AIR MONITORING NETWORK RESULTS FOR 2019

Volume 9

DRAFT

July 2020

Air Program
Environmental Monitoring Branch
Department of Pesticide Regulation
1001 I Street, P.O Box 4015 Sacramento, CA 95812-4015

Report AIR 20-03

PERSONNEL

CDPR personnel assigned to this project include:

Project Lead: Christopher Collins

Project Supervisor: Maziar Kandelous

This project is under the overall management of Minh Pham, Environmental Program Manager, (916) 445-0979, Minh.Pham@cdpr.ca.gov.

ACKNOWLEDGEMENTS

We would like to give special thanks to the Delhi County Water District, the San Joaquin Air Pollution Control District, and the University of California's Kearney Agricultural Research and Extension Center for providing the California Department of Pesticide Regulation (CDPR) Air Program with permission, site security, and access to conduct the weekly sampling for this study. Also, this study could not have been done without the participation of the following schools: Cuyama Elementary School, Jefferson Elementary School, Rio Mesa High School, San Joaquin Elementary School, Bonita Elementary School, Shafter High School, Sequoia Elementary, and Ohlone Elementary.

Thank you to the Santa Barbara County Agricultural Commissioner's (SBCAC) office for their monitoring efforts on behalf of CDPR in the city of Santa Maria. Great appreciation goes to all current and past CDPR staff who actively collected weekly air samples -- Alex Gomez, Atac Tuli, Christopher Collins, Clarice Ando, Colin Brown, Fabio Sartori, Izabella Czaja, Juan Sanchez, Justin Kroes, Kelly Heal, and Rosemary Uyeda. The California Department of Food and Agriculture's Center for Analytical Chemistry (CDFA CAC) has been instrumental in the laboratory analyses for this study, as well as the California Air Resources Board Monitoring and Laboratory Division Organic Laboratory Section (CARB MLD-OLS). Additionally, we extend our gratitude to Jesse Ybarra, Sue Peoples, and Leslie Earl-Gould for their vital role in sample handling, storage, and logistics for the study.

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EXECUTIVE SUMMARY

In February 2011, the California Department of Pesticide Regulation (CDPR) implemented a multi-year statewide air monitoring network to measure pesticides in various agricultural communities. This pesticide Air Monitoring Network (AMN) is the first multi-year monitoring study conducted by CDPR. The goals of the AMN are to provide data that assists in assessing potential health risks, developing measures to mitigate risks, and evaluating the effectiveness of regulatory requirements. This annual report is the ninth volume of this study and contains AMN results from January 2, 2019, to December 31, 2019.

In 2019, 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 in eight communities. Pesticides monitored in the AMN were selected based primarily 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 for three communities; however, as part of the Budget Act of 2016, it was temporarily expanded to include five additional sites (for a total of eight sites) for a two-year period. All eight sites were operational throughout 2019.

One 24-h sample was collected each week at each monitoring location. Sampling start dates were randomly selected each week to produce variation in the sampling day while sampling start times were between 5:30 a.m. to 4:00 p.m.

Of the 14,616 analyses[1] conducted, 96.2% (14,061) did not return a detectable concentration. Of the 555 (3.8%) analyses with a detectable (trace or quantifiable) concentration, only 139 (0.95%) had quantifiable concentrations. A quantifiable concentration refers to a concentration above the analytical limit of quantitation.

Of the 36 chemicals monitored, 10 were not detected, 16 were only detected at trace levels, and the remaining 10 compounds (1,3-dichloropropene (1,3-D), chloropicrin, dacthal, DDVP, EPTC, malathion, malathion oxygen analog (OA), MITC, pp-dicofol, and trifluralin) were detected at quantifiable levels. The three chemicals with the highest number of detections from all eight sites were chloropicrin, MITC, and malathion.

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 devised health screening levels based on a preliminary assessment of possible health effects, and they are used as triggers for CDPR to conduct a more detailed evaluation. Regulatory targets are established based on a complete assessment of possible health risks and supersede the screening levels. CDPR puts measures in place based on the regulatory target to limit exposures, thereby avoiding the adverse

[1] Number of analyses = Number of samples multiplied by number of chemicals analyzed in each sample.

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effects on human health. Exceeding a regulatory target does not necessarily mean that an adverse health effect occurs; however, it does indicate that the restrictions on the pesticide in use may need to be modified.

None of the 31 pesticides or five breakdown products exceeded any of their health screening levels or regulatory targets for 2019.

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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) for measuring pesticide concentrations in the air in various California agricultural communities. AMN data is used to estimate sub-chronic and chronic pesticide exposures. The goals of the AMN are to provide data that assists in assessing potential health risks, developing measures to mitigate risks, and evaluating the effectiveness of current regulatory requirements.

The AMN has the following scientific objectives:

- Identify pesticides in air and determine seasonal, annual, and multi-year concentrations.
- Compare concentrations to sub-chronic and chronic health screening levels.
- Track temporal variation in pesticide concentration in the air.
- Estimate cumulative exposure to multiple pesticides with common physiological modes of action in humans (e.g., cholinesterase inhibitors).
- Attempt to correlate concentrations with use and weather patterns.

As part of the community selection process for the AMN, CDPR evaluated a total of 1,267 communities and ranked them based on pesticide use (both local and regional), demographic data[2], and availability of other exposure and health data. CDPR selected a total of eight communities for the AMN. In 2017, four sampling sites were operational; four others were added to the AMN in 2018.

At each sampling site location, one set of 24-h air sample 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 ninth volume of this study and contains AMN results from January 1, 2019, to December 31, 2019.

Changes to the AMN in 2017

The Budget Act of 2016 temporarily increased funding of the AMN, enabling CDPR to expand from three original sampling sites to a total of eight sites for a period of two years (Vidrio et al., 2017). During the temporary expansion of the AMN, CDPR is responsible for the operation of three sites while the California Air Resources Board (CARB) is 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 within the community of

[2] 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.

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Shafter from Shafter High School to Sequoia Elementary 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.

Number of Communities Monitored

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 (Vidrio et al., 2017). However, all eight sites were monitored for all 36 compounds. Complete details on community selection can be found at:

https://www.cdpr.ca.gov/docs/emon/airinit/community_monitoring.htm. Table 1 lists the eight communities selected for monitoring.

Table 1. List of communities in the 2017 AMN Monitoring Plan.

Community	County	Date of first sample collection	Agency Responsible for Site Operation
Chualar	Monterey	1/1/2017	CDPR
Cuyama	Santa Barbara	5/10/2018	CARB
Lindsay	Tulare	4/26/2018	CARB
Oxnard	Ventura	8/14/2018†	CARB
San Joaquin	Fresno	4/26/2018	CARB
Santa Maria*	Santa Barbara	1/1/2017	CDPR
Shafter**	Kern	1/1/2017 | 4/2/2018‡	CDPR → CARB‡
Watsonville	Monterey	1/1/2017	CDPR

* The sampling site in the community of Santa Maria was moved from a CARB monitoring location to Bonita Elementary School; sampling began at Bonita Elementary on 11/12/2019.
** The sampling site in the community of Shafter was relocated from Shafter High School to Sequoia Elementary; sampling began at Sequoia Elementary on 2/26/2019.
† The Oxnard sampling site transitioned from a Toxic Air Contaminant (TAC) monitoring site to an AMN site in 2018. Additional information on TAC monitoring including annual monitoring reports can be accessed at the following site: https://www.cdpr.ca.gov/docs/emon/airinit/air_monitoring_reports.htm
‡ Monitoring responsibilities of the site was transitioned from CDPR to CARB. Samples collected by CARB staff began to be processed as primary samples on 4/2/18.

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CARB began monitoring at their five assigned sites on various dates throughout 2018 (Table 1). Monitoring at Shafter was performed by CDPR staff until CARB was able to take over the monitoring at the site. Additionally, Oxnard began the year as a Toxic Air Contaminant network site in which 1,3-D and methyl bromide were monitored using 6-day intervals until it was transitioned to a full AMN site in August. After the transition, weekly monitoring for all 36 compounds was conducted at the Oxnard AMN site.

Equipment Upgrades

The increase in temporary funding allowed CDPR and CARB to purchase upgraded sampling equipment custom built for pesticide ambient air monitoring. A key advantage of the new system is greater accuracy and precision in sample collection.

Pesticides Monitored

As part of the AMN, CDPR monitored for 31 pesticides and 5 breakdown products. Chemicals included in the AMN were selected based primarily on potential health risk (Vidrio et al., 2013a). Four analytical methods were used to analyze the collected air samples as part of the AMN[3]:

1) Multi-Pesticide Residue;
2) Volatile Organic Compounds (VOC);
3) Methyl Isothiocyanate (MITC); and
4) Chloropicrin.

AIR MONITORING NETWORK RESULTS

Results for all Pesticides and Communities Combined[4]

Pesticide Detections

A total of 14,616 analyses were conducted on the air samples collected from the eight AMN sites operating from January 1, 2019, to December 31, 2019. Of the 14,616 analyses, 3.8% (555) resulted in a detectable concentration, which includes both quantifiable (above the Limit of Quantitation (LOQ)) and trace (above the Method Detection Limit (MDL) but below the LOQ) detections[5]. Samples that resulted in a quantifiable detection accounted for 0.95% (139) of all analyses conducted.

Of the 36 pesticides and breakdown products monitored, 10 were detected at quantifiable levels, 16 were detected at trace levels, and 10 were not detected. Table 2 lists the number of detections by type for each pesticide and pesticide breakdown product at all sites included in the AMN for this year. The chemicals with the highest number of quantifiable detection were MITC (17.5%), chloropicrin (3.4%), and malathion (3.4%).

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[3] Greater detail on each of these analytical methods is provided in Appendices I and J.
[4] See Appendices A-H for detailed AMN results for each sampling location.
[5] Quantifiable detections refer to concentrations above the Limit of Quantitation (LOQ) for the respective pesticide. Trace detections are measure concentrations between the LOQ and the Method Detection Limit (MDL). Non-detections refer to all samples with measured concentrations below the MDL.

Table 2. Number and percentage of positive samples per chemical for all AMN sites during 2019.

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
1,3-dichloropropene	409	12	12	2.9%	2.9%
Acephate	406	2	0	0.5%	0%
Bensulide	406	1	0	0.2%	0%
Chloropicrin	407	28	14	6.9%	3.4%
Chlorothalonil	403	49	0	12.2%	0%
Chlorpyrifos	406	5	0	1.2%	0%
Chlorpyrifos OA	406	1	0	0.2%	0%
Cypermethrin	406	2	0	0.5%	0%
Dacthal	406	78	12	19.2%	3.0%
DDVP	403	61	3	15.1%	0.7%
DEF	406	0	0	0%	0%
Diazinon	406	1	0	0.2%	0%
Diazinon OA	406	1	0	0.2%	0%
Dimethoate	406	2	0	0.5%	0%
Dimethoate OA	406	2	0	0.5%	0%
Diuron	406	4	0	1.0%	0%
Endosulfan	406	0	0	0%	0%
Endosulfan Sulfate	406	0	0	0%	0%
EPTC	406	12	5	3.0%	1.2%
Iprodione	406	1	0	0.2%	0%
Malathion	406	55	14	13.5%	3.4%
Malathion OA	406	54	6	13.5%	1.5%
Methidathion	406	1	0	0.2%	0%
Methyl Bromide	409	0	0	0%	0%
Metolachlor	406	0	0	0%	0%
MITC	405	137	71	33.8%	17.5%
Norflurazon	406	0	0	0%	0%
Oryzalin	406	0	0	0%	0%
Oxydemeton Methyl	406	0	0	0%	0%
Oxyfluorfen	406	1	0	0.2%	0%
Permethrin	406	1	0	0.2%	0%
Phosmet	406	0	0	0%	0%
pp-dicofol	406	1	1	0.2%	0.2%
Propargite	406	1	0	0.2%	0%
Simazine	406	0	0	0%	0%
Trifluralin	406	42	1	10.3%	0.2%
Total	**14,616**	**555**	**139**	**3.8%**	**0.95%**

*Includes both quantifiable and trace detections.

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Table 3 summarizes the total number of detections of the monitored chemicals by community. The percentages of detections, quantifiable and trace, for monitored chemicals in each community ranged

from 1.9% to 6.2% of all collected samples. Santa Maria had the highest percentage of samples with detections (6.2%), and Shafter had the highest percentage of samples with quantifiable detections (1.6%).

A total of 413 sample sets were taken from all eight communities (54 sets from Lindsay; 53 sets from San Joaquin and Santa Maria; 52 sets from Chualar and Watsonville; 51 sets from Oxnard; and 49 sets from Cuyama and Shafter). Three hundred and one (73%) of these samples contained at least one detection (Table 4).

There were at total of 45 lost samples in 2019. Sample losses were attributed to adverse weather, equipment malfunctions, and samples which did not meet the criteria for being considered valid (runtime, flow rate, ending sample pressure and/or volume, e.g.).

Table 3. Detections of monitored chemicals by location, as individual samples during 2019.

Community	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
Chualar	1,835	72	18	3.9%	1.0%
Cuyama	1,764	33	5	1.9%	0.3%
Lindsay	1,908	41	11	2.1%	0.6%
Oxnard	1,765	69	23	3.9%	1.3%
San Joaquin	1,908	73	25	3.8%	1.3%
Santa Maria	1,835	113	15	6.2%	0.8%
Shafter	1,764	83	29	4.7%	1.6%
Watsonville	1,837	71	13	3.9%	0.7%
Total	14,616	555	139	3.8%	0.9%

*Includes both quantifiable and trace detections.

Table 4. Detections of monitored chemicals by location, as weekly sample sets during 2019.

Community	Number of sample sets	Number of sets with at least one detection*	Percent of sample sets with at least one detection
Chualar	52	50	96%
Cuyama	49	22	45%
Lindsay	54	27	50%
Oxnard	51	35	69%
San Joaquin	53	47	89%
Santa Maria	53	41	77%
Shafter	49	41	84%
Watsonville	52	28	54%
Total	413	301	73%

*Includes both quantifiable and trace detections.

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Pesticide Concentrations

Acute Exposure: Highest 24-h

Concentrations Among All Sites

While the results of the 24-h samples and acute exposures are discussed in this report, estimating acute exposure is not one of the AMN objectives as the AMN is designed to best measure sub-chronic and chronic exposures. CDPR and CARB routinely conduct application-site monitoring studies that are designed to assess acute exposures to pesticides as monitoring is conducted in the immediate vicinity (100 feet or less) of a treated field. Application site monitoring studies for individual pesticides and all monitoring reports can be found at:

https://www.cdpr.ca.gov/docs/emon/airinit/air_monitoring_reports.htm.

Table 5 lists the highest 24-h concentrations at any site for the pesticides detected at a quantifiable concentration in 2019. None of the pesticides or breakdown products exceeded their respective acute (24-h or 72-h) screening levels or regulatory targets during 2019 monitoring. Of all monitored pesticides, the pesticide with the highest percentage of 24-h air concentration compared to its acute screening level was DDVP (5.2%), followed by 1,3-D (2.9%), then chloropicrin (1.4%), and then MITC (0.7%). All other compounds were less than 0.5% of their acute screening levels or regulatory target during monitoring in 2019 (Table 5). The following chemicals were only detected at trace levels at any monitoring location:

- Acephate
- Bensulide
- Chlorothalonil
- Chlorpyrifos
- Chlorpyrifos OA
- Cypermethrin
- Diazinon
- Dimethoate
- Dimethoate OA
- Diuron
- Methidathion
- Iprodione
- Oxyfluorfen
- Permethrin
- Propargite

The following chemicals were not detected at any monitoring location:

- DEF

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- Diazinon OA
- Endosulfan
- Endosulfan Sulfate
- Methyl Bromide
- Metolachlor
- Norflurazon
- Oryzalin
- Oxydemeton Methyl
- Phosmet
- Simazine

Table 5. Highest 24-h air concentrations, acute screening levels, and percent of screening level of any pesticide detected at a quantifiable concentration in 2019 among all eight sites.

