OA (57.1%, n = 28), and dacthal (53.1%, n = 26). The highest percentage of quantifiable detections was observed for 1,3-D (49%, n = 25), followed by MITC (20.4%, n = 10), chloropicrin (12.2%, n = 6), and malathion (12.2%, n = 6).

Table F-1. Number and percentage of positive samples per chemical in Santa Maria in 2020.

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	51	25	25	49 %	49 %
Acephate	49	1	1	2 %	2 %
Bensulide	49	0	0	0 %	0 %
Chloropicrin	49	14	6	28.6 %	12.2 %
Chlorothalonil	49	14	0	28.6 %	0 %
Chlorpyrifos	49	0	0	0 %	0 %
Chlorpyrifos OA	49	0	0	0 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Cypermethrin	49	1	0	2 %	0 %
Dacthal	49	26	0	53.1 %	0 %
DDVP	49	18	2	36.7 %	4.1 %
DEF	49	0	0	0 %	0 %
Diazinon	49	1	0	2 %	0 %
Diazinon OA	49	1	0	2 %	0 %
Dimethoate	49	1	0	2 %	0 %
Dimethoate OA	49	1	0	2 %	0 %
Diuron	49	1	0	2 %	0 %
Endosulfan	49	0	0	0 %	0 %
Endosulfan Sulfate	49	0	0	0 %	0 %
EPTC	49	0	0	0 %	0 %
Iprodione	49	1	0	2 %	0 %
Malathion	49	30	6	61.2 %	12.2 %
Malathion OA	49	28	0	57.1 %	0 %
Methidathion	49	1	0	2 %	0 %
Methyl Bromide	51	2	2	3.9 %	3.9 %
Metolachlor (S-Metolachlor)	49	1	0	2 %	0 %
MITC	49	18	10	36.7 %	20.4 %
Norflurazon	49	1	0	2 %	0 %
Oryzalin	49	1	0	2 %	0 %
Oxydemeton Methyl	49	1	0	2 %	0 %
Oxyfluorfen	49	0	0	0 %	0 %
Permethrin	49	2	0	4.1 %	0 %
Phosmet	49	1	0	2 %	0 %
pp-dicofol	49	0	0	0 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Propargite	49	0	0	0 %	0 %
Simazine	49	2	0	4.1 %	0 %
Trifluralin	49	12	1	24.5 %	2 %
Total	1,768	205	53	11.6 %	3 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table F-2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Santa Maria AMN sampling location in 2020. The highest concentration relative to its screening level was that of 1,3-D at 1%, followed by both DDVP and chloropicrin at 0.81%.

Table F-2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Santa Maria in 2020.

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
1,3-dichloropropene	1.1 ppb (5,097 ng/m^3)	110 ppb (505,000 ng/m^3)**	1 %
DDVP	0.01 ppb (88.9 ng/m^3)	1.2 ppb (11,000 ng/m^3)	0.81 %
Chloropicrin	0.59 ppb (3,966 ng/m^3)	73 ppb (491,000 ng/m^3)*†	0.81 %
Acephate	0.002 ppb (12.5 ng/m^3)	1.6 ppb (12,000 ng/m^3)	0.1 %
Malathion	0.003 ppb (35.6 ng/m^3)	8.3 ppb (112,500 ng/m^3)	0.032 %
MITC	0.042 ppb (124 ng/m^3)	220 ppb (660,000 ng/m^3)*†	0.019 %
Methyl Bromide	0.024 ppb (93.2 ng/m^3)	210 ppb (820,000 ng/m^3)*	0.011 %
Trifluralin	0.002 ppb (25.5 ng/m^3)	87.5 ppb (1,200,000 ng/m^3)	0.0021 %

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chlorothalonil	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.084 ppb (1,200 ng/m^3)‡	
Chlorpyrifos OA	ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin	Trace	6.6 ppb (113,000 ng/m^3)	
Dacthal	Trace	1,732 ppb (23,500,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	Trace	0.01 ppb (130 ng/m^3)	
Diazinon OA	Trace	0.011 ppb (130 ng/m^3)	
Dimethoate	Trace	0.46 ppb (4,300 ng/m^3)	
Dimethoate OA	Trace	0.49 ppb (4,300 ng/m^3)	
Diuron	Trace	17.8 ppb (170,000 ng/m^3)	
Endosulfan	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	29.7 ppb (230,000 ng/m^3)	
Iprodione	Trace	23.18 ppb (313,000 ng/m^3)	

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Malathion OA	Trace	8.8 ppb (112,500 ng/m^3)	
Methidathion	Trace	0.25 ppb (3,100 ng/m^3)	
Metolachlor (S-Metolachlor)	Trace	7.3 ppb (85,000 ng/m^3)	
Norflurazon	Trace	12.6 ppb (170,000 ng/m^3)	
Oryzalin	Trace	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl	Trace	3.7 ppb (39,200 ng/m^3)	
Oxyfluorfen	ND	34.5 ppb (510,000 ng/m^3)	
Permethrin	Trace	10.5 ppb (168,000 ng/m^3)	
Phosmet	Trace	5.9 ppb (77,000 ng/m^3)	
pp-dicofol	ND	4.5 ppb (68,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	Trace	13.3 ppb (110,000 ng/m^3)	

*This value is a regulatory target rather than a screening level
†This value is an 8-hour time-weighted-average (TWA) used to compare against the 24-h measured concentration.
**This value is a 72-hour TWA used to compare against the 24-hour measured concentration.
‡CDPR's risk management directive for Chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m^3), 1-hour TWA on May 28, 2019. However, the current sample duration does not allow for a direct comparison between the acute regulatory target concentration and the measured sample values

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

Table F-3 shows the highest observed rolling 4-week or 13-week average concentrations for all chemicals monitored at the Santa Maria AMN sampling location in 2020. The highest concentration relative to its screening level was that of chloropicrin at 34.9%, followed by 1,3-D

at 9.9%, MITC at 2.5%, and DDVP at 1.4%. All other monitored chemicals were less than 1% of their subchronic screening levels or regulatory targets in Santa Maria during 2020.

Table F-3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored in Santa Maria in 2020.

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Chloropicrin	13-week	0.11 ppb (728 ng/m^3)	0.35 ppb (2,300 ng/m^3)	31.7 %
1,3-dichloropropene	13-week	0.31 ppb (1,390 ng/m^3)	3 ppb (14,000 ng/m^3)	9.9 %
MITC	4-week	0.012 ppb (34.4 ng/m^3)	1 ppb (3,000 ng/m^3)	1.1 %
DDVP	4-week	0.0035 ppb (31.2 ng/m^3)	0.24 ppb (2,200 ng/m^3)	1.4 %
Methyl Bromide	4-week	0.015 ppb (58.2 ng/m^3)	5 ppb (19,400 ng/m^3)†	0.3 %
Acephate	4-week	0.00053 ppb (3.4 ng/m^3)	1.1 ppb (8,500 ng/m^3)	0.04 %
Malathion	4-week	0.0014 ppb (17.2 ng/m^3)	6 ppb (80,600 ng/m^3)	0.021 %
Trifluralin	4-week	0.00088 ppb (12.1 ng/m^3)	12.4 ppb (170,000 ng/m^3)	0.0071 %
Bensulide	4-week	ND	1.5 ppb (24,000 ng/m^3)	
Chlorothalonil	4-week	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	4-week	ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos OA	4-week	ND	0.062 ppb (850 ng/m^3)	
Cypermethrin	4-week	Trace	4.8 ppb (81,000 ng/m^3)	
Dacthal	4-week	Trace	34.6 ppb (470,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
DEF	4-week	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	4-week	Trace	0.01 ppb (130 ng/m^3)	
Diazinon OA	4-week	Trace	0.011 ppb (130 ng/m^3)	
Dimethoate	4-week	Trace	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	4-week	Trace	0.34 ppb (3,000 ng/m^3)	
Diuron	4-week	Trace	1.8 ppb (17,000 ng/m^3)	
Endosulfan	4-week	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	4-week	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	4-week	ND	3.1 ppb (24,000 ng/m^3)	
Iprodione	4-week	Trace	7.08 ppb (95,600 ng/m^3)	
Malathion OA	4-week	Trace	6.3 ppb (80,600 ng/m^3)	
Methidathion	4-week	Trace	0.25 ppb (3,100 ng/m^3)	
Metolachlor (S-Metolachlor)	4-week	Trace	1.3 ppb (15,000 ng/m^3)	
Norflurazon	4-week	Trace	1.9 ppb (26,000 ng/m^3)	
Oryzalin	4-week	Trace	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	4-week	Trace	0.058 ppb (610 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Oxyfluorfen	4-week	ND	12.2 ppb (180,000 ng/m^3)	
Permethrin	4-week	Trace	5.6 ppb (90,000 ng/m^3)	
Phosmet	4-week	Trace	2 ppb (26,000 ng/m^3)	
pp-dicofol	4-week	ND	3.2 ppb (49,000 ng/m^3)	
Propargite	4-week	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	4-week	Trace	3.8 ppb (31,000 ng/m^3)	

*Rolling averages of weeks 1-4, weeks 2-5, weeks 3-6, etc.; or weeks 1-13, weeks 2-14, weeks 3-15, etc.
†This value is a regulatory target rather than a screening level

Chronic (annual) Concentrations

Table F-4 shows the annual average concentration for all chemicals monitored at the Santa Maria sampling location in 2020. The active ingredient with highest concentration relative to its screening level was chloropicrin at 18.3%, followed by 1,3-D at 5.8% and MITC at 5.4%. All other monitored chemicals were less than 1% of their chronic screening levels or regulatory targets in Santa Maria during monitoring in 2020.

Table F-4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored in Santa Maria in 2020.

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Chloropicrin	0.049 ppb (329 ng/m^3)	0.27 ppb (1,800 ng/m^3)	18.3 %
1,3-dichloropropene	0.11 ppb (519 ng/m^3)	2 ppb (9,000 ng/m^3)	5.8 %
MITC	0.0055 ppb (16.3 ng/m^3)	0.1 ppb (300 ng/m^3)	5.4 %
DDVP	0.00075 ppb (6.7 ng/m^3)	0.085 ppb (770 ng/m^3)	0.87 %

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Methyl Bromide	0.006 ppb (23.4 ng/m^3)	1 ppb (3,900 ng/m^3)	0.6 %
Malathion	0.00042 ppb (5.2 ng/m^3)	0.6 ppb (8,100 ng/m^3)	0.064 %
Trifluralin	0.00027 ppb (3.7 ng/m^3)	3 ppb (41,000 ng/m^3)	0.009 %
Acephate	0.000085 ppb (0.57 ng/m^3)	1.1 ppb (8,500 ng/m^3)	0.0067 %
Bensulide	ND	1.5 ppb (24,000 ng/m^3)	
Chlorothalonil	Trace	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.036 ppb (510 ng/m^3)	
Chlorpyrifos OA	ND	0.037 ppb (510 ng/m^3)	
Cypermethrin	Trace	1.6 ppb (27,000 ng/m^3)	
Dacthal	Trace	3.5 ppb (47,000 ng/m^3)	
DEF	ND	NA ppb (NA ng/m^3)	
Diazinon	Trace	0.01 ppb (130 ng/m^3)	
Diazinon OA	Trace	0.011 ppb (130 ng/m^3)	
Dimethoate	Trace	0.032 ppb (300 ng/m^3)	
Dimethoate OA	Trace	0.034 ppb (300 ng/m^3)	
Diuron	Trace	0.6 ppb (5,700 ng/m^3)	

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.019 ppb (330 ng/m^3)	
EPTC	ND	1.1 ppb (8,500 ng/m^3)	
Iprodione	Trace	7.08 ppb (95,600 ng/m^3)	
Malathion OA	Trace	0.63 ppb (8,100 ng/m^3)	
Methidathion	Trace	0.2 ppb (2,500 ng/m^3)	
Metolachlor (S-Metolachlor)	Trace	1.3 ppb (15,000 ng/m^3)	
Norflurazon	Trace	1.9 ppb (26,000 ng/m^3)	
Oryzalin	Trace	16.4 ppb (232,000 ng/m^3)	
Oxydemeton Methyl	Trace	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	ND	3.4 ppb (51,000 ng/m^3)	
Permethrin	Trace	5.6 ppb (90,000 ng/m^3)	
Phosmet	Trace	1.4 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.3 ppb (20,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	Trace	3.8 ppb (31,000 ng/m^3)	

Temporal Trends in Detected Concentrations

The following figures depict the concentrations over time for monitoring results in 2020 for any chemical detected at a quantifiable concentration in Santa Maria. Screening levels are abbreviated as SL, whereas regulatory targets are abbreviated as RT.

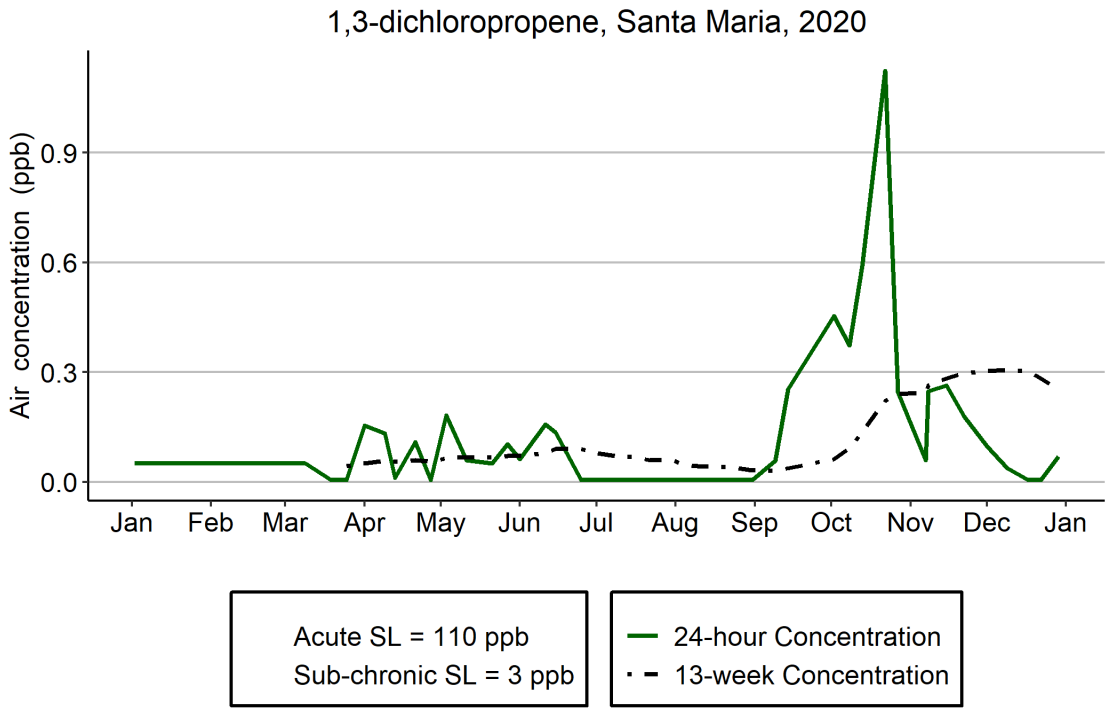

Figure F-1. Temporal trend in 1,3-dichloropropene concentrations in Santa Maria in 2020.

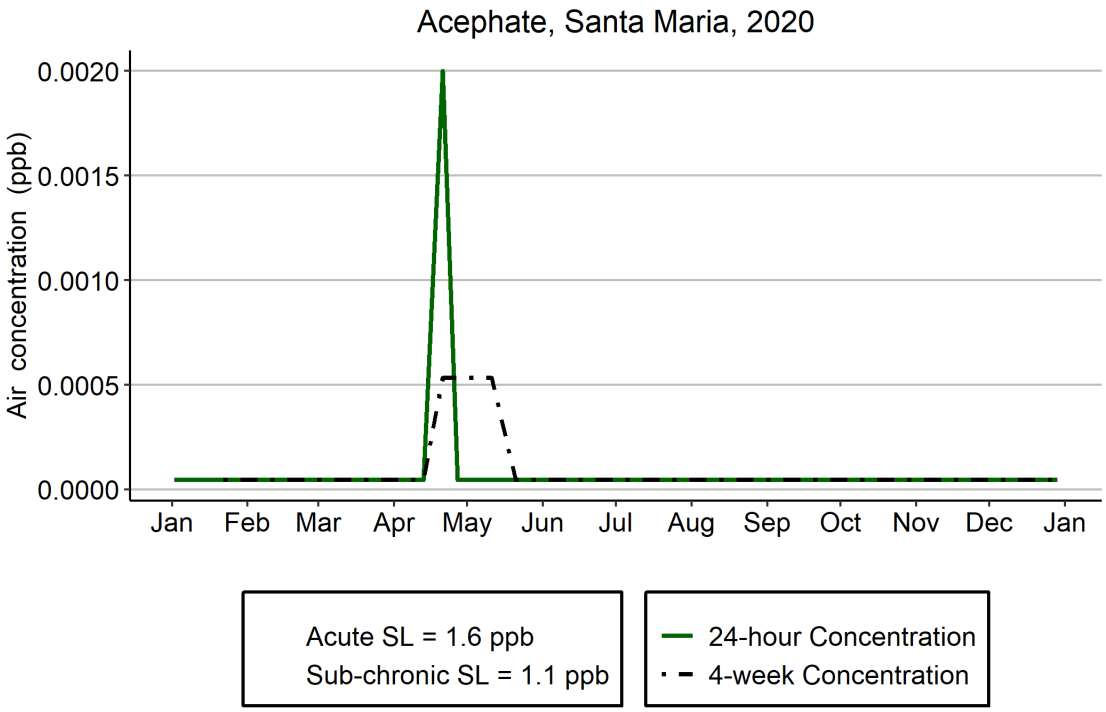

Figure F-2. Temporal trend in Acephate concentrations in Santa Maria in 2020.