Chemical	Highest 24-h concentration	24-h acute screening level	% of screening level
1,3-dichloropropene	3.2 ppb (14,542 ng/m^3)	110 ppb (505,000 ng/m^3)	2.9%
Chloropicrin	1.0 ppb (6,939 ng/m^3)	73.0 ppb (491,000 ng/m^3)**	1.4%
Dacthal	0.002 ppb (34 ng/m^3)	1,730 ppb (23,500,000 ng/m^3)	0.0001%
DDVP	0.06 ppb (572 ng/m^3)	1.22 ppb (11,000 ng/m^3)	5.2%
EPTC	0.009 ppb (73 ng/m^3)	29.7 ppb (230,000 ng/m^3)	0.03%
Malathion	0.008 ppb (113 ng/m^3)	8.33 ppb (113,000 ng/m^3)	0.1%
Malathion OA	0.001 ppb (19 ng/m^3)	8.76 ppb (113,000 ng/m^3)	0.02%
MITC	1.53 ppb (4,580 ng/m^3)	220 ppb (660,000 ng/m^3)*	0.7%
pp-dicofol	0.001 ppb (19 ng/m^3)	4.49 ppb (68,000 ng/m^3)	0.03%
Trifluralin	0.001 (10 ng/m^3)	87.5 ppb (1,200,000 ng/m^3)	0.0008%

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

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Sub-chronic Exposure: Highest Rolling 4-week or 13-week Average Concentrations Among All Sites

Table 6 lists the highest observed rolling 4-week or 13-week average concentrations for any chemical detected at a quantifiable concentration in 2019 among all sites. Chloropicrin was the pesticide with the highest rolling 13-week average concentration with an estimated concentration of 0.2 ppb (59.1%).This concentration did not exceed the given sub-chronic screening level for chloropicrin exposure. The pesticide with the highest 4-week average was the fumigant MITC, with an estimated concentration of 0.43 ppb (43% of subchronic screening level).

Table 6. Highest rolling 4-week average concentrations, subchronic screening levels, and percent of screening levels of any pesticide detected at a quantifiable concentration in 2019 among all eight sites.

Chemical	Highest 4-week average concentration†	Subchronic screening level	% of screening level
1,3-dichloropropene**	0.4 ppb (1,774 ng/m^3)	3.0 ppb (14,000 ng/m^3)	12.7%
Chloropicrin**	0.2 ppb (1,359 ng/m^3)	0.35 ppb (2,300 ng/m^3)	59.1%
Dacthal	0.001 ppb (16 ng/m^3)	34.6 ppb (470,000 ng/m^3)	0.003%
DDVP	0.02 ppb (157 ng/m^3)	0.24 ppb (2,200 ng/m^3)	7.1%
EPTC	0.003 ppb (27 ng/m^3)	3.10 ppb (24,000 ng/m^3)	0.10%
Malathion	0.005 ppb (62 ng/m^3)	5.97 ppb (80,600 ng/m^3)	0.08%
Malathion OA	0.0007 ppb (10.3 ng/m^3)	6.27 ppb (80,600 ng/m^3)	0.01%
MITC	0.43 ppb (1,284 ng/m^3)	1.00 ppb (3,000 ng/m^3)	43%
pp-dicofol	0.0004 ppb (6.6 ng/m^3)	3.24 ppb (49,000 ng/m^3)	0.01%
Trifluralin	0.001 ppb (12.2 ng/m^3)	12.4 ppb (170,000 ng/m^3)	0.01%

†Concentrations are presented as rolling or moving averages (i.e., averages of weeks 1, 2, 3, and 4; average of weeks 2, 3, 4, and 5; etc.)
* This value is a regulatory target rather than a screening level.
** These concentrations represent the highest 13-week rolling average, rather than the default 4-week rolling average.

Chronic Exposure: Highest One Year Average Concentrations Among All Sites

Table 7 presents the highest observed annual average concentrations for each chemical detected at a quantifiable concentration in 2019 at any AMN site alongside its respective chronic screening levels. The highest annual average concentration relative to its chronic screening level was observed for MITC (58%), followed by chloropicrin (24%) and then 1,3-D (6.7%).

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Table 7. Highest annual average air concentrations, chronic screening levels, and percent of screening level of any pesticide detected at a quantifiable concentration in 2019 among all eight sites.

Chemical	Highest annual average concentration	Chronic Screening Level	% of screening level
MITC	0.06 ppb (174 ng/m^3)	0.10 ppb (300 ng/m^3)	58%
Chloropicrin	0.06 ppb (436 ng/m^3)	0.27 ppb (1,800 ng/m^3)	24%
1,3-dichloropropene	0.1 ppb (599 ng/m^3)	2.00 ppb (9,000 ng/m^3)	6.7%
DDVP	0.002 ppb (15.3 ng/m^3)	0.09 ppb (770 ng/m^3)	2%
EPTC	0.0004 ppb (4.8 ng/m^3)	1.10 ppb (8,500 ng/m^3)	0.06%
Malathion OA	0.0002 ppb (2.8 ng/m^3)	0.63 ppb (8,100 ng/m^3)	0.03%
Dacthal	0.001 ppb (15.5 ng/m^3)	3.46 ppb (47,000 ng/m^3)	0.003%
Malathion	0.0007 ppb (9.6 ng/m^3)	0.60 ppb (8,100 ng/m^3)	0.01%
pp-dicofol	0.0004 ppb (6.6 ng/m^3)	1.32 ppb (20,000 ng/m^3)	0.01%
Trifluralin	0.0002 ppb (2.2 ng/m^3)	2.99 ppb (41,000 ng/m^3)	0.005%

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Lifetime Exposure: Cancer Risk Estimates

The AMN monitors for seven pesticides that have been designated as potential carcinogens by Proposition 65 or by U.S. EPA's B2 list: 1,3-D, chlorothalonil, DDVP, diuron, iprodione, oxydemeton methyl, and propargite. Of these, only 1,3-D had any significant quantifiable concentrations during 2019 AMN sampling. Annual average concentrations and cancer risk estimates for 1,3-D are shown in Table . These calculations use the average concentration using 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 shown 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 TWA 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 to be negligible. Cancer risk is estimated based on the following calculation:

*Cancer Risk = CPFH * LAC * nBR*

where:

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

CDPR assumes nBR to be 0.28 m^3 kg^{-1} day^{-1} (CDPR, 2015). Based on the available monitoring data, LAC is taken as the mean annual concentration of the pesticide for all available monitoring years. CDPR has estimated the following CPF_H values for three of the seven AMN-monitored pesticides, two were detected in 2019:

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

Table 8. Average 1,3-D concentrations, regulatory target, cancer risk estimates, cancer risk target, and proportion of cancer risk target for each AMN sampling location during 2019.

Community	Average concentration (ng/m³)	Lifetime regulatory target (ng/m³)	Cancer risk estimate	Target	Percent of target (%)
Chualar	188	2,600	7.0E-07	1.00E-05	7
Oxnard	270	2,600	1.0E-06	1.00E-05	10
San Joaquin	278	2,600	1.1E-06	1.00E-05	11
Santa Maria	293	2,600	1.1E-06	1.00E-05	11
Shafter	1,588	2,600	6.1E-06	1.00E-05	61
Watsonville	569	2,600	2.2E-06	1.00E-05	22

Table 9. Average DDVP, regulatory target, cancer risk estimates, cancer risk target, and proportion of cancer risk target for each AMN sampling location during 2019.

Community	Average concentration (ng/m³)	Cancer risk estimate	Target	Percent of target (%)
San Joaquin	15.3	1.5E-06	1.00E-05	15
Santa Maria	5.5	5.4E-07	1.00E-05	5.4

Cumulative Exposure Estimates for Organophosphates

Cumulative exposures were calculated for organophosphates because these are the only pesticides included in the AMN that have a common mode of action (cholinesterase inhibition) and that were detected at quantifiable concentrations. The 14 organophosphates included in the AMN monitoring are:

- Acephate
- Bensulide
- Chlorpyrifos and its oxygen analog

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- DDVP
- DEF
- Diazinon and its oxygen analog
- Dimethoate and its oxygen analog
- Malathion and its oxygen analog
- Oxydemeton methyl
- Phosmet

As described in Appendix K, the 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. The organophosphate cumulative exposures were estimated for each community and exposure period.

Table 10 summarizes the highest calculated HI's for each community and time period during monitoring in 2019. Both the acute and sub-chronic HI values were calculated for each individual sample set, from which the maximum observed HI was reported. None of the HI's exceeded a value of 1.0 at any of the sampling locations during this year. This indicates that even for the combined 14 organophosphate compounds, a summed screening level was not exceeded.

Table 10. Summary of organophosphate cumulative exposure.

Community	Acute Hazard Index	Subchronic Hazard Index	Chronic Hazard Index
Chualar	0.029	0.037	0.071
Cuyama	0.091	0.101	0.121
Lindsay	0.022	0.031	0.063
Oxnard	0.024	0.034	0.058
San Joaquin	0.080	0.106	0.073
Santa Maria	0.023	0.030	0.053
Shafter	0.029	0.041	0.071
Watsonville	0.020	0.028	0.048

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DISCUSSION

Fumigants accounted for three of the ten pesticides detected at quantifiable concentrations by the AMN in 2019. The fumigants were 1,3-D, chloropicrin, and MITC. Quantifiable detections of 1,3-D were observed at Chualar, Oxnard, San Joaquin, Santa Maria, Shafter, and Watsonville. Quantifiable detections of chloropicrin were observed at Oxnard, Santa Maria, Shafter, and Watsonville. All monitored sites had quantifiable detections of MITC, as also observed in 2018. Organophosphates and their breakdown products accounted for another three of the ten pesticides detected at quantifiable concentrations: DDVP, and malathion and its OA. The remaining four pesticides detected at quantifiable concentrations in 2019 were dacthal, EPTC, pp-dicofol, and trifluralin.

An HI was calculated for the included organophosphates that have a common mode of action (cholinesterase inhibition) and that were detected at quantifiable concentrations. The maximum HI calculated for any site at any exposure period was 0.121, indicating a low risk from cumulative exposure.

Overall, concentrations representing sub-chronic and chronic exposures were higher than acute exposures relative to their respective screening levels. As previously discussed, while acute exposure is discussed in this report, the AMN best measures sub-chronic and chronic exposures.

No monitored chemical exceeded its respective screening level for any of three types of exposure levels for 2019.

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APPENDIX A: DETAILED RESULTS FOR CHUALAR

Chualar

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.

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 for dacthal (78.4%, n = 40), followed by MITC and DDVP (15.7%, n = 8), and then chloropicrin (9.8%, n = 5). The highest percentage of quantifiable detections was observed for dacthal (19.6%, n = 10), followed by MITC (7.8%, n = 4), and then both chloropicrin and pp-dicofol (2%, n = 1).

Table A-1. Number and percentage of positive samples per chemical in Chualar, California.

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
1,3-dichloropropene	52	1	1	1.9%	1.9%
Acephate	51	0	0	0%	0%
Bensulide	51	1	0	2.0%	0%
Chloropicrin	51	5	1	9.8%	2.0%
Chlorothalonil	51	0	0	0%	0%
Chlorpyrifos	51	2	0	3.9%	0
Chlorpyrifos OA	51	0	0	0%	0%
Cypermethrin	51	0	0	0%	0%
Dacthal	51	40	10	78.4%	19.6%
DDVP	49	8	0	16.3%	0%
DEF	51	0	0	0%	0%
Diazinon	51	0	0	0%	0%
Diazinon OA	51	0	0	0%	0%

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Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
Dimethoate	51	0	0	0%	0%
Dimethoate OA	51	0	0	0%	0%
Diuron	51	0	0	0%	0%
Endosulfan	51	0	0	0%	0%
Endosulfan Sulfate	51	0	0	0%	0%
EPTC	51	0	0	0%	0%
Iprodione	51	0	0	0%	0%
Malathion	51	0	0	0%	0%
Malathion OA	51	4	0	7.8%	0%
Methidathion	51	0	0	0%	0%
Methyl Bromide	52	0	0	0%	0%
Metolachlor (S-Metolachlor)	51	0	0	0%	0%
MITC	51	8	4	15.7%	7.8%
Norflurazon	51	0	0	0%	0%
Oryzalin	51	0	0	0%	0%
Oxydemeton Methyl	51	0	0	0%	0%
Oxyfluorfen	51	0	0	0%	0%
Permethrin	51	0	0	0%	0%
Phosmet	51	0	0	0%	0%
pp-dicofol	51	1	1	2.0%	2.0%
Propargite	51	0	0	0%	0%
Simazine	51	0	0	0%	0%
Trifluralin	51	1	0	2.0%	0%
Total	**1,838**	**71**	**17**	**3.9%**	**1.0%**

*Includes both quantifiable and trace detections.

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Pesticide Concentrations

Acute (24-h) Concentrations

Table A-2 shows the highest observed 24-h concentrations observed for all chemicals monitored at the Chualar Air Monitoring Network (AMN) sampling location in 2019. The highest concentration relative to its screening level was that of chloropicrin at 0.2%, followed by 1,3-dichloropropene at 0.06%. The remaining chemicals for which there were quantifiable detections at Chualar in 2019 were pp-dicofol, MITC, and dacthal.

As noted in Appendix I, the MDL for 1,3-dichloropropene and methyl bromide analyzed by the California Air Resources Board's Organic Laboratory Section (CARB OLS) is 10-fold higher than that of the samples analyzed by California Department of Food and Agriculture's Center for Analytical Chemistry (CDFA CAC) laboratory. 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.

Table A-2. Highest 24-h air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored at the Chualar AMN sampling location in 2019.

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
Chloropicrin	0.12 ppb (835 ng/m^3)	73.0 ppb (491,000 ng/m^3)*	0.2%
1,3-dichloropropene	0.063 ppb (286 ng/m^3)	110 ppb (505,000 ng/m^3)	0.06%
pp-dicofol	0.001 ppb (19 ng/m^3)	4.49 ppb (68,000 ng/m^3)	0.03%
MITC	0.011 ppb (34 ng/m^3)	220 ppb (660,000 ng/m^3)*	0.005%
Dacthal	0.002 ppb (34 ng/m^3)	1,730 ppb(23,500,000 ng/m^3)	0.0001%
Acephate	ND	1.60 ppb (12,000 ng/m^3)	
Bensulide	Trace	15.9 ppb (259,000 ng/m^3)	
Chlorothalonil	ND	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	Trace	0.08 ppb(1,200 ng/m^3)**	
Chlorpyrifos OA	ND	0.09 ppb(1,200 ng/m^3)**	
Cypermethrin	ND	6.64 ppb(113,000 ng/m^3)	
DDVP	Trace	1.22 ppb(11,000 ng/m^3)	
DEF	ND	0.68 ppb(8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	

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Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
Diazinon OA	ND	0.01 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	0.20 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	69.6 ppb (939,000 ng/m^3)	
Malathion	ND	8.33 ppb (113,000 ng/m^3)	
Malathion OA	Trace	8.76 ppb (113,000 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor	ND	7.33 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl	ND	3.74 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	5.94 ppb (77,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	13.3 ppb (110,000 ng/m^3)	
Trifluralin	Trace	87.5 ppb (1,200,000 ng/m^3)	

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

** CDPR's May 28, 2019, risk management directive for chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m3), 1-h time-weighted average (TWA) 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-wk) Concentrations

Table A-3 shows the highest observed rolling 4-week or 13-week average concentrations for all chemicals monitored at the Chualar AMN sampling location in 2019. The highest concentration relative to its screening level was that of chloropicrin at 11.4%, then 1,3-dichloropropene at 1.6%, followed by MITC at 0.7%. Quantifiable detections for dacthal and pp-dicofol resulted in calculated sub-chronic concentrations of less than 0.1%.

Table A-3. Highest 4- or 13-wk air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored at the Chualar Air Monitoring Network sampling location.

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
Chloropicrin*	0.04 ppb(262 ng/m^3)	0.35 ppb(2,300 ng/m^3)	11.4%
1,3-dichloropropene*	0.06 ppb (227 ng/m^3)	3.0 ppb (14,000 ng/m^3)	1.6%
MITC	0.007 ppb (21.7 ng/m^3)	1.00 ppb (3,000 ng/m^3)	0.7%
pp-dicofol	0.0004 ppb (6.6 ng/m^3)	3.24 ppb (49,000 ng/m^3)	0.01%
Dacthal	0.001 ppb (15.5 ng/m^3)	34.6 ppb (470,000 ng/m^3)	0.003%
Acephate	ND	0.35 ppb (2,300 ng/m^3)	
Bensulide	Trace	1.47 ppb (24,000 ng/m^3)	
Chlorothalonil	ND	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	Trace	0.06 ppb (850 ng/m^3)	
Chlorpyrifos OA	ND	0.06 ppb (850 ng/m^3)	
Cypermethrin	ND	4.76 ppb (81,000 ng/m^3)	
DDVP	Trace	0.24 ppb (2,200 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb	

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Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
		(130 ng/m^3)	
Dimethoate	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	ND	1.78 ppb (17,000 ng/m^3)	
Endosulfan	ND	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	3.10 ppb (24,000 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	
Malathion	ND	5.97 ppb (80,600 ng/m^3)	
Malathion OA	Trace	6.27 ppb (80,600 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	5.0 ppb (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	12.2 ppb (18,0000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	2.00 ppb (26,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	Trace	12.4 ppb (170,000 ng/m^3)	

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* These concentrations represent the highest 13-week rolling average, rather than the default 4-week rolling average.

Chronic (2019) Concentrations

Table A-4 shows the annual average concentration for all chemicals monitored at the Chualar AMN sampling location in 2019. The highest concentration relative to its screening level was chloropicrin at 8.4%, followed by 1,3-dichloropropene at 2.1% and MITC at 1.9%. All other monitored chemicals were less than 1% of their chronic screening level or regulatory target in Chualar during monitoring in 2019.

Table A-4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored at the Chualar Air Monitoring Network sampling location.

Chemical	Overall average concentration (ng/m^3)	Chronic screening level (ng/m^3)	% of screening level
Chloropicrin	0.02 ppb (152 ng/m^3)	0.27 ppb (1,800 ng/m^3)	8.4%
1,3-dichloropropene	0.04 (193 ng/m^3)	2.00 ppb (9,000 ng/m^3)	2.1%
MITC	0.002 ppb (5.6 ng/m^3)	0.10 ppb (300 ng/m^3)	1.9%
Dacthal	0.0005 (6.6 ng/m^3)	3.46 ppb (47,000 ng/m^3)	0.01%
pp-dicofol	0.0002 ppb (2.6 ng/m^3)	1.32 ppb (20,000 ng/m^3)	0.01%
Acephate	ND	1.13 ppb (8,500 ng/m^3)	
Bensulide	Trace	1.48 ppb (24,000 ng/m^3)	
Chlorothalonil	ND	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	Trace	0.04 ppb (510 ng/m^3)	
Chlorpyrifos OA	ND	0.04 ppb (510 ng/m^3)	
Cypermethrin	ND	1.59 ppb (27,000 ng/m^3)	
DDVP	Trace	0.09 ppb (770 ng/m^3)	
DEF	ND	NA – Seasonal	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.03 ppb (300 ng/m^3)	
Dimethoate OA	ND	0.03 ppb (300 ng/m^3)	

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Chemical	Overall average concentration (ng/m^3)	Chronic screening level (ng/m^3)	% of screening level
Diuron	ND	0.60 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.02 ppb (330 ng/m^3)	
EPTC	ND	1.10 ppb (8,500 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	
Malathion	ND	0.60 ppb (8,100 ng/m^3)	
Malathion OA	Trace	0.63 ppb (8,100 ng/m^3)	
Methidathion	ND	0.20 ppb (2,500 ng/m^3)	
Methyl Bromide	ND	1.00 ppb (3,900 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	1.64 ppb (232,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	3.45 ppb (51,000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	1.39 ppb (18,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	Trace	2.99 ppb (41,000 ng/m^3)	

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Temporal trends in detected concentrations

Figures A-1 to A-5 present the concentrations over time for monitoring results in 2019 for any chemical detected at a quantifiable concentration in Chualar. Screening levels, as defined in Appendix K, are abbreviated as SL in the following graphs. Regulatory targets, also defined in Appendix K, are

abbreviated as RT. For graphs where both a pesticide and its degradate are shown, the detected concentrations of both the parent chemical and its degradate have been summed for each sampling.

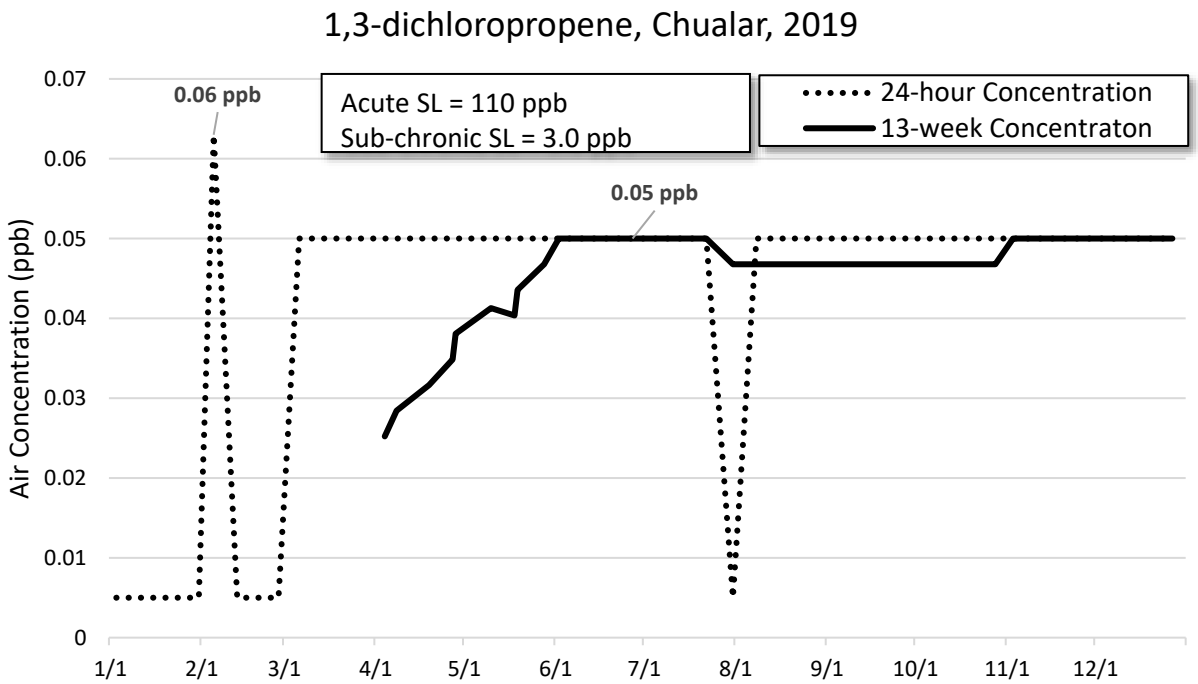

Figure A-1. Temporal trend in 1,3-dichloropropene concentrations in Chualar in 2019.

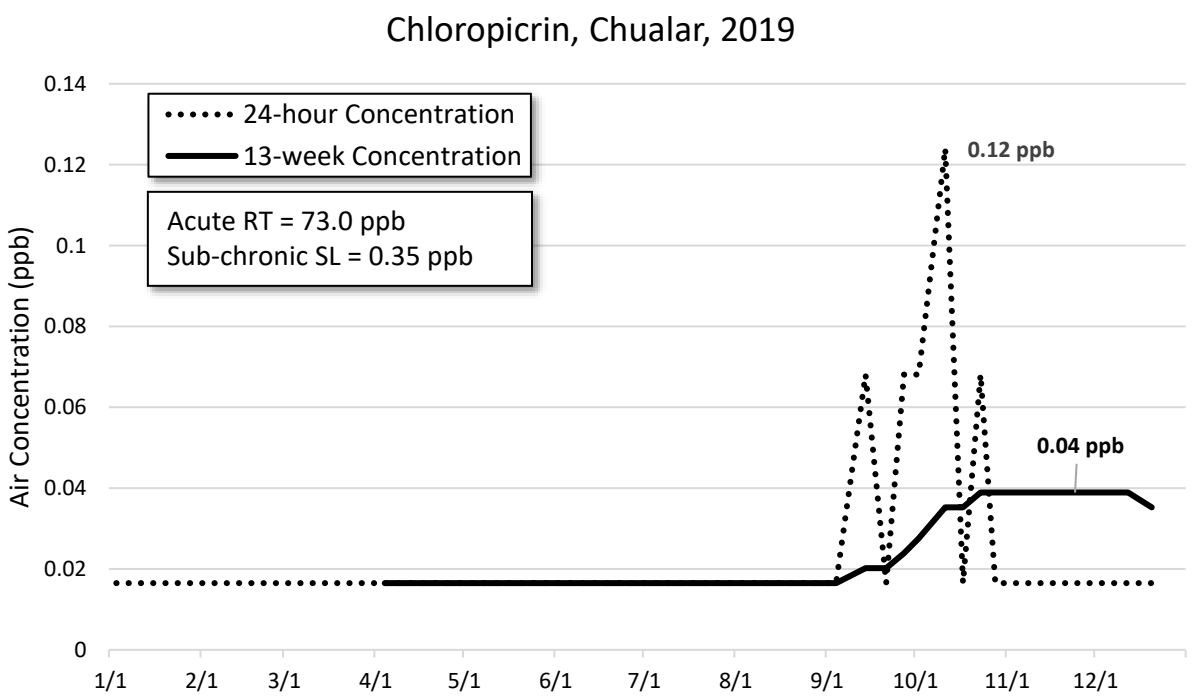

Figure A-2. Temporal trend in chloropicrin concentrations in Chualar in 2019.

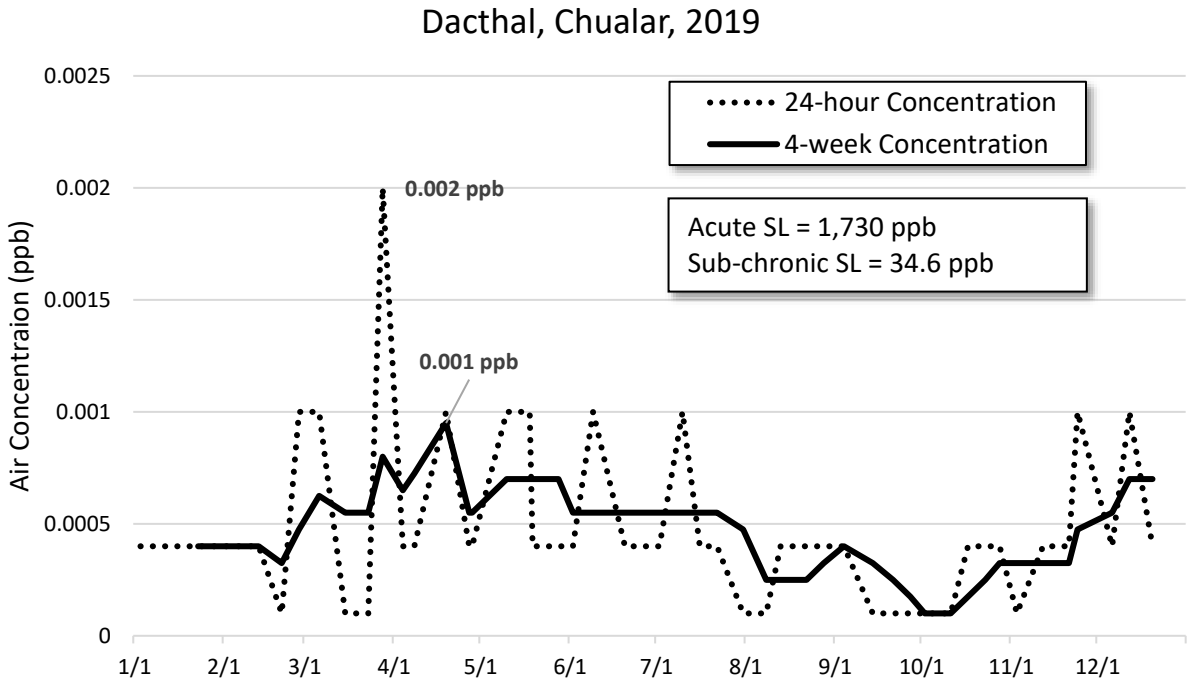

Figure A-3. Temporal trend in dacthal concentrations in Chualar in 2019.

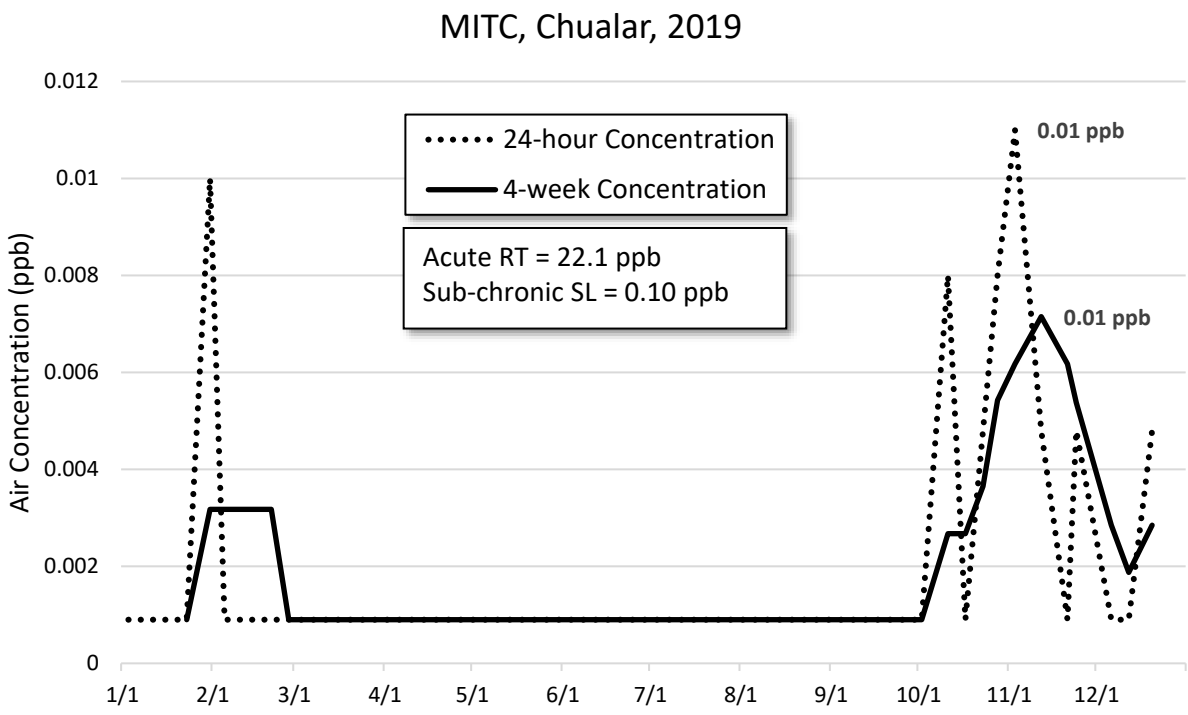

Figure A-4. Temporal trend in MITC concentrations in Chualar in 2019.

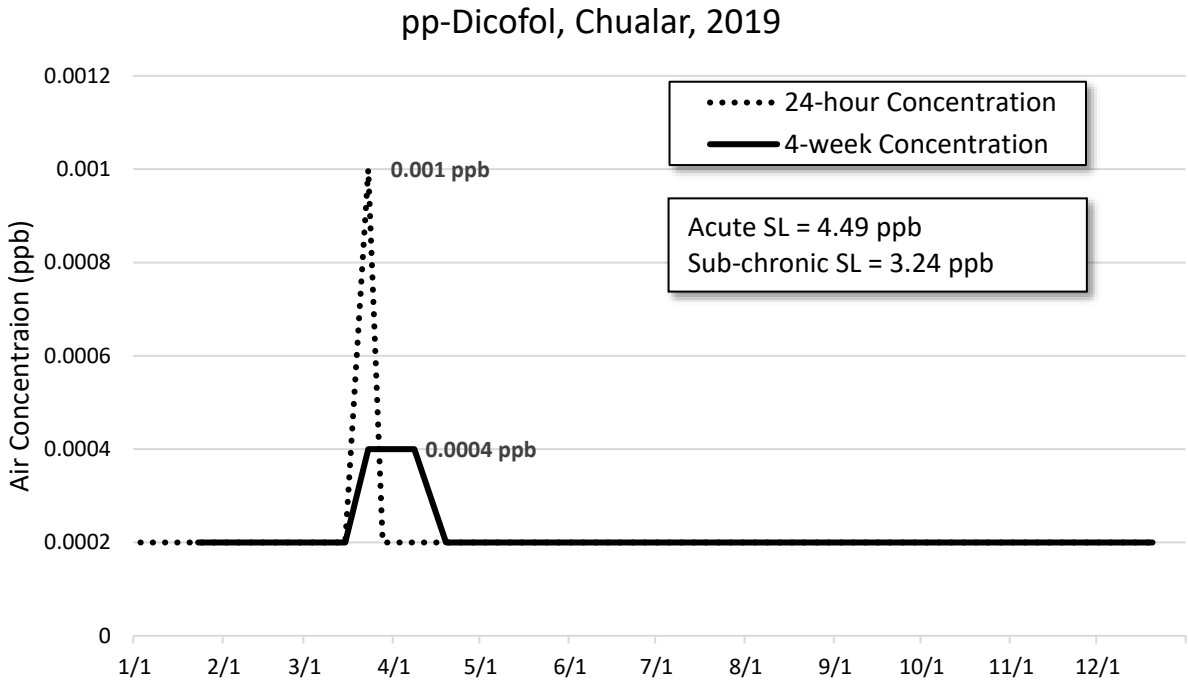

Figure A-5. Temporal trend in pp-Dicofol concentrations in Chualar in 2019.