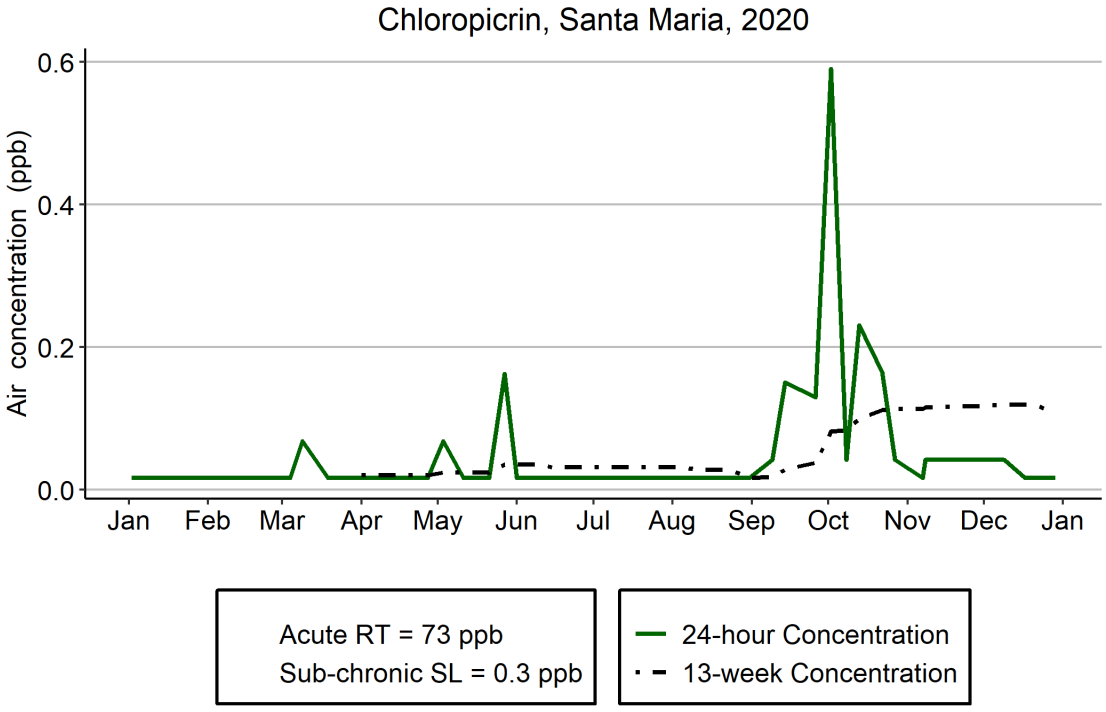

Figure F-3. Temporal trend in Chloropicrin concentrations in Santa Maria in 2020.

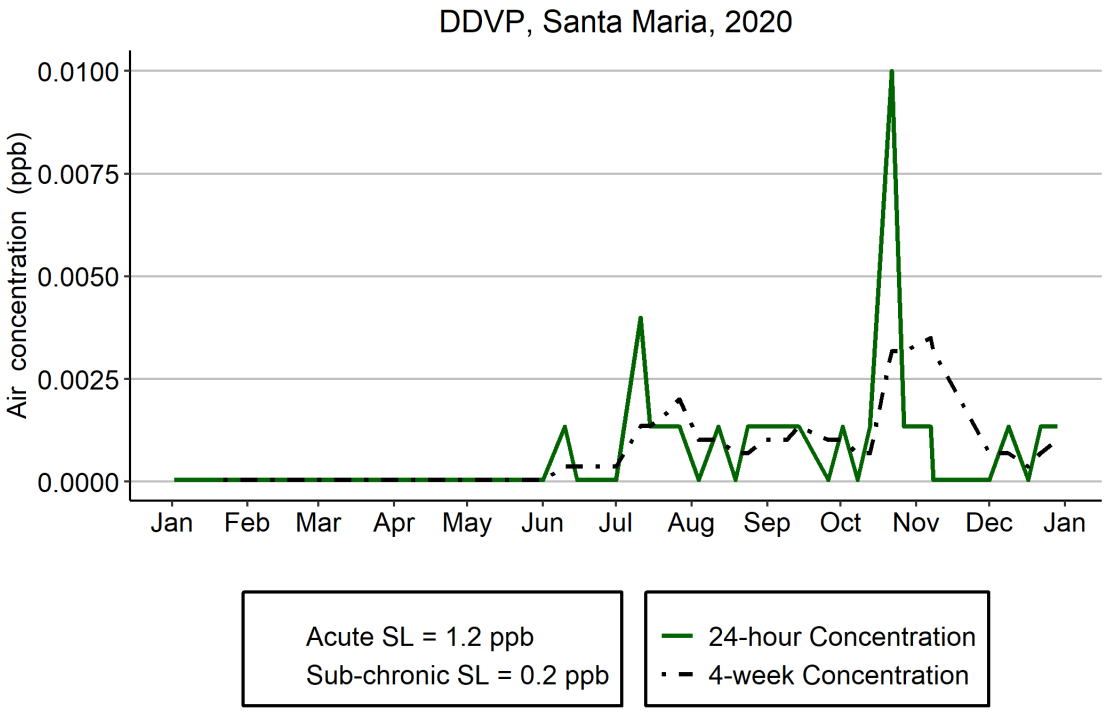

Figure F-4. Temporal trend in DDVP concentrations in Santa Maria in 2020.

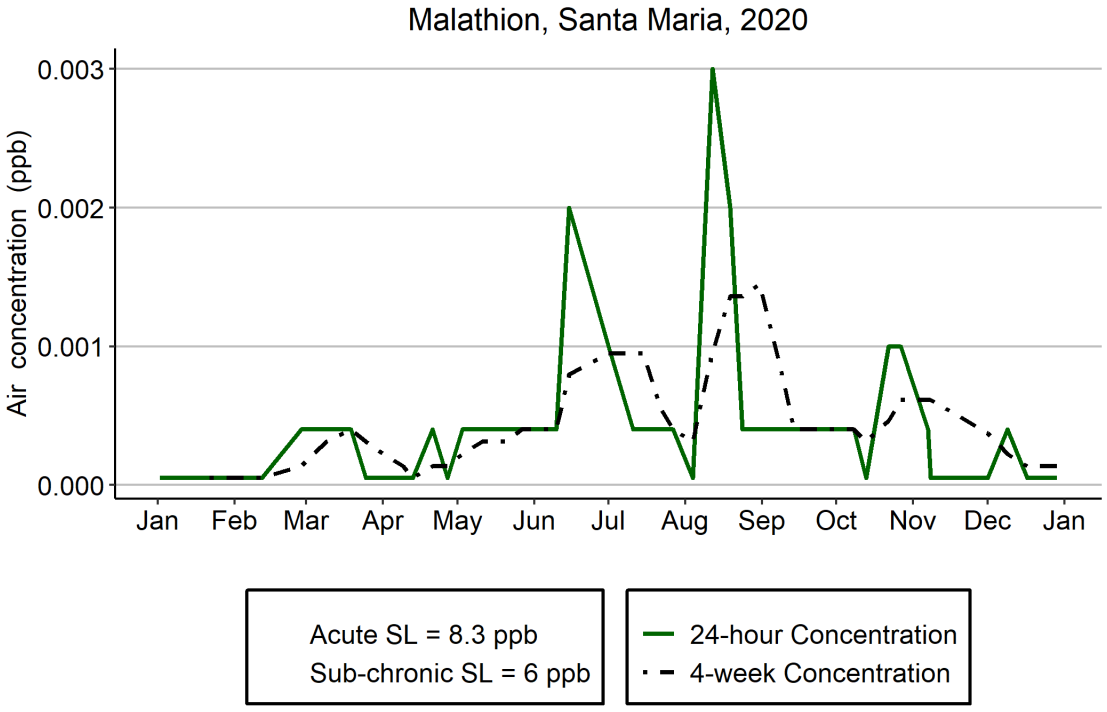

Figure F-5. Temporal trend in Malathion concentrations in Santa Maria in 2020.

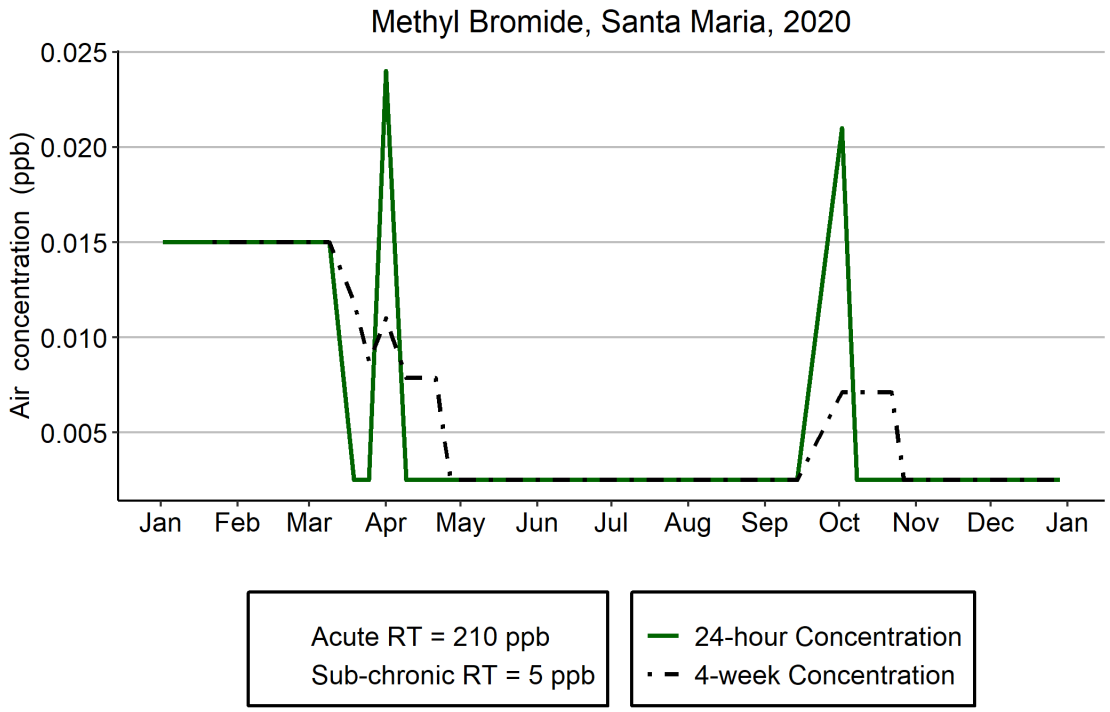

Figure F-6. Temporal trend in Methyl Bromide concentrations in Santa Maria in 2020.

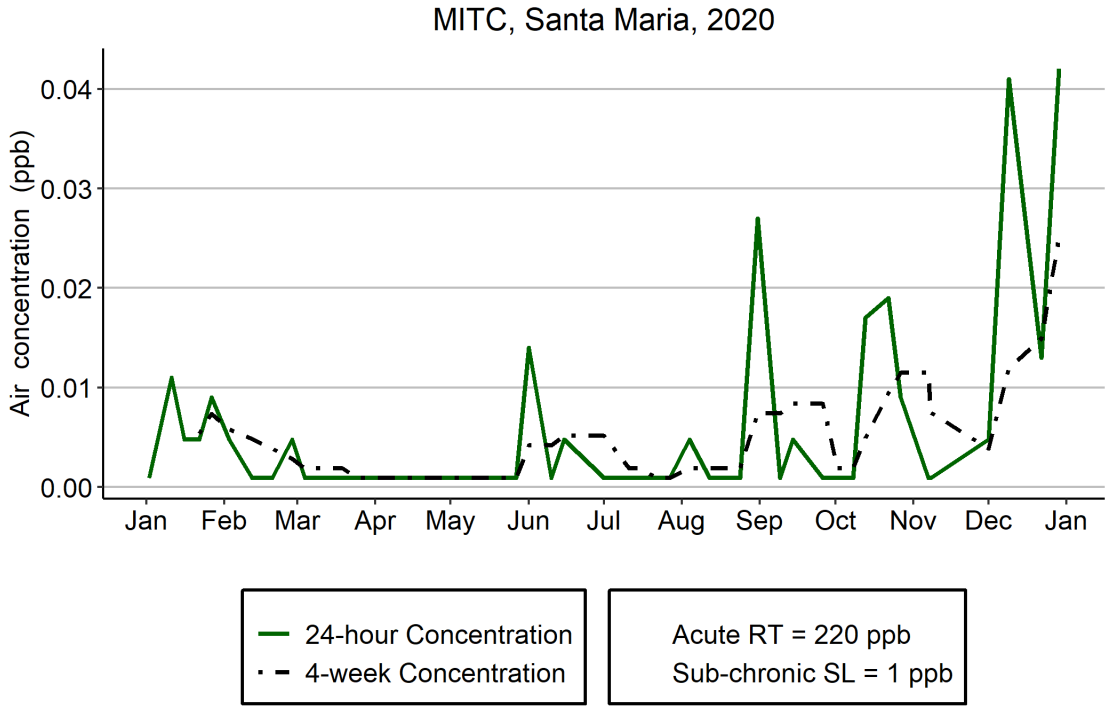

Figure F-7. Temporal trend in MITC concentrations in Santa Maria in 2020.

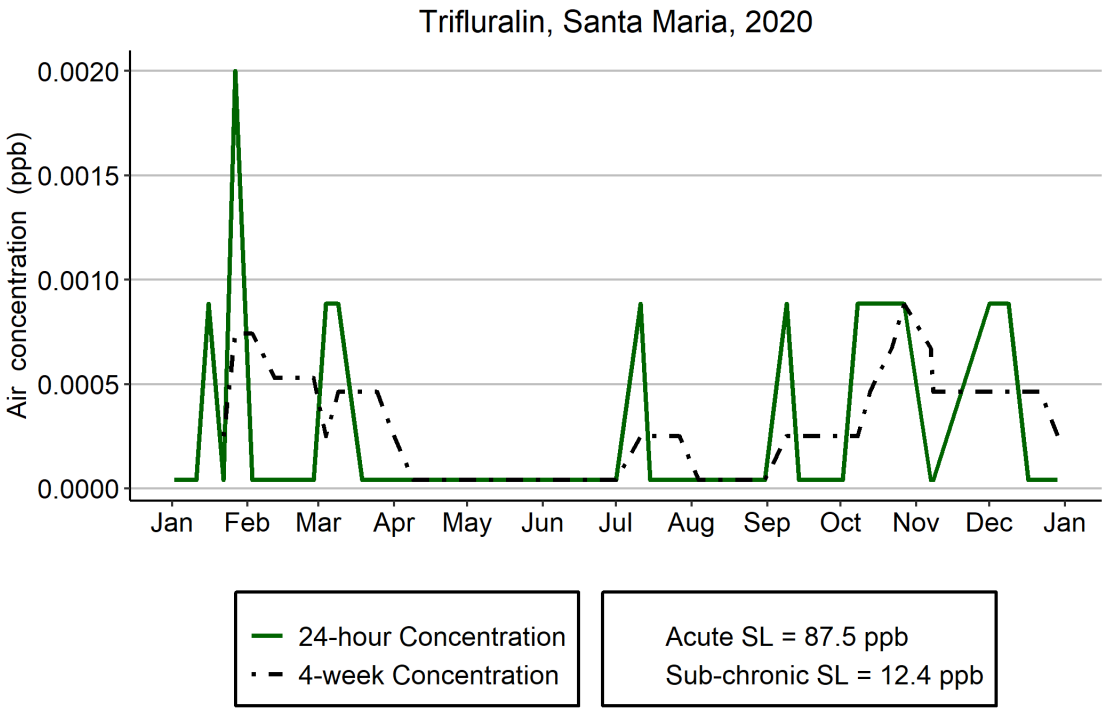

Figure F-8. Temporal trend in Trifluralin concentrations in Santa Maria in 2020.

APPENDIX G: SHAFTER RESULTS

The Shafter sampling site has continued as a monitoring site since 2011. Shafter is 18 square miles in area located 18 miles west-northwest of Bakersfield in Kern County. The elevation is 351 feet and receives an average of 7 inches of precipitation annually. Average temperatures range from 59° to 99°F in the summer and 35° to 64°F in winter. Based on the 2010 census, the population of Shafter was 16,988, of which 36.0% were below 18 years of age and 6.6% 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 situated at a city well located adjacent to Shafter High School at the northeastern edge of the city. Monitoring at this sampling location was initially operated by CDPR until April 2018 when the 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-northwest from the original sampling location. Due to COVID-19 restrictions, only 1,3-dichloropropene and Methyl Bromide were monitored throughout the year; the other 34 chemicals were only sampled the first 11 weeks.

Pesticide Detections

Table G–1 lists the number and percentage of analyses resulting in detections at the Shafter sampling site. The active ingredients with the highest percentage of detections were chlorothalonil (90.9%, n = 10), MITC (81.8%, n = 9), 1,3-D (70.6%, n = 36), and MeBr (11.8%, n = 6). The highest percentage of quantifiable detections was observed for MITC (72.7%, n = 8), followed by 1,3-D (70.6%, n = 36), and MeBr (11.8%, n = 6).

Table G-1. Number and percentage of positive samples per chemical in Shafter in 2020.