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APPENDIX B: DETAILED RESULTS FOR CUYAMA

Cuyama

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; 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. Monitoring at this site is conducted by the California Air Resources Board (CARB).

Pesticide Detections

Table B-1 lists the number and percentage of analyses resulting in detections at the Cuyama sampling site. The active ingredient with the highest percentage of detections was MITC (24.5%, n = 12), followed by trifluralin (14.3%, n = 7), and then EPTC (10.2%, n = 5). The highest percentage of quantifiable detections was observed for EPTC, MITC, and Trifluralin; all at 4.1% (n = 2).

Table B-1. Number and percentage of positive samples per chemical in Cuyama, California.

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of possible detections	Percent of quantifiable detections
1,3-dichloropropene	49	0	0	0%	0%
Acephate	49	1	0	2.0%	0%
Bensulide	49	0	0	0%	0%
Chloropicrin	49	0	0	0%	0%
Chlorothalonil	49	2	0	4.1%	0%
Chlorpyrifos	49	0	0	0%	0%
Chlorpyrifos OA	49	0	0	0%	0%
Cypermethrin	49	0	0	0%	0%
Dacthal	49	0	0	0%	0%
DDVP	49	2	0	4.1%	0%
DEF	49	0	0	0%	0%
Diazinon	49	1	0	2.0%	0%
Diazinon OA	49	1	0	2.0%	0%
Dimethoate	49	0	0	0%	0%
Dimethoate OA	49	0	0	0%	0%
Diuron	49	0	0	0%	0%
Endosulfan	49	0	0	0%	0%
Endosulfan Sulfate	49	0	0	0%	0%
EPTC	49	5	2	10.2%	4.1%
Iprodione	49	0	0	0%	0%
Malathion	49	1	0	2.0%	0%

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Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of possible detections	Percent of quantifiable detections
Malathion OA	49	1	0	2.0%	0%
Methidathion	49	0	0	0%	0%
Methyl Bromide	49	0	0	0%	0%
Metolachlor (S-Metolachlor)	49	0	0	0%	0%
MITC	49	12	2	24.5%	4.1%
Norflurazon	49	0	0	0%	0%
Oryzalin	49	0	0	0%	0%
Oxydemeton Methyl	49	0	0	0%	0%
Oxyfluorfen	49	0	0	0%	0%
Permethrin	49	0	0	0%	0%
Phosmet	49	0	0	0%	0%
pp-dicofol	49	0	0	0%	0%
Propargite	49	0	0	0%	0%
Simazine	49	0	0	0%	0%
Trifluralin	49	7	2	14.3%	4.1%
Total	**1,764**	**33**	**6**	**1.9%**	**0.3%**

*Includes both quantifiable and trace detections.

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Pesticide Concentrations

Acute (24-h) Concentrations

Table B-2 shows the highest observed 24-h concentrations observed for all chemicals monitored at the Cuyama Air Monitoring Network (AMN) sampling location in 2019. The highest concentration relative to its screening level was MITC at 0.06%, followed by EPTC at 0.03%. The remaining chemical with a quantifiable detection was Trifluralin at 0.0008% of its acute screening level.

Table B-2. Highest 24-h air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored at the Cuyama AMN sampling location in 2019.

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
MITC	0.13 ppb (381 ng/m^3)	220 ppb (660,000 ng/m^3)*	0.06%
EPTC	0.009 ppb (73 ng/m^3)	29.7 ppb (230,000 ng/m^3)	0.03%
Trifluralin	0.001 ppb (10 ng/m^3)	87.5 ppb (1,200,000 ng/m^3)	0.0008%
1,3-dichloropropene	ND	110 ppb (505,000 ng/m^3)	
Acephate	Trace	1.60 ppb (12,000 ng/m^3)	

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chloropicrin	ND	73.0 ppb (491,000 ng/m^3)*	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.08 ppb (1,200 ng/m^3)**	
Chlorpyrifos OA	ND	0.09 ppb (1,200 ng/m^3)**	
Cypermethrin	ND	6.64 ppb (113,000 ng/m^3)	
Dacthal	ND	1,730 ppb (23,500,000 ng/m^3)	
DDVP	Trace	1.22 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	0.01 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	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
Iprodione	ND	69.6 ppb (939,000 ng/m^3)	
Malathion	Trace	8.33 ppb (113,000 ng/m^3)	
Malathion OA	Trace	8.76 ppb (113,000 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor	ND	7.33 ppb (85,000 ng/m^3)	

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Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl	ND	3.74 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	5.94 ppb (77,000 ng/m^3)	
pp-dicofol	ND	4.49 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)	

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

** CDPR's May 28, 2019, risk management directive for chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m3), 1-h time weighted average (TWA). 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-wk or 13-wk) Concentrations

Table B-3 shows the highest observed rolling 4-week or 13-week average concentrations for all chemicals monitored at the Cuyama AMN sampling location in 2019. The highest concentration relative to its screening level was MITC at 4.2%, this was followed by EPTC at 0.1%.

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Table B-3. Highest 4-wk air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored at the Cuyama AMN sampling location.

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
MITC	0.04 ppb (125 ng/m^3)	1.00 ppb (3,000 ng/m^3)	4.2%
EPTC	0.003 ppb (26.9 ng/m^3)	3.10 ppb (24,000 ng/m^3)	0.1%
Trifluralin	0.001 ppb (12.2 ng/m^3)	12.4 ppb (170,000 ng/m^3)	0.007%

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
1,3-dichloropropene*	ND	3.0 ppb (14,000 ng/m^3)	
Acephate	Trace	0.35 ppb (2,300 ng/m^3)	
Bensulide	ND	1.47 ppb (24,000 ng/m^3)	
Chloropicrin*	ND	0.35 ppb (2,300 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.06 ppb (850 ng/m^3)	
Chlorpyrifos OA	ND	0.06 ppb (850 ng/m^3)	
Cypermethrin	ND	4.76 ppb (81,000 ng/m^3)	
Dacthal	ND	34.6 ppb (470,000 ng/m^3)	
DDVP	Trace	0.24 ppb (2,200 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	Trace	0.01 ppb (130 ng/m^3)	
Diazinon OA	Trace	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	ND	1.78 ppb (17,000 ng/m^3)	
Endosulfan	ND	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	

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Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
Malathion	Trace	5.97 ppb (80,600 ng/m^3)	
Malathion OA	Trace	6.27 ppb (80,600 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	5.0 ppb (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	12.2 ppb (18,0000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	2.00 ppb (26,000 ng/m^3)	
pp-dicofol	ND	3.24 ppb (49,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	

* These concentrations represent the highest 13-week rolling average, rather than the default 4-week rolling average.

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Chronic (2019) Concentrations

Table B-4 shows the annual average concentration for all chemicals monitored at the Cuyama (AMN) sampling location in 2019. The highest concentration relative to its screening level was MITC at 4.9%, followed by EPTC at 0.06%, and then trifluralin at 0.005%. All other monitored chemicals were either trace or non-detects and thus their percent of screening level could not be determined.

Table B-4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored at the Cuyama AMN sampling location.

Chemical	Overall average concentration (ng/m^3)	Chronic screening level (ng/m^3)	% of screening level
MITC	0.005 ppb (14.6 ng/m^3)	0.10 ppb (300 ng/m^3)	4.9%
EPTC	0.0004 ppb (4.8 ng/m^3)	1.10 ppb (8,500 ng/m^3)	0.06%
Trifluralin	0.0002 ppb (2.2 ng/m^3)	2.99 ppb (41,000 ng/m^3)	0.005%
1,3-dichloropropene	ND	2.00 ppb (9,000 ng/m^3)	
Acephate	Trace	1.13 ppb (8,500 ng/m^3)	
Bensulide	ND	1.48 ppb (24,000 ng/m^3)	
Chloropicrin	ND	0.27 ppb (1,800 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.04 ppb (510 ng/m^3)	
Chlorpyrifos OA	ND	0.04 ppb (510 ng/m^3)	
Cypermethrin	ND	1.59 ppb (27,000 ng/m^3)	
Dacthal	ND	3.46 ppb (47,000 ng/m^3)	
DDVP	Trace	0.09 ppb (770 ng/m^3)	
DEF	ND	NA – Seasonal	
Diazinon	Trace	0.01 ppb (130 ng/m^3)	
Diazinon OA	Trace	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.03 ppb (300 ng/m^3)	
Dimethoate OA	ND	0.03 ppb (300 ng/m^3)	
Diuron	ND	0.60 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.02 ppb (330 ng/m^3)	
Iprodione	ND	21.2 ppb	

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Chemical	Overall average concentration (ng/m^3)	Chronic screening level (ng/m^3)	% of screening level
		(286,000 ng/m^3)	
Malathion	Trace	0.60 ppb (8,100 ng/m^3)	
Malathion OA	Trace	0.63 ppb (8,100 ng/m^3)	
Methidathion	ND	0.20 ppb (2,500 ng/m^3)	
Methyl Bromide	ND	1.00 ppb (3,900 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	1.64 ppb (232,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	3.45 ppb (51,000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	1.39 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.32 ppb (20,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	

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Temporal trends in detected concentrations

Figures B-1 to B-3 present the concentrations over time for monitoring results in 2019 for any chemical detected at a quantifiable concentration in Cuyama. Screening levels, as defined in Appendix K, are abbreviated SL in the following graphs. Regulatory targets, also defined in Appendix K, are abbreviated at RT.

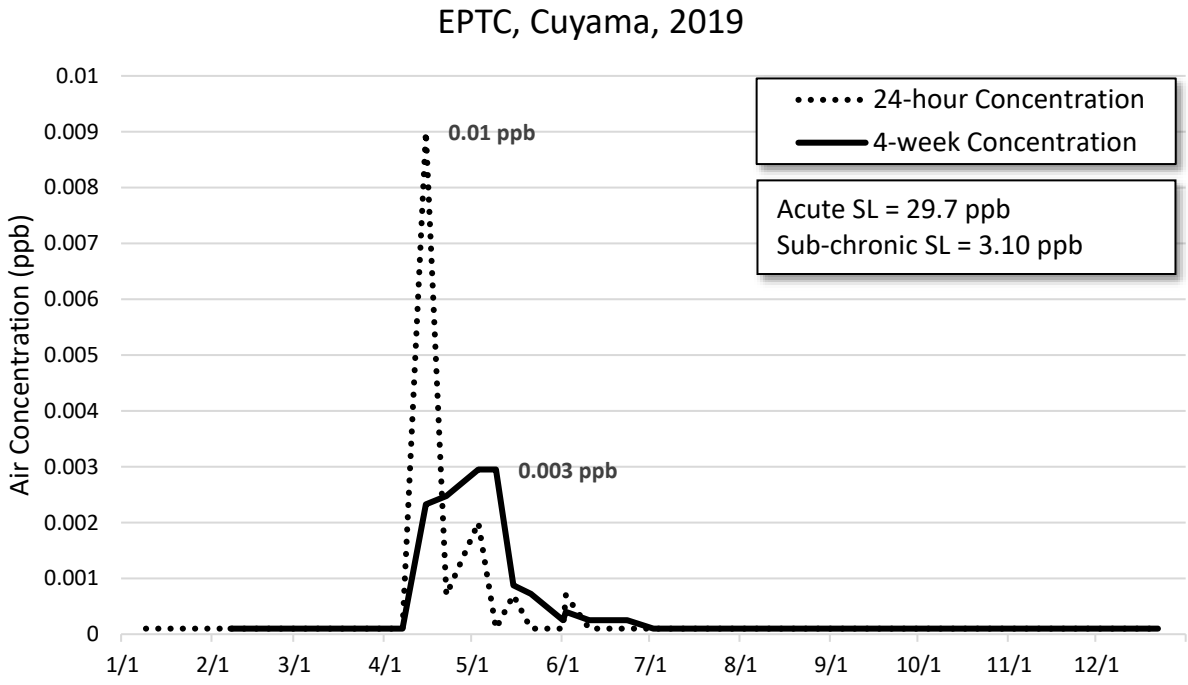

Figure B-1. Temporal trend in EPTC concentrations in Cuyama in 2019.

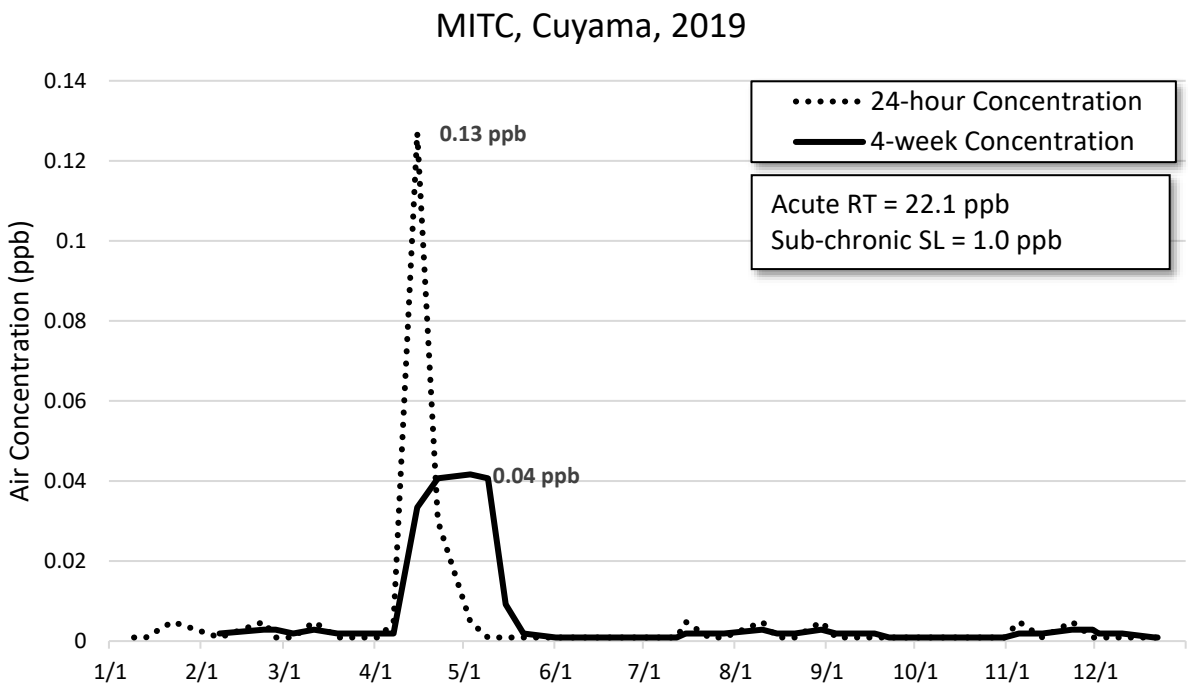

Figure B-2. Temporal trend in MITC concentrations in Cuyama in 2019.