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	51	36	36	70.6 %	70.6 %
Acephate	11	0	0	0 %	0 %
Bensulide	11	0	0	0 %	0 %
Chloropicrin	11	0	0	0 %	0 %
Chlorothalonil	11	10	2	90.9 %	18.2 %
Chlorpyrifos	11	0	0	0 %	0 %
Chlorpyrifos OA	11	0	0	0 %	0 %
Cypermethrin	11	0	0	0 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Dacthal	11	1	0	9.1 %	0 %
DDVP	11	0	0	0 %	0 %
DEF	11	0	0	0 %	0 %
Diazinon	11	1	0	9.1 %	0 %
Diazinon OA	11	1	0	9.1 %	0 %
Dimethoate	11	1	0	9.1 %	0 %
Dimethoate OA	11	0	0	0 %	0 %
Diuron	11	1	0	9.1 %	0 %
Endosulfan	11	0	0	0 %	0 %
Endosulfan Sulfate	11	1	0	9.1 %	0 %
EPTC	11	0	0	0 %	0 %
Iprodione	11	0	0	0 %	0 %
Malathion	11	0	0	0 %	0 %
Malathion OA	11	1	0	9.1 %	0 %
Methidathion	11	0	0	0 %	0 %
Methyl Bromide	51	6	6	11.8 %	11.8 %
Metolachlor (S-Metolachlor)	11	1	0	9.1 %	0 %
MITC	11	9	8	81.8 %	72.7 %
Norflurazon	11	1	0	9.1 %	0 %
Oryzalin	11	0	0	0 %	0 %
Oxydemeton Methyl	11	0	0	0 %	0 %
Oxyfluorfen	11	1	0	9.1 %	0 %
Permethrin	11	0	0	0 %	0 %
Phosmet	11	0	0	0 %	0 %
pp-dicofol	11	0	0	0 %	0 %
Propargite	11	0	0	0 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Simazine	11	1	0	9.1 %	0 %
Trifluralin	11	2	0	18.2 %	0 %
Total	476	74	52	15.5 %	10.9 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table G-2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Shafter AMN sampling location in 2020. The highest concentration relative to its screening level was that of 1,3-D at 33.7%, followed by chlorothalonil at 0.11%, MITC at 0.025%, and MeBr 0.023%.

Table G-2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Shafter in 2020.

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
1,3-dichloropropene	37.5 ppb (170,199 ng/m^3)	110 ppb (505,000 ng/m^3)**	33.7 %
Chlorothalonil	0.003 ppb (36.3 ng/m^3)	3.1 ppb (34,000 ng/m^3)	0.11 %
MITC	0.054 ppb (162 ng/m^3)	220 ppb (660,000 ng/m^3)*†	0.025 %
Methyl Bromide	0.048 ppb (186 ng/m^3)	210 ppb (820,000 ng/m^3)*	0.023 %
Acephate	ND	1.6 ppb (12,000 ng/m^3)	
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chloropicrin	ND	73 ppb (491,000 ng/m^3)*†	
Chlorpyrifos	ND	0.084 ppb (1,200 ng/m^3)‡	

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Chlorpyrifos OA	ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin	ND	6.6 ppb (113,000 ng/m^3)	
Dacthal	Trace	1,732 ppb (23,500,000 ng/m^3)	
DDVP	ND	1.2 ppb (11,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	Trace	0.01 ppb (130 ng/m^3)	
Diazinon OA	Trace	0.011 ppb (130 ng/m^3)	
Dimethoate	Trace	0.46 ppb (4,300 ng/m^3)	
Dimethoate OA	ND	0.49 ppb (4,300 ng/m^3)	
Diuron	Trace	17.8 ppb (170,000 ng/m^3)	
Endosulfan	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	Trace	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	29.7 ppb (230,000 ng/m^3)	
Iprodione	ND	23.18 ppb (313,000 ng/m^3)	
Malathion	ND	8.3 ppb (112,500 ng/m^3)	
Malathion OA	Trace	8.8 ppb (112,500 ng/m^3)	

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Metolachlor (S-Metolachlor)	Trace	7.3 ppb (85,000 ng/m^3)	
Norflurazon	Trace	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl	ND	3.7 ppb (39,200 ng/m^3)	
Oxyfluorfen	Trace	34.5 ppb (510,000 ng/m^3)	
Permethrin	ND	10.5 ppb (168,000 ng/m^3)	
Phosmet	ND	5.9 ppb (77,000 ng/m^3)	
pp-dicofol	ND	4.5 ppb (68,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	Trace	13.3 ppb (110,000 ng/m^3)	
Trifluralin	Trace	87.5 ppb (1,200,000 ng/m^3)	

*This value is a regulatory target rather than a screening level
†This value is an 8-hour time-weighted-average (TWA) used to compare against the 24-h measured concentration.
**This value is a 72-hour TWA used to compare against the 24-hour measured concentration.
‡CDPR's risk management directive for Chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m^3), 1-hour TWA on May 28, 2019. However, the current sample duration does not allow for a direct comparison between the acute regulatory target concentration and the measured sample values

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

Table G-3 shows the highest observed rolling 4-week or 13-week average concentrations for all chemicals monitored at the Shafter AMN sampling location in 2020. The highest concentration relative to its screening level was that of 1,3-D at 147%, followed by MITC at 3.1%, MeBr at 0.47%, and chlorothalonil at 0.066%.

Table G-3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored in Shafter in 2020.

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
1,3-dichloropropene	13-week	4.5 ppb (20,620 ng/m^3)	3 ppb (14,000 ng/m^3)	147 %
MITC	4-week	0.031 ppb (92.2 ng/m^3)	1 ppb (3,000 ng/m^3)	3.1 %
Methyl Bromide	4-week	0.023 ppb (90.2 ng/m^3)	5 ppb (19,400 ng/m^3)†	0.47 %
Chlorothalonil	4-week	0.002 ppb (22.6 ng/m^3)	3.1 ppb (34,000 ng/m^3)	0.066 %
Acephate	4-week	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	4-week	ND	1.5 ppb (24,000 ng/m^3)	
Chloropicrin	13-week	ND	0.35 ppb (2,300 ng/m^3)	
Chlorpyrifos	4-week	ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos OA	4-week	ND	0.062 ppb (850 ng/m^3)	
Cypermethrin	4-week	ND	4.8 ppb (81,000 ng/m^3)	
Dacthal	4-week	Trace	34.6 ppb (470,000 ng/m^3)	
DDVP	4-week	ND	0.24 ppb (2,200 ng/m^3)	
DEF	4-week	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	4-week	Trace	0.01 ppb (130 ng/m^3)	
Diazinon OA	4-week	Trace	0.011 ppb (130 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Dimethoate	4-week	Trace	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	4-week	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	4-week	Trace	1.8 ppb (17,000 ng/m^3)	
Endosulfan	4-week	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	4-week	Trace	0.19 ppb (3,300 ng/m^3)	
EPTC	4-week	ND	3.1 ppb (24,000 ng/m^3)	
Iprodione	4-week	ND	7.08 ppb (95,600 ng/m^3)	
Malathion	4-week	ND	6 ppb (80,600 ng/m^3)	
Malathion OA	4-week	Trace	6.3 ppb (80,600 ng/m^3)	
Methidathion	4-week	ND	0.25 ppb (3,100 ng/m^3)	
Metolachlor (S-Metolachlor)	4-week	Trace	1.3 ppb (15,000 ng/m^3)	
Norflurazon	4-week	Trace	1.9 ppb (26,000 ng/m^3)	
Oryzalin	4-week	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	4-week	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	4-week	Trace	12.2 ppb (180,000 ng/m^3)	
Permethrin	4-week	ND	5.6 ppb (90,000 ng/m^3)	

Chemical	Rolling week	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Phosmet	4-week	ND	2 ppb (26,000 ng/m^3)	
pp-dicofol	4-week	ND	3.2 ppb (49,000 ng/m^3)	
Propargite	4-week	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	4-week	Trace	3.8 ppb (31,000 ng/m^3)	
Trifluralin	4-week	Trace	12.4 ppb (170,000 ng/m^3)	

*Rolling averages of weeks 1-4, weeks 2-5, weeks 3-6, etc.; or weeks 1-13, weeks 2-14, weeks 3-15, etc.
†This value is a regulatory target rather than a screening level

Chronic (annual) Concentrations

Table G-4 shows the annual average concentration for 1,3-dichloropropene and Methyl Bromide monitored in Shafter in 2020. Due to COVID-19 restrictions, only 1,3-D and MeBr were monitored throughout the year. The active ingredient with highest concentration relative to its screening level was 1,3-D at 90.7%, followed by MeBr at 0.68%.

Table G-4. Annual average concentrations, chronic screening levels, and percent of the chronic screening levels for 1,3-dichloropropene and methyl bromide monitored in Shafter in 2020.

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
1,3-dichloropropene	1.8 ppb (8,163 ng/m^3)	2 ppb (9,000 ng/m^3)	90.7 %
Methyl Bromide	0.0068 ppb (26.4 ng/m^3)	1 ppb (3,900 ng/m^3)	0.68 %

Temporal Trends in Detected Concentrations

The following figures depict the concentrations over time for monitoring results in 2020 for any chemical detected at a quantifiable concentration in Shafter. Screening levels are abbreviated as SL, whereas regulatory targets are abbreviated as RT.

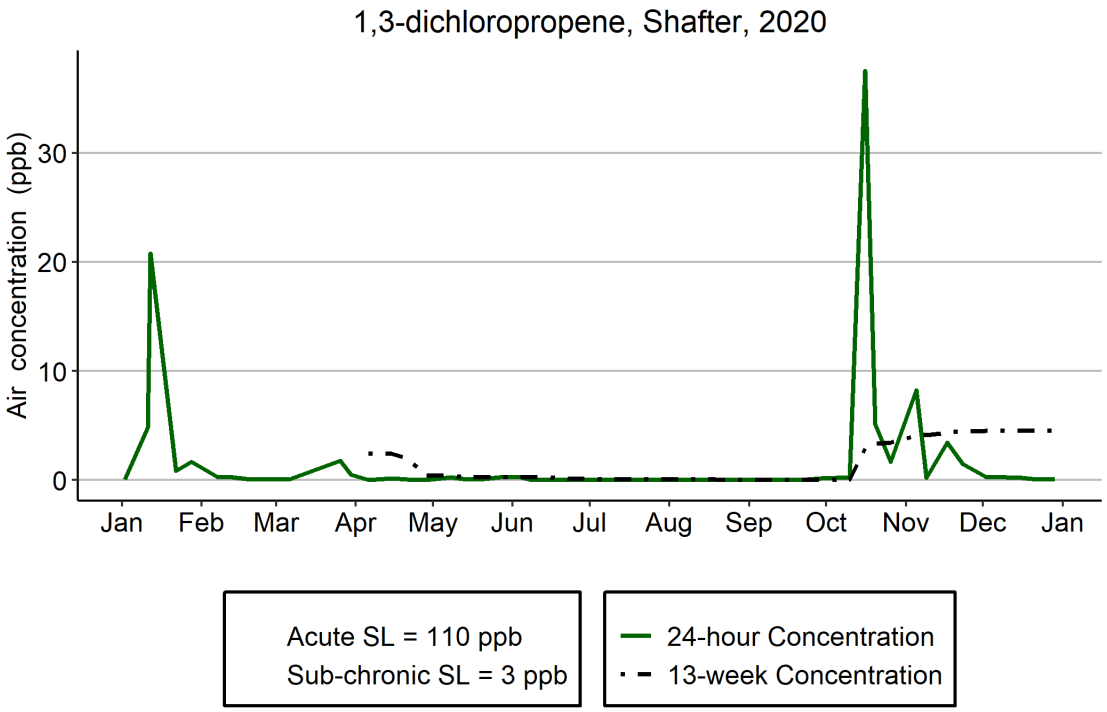

Figure G-1. Temporal trend in 1,3-dichloropropene concentrations in Shafter in 2020.

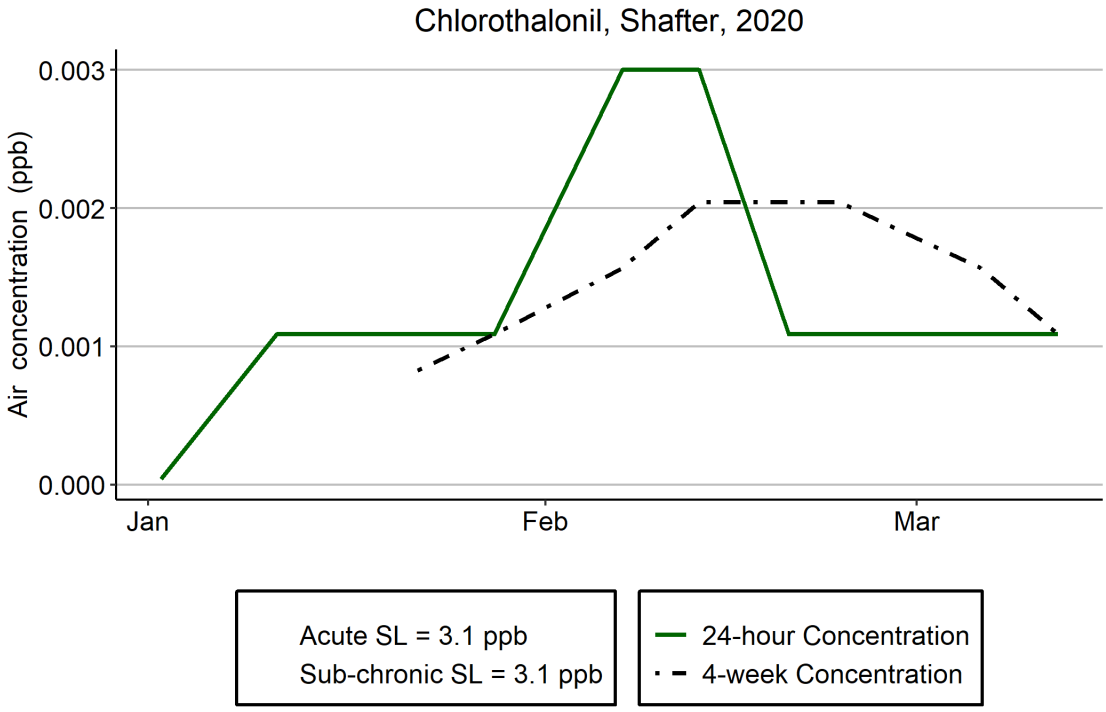

Figure G-2. Temporal trend in Chlorothalonil concentrations in Shafter in 2020.

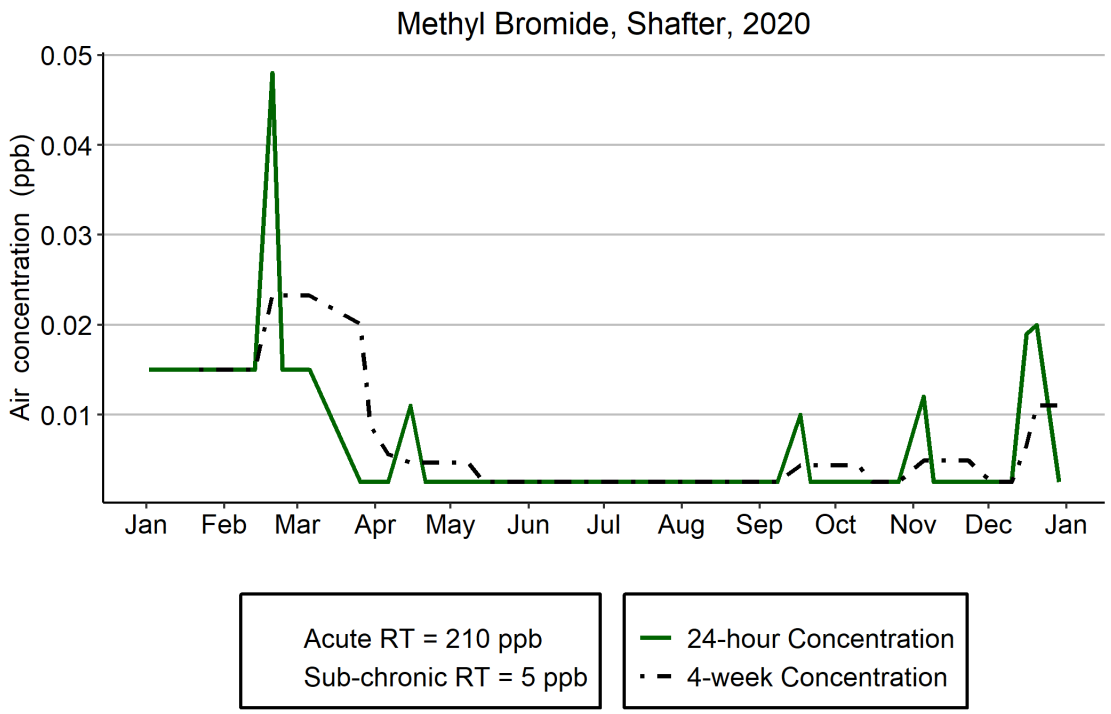

Figure G-3. Temporal trend in Methyl Bromide concentrations in Shafter in 2020.

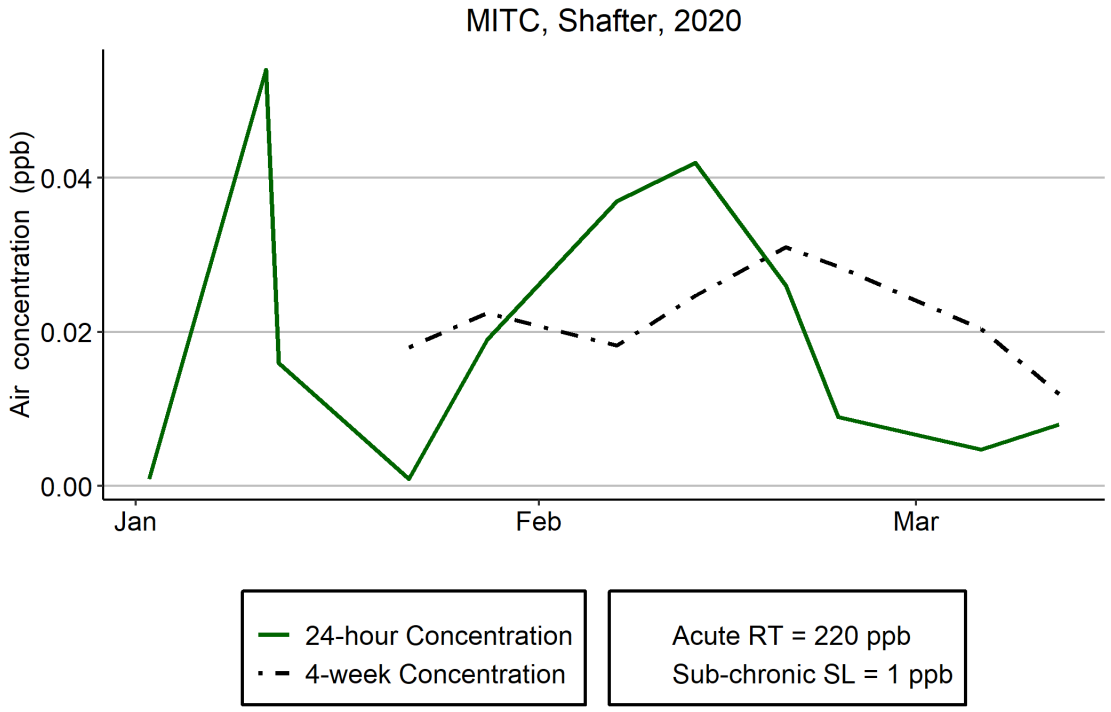

Figure G-4. Temporal trend in MITC concentrations in Shafter in 2020.

APPENDIX H: WATSONVILLE RESULTS

Watsonville is a small city of 7 square miles in area located on the southern edge of Santa Cruz County. The elevation is 29 feet, and it receives on average 22 inches of precipitation annually. Daily average temperatures range from 50° to 72°F in the summer to 38° to 63°F in winter. Based on the 2010 census, the population of Watsonville was 51,199, of which 31.5% were below 18 years of age and 8.3% 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 approximately 2 miles south of Watsonville at Ohlone Elementary School. Due to COVID-19 restrictions, only 1,3-dichloropropene and Methyl Bromide were monitored throughout the year; the other 34 chemicals were only sampled the first 11 weeks.

Pesticide Detections

Table H-1 lists the number and percentage of analyses resulting in detections at the Watsonville sampling site. The active ingredient with the highest percentage of detections was 1,3-D (49.1%, n = 26), followed by MITC (9.1%, n = 1), and MeBr (1.9%, n = 1).

Table H-1. Number and percentage of positive samples per chemical in Watsonville in 2020.

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
1,3-dichloropropene	53	26	26	49.1 %	49.1 %
Acephate	11	0	0	0 %	0 %
Bensulide	11	0	0	0 %	0 %
Chloropicrin	11	0	0	0 %	0 %
Chlorothalonil	11	0	0	0 %	0 %
Chlorpyrifos	11	0	0	0 %	0 %
Chlorpyrifos OA	11	0	0	0 %	0 %
Cypermethrin	11	0	0	0 %	0 %
Dacthal	11	0	0	0 %	0 %
DDVP	11	0	0	0 %	0 %
DEF	11	0	0	0 %	0 %
Diazinon	11	0	0	0 %	0 %
Diazinon OA	11	0	0	0 %	0 %

Chemical	Number of Valid samples	Quantifiable and Trace detections	Quantifiable detections	Quantifiable and Trace detections %	Quantifiable detections %
Dimethoate	11	0	0	0 %	0 %
Dimethoate OA	11	0	0	0 %	0 %
Diuron	11	0	0	0 %	0 %
Endosulfan	11	0	0	0 %	0 %
Endosulfan Sulfate	11	0	0	0 %	0 %
EPTC	11	0	0	0 %	0 %
Iprodione	11	0	0	0 %	0 %
Malathion	11	0	0	0 %	0 %
Malathion OA	11	0	0	0 %	0 %
Methidathion	11	0	0	0 %	0 %
Methyl Bromide	53	1	1	1.9 %	1.9 %
Metolachlor (S-Metolachlor)	11	0	0	0 %	0 %
MITC	11	1	1	9.1 %	9.1 %
Norflurazon	11	0	0	0 %	0 %
Oryzalin	11	0	0	0 %	0 %
Oxydemeton Methyl	11	0	0	0 %	0 %
Oxyfluorfen	11	0	0	0 %	0 %
Permethrin	11	0	0	0 %	0 %
Phosmet	11	0	0	0 %	0 %
pp-dicofol	11	0	0	0 %	0 %
Propargite	11	0	0	0 %	0 %
Simazine	11	0	0	0 %	0 %
Trifluralin	11	0	0	0 %	0 %
Total	480	28	28	5.8 %	5.8 %

Pesticide Concentrations

Acute (24-hour) Concentrations

Table H-2 shows the highest 24-hour concentrations observed for all chemicals monitored at the Watsonville AMN sampling location in 2020. The highest concentration relative to its screening level was that of 1,3-D at 0.74%, followed by MeBr at 0.011%, and MITC at 0.0043%.

Table H-2. Highest 24-hour air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored in Watsonville in 2020.

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
1,3-dichloropropene	0.83 ppb (3,753 ng/m^3)	110 ppb (505,000 ng/m^3)**	0.74 %
Methyl Bromide	0.023 ppb (89.3 ng/m^3)	210 ppb (820,000 ng/m^3)*	0.011 %
MITC	0.01 ppb (28.7 ng/m^3)	220 ppb (660,000 ng/m^3)*†	0.0043 %
Acephate	ND	1.6 ppb (12,000 ng/m^3)	
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chloropicrin	ND	73 ppb (491,000 ng/m^3)*†	
Chlorothalonil	ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.084 ppb (1,200 ng/m^3)‡	
Chlorpyrifos OA	ND	0.088 ppb (1,200 ng/m^3)	
Cypermethrin	ND	6.6 ppb (113,000 ng/m^3)	
Dacthal	ND	1,732 ppb (23,500,000 ng/m^3)	
DDVP	ND	1.2 ppb (11,000 ng/m^3)	

Chemical	Highest 24-hour concentration	24-hour acute screening level	Percent of screening level
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate OA	ND	0.49 ppb (4,300 ng/m^3)	
Diuron	ND	17.8 ppb (170,000 ng/m^3)	
Endosulfan	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	29.7 ppb (230,000 ng/m^3)	
Iprodione	ND	23.18 ppb (313,000 ng/m^3)	
Malathion	ND	8.3 ppb (112,500 ng/m^3)	
Malathion OA	ND	8.8 ppb (112,500 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	7.3 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	

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

*This value is a regulatory target rather than a screening level
†This value is an 8-hour time-weighted-average (TWA) used to compare against the 24-h measured concentration
**This value is a 72-hour TWA used to compare against the 24-hour measured concentration
‡CDPR's risk management directive for Chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m3), 1-hour TWA on May 28, 2019. However, the current sample duration does not allow for a direct comparison between the acute regulatory target concentration and the measured sample values

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

Table H–3 shows the highest observed rolling 4-week or 13-week average concentrations for all chemicals monitored at the Watsonville AMN sampling location in 2020. The highest concentration relative to its screening level was that of 1,3-D at 11.5%, followed by MITC at 0.31%, and MeBr at 0.3%.

Table H–3. Highest rolling average air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored in Watsonville in 2020.

Chemical	Rolling average	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
1,3-dichloropropene	13-week	0.36 ppb (1,612 ng/m^3)	3 ppb (14,000 ng/m^3)	11.5 %

Chemical	Rolling average	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
MITC	4-week	0.0032 ppb (9.2 ng/m^3)	1 ppb (3,000 ng/m^3)	0.31 %
Methyl Bromide	4-week	0.015 ppb (58.2 ng/m^3)	5 ppb (19,400 ng/m^3)†	0.3 %
Acephate	4-week	ND	1.1 ppb (8,500 ng/m^3)	
Bensulide	4-week	ND	1.5 ppb (24,000 ng/m^3)	
Chloropicrin	13-week	ND	0.35 ppb (2,300 ng/m^3)	
Chlorothalonil	4-week	ND	3.1 ppb (34,000 ng/m^3)	
Chlorpyrifos	4-week	ND	0.059 ppb (850 ng/m^3)	
Chlorpyrifos OA	4-week	ND	0.062 ppb (850 ng/m^3)	
Cypermethrin	4-week	ND	4.8 ppb (81,000 ng/m^3)	
Dacthal	4-week	ND	34.6 ppb (470,000 ng/m^3)	
DDVP	4-week	ND	0.24 ppb (2,200 ng/m^3)	
DEF	4-week	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	4-week	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	4-week	ND	0.011 ppb (130 ng/m^3)	
Dimethoate	4-week	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	4-week	ND	0.34 ppb (3,000 ng/m^3)	

Chemical	Rolling average	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Diuron	4-week	ND	1.8 ppb (17,000 ng/m^3)	
Endosulfan	4-week	ND	0.2 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	4-week	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	4-week	ND	3.1 ppb (24,000 ng/m^3)	
Iprodione	4-week	ND	7.08 ppb (95,600 ng/m^3)	
Malathion	4-week	ND	6 ppb (80,600 ng/m^3)	
Malathion OA	4-week	ND	6.3 ppb (80,600 ng/m^3)	
Methidathion	4-week	ND	0.25 ppb (3,100 ng/m^3)	
Metolachlor (S-Metolachlor)	4-week	ND	1.3 ppb (15,000 ng/m^3)	
Norflurazon	4-week	ND	1.9 ppb (26,000 ng/m^3)	
Oryzalin	4-week	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	4-week	ND	0.058 ppb (610 ng/m^3)	
Oxyfluorfen	4-week	ND	12.2 ppb (180,000 ng/m^3)	
Permethrin	4-week	ND	5.6 ppb (90,000 ng/m^3)	
Phosmet	4-week	ND	2 ppb (26,000 ng/m^3)	
pp-dicofol	4-week	ND	3.2 ppb (49,000 ng/m^3)	

Chemical	Rolling average	Highest rolling average concentration*	Sub-chronic screening level	Percent of screening level
Propargite	4-week	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	4-week	ND	3.8 ppb (31,000 ng/m^3)	
Trifluralin	4-week	ND	12.4 ppb (170,000 ng/m^3)	

*Rolling averages of weeks 1-4, weeks 2-5, weeks 3-6, etc.; or weeks 1-13, weeks 2-14, weeks 3-15, etc.
†This value is a regulatory target rather than a screening level.

Chronic (annual) Concentrations

Table H-4 shows the annual average concentration for 1,3-dichloropropene and Methyl Bromide monitored in Watsonville in 2020. Due to COVID-19 restrictions, only 1,3-D and MeBr were monitored during all 53 weeks. The pesticide with the highest concentration relative to its screening level was 1,3-D at 6%, followed by MeBr at 0.55%.

Table H-4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for 1,3-dichloropropene and Methyl Bromide in Watsonville in 2020.

Chemical	Overall average concentration	Chronic screening level	Percent of screening level
1,3-dichloropropene	0.12 ppb (543 ng/m^3)	2 ppb (9,000 ng/m^3)	6 %
Methyl Bromide	0.0055 ppb (21.4 ng/m^3)	1 ppb (3,900 ng/m^3)	0.55 %

Temporal Trends in Detected Concentrations

The following figures depict the concentrations over time for monitoring results in 2020 for any chemical detected at a quantifiable concentration in Watsonville. Screening levels are abbreviated as SL, whereas regulatory targets are abbreviated as RT.

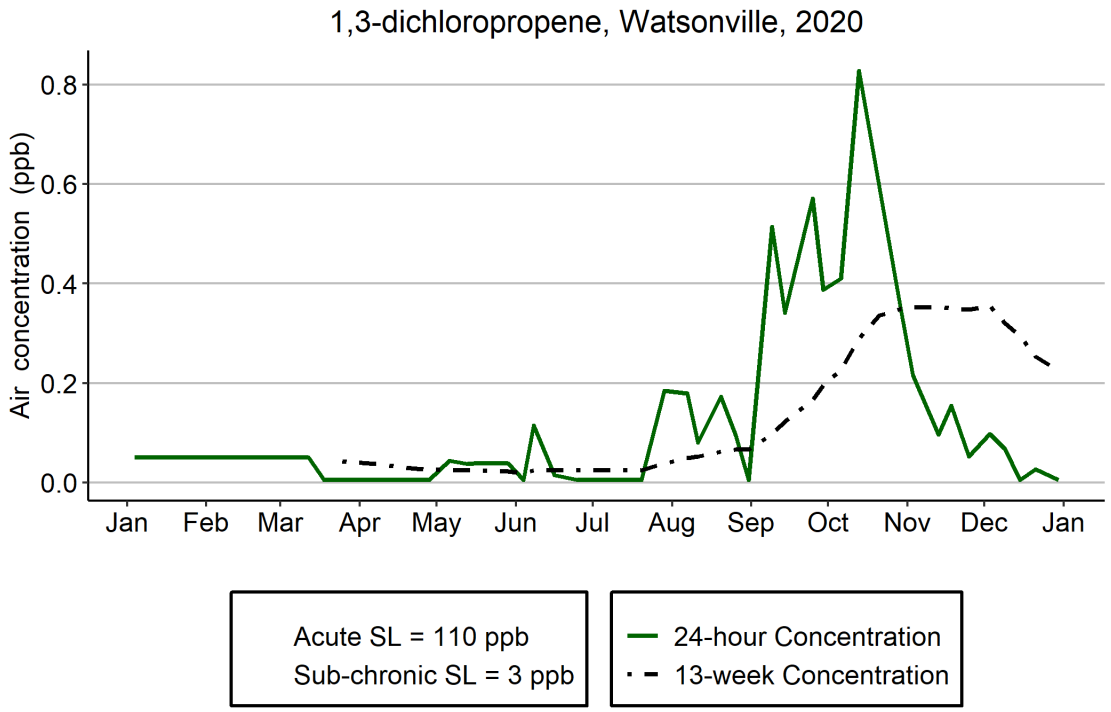

Figure H-1. Temporal trend in 1,3-dichloropropene concentrations in Watsonville in 2020.

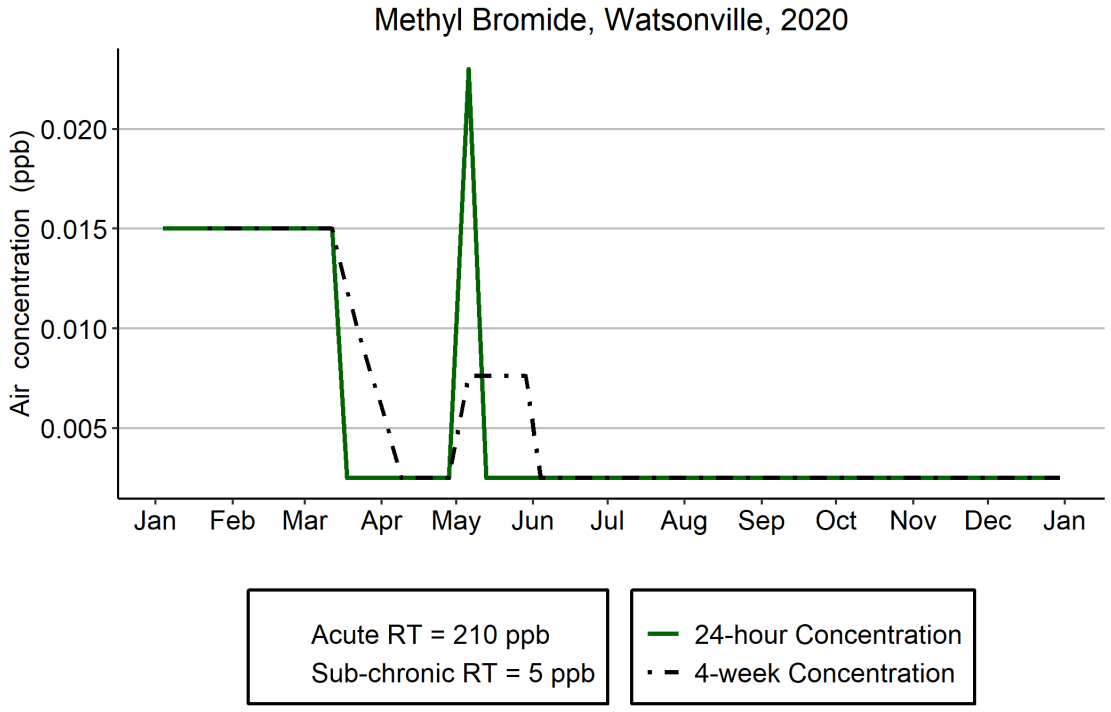

Figure H-2. Temporal trend in Methyl Bromide concentrations in Watsonville in 2020.