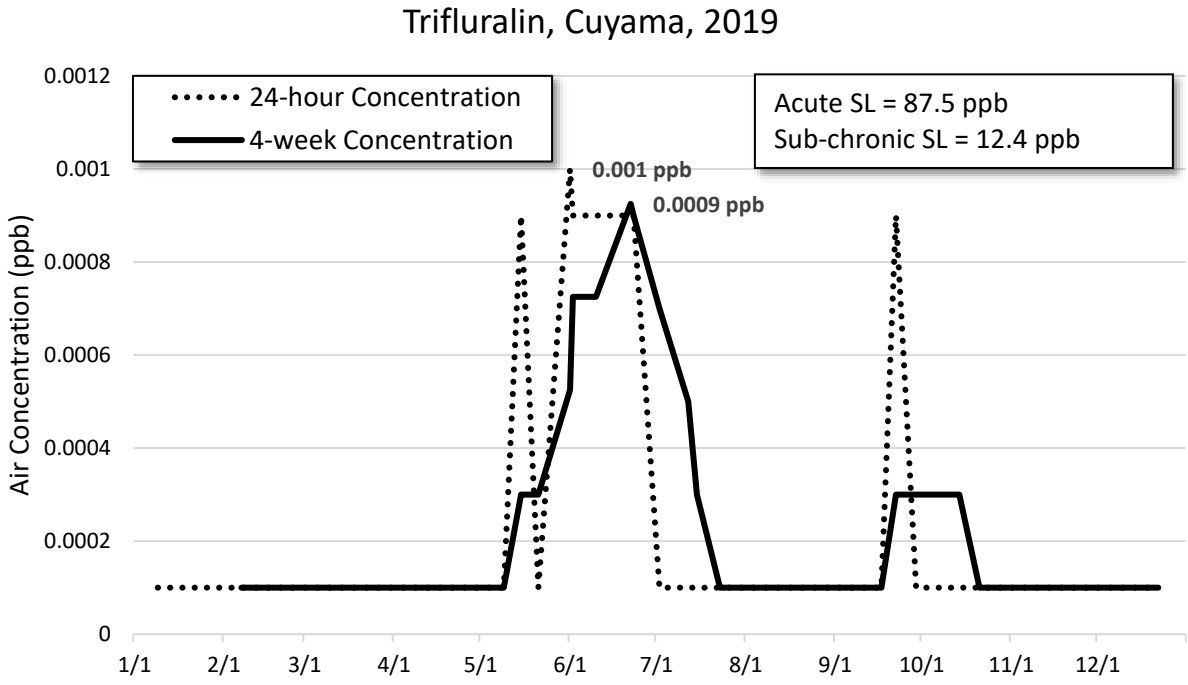

Figure B-3. Temporal trend in trifluralin concentrations in Cuyama in 2019.

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APPENDIX C: DETAILED RESULTS FOR LINDSAY

Lindsay

Lindsay is located in Tulare County and is 2.73 square miles in area. The average elevation is 387 feet; it receives about 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 at Reagan Elementary School. Monitoring at this site is conducted by the California Air Resources Board.

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 detection was MITC (39.6%, n = 21), followed by chlorothalonil (9.4%, n = 5), and then DDVP (7.5%, n = 4). The highest percentage of quantifiable detections was observed for MITC (20.8%, n = 11). All other monitored chemicals did not have a quantifiable detection.

Table C-1. Number and percentage of positive samples per chemical in Lindsay, California.

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
1,3-dichloropropene	53	0	0	0%	0%
Acephate	53	0	0	0%	0%
Bensulide	53	0	0	0%	0%
Chloropicrin	53	0	0	0%	0%
Chlorothalonil	53	5	0	9.4%	0%
Chlorpyrifos	53	0	0	0%	0%
Chlorpyrifos OA	53	0	0	0%	0%
Cypermethrin	53	0	0	0%	0%
Dacthal	53	2	0	3.7%	0%
DDVP	53	3	0	5.7%	0%
DEF	53	0	0	0%	0%
Diazinon	53	0	0	0%	0%
Diazinon OA	53	0	0	0%	0%
Dimethoate	53	2	0	3.8%	0%
Dimethoate OA	53	1	0	1.9%	0%
Diuron	53	0	0	0%	0%
Endosulfan	53	0	0	0%	0%
Endosulfan Sulfate	53	0	0	0%	0%
EPTC	53	1	0	1.9%	0%
Iprodione	53	0	0	0%	0%
Malathion	53	3	0	5.7%	0%

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Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
Malathion OA	53	3	0	5.7%	0%
Methidathion	53	0	0	0%	0%
Methyl Bromide	53	0	0	0%	0%
Metolachlor (S-Metolachlor)	53	0	0	0%	0%
MITC	53	21	11	39.6%	20.8%
Norflurazon	53	0	0	0%	0%
Oryzalin	53	0	0	0%	0%
Oxydemeton Methyl	53	0	0	0%	0%
Oxyfluorfen	53	0	0	0%	0%
Permethrin	53	0	0	0%	0%
Phosmet	53	0	0	0%	0%
pp-dicofol	53	0	0	0%	0%
Propargite	53	0	0	0%	0%
Simazine	53	0	0	0%	0%
Trifluralin	53	0	0	0%	0%
Total	**1,908**	**42**	**12**	**2.1%**	**0.6%**

*Includes both quantifiable and trace detections.

Pesticide Concentrations

Acute (24-h) Concentrations

Table C-2 shows the highest observed 24-h concentrations observed for all chemicals monitored at the Lindsay Air Monitoring Network (AMN) sampling location in 2019. The highest concentration relative to its screening level was MITC at 0.13%.

Table C-2. Highest 24-h air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored at the Lindsay AMN sampling location in 2019.

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
MITC	0.29 ppb (880 ng/m^3)	220 ppb (660,000 ng/m^3)*	0.13%
1,3-dichloropropene	ND	110 ppb (505,000 ng/m^3)	
Acephate	ND	1.60 ppb (12,000 ng/m^3)	
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chloropicrin	ND	73.0 ppb (491,000 ng/m^3)*	
Chlorothalonil	Trace	3.13 ppb (34,000	

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Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
		ng/m^3)	
Chlorpyrifos	ND	0.08 ppb (1,200 ng/m^3)**	
Chlorpyrifos OA	ND	0.09 ppb (1,200 ng/m^3)**	
Cypermethrin	ND	6.64 ppb (113,000 ng/m^3)	
Dacthal	Trace	1,730 ppb (23,500,000 ng/m^3)	
DDVP	Trace	1.22 ppb (11,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 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	ND	17.8 ppb (170,000 ng/m^3)	
Endosulfan	ND	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	Trace	29.7 ppb (230,000 ng/m^3)	
Iprodione	ND	69.6 ppb (939,000 ng/m^3)	
Malathion	Trace	8.33 ppb (113,000 ng/m^3)	
Malathion OA	Trace	8.76 ppb (113,000 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor	ND	7.33 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb	

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Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
		(420,000 ng/m³)	
Oxydemeton Methyl	ND	3.74 ppb (39,200 ng/m³)	
Oxyfluorfen	ND	34.5 ppb (510,000 ng/m³)	
Permethrin	ND	10.5 ppb (168,000 ng/m³)	
Phosmet	ND	5.94 ppb (77,000 ng/m³)	
pp-dicofol	ND	4.49 ppb (68,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m³)	
Simazine	ND	13.3 ppb (110,000 ng/m³)	
Trifluralin	ND	87.5 ppb (1,200,000 ng/m³)	

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

** CDPR's May 28, 2019, risk management directive for chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m3), 1-h time weighted average (TWA). 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-wk) Concentrations

Table C-3 shows the highest observed rolling 4-week or 13-week average concentrations for all chemicals monitored at the Lindsay AMN sampling location in 2019. The highest concentration relative to its screening level was that of MITC at 8%.

Table C-3. Highest 4- or 13-wk air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored at the Lindsay AMN sampling location.

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
MITC	0.08 ppb (239 ng/m^3)	1.00 ppb (3,000 ng/m^3)	8%
1,3-dichloropropene*	ND	3.0 ppb (14,000 ng/m^3)	
Acephate	ND	0.35 ppb (2,300 ng/m^3)	
Bensulide	ND	1.47 ppb (24,000 ng/m^3)	
Chloropicrin*	ND	0.35 ppb	

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Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
		(2,300 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.06 ppb (850 ng/m^3)	
Chlorpyrifos OA	ND	0.06 ppb (850 ng/m^3)	
Cypermethrin	ND	4.76 ppb (81,000 ng/m^3)	
Dacthal	Trace	34.6 ppb (470,000 ng/m^3)	
DDVP	Trace	0.24 ppb (2,200 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	Trace	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	Trace	0.34 ppb (3,000 ng/m^3)	
Diuron	ND	1.78 ppb (17,000 ng/m^3)	
Endosulfan	ND	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	Trace	3.10 ppb (24,000 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	
Malathion	Trace	5.97 ppb (80,600 ng/m^3)	
Malathion OA	Trace	6.27 ppb (80,600 ng/m^3)	
Methidathion	ND	0.25 ppb	

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Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
		(3,100 ng/m^3)	
Methyl Bromide	ND	5.0 ppb (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	12.2 ppb (18,0000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	2.00 ppb (26,000 ng/m^3)	
pp-dicofol	ND	3.24 ppb (49,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	ND	12.4 ppb (170,000 ng/m^3)	

* These concentrations represent the highest 13-week rolling average, rather than the default 4-week rolling average.

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Chronic (2019) Concentrations

Table C-4 shows the annual average concentration for all chemicals monitored at the Lindsay AMN sampling location in 2019. The active ingredient with the highest concentration relative to its screening level was MITC at 9%. No other monitored chemicals had a quantifiable detection.

Table C-4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored at the Lindsay Air Monitoring Network sampling location.

Chemical	Overall average concentration (ng/m^3)	Chronic screening level (ng/m^3)	% of screening level
MITC	0.009 ppb (27.8 ng/m^3)	0.10 ppb (300 ng/m^3)	9%
1,3-dichloropropene	ND	2.00 ppb (9,000 ng/m^3)	
Acephate	ND	1.13 ppb (8,500 ng/m^3)	
Bensulide	ND	1.48 ppb (24,000 ng/m^3)	
Chloropicrin	ND	0.27 ppb (1,800 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.04 ppb (510 ng/m^3)	
Chlorpyrifos OA	ND	0.04 ppb (510 ng/m^3)	
Cypermethrin	ND	1.59 ppb (27,000 ng/m^3)	
Dacthal	Trace	3.46 ppb (47,000 ng/m^3)	
DDVP	Trace	0.09 ppb (770 ng/m^3)	
DEF	ND	NA – Seasonal	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	Trace	0.03 ppb (300 ng/m^3)	
Dimethoate OA	Trace	0.03 ppb (300 ng/m^3)	
Diuron	ND	0.60 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.02 ppb (330 ng/m^3)	
EPTC	Trace	1.10 ppb (8,500 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	
Malathion	Trace	0.60 ppb	

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Chemical	Overall average concentration (ng/m^3)	Chronic screening level (ng/m^3)	% of screening level
		(8,100 ng/m^3)	
Malathion OA	Trace	0.63 ppb (8,100 ng/m^3)	
Methidathion	ND	0.20 ppb (2,500 ng/m^3)	
Methyl Bromide	ND	1.00 ppb (3,900 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	1.64 ppb (232,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	3.45 ppb (51,000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	1.39 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.32 ppb (20,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	ND	2.99 ppb (41,000 ng/m^3)	

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Temporal trends in detected concentrations

Figure C-1 presents the concentrations over time for monitoring results in 2019 for any chemical detected at a quantifiable concentration in Lindsay. Screening levels, as defined in Appendix K, are abbreviated as SL in the following graphs. Regulatory targets, also defined in Appendix K, are abbreviated as RT.

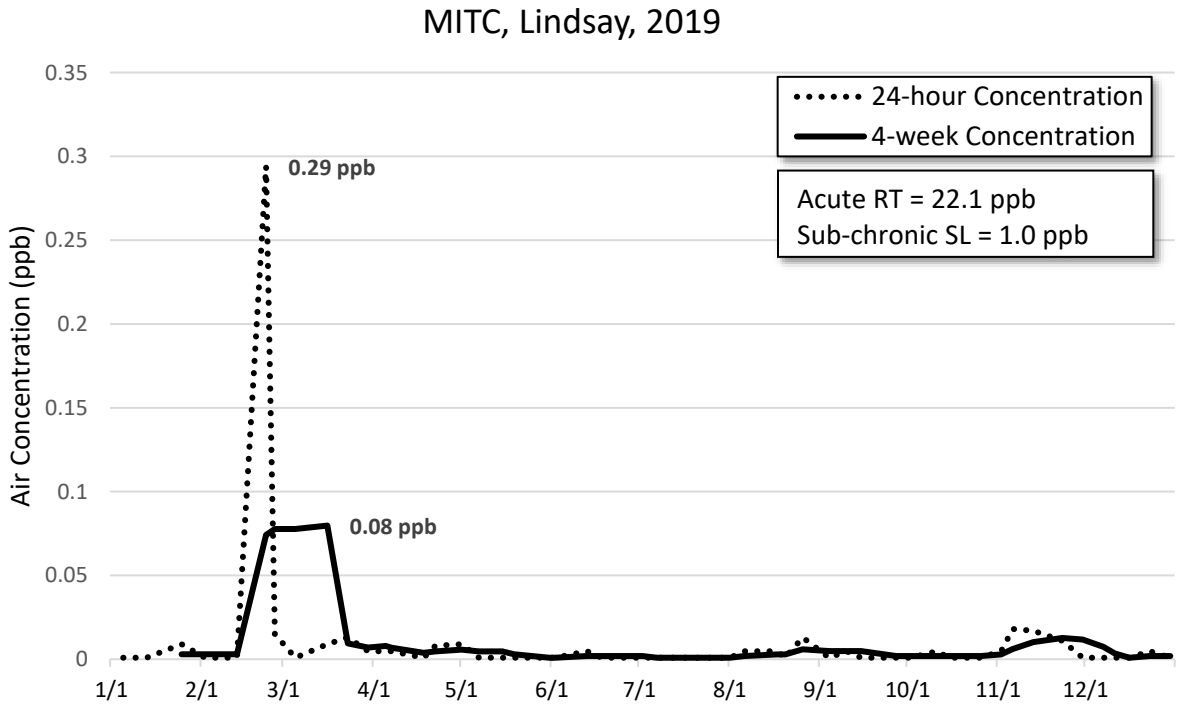

Figure C-1. Temporal trends in MITC concentrations in Lindsay in 2019.

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APPENDIX D: DETAILED RESULTS FOR OXNARD

Oxnard

Oxnard is located in Ventura County and is 39.21 square miles in area. The average elevation is 52 feet; it 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 transitioned from a Toxic Air Contaminant (TAC) Network site to an Air Monitoring Network (AMN) site. Monitoring is conducted by the California Air Resources Board (CARB).

Pesticide Detections

Table D-1 lists the number and percentage of analyses resulting in detections at the Oxnard sampling site. The active ingredients with the highest percentages of detections were malathion (28.6%, n = 14) and its oxygen analogue break-down product (32.7%, n = 16), followed by MITC (20.4%, n = 10). The highest percentage of quantifiable detections was observed for malathion (22.4%, n = 11), followed by chloropicrin (10%, n = 5), and then malathion's oxygen analog (6.1%, n = 3).

Table D-1. Number and percentage of positive samples per chemical in Oxnard, California.

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
1,3-dichloropropene	49	1	1	2%	2%
Acephate	49	0	0	0%	0%
Bensulide	49	0	0	0%	0%
Chloropicrin	50	7	5	14%	10%
Chlorothalonil	49	9	0	18.4%	0%
Chlorpyrifos	49	0	0	0%	0%
Chlorpyrifos OA	49	1	0	2%	0%
Cypermethrin	49	0	0	0%	0%
Dacthal	49	3	1	6.1%	2%
DDVP	49	8	0	16.3%	0%
DEF	49	0	0	0%	0%
Diazinon	49	0	0	0%	0%
Diazinon OA	49	0	0	0%	0%
Dimethoate	49	0	0	0%	0%
Dimethoate OA	49	0	0	0%	0%
Diuron	49	0	0	0%	0%
Endosulfan	49	0	0	0%	0%
Endosulfan Sulfate	49	0	0	0%	0%
EPTC	49	0	0	0%	0%
Iprodione	49	0	0	0%	0%

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Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
Malathion	49	14	11	28.6%	22.4%
Malathion OA	49	16	3	32.7%	6.1%
Methidathion	49	0	0	0%	0%
Methyl Bromide	49	0	0	0%	0%
Metolachlor (S-Metolachlor)	49	0	0	0%	0%
MITC	49	10	2	20.4%	4.1%
Norflurazon	49	0	0	0%	0%
Oryzalin	49	0	0	0%	0%
Oxydemeton Methyl	49	0	0	0%	0%
Oxyfluorfen	49	0	0	0%	0%
Permethrin	49	0	0	0%	0%
Phosmet	49	0	0	0%	0%
pp-dicofol	49	0	0	0%	0%
Propargite	49	0	0	0%	0%
Simazine	49	0	0	0%	0%
Trifluralin	49	0	0	0%	0%
Total	1,765	69	23	3.9%	1.3%

*Includes both quantifiable and trace detections.