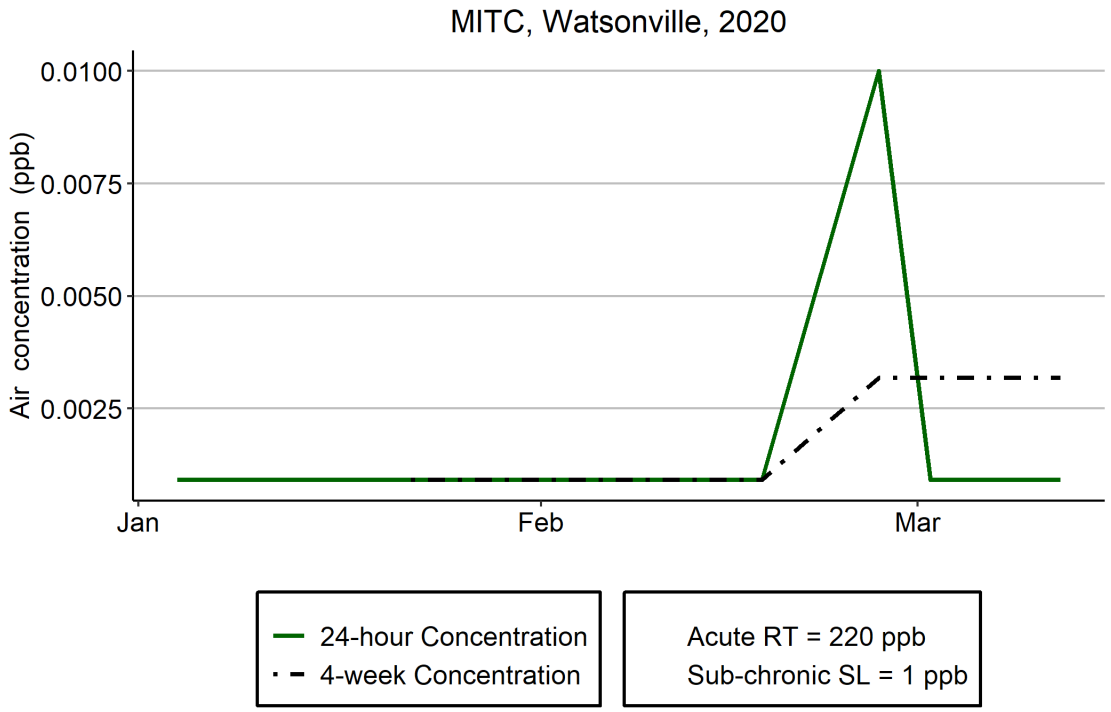

Figure H-3. Temporal trend in MITC concentrations in Watsonville in 2020.

APPENDIX I: LABORATORY ANALYSIS

Pesticides Monitored

As part of the Air Monitoring Network (AMN), the California Department of Pesticide Regulation (CDPR) monitors for 31 pesticides and 5 breakdown products. Chemicals included in the AMN were selected based primarily on potential health risk (CDPR 2013). A total of four analytical methods were used to analyze the collected air samples as part of the AMN:

1. Volatile Organic Compounds (VOC): SUMMA air canister sampling for 1,3-D and MeBr
2. Methyl Isothiocyanate (MITC): coconut charcoal glass sorbent tube sampling for MITC
3. Chloropicrin: sorbent glass tube with XAD-4 resin sampling for Chloropicrin
4. Multi-Pesticide Residue: Teflon cartridge with XAD-4 resin sampling for 32 chemicals

VOC

Collected air canisters were analyzed for the presence of two analytes (Table I-1) using a volatile organic compound (VOC) GC-MS method similar to the U.S. Environmental Protection Agency's (US EPA) Method TO-15 (CDFA 2010). Analysis of 1,3-D includes results for both cis- and trans- isomers, which are then consolidated and reported as a total 1,3-D concentration for use in this report. VOC compounds analyzed by the California Air Resources Board's Organic Laboratory Section (CARB-OLS) utilized method MLD 058 (CARB 2002).

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

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

MITC

Samples collected on Anasorb coconut charcoal sorbent tubes were analyzed by California Department of Food and Agriculture Center for Analytical Chemistry (CDFA-CAC) laboratory for the presence of Methyl Isothiocyanate (MITC) by GC-MS (Table I-2). MITC extraction from the sorbent medium involves using 1.0% carbon disulfide in ethyl acetate, followed by analysis using gas chromatography mass spectrometry (GC-MS) (CDFA 2018). The detector was switched from a nitrogen phosphorous detector to mass spectrometer in 2018. Full method validation data was obtained and verified by CDFA-CAC (CDFA 2018).

Chloropicrin

Samples collected on XAD-4 sorbent tubes were analyzed by CDFA-CAC laboratory for the presence of Chloropicrin (Table I-2). Each sorbent tube was desorbed and analyzed by GC equipped with an electron capture detector (CDFA 1999). In July 2020, the detector was switched from an electron capture detector to mass spectrometer. Full method validation data was obtained and verified by CDFA-CAC (CDFA 2020).

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

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

Multi-Pesticide Residue Analysis

Prior to sampling, CDFA-CAC personnel washed, rinsed, and packed 30 mL of XAD-4 sorbent material into a custom-built Teflon cartridge used to collect 32 analytes via multi-pesticide residue analysis. Multi-pesticide residue analysis using XAD-4 resin was performed using GC-MS and liquid chromatography mass spectrometer methods (CDFA 2008). This analysis can detect a variety of fungicides, insecticides, herbicides, and defoliants. The breakdown products of Chlorpyrifos, Diazinon, Dimethoate, Endosulfan, and Malathion were also included in the multi-pesticide residue analysis method (Table I-3).

Table I-3. Target analytes in multi-pesticide residue analysis with XAD-4 resin.

Chemical	Chemical Class	Pesticide Group
Acephate	Organophosphate	Insecticide
Bensulide	Organophosphate	Herbicide
Chlorothalonil	Chloronitrile	Fungicide
Chlorpyrifos	Organophosphate	Insecticide
Chlorpyrifos oxygen analog (OA)	Organophosphate	Degradate
Chlorthal-dimethyl (Dacthal, DCPA)	Phthalate	Herbicide
Cypermethrin	Pyrethroid	Insecticide
DDVP	Organophosphate	Insecticide
DEF (SSS-tributyl phosphorotrithioate)	Organophosphate	Defoliant

Chemical	Chemical Class	Pesticide Group
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
Iprodione	Dicarboximide	Fungicide
Malathion	Organophosphate	Insecticide
Malathion OA	Organophosphate	Degradate
Methidathion	Organophosphate	Insecticide
Metolachlor	Chloracetanilide	Herbicide
Norflurazon	Pyridazinone	Herbicide
Oryzalin	Dinitroaniline	Herbicide
Oxydemeton-methyl	Organophosphate	Insecticide
Oxyfluorfen	Diphenyl ether	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. 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, CARB-OLS utilizes a certified National Institute of Standards 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. This CARB-OLS established method calibration is described in detail in MLD 058 (CARB 2002).

Method Detection Limits and Limits of Quantitation

The method detection limit (MDL) is the lowest concentration of a pesticide (analyte) that a chemical method can reliably detect. The laboratory determined the MDL for each analyte by analyzing a standard at a concentration with a signal to noise ratio of 2.5 to 5. This standard is analyzed at least 7 times, and the MDL is determined by calculating the 99 % confidence interval of the mean.

The limit of quantitation (LOQ) is the level at which concentrations may be reliably measured and is set at a certain factor above the MDL. The level of interference determines the magnitude of this factor; the more interference, the higher the factor. Tables I-4 and I-5 list all the quantitation and detection limits for AMN analytes.

Table I-4. Method detection limit (MDL) and limit of quantitation (LOQ) for samples collected on sorbent media analyzed by the CDFA CAC laboratory.

Chemical	MDL (ppb)	LOQ (ppb)	MDL (ng/m^3)	LOQ (ng/m^3)
Acephate	0.00009	0.0012	0.65	9.3
Bensulide	0.00005	0.0006	0.88	9.3
Chloropicrin*	0.03302	0.1032 → 0.0516	222	694 → 327
Chlorothalonil	0.00008	0.0021	0.88	23.1
Chlorpyrifos	0.00006	0.0016	0.88	23.1
Chlorpyrifos OA	0.00006	0.0007	0.79	9.3
Cypermethrin	0.00014	0.0014	2.31	23.1
Dacthal	0.00006	0.0007	1.86	9.3

Chemical	MDL (ppb)	LOQ (ppb)	MDL (ng/m^3)	LOQ (ng/m^3)
DDVP	0.00008	0.0026	0.74	23.1
DEF	0.00002	0.0007	0.28	9.3
Diazinon	0.00003	0.0007	0.37	9.3
Diazinon OA	0.00003	0.0008	0.37	9.3
Dimethoate	0.00008	0.0010	0.74	9.3
Dimethoate OA	0.00007	0.0011	0.60	9.3
Diuron	0.00004	0.0010	0.37	9.3
Endosulfan	0.00011	0.0014	1.76	23.1
Endosulfan Sulfate	0.00005	0.0013	0.88	23.1
EPTC	0.00019	0.0012	1.44	23.1
Iprodione	0.00008	0.0007	1.02	23.1
Malathion	0.00010	0.0007	1.30	9.3
Malathion OA	0.00003	0.0007	0.37	9.3
Methidathion	0.00007	0.0007	0.88	9.3
Metolachlor (S-Metolachlor)	0.00009	0.0008	1.06	9.3
MITC	0.00182	0.0077	5.44	23.1
Norflurazon	0.00004	0.0007	0.60	9.3
Oryzalin	0.00012	0.0007	1.67	23.1
Oxydemeton Methyl	0.00014	0.0009	1.44	9.3
Oxyfluorfen	0.00009	0.0016	1.30	23.1
Permethrin	0.00010	0.0014	1.62	23.1
Phosmet	0.00029	0.0007	3.70	9.3
pp-dicofol	0.00030	0.0015	4.49	23.1
Propargite	0.00007	0.0016	1.02	23.1
Simazine	0.00004	0.0011	0.32	9.3
Trifluralin	0.00008	0.0017	1.16	23.1

*Chloropicrin's LOQ values were updated by CDFA on August 12, 2020.

Table I-5. Method detection limits (MDL) for VOC samples analyzed by CDFA-CAC and CARB-OLS laboratories.

Chemical	MDL (ppb) by CARB	MDL (ng/m^3) by CARB	MDL (ppb) by CDFA	MDL (ng/m^3) by CDFA
1,3-dichloropropene	0.1	454	0.01	45.4
Methyl Bromide	0.03	116.4	0.0051	19.8

Air Concentration Calculations

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

$$ng/m^3 = \frac{\text{Results (ug)} \times 1000\ (ng/ug) \times 1000\ (L/m^3)}{\text{Flow rate (L/min)} \times \text{Run time (min)}}$$

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

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

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

Per standard CDPR 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).

As noted in Table I-5, the RL for 1,3-D and methyl bromide analyzed by CARB-OLS are, respectively, 10-fold and 3-fold higher than that of the samples analyzed by CDFA-CAC. Incorporating these analytical limits into the estimated values for non-detections produced the observed variation between sites for these chemicals, particularly for annual averages where large periods of non-detections have a larger effect on the calculated concentration.

Data Validation/Quality Assurance

Method Validation

The method validation consisted of five sample sets and five fortification (spike) levels for chloropicrin and multi-residue analyses, and three sample sets and seven fortification levels for MITC (CDFA 2008, 2018, 2020). An acceptable range of spike recoveries was established by analyzing laboratory spike sample, and the mean percent recovery and standard deviation were determined based on these data points. The control limits were established as the mean percent recovery ± 3 standard deviations. For VOC analysis, CARB-OLS utilized method MLD 058 where extensive method validation had been performed (CARB 2002).

General Continuing Quality Control

Samples were stored at the CDPR facility in West Sacramento under the care of the laboratory liaison until scheduled delivery to the CDFA-CAC laboratory or CARB-OLS 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, analytes analyzed by CARB-OLS have storage stability data for 30 days. Each extraction set consisted of 1 to 20 actual samples and quality control (QC) samples which include a reagent blank, a matrix blank, and a matrix spiked sample. Any subsequent matrix spiked samples outside the control limits required the set of samples associated with that spike to be reanalyzed.

Quality Control Results

Laboratory matrix spikes and matrix blanks were included with every set of samples extracted and analyzed at the CDFA-CAC laboratory and are part of the laboratory's QC program. The matrix spikes are conducted to assess accuracy and precision; the blanks are used to check for contamination at the laboratory or contamination of the media packed in the sorption tubes or cartridges. The blank matrix materials were not fortified, but were extracted and analyzed along with the matrix spikes and field samples. Table I-6 lists the average for the QC samples that were extracted and analyzed with the air samples for the entire monitoring period. Average laboratory matrix spike recoveries ranged from 82% to 97% for all chemicals analyzed. CARB-OLS lab does not perform matrix spikes or field blanks.

Field blanks and duplicate samples are part of CDPR's field and laboratory QC program. The trip blanks were blank matrix samples that were transported to and from the field locations but were not placed on air pumps. These samples were a control to check for contamination during transportation. Table I-6 shows that all field blanks resulted in non-detections.

Table I-6. Average results for quality control and quality assurance samples analyzed by CDFA-CAC lab in 2020.

Chemical	Lab spikes (% recovery)	Lab blanks (ng/m^3)	Field blanks (ng/m^3)
1,3-dichloropropene	95%	ND	None Taken
Acephate	90%	ND	ND
Bensulide	85%	ND	ND
Chloropicrin	97%	ND	ND
Chlorothalonil	88%	ND	ND
Chlorpyrifos	90%	ND	ND
Chlorpyrifos OA	86%	ND	ND
Cypermethrin	90%	ND	ND
Dacthal	90%	ND	ND
DDVP	85%	ND	ND
DEF	84%	ND	ND
Diazinon	86%	ND	ND
Diazinon OA	88%	ND	ND
Dimethoate	90%	ND	ND
Dimethoate OA	90%	ND	ND
Diuron	89%	ND	ND
Endosulfan	89%	ND	ND
Endosulfan Sulfate	90%	ND	ND
EPTC	82%	ND	ND
Iprodione	90%	ND	ND
Malathion	92%	ND	ND
Malathion OA	90%	ND	ND
Methidathion	86%	ND	ND
Methyl bromide	93%	ND	None Taken
Metolachlor	86%	ND	ND
MITC	83%	ND	ND
Norflurazon	88%	ND	ND
Oryzalin	89%	ND	ND

Chemical	Lab spikes (% recovery)	Lab blanks (ng/m^3)	Field blanks (ng/m^3)
Oxydemeton methyl	89%	ND	ND
Oxyfluorfen	95%	ND	ND
Permethrin	89%	ND	ND
Phosmet	84%	ND	ND
pp-Dicofol	89%	ND	ND
Propargite	91%	ND	ND
Simazine	88%	ND	ND
Trifluralin	90%	ND	ND

Table I-7 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 a large number of 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 I-7. Results for the co-located sample pairs in 2020. 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	MeBr	Chloropicrin	MITC	Multi-residue
ND / ND	8	18	3	1	94
ND / Trace	0	0	0	0	0
ND / >LOQ	0	0	0	0	0
Trace / ND	0	0	0	0	0
Trace / Trace	0	0	0	0	1
Trace / >LOQ	0	0	0	0	0
>LOQ / ND	2	0	0	0	0
>LOQ / Trace	0	0	0	0	1
>LOQ / >LOQ	8	0	0	2	0
RD %	33%	-	-	574%	-

ND = Not Detected; Trace = Detection confirmed but less than the quantitation limit; LOQ = Limit of quantification; RD = Relative Difference for pairs with both concentrations >LOQ

Lost and Invalid Samples

A valid sample is a sample that meets all the sampling criteria for its corresponding sampling method. For example, A VOC sample collected by Xonteck ambient air sampler (model 901) should run for 24±1 hours and the ending pressure must be between 6 and 16 PSI. These criteria for each sampling method and each sampling media is explained in detail in Appendix J.

As previously stated, six samples were lost or invalidated during the year. Table I-8 lists the location, operator, date, and type of samples.

Table I-8. Lost or invalid samples in 2020.

Community	Operator	Date	Sample type
Santa Maria	SB CAC	08/20/2020	VOC canister (1,3-D and MeBr) invalid due to low pressure (5.4 psi)
Santa Maria	SB CAC	09/27/2020	VOC canister (1,3-D and MeBr) invalid due to low pressure (1.9 psi)
Santa Maria	SB CAC	11/23/2020	Met One sampler was inoperative. Consequently, MITC, chloropicrin, and multi-residue sorbent tubes were lost
Santa Maria	SB CAC	12/18/2020	MITC sorbent tube broke during shipping

APPENDIX J: FIELD METHODS

Materials and Methods

Current Methods and Equipment

Four air sampling methods were used for the collection of air samples as part of the AMN.

Volatile Organic Compounds (VOC)

As part of sample collection, ambient air was drawn through 1/16" internal diameter PTFE (Teflon®) tubing into a Xonteck model 901 ambient air sampler into a 6-L air sample canister. The flow rate using this method was 7.5 mL/min (± 10%) and was sustained for a 24-h period. The sampler itself included an automatically initiated 60-second purge period to clear the sampling lines immediately prior to sample collection.

Multi-Pesticide Residue

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

Methyl Isothiocyanate (MITC)

As part of sample collection, ambient air was drawn through a Anasorb CSC sorbent tube (SKC part # 226-09) containing activated coconut charcoal media using channel 2 of the Met One pesticide sampler. Channel 2 provided a sustained flow of 1.5 L/min (± 5%). The average of flow measurements collected at 5-minute intervals was used to directly calculate the volume sampled which was reported by the sampler. This feature allowed for more certainty than the previous method of calculation, which used the mean from only two data points (measurements at the start and end of sample collection). The glass sorption tubes containing the sampling media and any collected analyte were shielded from sunlight by the sampler's radiation shield.

Chloropicrin

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

Legacy Methods and Equipment (2011-2018)

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

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

Should the Met One equipment fail or become unavailable, ambient air was drawn through the XAD-4 media using an SKC® AirChek HV30 air pump as a backup method. Pumps were calibrated at a flow rate of 15 L/min for Multi-residue, 1.5 L/min for MITC, and 50mL/min for Chloropicrin (± 10%) for a continuous 24-h period. The cartridges were connected to the pump using a combination of threaded ABS plastic fittings, nitrile o-rings, and approximately 8 feet of Tygon® tubing which were all downstream of the sample media. The Teflon® tube containing the sample media was kept sealed prior to sampling at which time the inlet of the cartridge itself was open to the ambient air. Bios Defender 530® or DC-Lite® flow meters were used to obtain flow rates at the start and finish of the sampling period.

Field Sampling Procedure

One 24-hour sample was collected each week at each of the eight sites, once they were active. The starting day varied each week with the actual dates being randomly selected as much as possible. Actual sampling start times were left to the discretion of the field sampling personnel.

Chain of custody (COC) forms, sample analysis request forms, and sample labels including the study number and unique sample identification numbers were supplied to field sampling personnel to be attached to sample tubes, cartridges, and canister tags prior to sampling.

Each of the four sample types detailed above were set up and started as closely as possible to the same time, except for the occasional make-up sample needed to replace an invalid sample. These make-up samples were typically run on the day following an invalidation event. Reasons why samples might be deemed invalid include, but are not limited to, the following: sampling period out of range, ending flow or pressure out of acceptable range, power interruptions, glass tube breakage during removal (i.e., damaged sampling media), and inoperative sampling equipment. The starting flow rates were measured prior to air sample collection and if any were determined to be out of the acceptable range (± 5% for the new equipment, ± 10% for the old equipment) that sampling equipment was recalibrated to within an acceptable tolerance. 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 COC form.

Quality Control Methods

In addition to the primary samples, CDPR collected quality control (QC) samples including trip blanks, and co-located duplicate samples at a rate of at least 10% of primary samples. Table I-6 and Table I-7 summarize the results of these QC procedures and are specific to samples analyzed by CDFA's CAC lab only.

A trip blank sample provides information on possible contamination of field collected samples. For the manufactured pre-packed XAD-4 and charcoal sample tubes, trip blank sample ends were broken open, capped, and placed on dry ice with the field samples. The multi-pesticide residue XAD cartridges were opened in the field, capped, and placed on dry ice to be stored and shipped with the field samples. No air canister trip blanks were collected. Trip blanks were collected from the monitoring station in Watsonville (designated CDPR's QC sampling site) 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.

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 site at Watsonville was designated as CDPR's QC site for the CDPR-operated portion of the AMN. A second set of sampling equipment dedicated to the collection of QC samples was installed at this location.

APPENDIX K: HEALTH EVALUATION AND CALCULATIONS

Calculation of Sub-chronic Rolling Averages

In 2016, CDPR eliminated the practice of using a 4-week rolling average concentration to represent a sub-chronic time period for 1,3-dichloropropene and chloropicrin, and replaced them with 13-week rolling averages to compare to sub-chronic screening levels and regulatory targets. This determination was based on an evaluation conducted by CDPR's Human Health Assessment Branch that investigated seasonal reference concentrations for these two chemicals (CDPR 2016b). Given that the COVID-19 pandemic affected sampling in 2020, rolling averages were computed for all samples collected from January to March in 2020. Therefore, 11- or 12-week rolling averages were calculated to represent sub-chronic time periods for 1,3-D and chloropicrin, instead of 13-weeks.

Health Evaluation Methods

Pesticides can cause a variety of health effects when present at concentrations above health-protective levels. 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 (CDPR 2013). No state or federal agency has established health standards for pesticides in air. Therefore, CDPR in consultation with the Office of Environmental Health Hazard Assessment developed health screening levels or regulatory targets to place the results in a health-based context.

Health screening levels are based on a preliminary assessment of possible health effects and are used as triggers for CDPR to conduct a more detailed evaluation. An air concentration that measures less than the screening level 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 screening level would not necessarily indicate a significant health concern, but would indicate the need for a further, more refined evaluation. CDPR (2013) summarizes more information on CDPR-determined screening levels including information on deriving screening levels for each pesticide.

CDPR puts measures in place based on the regulatory target to limit exposures so that adverse effects can be avoided. Exceeding a regulatory target does not necessarily mean an adverse health effect occurs, but it does indicate that the restrictions on the pesticide use may need to be modified. CDPR normally establishes a regulatory target after completing a formal risk

assessment of a chemical's toxicity and potential exposures. CDPR management determines a regulatory target using its risk assessment, as well as risk assessments from other agencies, pesticide use patterns, potential effects on use of alternative pesticides, and other factors. A regulatory target is based on a more comprehensive evaluation than a health screening level. Therefore, a regulatory target supersedes a health screening level (i.e., a specific pesticide and exposure duration will have either a regulatory target or a health screening level, but not both). Out of the 36 pesticides monitored in the AMN, 1,3-dichloropropene, Chloropicrin, Methyl Bromide, and MITC have regulatory targets for one or more exposure periods.

Cumulative Exposures

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

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

The detected air concentration is considered to exceed its pre-determined screening level when HQ is greater than 1, and would indicate the need for a further and 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 L: COMPARISON TO PREVIOUS YEARS OF AIR MONITORING NETWORK DATA

All Air Monitoring Network Sites

This report covers results from the tenth year of monitoring by the Air Monitoring Network (AMN), which has been collecting samples since 2011. Annual AMN reports from 2011 to 2019 can be found in Air Monitoring Reports page at CDPR'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 (ATSDR 2007), and uncertainties related to the laboratory methodology. On March 21, 2012, CDPR canceled the registration of all products containing methyl iodide at the request of the registrant. Therefore, monitoring for methyl iodide 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.

Table L-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 each monitoring year. Table L-2 shows the results presented in terms of individual analyses as raw counts.

Table L-1. Summary of pesticide detection trends aggregated by chemical from 2011 to 2020.

Year	Total monitored chemicals	Total non-detected chemicals	Total detected chemicals†	Total quantifiable chemicals
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

Year	Total monitored chemicals	Total non-detected chemicals	Total detected chemicals†	Total quantifiable chemicals
2020	36	7	29	10

†Includes both quantified and trace detections.

Table L-2. Summary of pesticide detection trends as individual analyses from 2011 to 2020.

Year	Total analyses	Total non-detected analyses	Total detected analyses*	Total quantifiable analyses
2011	5,676	5,251	425	173
2012	6,002	5,671	331	81
2013	6,033	5,607	426	159
2014	5,966	5,468	498	225
2015	5,892	5,286	606	306
2016	5,928	5,393	535	307
2017	7,396	6,868	528	122
2018	12,058	11,316	742	152
2019	14,621	14,066	555	139
2020	4,692	4,315	377	152

*Includes both quantified and trace detections.

Table L-3 summarizes this information into the percentages of possible detections. Further inspection reveals that the highest percentage of detections occurred in 2015 with 10.3% of possible detections and 5.2% of quantifiable detections. On the other hand, the lowest percentage of detections occurred in 2019 with 3.8% of possible detections and 0.95% of quantifiable detections.

Table L-3. Summary of pesticide detection trends as percentage of possible detections from 2011 to 2020.

Year	Percent of non-detected analyses	Percent of detected analyses*	Percent of quantifiable analyses
2011	92.5%	7.5%	3.0%
2012	94.5%	5.5%	1.3%

Year	Percent of non-detected analyses	Percent of detected analyses*	Percent of quantifiable analyses
2013	92.9%	7.1%	2.6%
2014	91.7%	8.3%	3.8%
2015	89.7%	10.3%	5.2%
2016	91.0%	9.0%	5.2%
2017	92.9%	7.1%	1.6%
2018	93.8%	6.2%	1.3%
2019	96.2 %	3.8 %	0.95 %
2020	92 %	8 %	3.2 %

*Includes both quantified and trace detections.

Historic Air Concentrations in Chualar

The following tables summarize the results of three years of air monitoring in Chualar. Due to COVID-19 restrictions, pesticides were only monitored in January-March 2020. Therefore, 2020 concentrations are only reference values and should not be directly compared with previous years.

Table L-4. Percentage of analyses resulting in a quantifiable or trace detection in Chualar in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	18 %	2 %	0 %
Acephate	2 %	0 %	0 %
Bensulide	2 %	2 %	8 %
Chloropicrin	15 %	10 %	0 %
Chlorothalonil	8 %	0 %	8 %
Chlorpyrifos	0 %	4 %	0 %
Dacthal	98 %	80 %	100 %
DDVP	12 %	16 %	0 %
Diuron	0 %	0 %	8 %
Endosulfan	2 %	0 %	0 %

Chemical	2018	2019	2020
Endosulfan Sulfate	0 %	0 %	8 %
Malathion	10 %	0 %	0 %
Malathion OA	8 %	8 %	8 %
MITC	42 %	16 %	8 %
Norflurazon	0 %	0 %	8 %
Oryzalin	0 %	0 %	8 %
Permethrin	4 %	0 %	0 %
pp-dicofol	0 %	2 %	0 %
Simazine	0 %	0 %	8 %
Trifluralin	0 %	2 %	0 %

Table L-5. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Chualar in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	0.1 ppb (463 ng/m^3)	0.063 ppb (286 ng/m^3)	ND
Acephate	Trace	ND	ND
Bensulide	Trace	Trace	Trace
Chloropicrin	0.12 ppb (779 ng/m^3)	0.12 ppb (835 ng/m^3)	ND
Chlorothalonil	Trace	ND	Trace
Chlorpyrifos	ND	Trace	ND
Dacthal	0.003 ppb (39.4 ng/m^3)	0.002 ppb (33.8 ng/m^3)	0.001 ppb (14.2 ng/m^3)
DDVP	Trace	Trace	ND
Diuron	ND	ND	Trace
Endosulfan	Trace	ND	ND
Endosulfan Sulfate	ND	ND	Trace

Chemical	2018	2019	2020
Malathion	0.001 ppb (9.2 ng/m^3)	ND	ND
Malathion OA	Trace	Trace	Trace
MITC	0.11 ppb (342 ng/m^3)	0.011 ppb (34.3 ng/m^3)	0.009 ppb (28.2 ng/m^3)
Norflurazon	ND	ND	Trace
Oryzalin	ND	ND	Trace
Permethrin	Trace	ND	ND
pp-dicofol	ND	0.001 ppb (19.4 ng/m^3)	ND
Simazine	ND	ND	Trace
Trifluralin	ND	Trace	ND

Table L-6. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Chualar in 2018-2020.

Rolling average	Chemical	2018	2019	2020
13-week	1,3-dichloropropene	0.05 ppb (227 ng/m^3)	0.05 ppb (227 ng/m^3)	ND
4-week	Acephate	Trace	ND	ND
4-week	Bensulide	Trace	Trace	Trace
13-week	Chloropicrin	0.055 ppb (372 ng/m^3)	0.041 ppb (273 ng/m^3)	ND
4-week	Chlorothalonil	Trace	ND	Trace
4-week	Chlorpyrifos	ND	Trace	ND
4-week	Dacthal	0.0018 ppb (24.7 ng/m^3)	0.001 ppb (16.3 ng/m^3)	0.00069 ppb (9.6 ng/m^3)
4-week	DDVP	Trace	Trace	ND
4-week	Diuron	ND	ND	Trace
4-week	Endosulfan	Trace	ND	ND

Rolling average	Chemical	2018	2019	2020
4-week	Endosulfan Sulfate	ND	ND	Trace
4-week	Malathion	0.00046 ppb (5.1 ng/m^3)	ND	ND
4-week	Malathion OA	Trace	Trace	Trace
4-week	MITC	0.034 ppb (101 ng/m^3)	0.0071 ppb (21.7 ng/m^3)	0.0029 ppb (9.1 ng/m^3)
4-week	Norflurazon	ND	ND	Trace
4-week	Oryzalin	ND	ND	Trace
4-week	Permethrin	Trace	ND	ND
4-week	pp-dicofol	ND	0.00036 ppb (6.5 ng/m^3)	ND
4-week	Simazine	ND	ND	Trace
4-week	Trifluralin	ND	Trace	ND

Table L-7. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Chualar in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	0.026 ppb (120 ng/m^3)	0.042 ppb (193 ng/m^3)	ND
Acephate	Trace	ND	ND
Bensulide	Trace	Trace	Trace
Chloropicrin	0.026 ppb (175 ng/m^3)	0.023 ppb (152 ng/m^3)	ND
Chlorothalonil	Trace	ND	Trace
Chlorpyrifos	ND	Trace	ND
Dacthal	0.00052 ppb (7.5 ng/m^3)	0.00046 ppb (6.6 ng/m^3)	0.00048 ppb (6.9 ng/m^3)
DDVP	Trace	Trace	ND
Diuron	ND	ND	Trace

Chemical	2018	2019	2020
Endosulfan	Trace	ND	ND
Endosulfan Sulfate	ND	ND	Trace
Malathion	0.000095 ppb (1.2 ng/m^3)	ND	ND
Malathion OA	Trace	Trace	Trace
MITC	0.0051 ppb (15.2 ng/m^3)	0.0019 ppb (5.6 ng/m^3)	0.0016 ppb (4.8 ng/m^3)
Norflurazon	ND	ND	Trace
Oryzalin	ND	ND	Trace
Permethrin	Trace	ND	ND
pp-dicofol	ND	0.00017 ppb (2.6 ng/m^3)	ND
Simazine	ND	ND	Trace
Trifluralin	ND	Trace	ND

Historic Air Concentrations in Cuyama

The following tables summarize the results of three years of air monitoring in Cuyama. Monitoring began in May 2018; and due to COVID-19 restrictions, pesticides were only monitored in January-March 2020. . Therefore, 2020 concentrations are only reference values and should not be directly compared with previous years.

Table L-8. Percentage of analyses resulting in a quantifiable or trace detection in Cuyama in 2018-2020.

Chemical	2018	2019	2020
Acephate	0 %	2 %	0 %
Chlorothalonil	9 %	4 %	0 %
DDVP	3 %	4 %	0 %
Diazinon	0 %	2 %	0 %
Diazinon OA	0 %	2 %	0 %
EPTC	0 %	10 %	0 %

Chemical	2018	2019	2020
Iprodione	3 %	0 %	0 %
Malathion	0 %	2 %	0 %
Malathion OA	3 %	2 %	0 %
MITC	89 %	24 %	82 %
Trifluralin	31 %	14 %	0 %

Table L-9. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Cuyama in 2018-2020.

Chemical	2018	2019	2020
Acephate	ND	Trace	ND
Chlorothalonil	Trace	Trace	ND
DDVP	Trace	Trace	ND
Diazinon	ND	Trace	ND
Diazinon OA	ND	Trace	ND
EPTC	ND	0.009 ppb (73.1 ng/m^3)	ND
Iprodione	Trace	ND	ND
Malathion	ND	Trace	ND
Malathion OA	Trace	Trace	ND
MITC	0.02 ppb (60.2 ng/m^3)	0.13 ppb (381 ng/m^3)	0.009 ppb (25.9 ng/m^3)
Trifluralin	0.03 ppb (405 ng/m^3)	0.001 ppb (10.5 ng/m^3)	ND

Table L-10. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Cuyama in 2018-2020.

Rolling average	Chemical	2018	2019	2020
4-week	Acephate	ND	Trace	ND

Rolling average	Chemical	2018	2019	2020
4-week	Chlorothalonil	Trace	Trace	ND
4-week	DDVP	Trace	Trace	ND
4-week	Diazinon	ND	Trace	ND
4-week	Diazinon OA	ND	Trace	ND
4-week	EPTC	ND	0.0029 ppb (26.1 ng/m^3)	ND
4-week	Iprodione	Trace	ND	ND
4-week	Malathion	ND	Trace	ND
4-week	Malathion OA	Trace	Trace	ND
4-week	MITC	0.011 ppb (31.8 ng/m^3)	0.042 ppb (125 ng/m^3)	0.0058 ppb (17.2 ng/m^3)
4-week	Trifluralin	0.012 ppb (167 ng/m^3)	0.00088 ppb (12.1 ng/m^3)	ND

Table L-11. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Cuyama in 2018-2020.

Chemical	2018	2019	2020
Acephate	ND	Trace	ND
Chlorothalonil	Trace	Trace	ND
DDVP	Trace	Trace	ND
Diazinon	ND	Trace	ND
Diazinon OA	ND	Trace	ND
EPTC	ND	0.00035 ppb (3.3 ng/m^3)	ND
Iprodione	Trace	ND	ND
Malathion	ND	Trace	ND
Malathion OA	Trace	Trace	ND
MITC	0.0059 ppb (17.7 ng/m^3)	0.0049 ppb (14.6 ng/m^3)	0.0045 ppb (13.2 ng/m^3)

Chemical	2018	2019	2020
Trifluralin	0.0016 ppb (21.9 ng/m^3)	0.00016 ppb (2.2 ng/m^3)	ND

Historic Air Concentrations in Lindsay

The following tables summarize the results of three years of air monitoring in Lindsay. Monitoring began in April 2018; and due to COVID-19 restrictions, pesticides were only monitored in January-March 2020. . Therefore, 2020 concentrations are only reference values and should not be directly compared with previous years.