Pesticide Concentrations

Acute (24-h) Concentrations

Table D-2 shows the highest 24-h concentrations observed for all chemicals monitored at the Oxnard AMN sampling location in 2019. The active ingredient with the highest concentration relative to its screening level was chloropicrin at 1.4%, followed by 1,3-dichloropropene at 0.5% and malathion at 0.1%. All other quantifiable concentrations of chemicals monitored for by the AMN were less than 0.1% of the acute screening level at Oxnard.

Table D-2. Highest 24-h air concentrations, acute screening levels, and percent of the acute screening levels for all chemicals monitored at the Oxnard AMN sampling location in 2019.

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
Chloropicrin	1.0 ppb (6,939 ng/m^3)	73.0 ppb (491,000 ng/m^3)*	1.4%
1,3-dichloropropene	0.51 ppb (2,315 ng/m^3)	110 ppb (505,000 ng/m^3)	0.5%
Malathion	0.008 ppb (113 ng/m^3)	8.33 ppb (113,000 ng/m^3)	0.1%
Malathion OA	0.001 ppb (19 ng/m^3)	8.76 ppb	0.02%

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Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
		(113,000 ng/m^3)	
MITC	0.03 ppb (84 ng/m^3)	220 ppb (660,000 ng/m^3)*	0.01%
Dacthal	0.002 ppb (21 ng/m^3)	1,730 ppb (23,500,000 ng/m^3)	0.00009%
Acephate	ND	1.60 ppb (12,000 ng/m^3)	
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.08 ppb (1,200 ng/m^3)**	
Chlorpyrifos OA	Trace	0.09 ppb (1,200 ng/m^3)**	
Cypermethrin	ND	6.64 ppb (113,000 ng/m^3)	
DDVP	Trace	1.22 ppb (11,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 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	0.20 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	69.6 ppb (939,000 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor	ND	7.33 ppb	

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Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
		(85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl	ND	3.74 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	5.94 ppb (77,000 ng/m^3)	
pp-dicofol	ND	4.49 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.

** CDPR's May 28, 2019, risk management directive for chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m3), 1-h time weighted average (TWA). However, the current sample duration does not allow for a direct comparison between the acute regulatory target concentration and the measured sample values.

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

Table D-3 shows the highest observed rolling 4-week or 13-week average concentrations for all chemicals monitored at the Oxnard AMN sampling location in 2019. The active ingredient with the highest concentration relative to its screening level was chloropicrin at 59%. This was followed by 1,3-dichloropropene at 3% and MITC at 1.3%. The remaining chemicals with quantifiable concentrations were significantly less than 1% of their sub-chronic screening levels.

Table D-3. Highest 4- or 13-wk air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored at the Oxnard Air Monitoring Network sampling location.

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
Chloropicrin*	0.2 ppb (1,359 ng/m^3)	0.35 ppb (2,300 ng/m^3)	59.1%
1,3-dichloropropene*	0.09 ppb	3.0 ppb	3%

	(417 ng/m^3)	(14,000 ng/m^3)	
MITC	0.01 ppb (40 ng/m^3)	1.00 ppb (3,000 ng/m^3)	1.3%
Malathion	0.005 ppb (62.3 ng/m^3)	6.27 ppb (80,600 ng/m^3)	0.08%
Malathion OA	0.0007 ppb (10.3 ng/m^3)	6.27 ppb (80,600 ng/m^3)	0.01%
Dacthal	0.0007 ppb (8.2 ng/m^3)	34.6 ppb (470,000 ng/m^3)	0.002%
Acephate	ND	0.35 ppb (2,300 ng/m^3)	
Bensulide	ND	1.47 ppb (24,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.06 ppb (850 ng/m^3)	
Chlorpyrifos OA	Trace	0.06 ppb (850 ng/m^3)	
Cypermethrin	ND	4.76 ppb (81,000 ng/m^3)	
DDVP	Trace	0.24 ppb (2,200 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	ND	1.78 ppb (17,000 ng/m^3)	
Endosulfan	ND	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	3.10 ppb (24,000 ng/m^3)	

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Iprodione	ND	21.2 ppb (286,000 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	5.0 ppb (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	12.2 ppb (18,0000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	2.00 ppb (26,000 ng/m^3)	
pp-dicofol	ND	3.24 ppb (49,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	ND	12.4 ppb (170,000 ng/m^3)	

* These concentrations represent the highest 13-week rolling average, rather than the default 4-week rolling average.

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Chronic (2019) Concentrations

Table D-4 shows the annual average concentration for all chemicals monitored at the Oxnard AMN sampling location in 2019. The active ingredient with the highest concentration relative to its screening level was chloropicrin at 24.2%, followed by MITC at 2.4%. All other monitored chemicals were less than 0.1% of the chronic screening level or regulatory target in Oxnard during monitoring in 2019.

Table D-4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored at the Oxnard AMN sampling location.

Chemical	Overall average concentration in ppb (ng/m^3)	Chronic screening level in ppb (ng/m^3)	% of screening level
Chloropicrin	0.06 ppb (436 ng/m^3)	0.27 ppb	24.2%

Chemical	Overall average concentration in ppb (ng/m^3)	Chronic screening level in ppb (ng/m^3)	% of screening level
		(1,800 ng/m^3)	
MITC	0.002 ppb (7.1 ng/m^3)	0.10 ppb (300 ng/m^3)	2.4%
1,3-dichloropropene	0.06 ppb (270 ng/m^3)	2.00 ppb (9,000 ng/m^3)	0.03%
Malathion OA	0.0002 ppb (2.8 ng/m^3)	0.63 ppb (8,100 ng/m^3)	0.03%
Malathion	0.0007 ppb (9.6 ng/m^3)	0.60 ppb (8,100 ng/m^3)	0.01%
Dacthal	0.0002 ppb (1.5 ng/m^3)	3.46 ppb (47,000 ng/m^3)	0.003%
Acephate	ND	1.13 ppb (8,500 ng/m^3)	
Bensulide	ND	1.48 ppb (24,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.04 ppb (510 ng/m^3)	
Chlorpyrifos OA	Trace	0.04 ppb (510 ng/m^3)	
Cypermethrin	ND	1.59 ppb (27,000 ng/m^3)	
DDVP	Trace	0.09 ppb (770 ng/m^3)	
DEF	ND	NA – Seasonal	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.03 ppb (300 ng/m^3)	
Dimethoate OA	ND	0.03 ppb (300 ng/m^3)	
Diuron	ND	0.60 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.02 ppb (330 ng/m^3)	
EPTC	ND	1.10 ppb (8,500 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	

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Chemical	Overall average concentration in ppb (ng/m^3)	Chronic screening level in ppb (ng/m^3)	% of screening level
Methidathion	ND	0.20 ppb (2,500 ng/m^3)	
Methyl Bromide	ND	1.00 ppb (3,900 ng/m^3)	
Metolachlor	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	1.64 ppb (232,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	3.45 ppb (51,000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	1.39 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.32 ppb (20,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	ND	2.99 ppb (41,000 ng/m^3)	

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Temporal trends in detected concentrations

Figures D-1 to D-5 present the present the concentrations over time for monitoring results in 2019 for any chemical detected at a quantifiable concentration in Oxnard. Screening levels, as defined in Appendix K, are abbreviated as SL in the following graphs. Regulatory targets, also defined in Appendix K, are abbreviated as RT. For graphs where both a pesticide and its degradate are shown, the detected concentrations of both the parent chemical and its degradate have been summed for each sampling date.

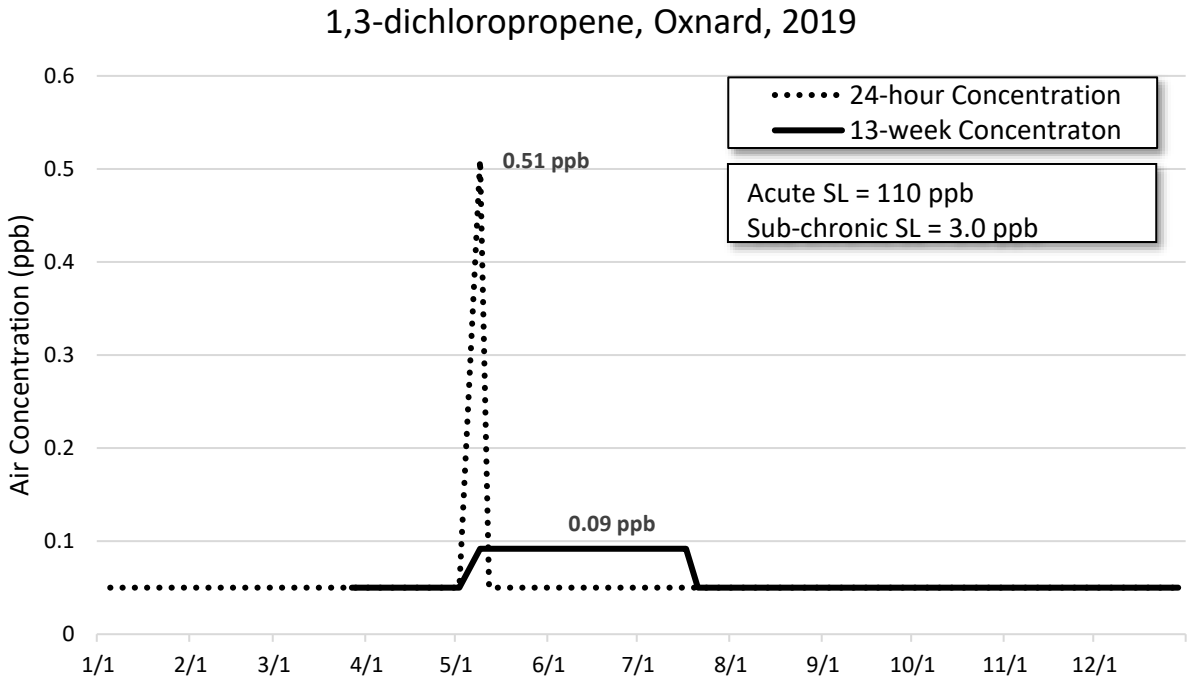

Figure D-1. Temporal trend in 1,3-dichloropropene concentrations in Oxnard in 2019.

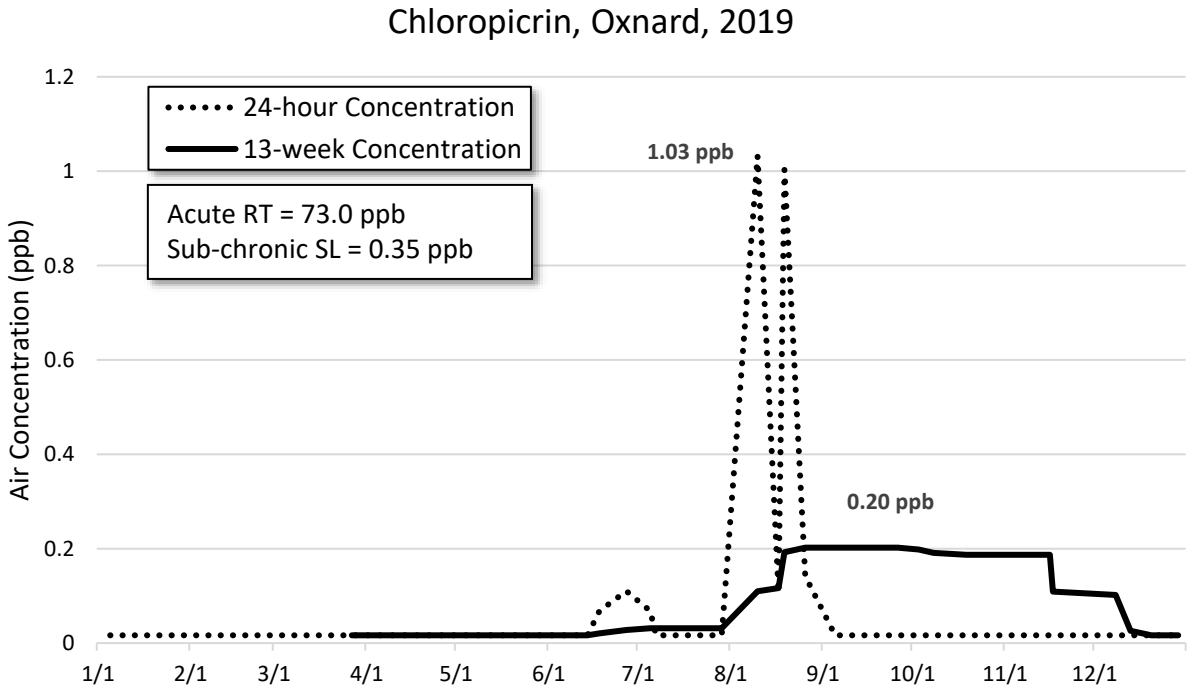

Figure D-2. Temporal trend in chloropicrin concentrations in Oxnard in 2019.

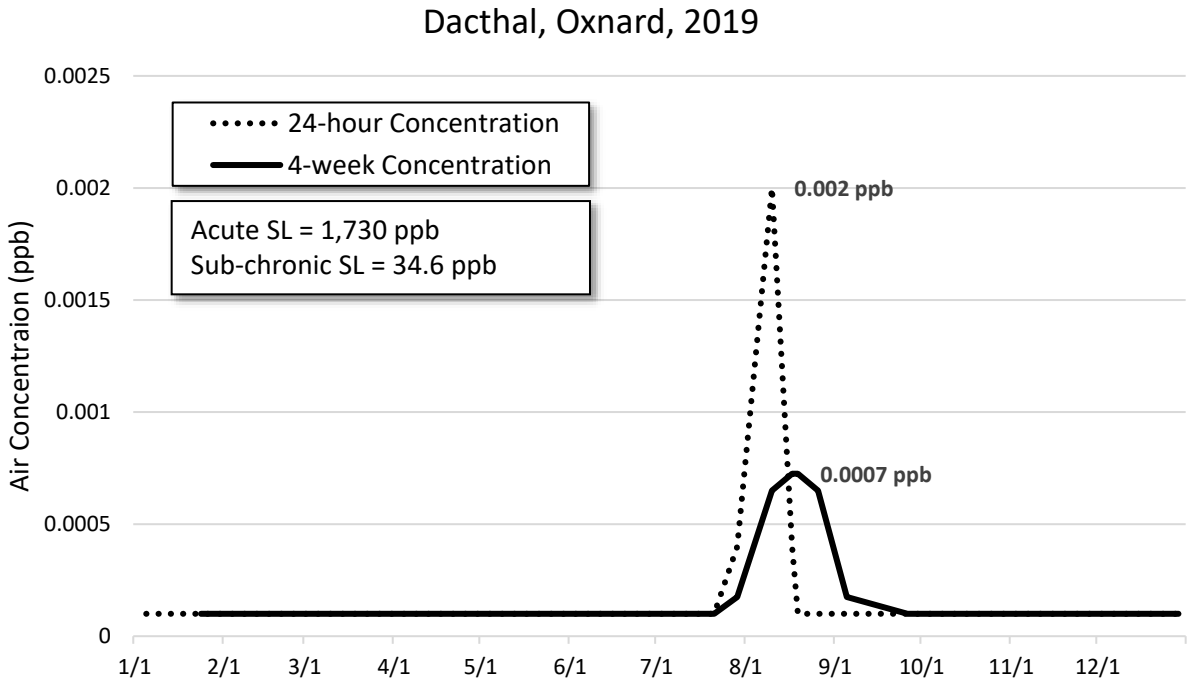

Figure D-3. Temporal trend in dacthal concentrations in Oxnard in 2019.