Table L-12. Percentage of analyses resulting in a quantifiable or trace detection in Lindsay in 2018-2020.

Chemical	2018	2019	2020
Acephate	3 %	0 %	0 %
Chlorothalonil	50 %	9 %	18 %
Chlorpyrifos	17 %	0 %	0 %
Chlorpyrifos OA	22 %	0 %	0 %
Dacthal	0 %	4 %	0 %
DDVP	3 %	6 %	0 %
Dimethoate	3 %	4 %	0 %
Dimethoate OA	8 %	2 %	0 %
Diuron	6 %	0 %	0 %
EPTC	0 %	2 %	0 %
Malathion	3 %	6 %	9 %
Malathion OA	8 %	6 %	9 %
MITC	61 %	40 %	73 %
Propargite	3 %	0 %	0 %
Simazine	3 %	0 %	0 %

Table L-13. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Lindsay in 2018-2020.

Chemical	2018	2019	2020
Acephate	Trace	ND	ND
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos	Trace	ND	ND
Chlorpyrifos OA	0.001 ppb (14 ng/m^3)	ND	ND
Dacthal	ND	Trace	ND
DDVP	Trace	Trace	ND
Dimethoate	Trace	Trace	ND
Dimethoate OA	0.002 ppb (17.2 ng/m^3)	Trace	ND
Diuron	Trace	ND	ND
EPTC	ND	Trace	ND
Malathion	Trace	Trace	Trace
Malathion OA	Trace	Trace	Trace
MITC	0.028 ppb (84.6 ng/m^3)	0.29 ppb (880 ng/m^3)	0.02 ppb (61.1 ng/m^3)
Propargite	Trace	ND	ND
Simazine	Trace	ND	ND

Table L-14. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Lindsay in 2018-2020.

Rolling average	Chemical	2018	2019	2020
4-week	Acephate	Trace	ND	ND
4-week	Chlorothalonil	Trace	Trace	Trace
4-week	Chlorpyrifos	Trace	ND	ND
4-week	Chlorpyrifos OA	0.00054 ppb (7.3 ng/m^3)	ND	ND

Rolling average	Chemical	2018	2019	2020
4-week	Dacthal	ND	Trace	ND
4-week	DDVP	Trace	Trace	ND
4-week	Dimethoate	Trace	Trace	ND
4-week	Dimethoate OA	0.0008 ppb (6.9 ng/m^3)	Trace	ND
4-week	Diuron	Trace	ND	ND
4-week	EPTC	ND	Trace	ND
4-week	Malathion	Trace	Trace	Trace
4-week	Malathion OA	Trace	Trace	Trace
4-week	MITC	0.017 ppb (51.4 ng/m^3)	0.08 ppb (239 ng/m^3)	0.011 ppb (32.9 ng/m^3)
4-week	Propargite	Trace	ND	ND
4-week	Simazine	Trace	ND	ND

Table L-15. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Lindsay in 2018-2020.

Chemical	2018	2019	2020
Acephate	Trace	ND	ND
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos	Trace	ND	ND
Chlorpyrifos OA	0.00012 ppb (1.7 ng/m^3)	ND	ND
Dacthal	ND	Trace	ND
DDVP	Trace	Trace	ND
Dimethoate	Trace	Trace	ND
Dimethoate OA	0.00012 ppb (1 ng/m^3)	Trace	ND
Diuron	Trace	ND	ND
EPTC	ND	Trace	ND

Chemical	2018	2019	2020
Malathion	Trace	Trace	Trace
Malathion OA	Trace	Trace	Trace
MITC	0.005 ppb (15 ng/m^3)	0.0093 ppb (27.8 ng/m^3)	0.0059 ppb (17.9 ng/m^3)
Propargite	Trace	ND	ND
Simazine	Trace	ND	ND

Historic Air Concentrations in Oxnard

The following tables summarize the results of three years of air monitoring in Oxnard. Monitoring began in August 2018; and due to COVID-19 restrictions, pesticides were only monitored in January-March 2020. . Therefore, 2020 concentrations are only reference values and should not be directly compared with previous years.

Table L-16. Percentage of analyses resulting in a quantifiable or trace detection in Oxnard in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	5 %	2 %	0 %
Bensulide	0 %	0 %	10 %
Chloropicrin	20 %	14 %	0 %
Chlorothalonil	65 %	18 %	20 %
Chlorpyrifos OA	5 %	2 %	0 %
Dacthal	40 %	6 %	0 %
DDVP	0 %	16 %	0 %
Malathion	5 %	29 %	0 %
Malathion OA	15 %	33 %	0 %
MITC	55 %	20 %	40 %

Table L-17. Highest 24-hour concentrations for pesticides with at least one detectable concentration by year (2018-2020) in Oxnard.

Chemical	2018	2019	2020
1,3-dichloropropene	0.1 ppb (454 ng/m^3)	0.51 ppb (2,315 ng/m^3)	ND
Bensulide	ND	ND	Trace
Chloropicrin	0.8 ppb (5,365 ng/m^3)	1 ppb (6,939 ng/m^3)	ND
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos OA	Trace	Trace	ND
Dacthal	Trace	0.002 ppb (20.6 ng/m^3)	ND
DDVP	ND	Trace	ND
Malathion	Trace	0.008 ppb (113 ng/m^3)	ND
Malathion OA	Trace	0.001 ppb (19.1 ng/m^3)	ND
MITC	0.016 ppb (48.2 ng/m^3)	0.028 ppb (84 ng/m^3)	0.008 ppb (23.4 ng/m^3)

Table L-18. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Oxnard in 2018-2020.

Rolling average	Chemical	2018	2019	2020
13-week	1,3-dichloropropene	0.054 ppb (244 ng/m^3)	0.085 ppb (388 ng/m^3)	ND
4-week	Bensulide	ND	ND	Trace
13-week	Chloropicrin	0.095 ppb (639 ng/m^3)	0.2 ppb (1,359 ng/m^3)	ND
4-week	Chlorothalonil	Trace	Trace	Trace
4-week	Chlorpyrifos OA	Trace	Trace	ND
4-week	Dacthal	Trace	0.0007 ppb (8.2 ng/m^3)	ND

Rolling average	Chemical	2018	2019	2020
4-week	DDVP	ND	Trace	ND
4-week	Malathion	Trace	0.0045 ppb (62.3 ng/m^3)	ND
4-week	Malathion OA	Trace	0.00068 ppb (9.9 ng/m^3)	ND
4-week	MITC	0.011 ppb (32.3 ng/m^3)	0.013 ppb (39.8 ng/m^3)	0.0046 ppb (13.7 ng/m^3)

Table L-19. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Oxnard in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	0.053 ppb (238 ng/m^3)	0.059 ppb (270 ng/m^3)	ND
Bensulide	ND	ND	Trace
Chloropicrin	0.068 ppb (454 ng/m^3)	0.066 ppb (442 ng/m^3)	ND
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos OA	Trace	Trace	ND
Dacthal	Trace	0.000084 ppb (1.5 ng/m^3)	ND
DDVP	ND	Trace	ND
Malathion	Trace	0.00067 ppb (9.4 ng/m^3)	ND
Malathion OA	Trace	0.00015 ppb (2 ng/m^3)	ND
MITC	0.0043 ppb (12.7 ng/m^3)	0.0024 ppb (7.2 ng/m^3)	0.0028 ppb (8.3 ng/m^3)

Historic Air Concentrations in San Joaquin

The following tables summarize the results of three years of air monitoring in San Joaquin. Monitoring began in April 2018; and due to COVID-19 restrictions, pesticides were only monitored in January-March 2020. . Therefore, 2020 concentrations are only reference values and should not be directly compared with previous years.

Table L-20. Percentage of analyses resulting in a quantifiable or trace detection in San Joaquin in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	3 %	4 %	22 %
Acephate	8 %	0 %	0 %
Chlorothalonil	56 %	15 %	9 %
Chlorpyrifos	19 %	2 %	0 %
Chlorpyrifos OA	36 %	0 %	0 %
Dacthal	6 %	0 %	36 %
DDVP	19 %	17 %	0 %
Dimethoate OA	6 %	0 %	0 %
Diuron	3 %	2 %	9 %
Iprodione	0 %	0 %	9 %
Malathion	0 %	4 %	0 %
Malathion OA	3 %	2 %	0 %
Methyl Bromide	8 %	0 %	11 %
Metolachlor (S-Metolachlor)	3 %	0 %	0 %
MITC	72 %	58 %	91 %
Oxyfluorfen	3 %	0 %	9 %
Propargite	11 %	2 %	0 %
Trifluralin	33 %	32 %	0 %

Table L-21. Highest 24-hour concentrations for pesticides with at least one detectable concentration in San Joaquin in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	0.74 ppb (3,359 ng/m^3)	0.56 ppb (2,542 ng/m^3)	1.6 ppb (7,126 ng/m^3)
Acephate	Trace	ND	ND
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos	Trace	Trace	ND
Chlorpyrifos OA	0.001 ppb (13.9 ng/m^3)	ND	ND
Dacthal	Trace	ND	Trace
DDVP	Trace	0.063 ppb (572 ng/m^3)	ND
Dimethoate OA	Trace	ND	ND
Diuron	Trace	Trace	Trace
Iprodione	ND	ND	Trace
Malathion	ND	Trace	ND
Malathion OA	Trace	Trace	ND
Methyl Bromide	0.038 ppb (148 ng/m^3)	ND	0.03 ppb (116 ng/m^3)
Metolachlor (S-Metolachlor)	Trace	ND	ND
MITC	0.32 ppb (950 ng/m^3)	1.5 ppb (4,580 ng/m^3)	1.1 ppb (3,174 ng/m^3)
Oxyfluorfen	Trace	ND	Trace
Propargite	Trace	Trace	ND
Trifluralin	Trace	Trace	ND

Table L-22. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in San Joaquin in 2018-2020.

Rolling average	Chemical	2018	2019	2020
13-week	1,3-dichloropropene	0.1 ppb (468 ng/m^3)	0.089 ppb (405 ng/m^3)	NA ppb (NA ng/m^3)
4-week	Acephate	Trace	ND	ND
4-week	Chlorothalonil	Trace	Trace	Trace
4-week	Chlorpyrifos	Trace	Trace	ND
4-week	Chlorpyrifos OA	0.00054 ppb (7.2 ng/m^3)	ND	ND
4-week	Dacthal	Trace	ND	Trace
4-week	DDVP	Trace	0.017 ppb (156 ng/m^3)	ND
4-week	Dimethoate OA	Trace	ND	ND
4-week	Diuron	Trace	Trace	Trace
4-week	Iprodione	ND	ND	Trace
4-week	Malathion	ND	Trace	ND
4-week	Malathion OA	Trace	Trace	ND
4-week	Methyl Bromide	0.024 ppb (93.2 ng/m^3)	ND	0.019 ppb (72.8 ng/m^3)
4-week	Metolachlor (S-Metolachlor)	Trace	ND	ND
4-week	MITC	0.14 ppb (422 ng/m^3)	0.43 ppb (1,284 ng/m^3)	0.47 ppb (1,416 ng/m^3)
4-week	Oxyfluorfen	Trace	ND	Trace
4-week	Propargite	Trace	Trace	ND
4-week	Trifluralin	Trace	Trace	ND

Table L-23. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in San Joaquin in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	0.069 ppb (314 ng/m^3)	0.061 ppb (278 ng/m^3)	0.25 ppb (1,145 ng/m^3)
Acephate	Trace	ND	ND
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos	Trace	Trace	ND
Chlorpyrifos OA	0.00017 ppb (2.3 ng/m^3)	ND	ND
Dacthal	Trace	ND	Trace
DDVP	Trace	0.0015 ppb (13.4 ng/m^3)	ND
Dimethoate OA	Trace	ND	ND
Diuron	Trace	Trace	Trace
Iprodione	ND	ND	Trace
Malathion	ND	Trace	ND
Malathion OA	Trace	Trace	ND
Methyl Bromide	0.017 ppb (64.6 ng/m^3)	ND	0.017 ppb (64.7 ng/m^3)
Metolachlor (S-Metolachlor)	Trace	ND	ND
MITC	0.027 ppb (81.8 ng/m^3)	0.058 ppb (175 ng/m^3)	0.19 ppb (568 ng/m^3)
Oxyfluorfen	Trace	ND	Trace
Propargite	Trace	Trace	ND
Trifluralin	Trace	Trace	ND

Historic Air Concentrations in Santa Maria

The following tables summarize the results of three years of air monitoring in Santa Maria, which was the only AMN site where all 36 chemicals were monitored throughout the year in 2020.

Table L-24 shows that the percentage of detections of most chemicals increased from 2019 to 2020. The percentage of analyses resulting in a quantifiable or trace detections increased for 1,3-D from 2% to 49%, while both chloropicrin and chlorothalonil increased from 6% to 29%.

Table L-25 shows that the highest observed 24-hour concentration of 1,3-D increased from 0.13 ppb in 2019 to 1.1 ppb in 2020, while MITC has consistently decreased in the last three years from 0.42 ppb in 2018 to 0.12 ppb in 2019 to 0.042 ppb in 2020.

Table L-26 shows the rolling 13-week average concentration of 1,3-D increased from 0.056 ppb in 2019 to 0.31 ppb in 2020, while chloropicrin increased from 0.078 ppb to 0.12 ppb in the last year. Conversely, the rolling 4-week average concentration of MITC decreased from 0.11 ppb in 2017 to 0.043 ppb in 2019 to 0.025 ppb in 2020.

Table L-27 shows that the annual average concentration of 1,3-D doubled from 0.052 ppb in 2019 to 0.11 ppb in 2020, whereas chloropicrin increased from 0.032 ppb to 0.049 ppb in the last year. Methyl Bromide was detected in Santa Maria for the first time since 2016 with an annual average of 0.006 ppb.

Table L-24. Percentage of analyses resulting in a quantifiable or trace detection in Santa Maria in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	6 %	2 %	49 %
Acephate	0 %	2 %	2 %
Chloropicrin	17 %	6 %	29 %
Chlorothalonil	8 %	6 %	29 %
Chlorpyrifos	4 %	0 %	0 %
Cypermethrin	0 %	2 %	2 %
Dacthal	39 %	43 %	53 %
DDVP	16 %	25 %	37 %
Diazinon	0 %	0 %	2 %
Diazinon OA	2 %	0 %	2 %

Chemical	2018	2019	2020
Dimethoate	0 %	0 %	2 %
Dimethoate OA	0 %	2 %	2 %
Diuron	2 %	0 %	2 %
Endosulfan	4 %	0 %	0 %
Iprodione	2 %	0 %	2 %
Malathion	59 %	49 %	61 %
Malathion OA	63 %	39 %	57 %
Methidathion	0 %	0 %	2 %
Methyl Bromide	0 %	0 %	4 %
Metolachlor (S-Metolachlor)	0 %	0 %	2 %
MITC	58 %	22 %	37 %
Norflurazon	0 %	0 %	2 %
Oryzalin	0 %	0 %	2 %
Oxydemeton Methyl	0 %	0 %	2 %
Permethrin	0 %	0 %	4 %
Phosmet	0 %	0 %	2 %
Simazine	2 %	0 %	4 %
Trifluralin	22 %	24 %	24 %

Table L-25. Highest 24-hour concentrations for pesticides with at least one detectable concentration in Santa Maria in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	0.48 ppb (2,179 ng/m^3)	0.13 ppb (590 ng/m^3)	1.1 ppb (5,097 ng/m^3)
Acephate	ND	Trace	0.002 ppb (12.5 ng/m^3)
Chloropicrin	0.46 ppb (3,100 ng/m^3)	0.44 ppb (2,992 ng/m^3)	0.59 ppb (3,966 ng/m^3)

Chemical	2018	2019	2020
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos	Trace	ND	ND
Cypermethrin	ND	Trace	Trace
Dacthal	Trace	Trace	Trace
DDVP	Trace	0.003 ppb (23.6 ng/m^3)	0.01 ppb (88.9 ng/m^3)
Diazinon	ND	ND	Trace
Diazinon OA	Trace	ND	Trace
Dimethoate	ND	ND	Trace
Dimethoate OA	ND	Trace	Trace
Diuron	Trace	ND	Trace
Endosulfan	Trace	ND	ND
Iprodione	Trace	ND	Trace
Malathion	0.001 ppb (9.8 ng/m^3)	0.007 ppb (96.5 ng/m^3)	0.003 ppb (35.6 ng/m^3)
Malathion OA	Trace	0.001 ppb (12.5 ng/m^3)	Trace
Methidathion	ND	ND	Trace
Methyl Bromide	ND	ND	0.024 ppb (93.2 ng/m^3)
Metolachlor (S-Metolachlor)	ND	ND	Trace
MITC	0.42 ppb (1,269 ng/m^3)	0.12 ppb (375 ng/m^3)	0.042 ppb (124 ng/m^3)
Norflurazon	ND	ND	Trace
Oryzalin	ND	ND	Trace
Oxydemeton Methyl	ND	ND	Trace
Permethrin	ND	ND	Trace
Phosmet	ND	ND	Trace
Simazine	Trace	ND	Trace

Chemical	2018	2019	2020
Trifluralin	Trace	Trace	0.002 ppb (25.5 ng/m^3)

Table L-26. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Santa Maria in 2018-2020.

Rolling average	Chemical	2018	2019	2020
13-week	1,3-dichloropropene	0.093 ppb (422 ng/m^3)	0.056 ppb (255 ng/m^3)	0.31 ppb (1,390 ng/m^3)
4-week	Acephate	ND	Trace	0.00053 ppb (3.4 ng/m^3)
13-week	Chloropicrin	0.11 ppb (748 ng/m^3)	0.078 ppb (523 ng/m^3)	0.12 ppb (804 ng/m^3)
4-week	Chlorothalonil	Trace	Trace	Trace
4-week	Chlorpyrifos	Trace	ND	ND
4-week	Cypermethrin	ND	Trace	Trace
4-week	Dacthal	Trace	Trace	Trace
4-week	DDVP	Trace	0.0013 ppb (11.9 ng/m^3)	0.0035 ppb (31.2 ng/m^3)
4-week	Diazinon	ND	ND	Trace
4-week	Diazinon OA	Trace	ND	Trace
4-week	Dimethoate	ND	ND	Trace
4-week	Dimethoate OA	ND	Trace	Trace
4-week	Diuron	Trace	ND	Trace
4-week	Endosulfan	Trace	ND	ND
4-week	Iprodione	Trace	ND	Trace
4-week	Malathion	0.00055 ppb (6.4 ng/m^3)	0.002 ppb (28.1 ng/m^3)	0.0014 ppb (17.2 ng/m^3)
4-week	Malathion OA	Trace	0.00052 ppb (6.8 ng/m^3)	Trace
4-week	Methidathion	ND	ND	Trace

Rolling average	Chemical	2018	2019	2020
4-week	Methyl Bromide	ND	ND	0.015 ppb (58.2 ng/m^3)
4-week	Metolachlor (S-Metolachlor)	ND	ND	Trace
4-week	MITC	0.11 ppb (325 ng/m^3)	0.043 ppb (129 ng/m^3)	0.025 ppb (75.4 ng/m^3)
4-week	Norflurazon	ND	ND	Trace
4-week	Oryzalin	ND	ND	Trace
4-week	Oxydemeton Methyl	ND	ND	Trace
4-week	Permethrin	ND	ND	Trace
4-week	Phosmet	ND	ND	Trace
4-week	Simazine	Trace	ND	Trace
4-week	Trifluralin	Trace	Trace	0.00088 ppb (12.1 ng/m^3)

Table L-27. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Santa Maria in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	0.061 ppb (276 ng/m^3)	0.052 ppb (234 ng/m^3)	0.11 ppb (519 ng/m^3)
Acephate	ND	Trace	0.000085 ppb (0.57 ng/m^3)
Chloropicrin	0.041 ppb (277 ng/m^3)	0.032 ppb (216 ng/m^3)	0.049 ppb (329 ng/m^3)
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos	Trace	ND	ND
Cypermethrin	ND	Trace	Trace
Dacthal	Trace	Trace	Trace

Chemical	2018	2019	2020
DDVP	Trace	0.0004 ppb (3.5 ng/m^3)	0.00075 ppb (6.7 ng/m^3)
Diazinon	ND	ND	Trace
Diazinon OA	Trace	ND	Trace
Dimethoate	ND	ND	Trace
Dimethoate OA	ND	Trace	Trace
Diuron	Trace	ND	Trace
Endosulfan	Trace	ND	ND
Iprodione	Trace	ND	Trace
Malathion	0.00027 ppb (3.5 ng/m^3)	0.00036 ppb (5 ng/m^3)	0.00042 ppb (5.2 ng/m^3)
Malathion OA	Trace	0.00015 ppb (2.1 ng/m^3)	Trace
Methidathion	ND	ND	Trace
Methyl Bromide	ND	ND	0.006 ppb (23.4 ng/m^3)
Metolachlor (S-Metolachlor)	ND	ND	Trace
MITC	0.014 ppb (42.3 ng/m^3)	0.0056 ppb (16.6 ng/m^3)	0.0055 ppb (16.3 ng/m^3)
Norflurazon	ND	ND	Trace
Oryzalin	ND	ND	Trace
Oxydemeton Methyl	ND	ND	Trace
Permethrin	ND	ND	Trace
Phosmet	ND	ND	Trace
Simazine	Trace	ND	Trace
Trifluralin	Trace	Trace	0.00027 ppb (3.7 ng/m^3)

Historic Air Concentrations in Shafter

The following tables summarize the results of three years of air monitoring in Shafter. In 2020, 1,3-dichloropropene and methyl bromide were sampled weekly throughout the year, while the other 34 pesticides were only monitored in January-March 2020 due to COVID-19 restrictions. Therefore, 2020 concentrations are only reference values - with the exception of 1,3-dichloropropene and methyl bromide - and should not be directly compared with previous years.

Table L-28 shows that the percentage of 1,3-D detections increased considerably in 2020 when compared to the previous two years. The percentage of MeBr detections varied from 13% in 2018 to zero in 2019, and to 12% in 2020.

Table L-29 shows that the highest rolling 13-week average concentration for 1,3-D increased from 0.34 ppb in 2019 to 4.5 ppb in 2020 yet this value is lower than the reported 5.6 ppb in 2018. The highest rolling 4-week average concentration for MeBr fluctuated from 0.04 ppb in 2018 to non-detect in 2019 to 0.023 ppb in 2020.

Table L-30 shows that the annual average concentration of 1.8 ppb for 1,3-D in 2020 was higher than the 1.5 ppb and 0.13 ppb reported in 2018 and 2019, respectively. The annual average concentration of MeBr increased from not being detected in 2019 to 0.0068 ppb in 2020, yet this value was lower than the 0.018 ppb reported in 2018.

Table L-28. Percentage of analyses resulting in a quantifiable or trace detection in Shafter in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	38 %	10 %	71 %
Bensulide	4 %	0 %	0 %
Chloropicrin	0 %	2 %	0 %
Chlorothalonil	64 %	43 %	91 %
Chlorpyrifos	30 %	4 %	0 %
Chlorpyrifos OA	25 %	0 %	0 %
Cypermethrin	2 %	2 %	0 %
Dacthal	4 %	2 %	9 %
DDVP	8 %	10 %	0 %

Chemical	2018	2019	2020
Diazinon	0 %	0 %	9 %
Diazinon OA	2 %	0 %	9 %
Dimethoate	0 %	0 %	9 %
Diuron	4 %	4 %	9 %
Endosulfan Sulfate	0 %	0 %	9 %
EPTC	6 %	10 %	0 %
Iprodione	2 %	2 %	0 %
Malathion	0 %	6 %	0 %
Malathion OA	2 %	4 %	9 %
Methyl Bromide	13 %	0 %	12 %
Metolachlor (S-Metolachlor)	0 %	0 %	9 %
MITC	83 %	59 %	82 %
Norflurazon	0 %	0 %	9 %
Oryzalin	2 %	0 %	0 %
Oxyfluorfen	9 %	2 %	9 %
Permethrin	0 %	2 %	0 %
Simazine	6 %	0 %	9 %
Trifluralin	2 %	6 %	18 %

Table L-29. Highest 24-hour concentrations for pesticides with at least one detectable concentration by year (2018-2020) in Shafter.

Chemical	2018	2019	2020
1,3-dichloropropene	50.5 ppb (229,166 ng/m^3)	3.2 ppb (14,524 ng/m^3)	37.5 ppb (170,199 ng/m^3)
Bensulide	Trace	ND	ND
Chloropicrin	ND	0.1 ppb (694 ng/m^3)	ND

Chemical	2018	2019	2020
Chlorothalonil	0.005 ppb (49.9 ng/m^3)	Trace	0.003 ppb (36.3 ng/m^3)
Chlorpyrifos	0.003 ppb (44.9 ng/m^3)	Trace	ND
Chlorpyrifos OA	Trace	ND	ND
Cypermethrin	Trace	Trace	ND
Dacthal	Trace	Trace	Trace
DDVP	Trace	Trace	ND
Diazinon	ND	ND	Trace
Diazinon OA	Trace	ND	Trace
Dimethoate	ND	ND	Trace
Diuron	Trace	Trace	Trace
Endosulfan Sulfate	ND	ND	Trace
EPTC	Trace	0.005 ppb (35.6 ng/m^3)	ND
Iprodione	Trace	Trace	ND
Malathion	ND	Trace	ND
Malathion OA	Trace	Trace	Trace
Methyl Bromide	0.097 ppb (377 ng/m^3)	ND	0.048 ppb (186 ng/m^3)
Metolachlor (S-Metolachlor)	ND	ND	Trace
MITC	1.3 ppb (3,747 ng/m^3)	0.11 ppb (316 ng/m^3)	0.054 ppb (162 ng/m^3)
Norflurazon	ND	ND	Trace
Oryzalin	Trace	ND	ND
Oxyfluorfen	Trace	Trace	Trace
Permethrin	ND	Trace	ND
Simazine	Trace	ND	Trace
Trifluralin	Trace	Trace	Trace

Table L-30. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Shafter in 2018-2020.

Rolling average	Chemical	2018	2019	2020
13-week	1,3-dichloropropene	5.6 ppb (25,443 ng/m^3)	0.34 ppb (1,536 ng/m^3)	4.5 ppb (20,620 ng/m^3)
4-week	Bensulide	Trace	ND	ND
13-week	Chloropicrin	ND	0.023 ppb (156 ng/m^3)	ND
4-week	Chlorothalonil	0.0028 ppb (30.6 ng/m^3)	Trace	0.002 ppb (22.6 ng/m^3)
4-week	Chlorpyrifos	0.0014 ppb (20.2 ng/m^3)	Trace	ND
4-week	Chlorpyrifos OA	Trace	ND	ND
4-week	Cypermethrin	Trace	Trace	ND
4-week	Dacthal	Trace	Trace	Trace
4-week	DDVP	Trace	Trace	ND
4-week	Diazinon	ND	ND	Trace
4-week	Diazinon OA	Trace	ND	Trace
4-week	Dimethoate	ND	ND	Trace
4-week	Diuron	Trace	Trace	Trace
4-week	Endosulfan Sulfate	ND	ND	Trace
4-week	EPTC	Trace	0.0018 ppb (12.5 ng/m^3)	ND
4-week	Iprodione	Trace	Trace	ND
4-week	Malathion	ND	Trace	ND
4-week	Malathion OA	Trace	Trace	Trace
4-week	Methyl Bromide	0.04 ppb (155 ng/m^3)	ND	0.023 ppb (90.2 ng/m^3)
4-week	Metolachlor (S-Metolachlor)	ND	ND	Trace

Rolling average	Chemical	2018	2019	2020
4-week	MITC	0.5 ppb (1,509 ng/m^3)	0.065 ppb (194 ng/m^3)	0.031 ppb (92.2 ng/m^3)
4-week	Norflurazon	ND	ND	Trace
4-week	Oryzalin	Trace	ND	ND
4-week	Oxyfluorfen	Trace	Trace	Trace
4-week	Permethrin	ND	Trace	ND
4-week	Simazine	Trace	ND	Trace
4-week	Trifluralin	Trace	Trace	Trace

Table L-31. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Shafter 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	1.5 ppb (6,921 ng/m^3)	0.13 ppb (599 ng/m^3)	1.8 ppb (8,163 ng/m^3)
Bensulide	Trace	ND	ND
Chloropicrin	ND	0.018 ppb (123 ng/m^3)	ND
Chlorothalonil	0.00091 ppb (10 ng/m^3)	Trace	0.0013 ppb (14.8 ng/m^3)
Chlorpyrifos	0.00033 ppb (4.8 ng/m^3)	Trace	ND
Chlorpyrifos OA	Trace	ND	ND
Cypermethrin	Trace	Trace	ND
Dacthal	Trace	Trace	Trace
DDVP	Trace	Trace	ND
Diazinon	ND	ND	Trace
Diazinon OA	Trace	ND	Trace
Dimethoate	ND	ND	Trace
Diuron	Trace	Trace	Trace

Chemical	2018	2019	2020
Endosulfan Sulfate	ND	ND	Trace
EPTC	Trace	0.0003 ppb (2.4 ng/m^3)	ND
Iprodione	Trace	Trace	ND
Malathion	ND	Trace	ND
Malathion OA	Trace	Trace	Trace
Methyl Bromide	0.018 ppb (69.1 ng/m^3)	ND	0.0068 ppb (26.4 ng/m^3)
Metolachlor (S-Metolachlor)	ND	ND	Trace
MITC	0.059 ppb (175 ng/m^3)	0.015 ppb (43.4 ng/m^3)	0.02 ppb (59.2 ng/m^3)
Norflurazon	ND	ND	Trace
Oryzalin	Trace	ND	ND
Oxyfluorfen	Trace	Trace	Trace
Permethrin	ND	Trace	ND
Simazine	Trace	ND	Trace
Trifluralin	Trace	Trace	Trace

Historic Air Concentrations in Watsonville

The following tables summarize the results of three years of air monitoring in Watsonville. In 2020, 1,3-dichloropropene and Methyl Bromide were sampled weekly throughout the year, while the other 34 pesticides were only monitored in January-March 2020 due to COVID-19 restrictions. Therefore, 2020 concentrations are only reference values - with the exception of 1,3-dichloropropene and methyl bromide - and should not be directly compared with previous years.

Table L-32 shows that the percentage of 1,3-D detections increased from 6% and 4% in 2018 and 2019 to 49% in 2020. Moreover, MeBr detections went from not being detected in the previous two years to 2% in 2020.

Tables L-33 shows that the highest 24-hour concentration of 1,3-D increased from 0.27 ppb in 2018 to 0.29 ppb in 2019, and to 0.83 in 2020.

Table L-34 shows that the highest rolling 13-week average concentration of 1,3-D increased from 0.07 ppb in 2018 to 0.08 ppb in 2019, and to 0.36 ppb in 2020.

Table L-35 shows that the annual average concentration of 1,3-D also increased from 0.046 ppb in 2018 to 0.057 in 2019 to 0.12 ppb in 2020.

Table L-32. Percentage of analyses resulting in a quantifiable or trace detection in Watsonville in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	6 %	4 %	49 %
Chloropicrin	25 %	24 %	0 %
Chlorothalonil	0 %	2 %	0 %
Dacthal	2 %	18 %	0 %
DDVP	10 %	25 %	0 %
Diuron	0 %	2 %	0 %
EPTC	0 %	2 %	0 %
Malathion	6 %	14 %	0 %
Malathion OA	6 %	16 %	0 %
Methyl Bromide	0 %	0 %	2 %
MITC	48 %	30 %	9 %
Trifluralin	2 %	4 %	0 %

Table L-33. Highest 24-hour concentrations for pesticides with at least one detectable concentration by year (2018-2020) in Watsonville.

Chemical	2018	2019	2020
1,3-dichloropropene	0.27 ppb (1,225 ng/m^3)	0.29 ppb (1,316 ng/m^3)	0.83 ppb (3,753 ng/m^3)
Chloropicrin	0.12 ppb (778 ng/m^3)	0.85 ppb (5,741 ng/m^3)	ND
Chlorothalonil	ND	Trace	ND

Chemical	2018	2019	2020
Dacthal	Trace	Trace	ND
DDVP	Trace	Trace	ND
Diuron	ND	Trace	ND
EPTC	ND	Trace	ND
Malathion	Trace	0.004 ppb (56 ng/m^3)	ND
Malathion OA	Trace	Trace	ND
Methyl Bromide	ND	ND	0.023 ppb (89.3 ng/m^3)
MITC	0.042 ppb (125 ng/m^3)	0.055 ppb (164 ng/m^3)	0.01 ppb (28.7 ng/m^3)
Trifluralin	Trace	Trace	ND

Table L-34. Highest rolling 4- or 13-week average concentrations for pesticides with at least one detectable concentration in Watsonville in 2018-2020.

Rolling average	Chemical	2018	2019	2020
13-week	1,3-dichloropropene	0.07 ppb (316 ng/m^3)	0.082 ppb (374 ng/m^3)	0.36 ppb (1,612 ng/m^3)
13-week	Chloropicrin	0.063 ppb (426 ng/m^3)	0.15 ppb (1,042 ng/m^3)	ND
4-week	Chlorothalonil	ND	Trace	ND
4-week	Dacthal	Trace	Trace	ND
4-week	DDVP	Trace	Trace	ND
4-week	Diuron	ND	Trace	ND
4-week	EPTC	ND	Trace	ND
4-week	Malathion	Trace	0.0011 ppb (15.7 ng/m^3)	ND
4-week	Malathion OA	Trace	Trace	ND
4-week	Methyl Bromide	ND	ND	0.015 ppb (58.2 ng/m^3)

Rolling average	Chemical	2018	2019	2020
4-week	MITC	0.015 ppb (44.2 ng/m^3)	0.024 ppb (71 ng/m^3)	0.0032 ppb (9.2 ng/m^3)
4-week	Trifluralin	Trace	Trace	ND

Table L-35. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration in Watsonville in 2018-2020.

Chemical	2018	2019	2020
1,3-dichloropropene	0.046 ppb (210 ng/m^3)	0.057 ppb (260 ng/m^3)	0.12 ppb (543 ng/m^3)
Chloropicrin	0.03 ppb (203 ng/m^3)	0.052 ppb (348 ng/m^3)	ND
Chlorothalonil	ND	Trace	ND
Dacthal	Trace	Trace	ND
DDVP	Trace	Trace	ND
Diuron	ND	Trace	ND
EPTC	ND	Trace	ND
Malathion	Trace	0.00017 ppb (2.3 ng/m^3)	ND
Malathion OA	Trace	Trace	ND
Methyl Bromide	ND	ND	0.0055 ppb (21.4 ng/m^3)
MITC	0.0051 ppb (15.2 ng/m^3)	0.0041 ppb (12 ng/m^3)	0.0017 ppb (5.1 ng/m^3)
Trifluralin	Trace	Trace	ND

APPENDIX M: REFERENCES

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