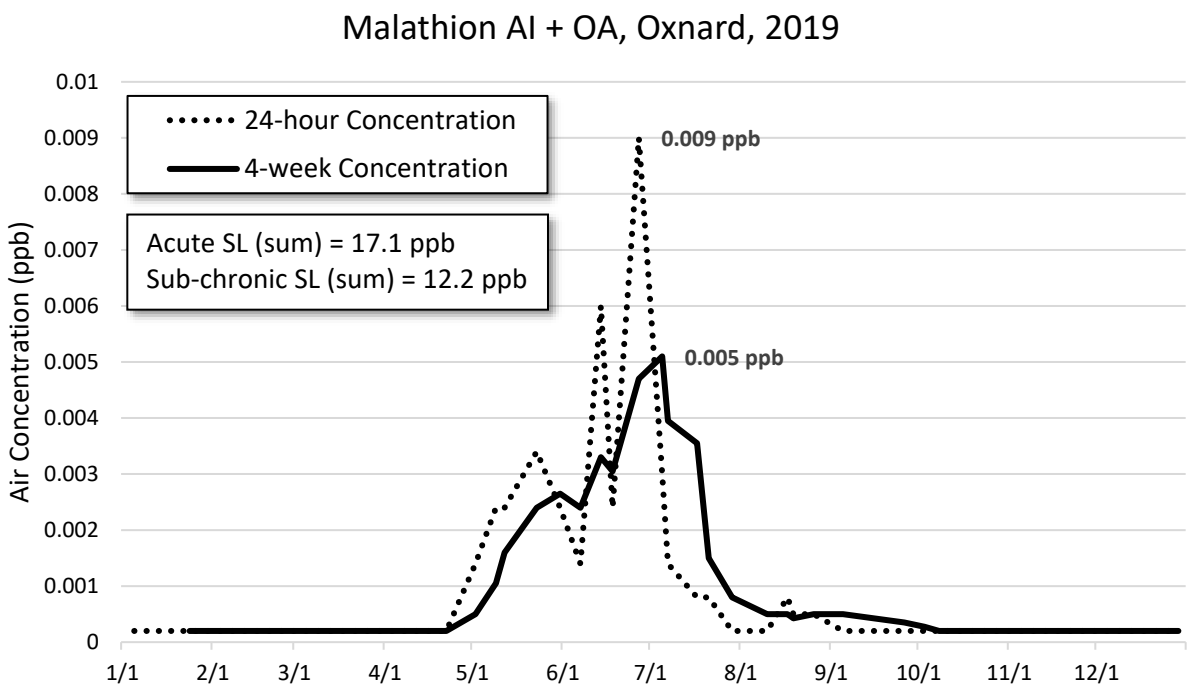

Figure D-4. Temporal trend in malathion AI + OA concentrations in Oxnard in 2019.

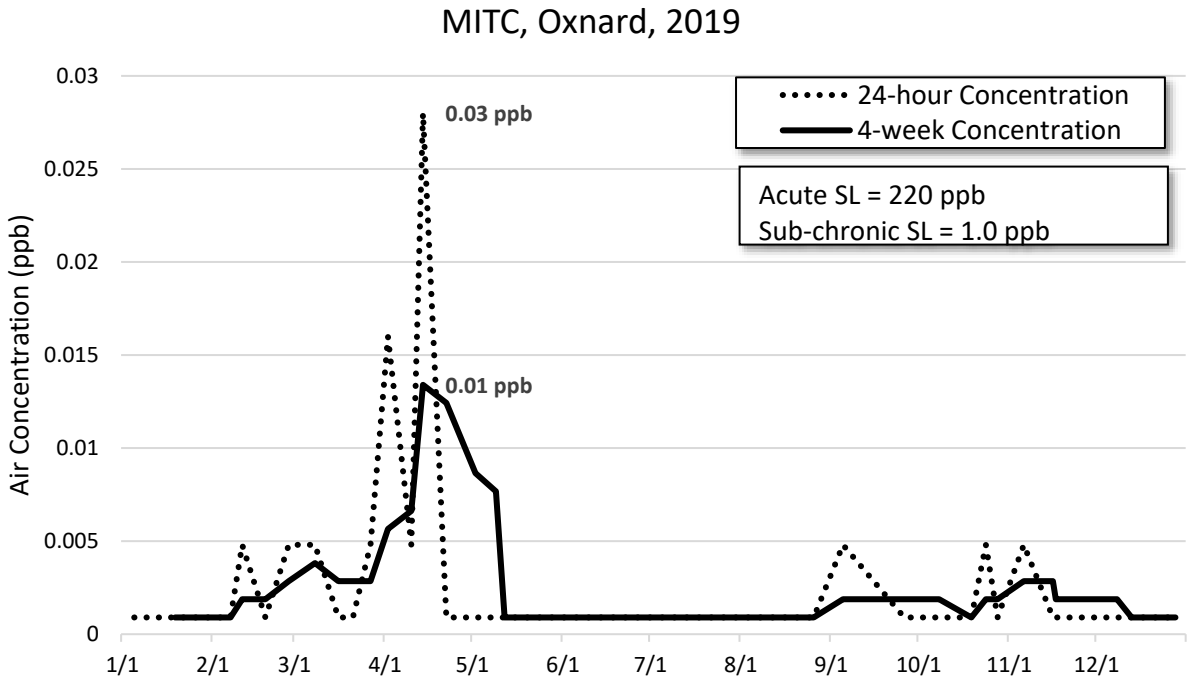

Figure D-5. Temporal trend in MITC concentrations in Oxnard in 2019.

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APPENDIX E: DETAILED RESULTS FOR SAN JOAQUIN

San Joaquin

The city of San Joaquin is located in Fresno County and is 1.20 square miles in area. The average elevation is 174 feet; 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 is conducted by the California Air Resources Board.

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 (54.7%, n = 29), followed by trifluralin (28.3%, n = 15), and then both chlorothalonil and DDVP (15.1%, n = 8). The highest percentage of quantifiable detections were observed for MITC (35.8%, n= 19), followed by 1,3-dichloropropene (3.8%, n = 2)

Table E-1. Number and percentage of positive samples per chemical in San Joaquin, California.

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
1,3-dichloropropene	53	2	2	3.8%	3.8%
Acephate	53	0	0	0%	0%
Bensulide	53	0	0	0%	0%
Chloropicrin	53	0	0	0%	0%
Chlorothalonil	53	8	0	15.1%	0%
Chlorpyrifos	53	1	0	1.9%	0%
Chlorpyrifos oa	53	0	0	0%	0%
Cypermethrin	53	0	0	0%	0%
Dacthal	53	0	0	0%	0%
DDVP	53	5	2	17%	3.8%
DEF	53	0	0	0%	0%
Diazinon	53	0	0	0%	0%
Diazinon oa	53	0	0	0%	0%
Dimethoate	53	0	0	0%	0%
Dimethoate oa	53	0	0	0%	0%
Diuron	53	1	0	1.9%	0%
Endosulfan	53	0	0	0%	0%
Endosulfan Sulfate	53	0	0	0%	0%
EPTC	53	0	0	0%	0%
Iprodione	53	0	0	0%	0%

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Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
Malathion	53	2	0	3.8%	0%
Malathion oa	53	2	0	3.8%	0%
Methidathion	53	0	0	0%	0%
Methyl Bromide	53	0	0	0%	0%
Metolachlor (S-Metolachlor)	53	0	0	0%	0%
MITC	53	31	21	58.4%	39.6%
Norflurazon	53	0	0	0%	0%
Oryzalin	53	0	0	0%	0%
Oxydemeton Methyl	53	0	0	0%	0%
Oxyfluorfen	53	0	0	0%	0%
Permethrin	53	0	0	0%	0%
Phosmet	53	0	0	0%	0%
pp-dicofol	53	0	0	0%	0%
Propargite	53	1	0	1.9%	0%
Simazine	53	0	0	0%	0%
Trifluralin	53	17	0	32.1%	0%
Total	**1,908**	**73**	**25**	**3.8%**	**1.3%**

*Includes both quantifiable and trace detections.

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Pesticide Concentrations

Acute (24-h) Concentrations

Table E-2 shows the highest observed 24-h concentrations observed for all chemicals monitored at the San Joaquin Air Monitoring Network (AMN) sampling location in 2019. The highest concentration relative to its screening level was that of DDVP at 5.2%, followed by MITC at 0.7%, and then 1,3-dichloropropene at 0.5%.

Table E-2. Highest 24-h air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored at the San Joaquin AMN sampling location in 2019.

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
DDVP	0.06 ppb (572 ng/m^3)	1.22 ppb (11,000 ng/m^3)	5.2%
MITC	1.53 ppb (4,580 ng/m^3)	220 ppb (660,000 ng/m^3)*	0.7%
1,3-dichloropropene	0.56 ppb (2,542 ng/m^3)	110 ppb (505,000 ng/m^3)	0.5%
Acephate	ND	1.60 ppb (12,000 ng/m^3)	
Bensulide	ND	15.9 ppb (259,000	

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
		ng/m^3)	
Chloropicrin	ND	73.0 ppb (491,000 ng/m^3)*	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	Trace	0.08 ppb (1,200 ng/m^3)**	
Chlorpyrifos OA	ND	0.09 ppb (1,200 ng/m^3)**	
Cypermethrin	ND	6.64 ppb (113,000 ng/m^3)	
Dacthal	ND	1,730 ppb (23,500,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 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	0.20 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	69.6 ppb (939,000 ng/m^3)	
Malathion	Trace	8.33 ppb (113,000 ng/m^3)	
Malathion OA	Trace	8.76 ppb (113,000 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor	ND	7.33 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb	

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Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
		(170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl	ND	3.74 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	5.94 ppb (77,000 ng/m^3)	
pp-dicofol	ND	4.49 ppb (68,000 ng/m^3)	
Propargite	Trace	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	13.3 ppb (110,000 ng/m^3)	
Trifluralin	Trace	87.5 ppb (1,200,000 ng/m^3)	

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

** CDPR's May 28, 2019, risk management directive for chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m3), 1-h time weighted average (TWA). However, the current sample duration does not allow for a direct comparison between the acute regulatory target concentration and the measured sample values.

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

Table E-3 shows the highest observed rolling 4-week or 13-week average concentrations for all chemicals monitored at the San Joaquin AMN sampling location in 2019. The highest concentration relative to its sub-chronic screening level was that of MITC at 43%, which was followed by DDVP at 7% and then 1,3-dichloropropene at 2.9%.

Table E-3. Highest 4- or 13-wk air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored at the San Joaquin AMN sampling location.

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
MITC	0.43 ppb (1,284 ng/m^3)	1.00 ppb (3,000 ng/m^3)	43%
DDVP	0.02 ppb (157 ng/m^3)	0.24 ppb (2,200 ng/m^3)	7.1%
1,3-dichloropropene*	0.09 ppb (405 ng/m^3)	3.0 ppb (14,000 ng/m^3)	2.9%

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
Acephate	ND	0.35 ppb (2,300 ng/m^3)	
Bensulide	ND	1.47 ppb (24,000 ng/m^3)	
Chloropicrin*	ND	0.35 ppb (2,300 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	Trace	0.06 ppb (850 ng/m^3)	
Chlorpyrifos OA	ND	0.06 ppb (850 ng/m^3)	
Cypermethrin	ND	4.76 ppb (81,000 ng/m^3)	
Dacthal	ND	34.6 ppb (470,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	Trace	1.78 ppb (17,000 ng/m^3)	
Endosulfan	ND	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	3.10 ppb (24,000 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	
Malathion	Trace	5.97 ppb (80,600 ng/m^3)	

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Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
Malathion OA	Trace	6.27 ppb (80,600 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	5.0 ppb (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	12.2 ppb (18,0000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	2.00 ppb (26,000 ng/m^3)	
pp-dicofol	ND	3.24 ppb (49,000 ng/m^3)	
Propargite	Trace	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	Trace	12.4 ppb (170,000 ng/m^3)	

* These concentrations represent the highest 13-week rolling average, rather than the default 4-week rolling average.

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Chronic (2019) Concentrations

Table E-4 shows the annual average concentration for all chemicals monitored at the San Joaquin AMN sampling location in 2019. The highest concentration relative to its screening level was that of MITC at 58%, followed by 1,3-dichloropropene at 3% and then DDVP at 2%. All other monitored chemicals were either trace detections or not detected during 2019.

Table E-4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored at the San Joaquin AMN sampling location.

Chemical	Overall average concentration (ng/m^3)	Chronic screening level (ng/m^3)	% of screening level
1,3-dichloropropene	0.061 ppb (277.52 ng/m^3)	2.00 ppb (9,000 ng/m^3)	3%
MITC	0.058 ppb (174 ng/m^3)	0.10 ppb (300 ng/m^3)	58%
DDVP	0.002 ppb (15.3 ng/m^3)	0.09 ppb (770 ng/m^3)	2%
Acephate	ND	1.13 ppb (8,500 ng/m^3)	
Bensulide	ND	1.48 ppb (24,000 ng/m^3)	
Chloropicrin	ND	0.27 ppb (1,800 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	Trace	0.04 ppb (510 ng/m^3)	
Chlorpyrifos OA	ND	0.04 ppb (510 ng/m^3)	
Cypermethrin	ND	1.59 ppb (27,000 ng/m^3)	
Dacthal	ND	3.46 ppb (47,000 ng/m^3)	
DEF	ND	NA – Seasonal	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.03 ppb (300 ng/m^3)	
Dimethoate OA	ND	0.03 ppb (300 ng/m^3)	
Diuron	Trace	0.60 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.02 ppb (330 ng/m^3)	
EPTC	ND	1.10 ppb (8,500 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	
Malathion	Trace	0.60 ppb	

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Chemical	Overall average concentration (ng/m^3)	Chronic screening level (ng/m^3)	% of screening level
		(8,100 ng/m^3)	
Malathion OA	Trace	0.63 ppb (8,100 ng/m^3)	
Methidathion	ND	0.20 ppb (2,500 ng/m^3)	
Methyl Bromide	ND	1.00 ppb (3,900 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	1.64 ppb (232,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	3.45 ppb (51,000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	1.39 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.32 ppb (20,000 ng/m^3)	
Propargite	Trace	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	Trace	2.99 ppb (41,000 ng/m^3)	

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Temporal trends in detected concentrations

Figures E-1 to E-3 present the concentrations over time for monitoring results in 2019 for any chemical detected at a quantifiable concentration in San Joaquin. Screening levels, as defined in Appendix K, are abbreviated as SL in the following graphs. Regulatory targets, also defined in Appendix K, are abbreviated as RT.

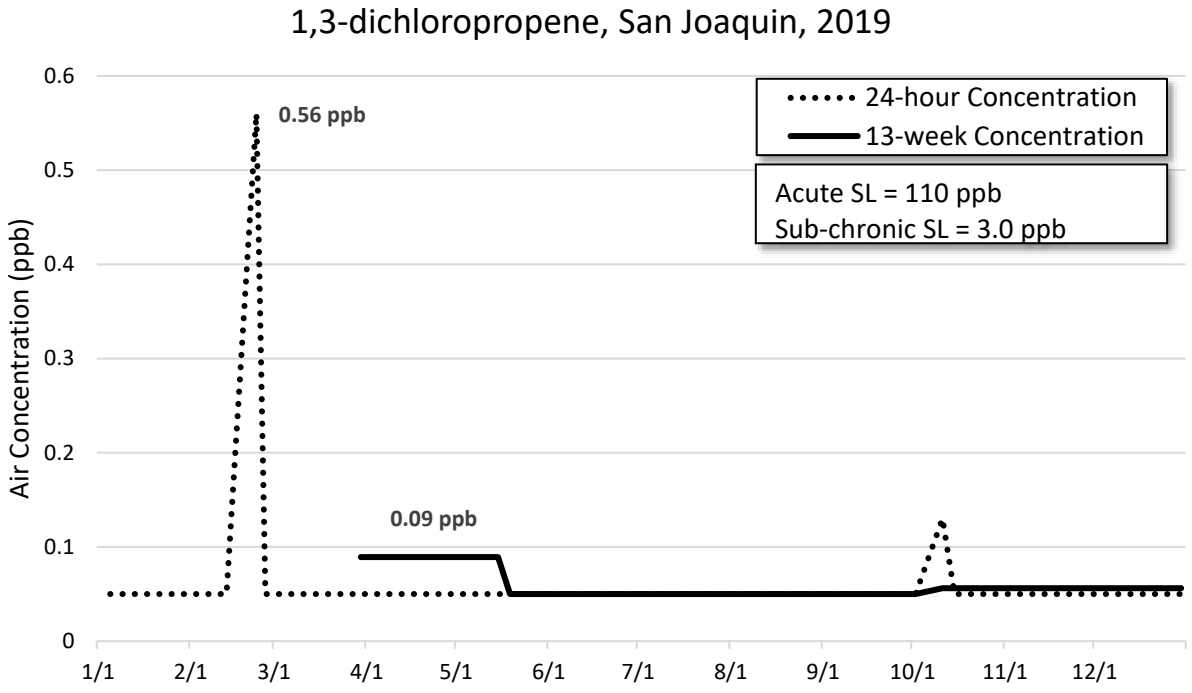

Figure E-1. Temporal trend in 1,3-dichloropropene concentrations in San Joaquin in 2019.

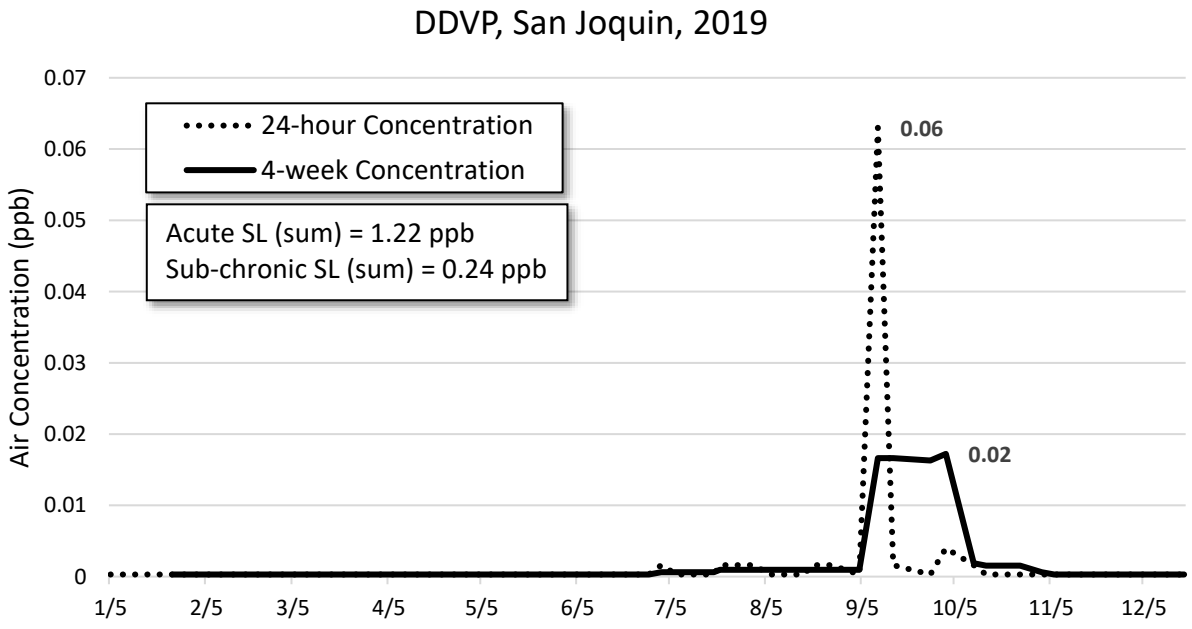

Figure E-2. Temporal trend in DDVP concentrations in San Joaquin in 2019.

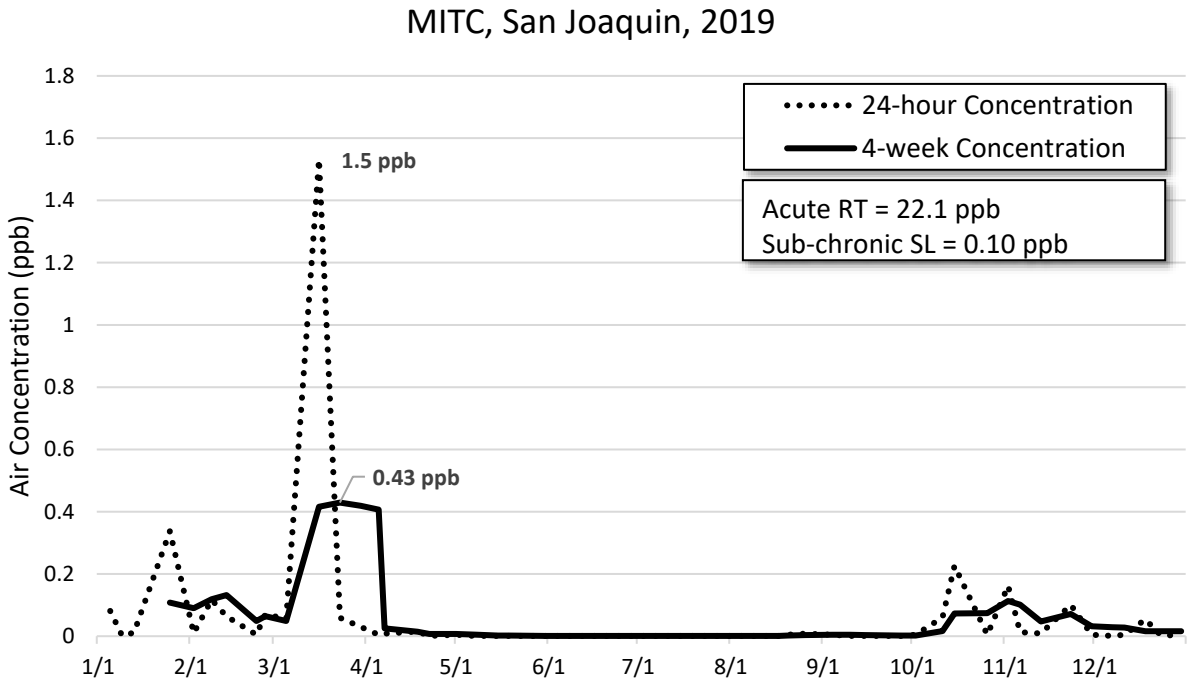

Figure E-3. Temporal trend in MITC concentrations in San Joaquin in 2019.

APPENDIX F: DETAILED RESULTS FOR SANTA MARIA

Santa Maria

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 this population, 31.45% were below 18 years of age and 9.43% were above 65 years of age. The major crops in the immediate area around Santa Maria are strawberries, wine grapes, and broccoli. The monitoring site was located at a California Air Resources Board (CARB) monitoring location adjacent to Santa Maria High School for most of 2019. On November 12, 2019, the monitoring site was relocated to the southwest corner of Bonita Elementary.

Monitoring at this site is conducted through a California Department of Pesticide Regulation (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 for this study, 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 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 (49%, n = 25), followed by dacthal (43.1%, n = 22), and then malathion's oxygen analog (OA) break-down product (37.2%, n = 19). The highest percentage of quantifiable detections were observed for MITC (11.5%, n = 6), followed by malathion OA (5.9%, n = 3), and then both chloropicrin and malathion (3.9%, n = 2).

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

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of possible detections	Percent of quantifiable detections
1,3-dichloropropene	52	1	1	1.9%	1.9%
Acephate	51	1	0	2.0%	0%
Bensulide	51	0	0	0%	0%
Chloropicrin	51	3	2	5.9%	3.9%
Chlorothalonil	51	3	0	5.9%	0%
Chlorpyrifos	51	0	0	0%	0%
Chlorpyrifos OA	51	0	0	0%	0%
Cypermethrin	51	1	0	2.0%	0%
Dacthal	51	22	0	43.1%	0%
DDVP	51	13	1	25.4%	2.0%
DEF	51	0	0	0%	0%

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of possible detections	Percent of quantifiable detections
Diazinon	51	0	0	0%	0%
Diazinon OA	51	0	0	0%	0%
Dimethoate	51	0	0	0%	0%
Dimethoate OA	51	1	0	2.0%	0%
Diuron	51	0	0	0%	0%
Endosulfan	51	0	0	0%	0%
Endosulfan Sulfate	51	0	0	0%	0%
EPTC	51	0	0	0%	0%
Iprodione	51	0	0	0%	0%
Malathion	51	25	2	49%	3.9%
Malathion OA	51	20	3	39.2%	5.9%
Methidathion	51	1	0	2.0%	0%
Methyl Bromide	52	0	0	0%	0%
Metolachlor (S-Metolachlor)	51	0	0	0%	0%
MITC	52	11	6	21.2%	11.5%
Norflurazon	51	0	0	0%	0%
Oryzalin	51	0	0	0%	0%
Oxydemeton Methyl	51	0	0	0%	0%
Oxyfluorfen	51	0	0	0%	0%
Permethrin	51	0	0	0%	0%
Phosmet	51	0	0	0%	0%
pp-dicofol	51	0	0	0%	0%
Propargite	51	0	0	0%	0%
Simazine	51	0	0	0%	0%
Trifluralin	51	12	0	23.5%	0%
Total	**1,839**	**110**	**15**	**6.0%**	**0.8%**

*Includes both quantifiable and trace detections.

Pesticide Concentrations

Acute (24-h) Concentrations

Table F-2 shows the highest 24-h concentrations observed for all chemicals monitored at the Santa Maria Air Monitoring Network (AMN) sampling location in 2019. The active ingredients with the highest concentration relative to its screening level was chloropicrin at 0.6%, followed by DDVP at 0.2%. All other quantifiable concentrations were below 0.1% of their respective chemicals' screening level.

Table F-2. Highest 24-h air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored at the Santa Maria AMN sampling location in 2019.

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
Chloropicrin	0.45 ppb (2,992 ng/m^3)	73.0 ppb (491,000 ng/m^3)*	0.6%
DDVP	0.003 ppb (24 ng/m^3)	1.22 ppb (11,000 ng/m^3)	0.2%
Malathion	0.007 ppb (97 ng/m^3)	8.33 ppb (113,000 ng/m^3)	0.09%
MITC	0.125 ppb (375 ng/m^3)	220 ppb (660,000 ng/m^3)*	0.06%
Malathion OA	0.001 ppb (13 ng/m^3)	8.76 ppb (113,000 ng/m^3)	0.01%
1,3-dichloropropene	0.13 ppb (590 ng/m^3)	110 ppb (505,000 ng/m^3)	0.001%
Acephate	Trace	1.60 ppb (12,000 ng/m^3)	
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.08 ppb (1,200 ng/m^3)**	
Chlorpyrifos OA	ND	0.09 ppb (1,200 ng/m^3)**	
Cypermethrin	Trace	6.64 ppb (113,000 ng/m^3)	
Dacthal	Trace	1,730 ppb (23,500,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.46 ppb (4,300 ng/m^3)	
Dimethoate OA	Trace	0.49 ppb (4,300 ng/m^3)	
Diuron	ND	17.8 ppb (170,000 ng/m^3)	
Endosulfan	ND	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb	

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
		(3,300 ng/m^3)	
EPTC	ND	29.7 ppb (230,000 ng/m^3)	
Iprodione	ND	69.6 ppb (939,000 ng/m^3)	
Methidathion	Trace	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor	ND	7.33 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl	ND	3.74 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	5.94 ppb (77,000 ng/m^3)	
pp-dicofol	ND	4.49 ppb (68,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	13.3 ppb (110,000 ng/m^3)	
Trifluralin	Trace	87.5 ppb (1,200,000 ng/m^3)	

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

** CDPR's May 28, 2019, risk management directive for chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m3), 1-h time weighted average (TWA). 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-wk) 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 2019. The active ingredient with the highest concentration relative to its screening level was chloropicrin at 23%. This was followed by MITC at 4.3% and then 1,3-dichloropropene at 1.8%. Rolling 4-week averages for DDVP, malathion and its oxygen analog breakdown product came in at 0.5%, 0.03%, and 0.008% of the sub-chronic screening levels, respectively.

Table F-3. Highest 4- or 13-wk air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored at the Santa Maria AMN sampling location.

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
Chloropicrin*	0.08 ppb (523 ng/m^3)	0.35 ppb (2,300 ng/m^3)	23%
MITC	0.04 ppb (129 ng/m^3)	1.00 ppb (3,000 ng/m^3)	4.3%
1,3-dichloropropene*	0.06 ppb (255 ng/m^3)	3.0 ppb (14,000 ng/m^3)	1.8%
DDVP	0.001 ppb (11 ng/m^3)	0.24 ppb (2,200 ng/m^3)	0.5%
Malathion	0.002 ppb (28 ng/m^3)	5.97 ppb (80,600 ng/m^3)	0.03%
Malathion OA	0.0005 ppb (6.2 ng/m^3)	6.27 ppb (80,600 ng/m^3)	0.008%
Acephate	Trace	0.35 ppb (2,300 ng/m^3)	
Bensulide	ND	1.47 ppb (24,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.06 ppb (850 ng/m^3)	
Chlorpyrifos oa	ND	0.06 ppb (850 ng/m^3)	
Cypermethrin	Trace	4.76 ppb (81,000 ng/m^3)	
Dacthal	Trace	34.6 ppb (470,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon oa	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate oa	Trace	0.34 ppb	

		(3,000 ng/m^3)	
Diuron	ND	1.78 ppb (17,000 ng/m^3)	
Endosulfan	ND	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	ND	3.10 ppb (24,000 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	
Methidathion	Trace	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	5.0 ppb (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	12.2 ppb (18,0000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	2.00 ppb (26,000 ng/m^3)	
pp-dicofol	ND	3.24 ppb (49,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	Trace	12.4 ppb (170,000 ng/m^3)	

* These concentrations represent the highest 13-week rolling average, rather than the default 4-week rolling average.

Chronic (2019) Concentrations

Table F-4 shows the annual average concentration for all chemicals monitored at the Santa Maria AMN sampling location in 2019. The active ingredients with the highest concentration relative to its screening level was chloropicrin at 12%, followed by MITC at 5.7% and 1,3-dichloropropene at 2.6%.

Table F-4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored at the Santa Maria AMN sampling location.

Chemical	Overall average concentration in ppb (ng/m^3)	Chronic screening level in ppb (ng/m^3)	% of screening level
Chloropicrin	0.03 ppb (216 ng/m^3)	0.27 ppb (1,800 ng/m^3)	12%
MITC	0.006 ppb (17 ng/m^3)	0.10 ppb (300 ng/m^3)	5.7%
1,3-dichloropropene	0.05 ppb (234 ng/m^3)	2.00 ppb (9,000 ng/m^3)	2.6%
DDVP	0.0007 ppb (5.5 ng/m^3)	0.09 ppb (770 ng/m^3)	0.7%
Malathion	0.0004 ppb (5.3 ng/m^3)	0.60 ppb (8,100 ng/m^3)	0.07%
Malathion OA	0.0002 ppb (2.7 ng/m^3)	0.63 ppb (8,100 ng/m^3)	0.03%
Acephate	Trace	1.13 ppb (8,500 ng/m^3)	
Bensulide	ND	1.48 ppb (24,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.04 ppb (510 ng/m^3)	
Chlorpyrifos OA	ND	0.04 ppb (510 ng/m^3)	
Cypermethrin	Trace	1.59 ppb (27,000 ng/m^3)	
Dacthal	Trace	3.46 ppb (47,000 ng/m^3)	
DEF	ND	NA – Seasonal	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.03 ppb (300 ng/m^3)	
Dimethoate OA	Trace	0.03 ppb (300 ng/m^3)	
Diuron	ND	0.60 ppb	

Chemical	Overall average concentration in ppb (ng/m^3)	Chronic screening level in ppb (ng/m^3)	% of screening level
		(5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.02 ppb (330 ng/m^3)	
EPTC	ND	1.10 ppb (8,500 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	
Methidathion	Trace	0.20 ppb (2,500 ng/m^3)	
Methyl Bromide	ND	1.00 ppb (3,900 ng/m^3)	
Metolachlor	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	1.64 ppb (232,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	3.45 ppb (51,000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	1.39 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.32 ppb (20,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	Trace	2.99 ppb (41,000 ng/m^3)	

Temporal trends in detected concentrations

Figures F-1 to F-5 present the concentrations over time for monitoring results in 2019 for any chemical detected at a quantifiable concentration in Santa Maria. Screening levels, as defined in Appendix K, are abbreviated as SL in the following graphs. Regulatory targets, also defined in Appendix K, are abbreviated as RT. For graphs where both a pesticide and its degradate are shown, the detected

concentrations of both the parent chemical and its degradate have been summed for each sampling date.

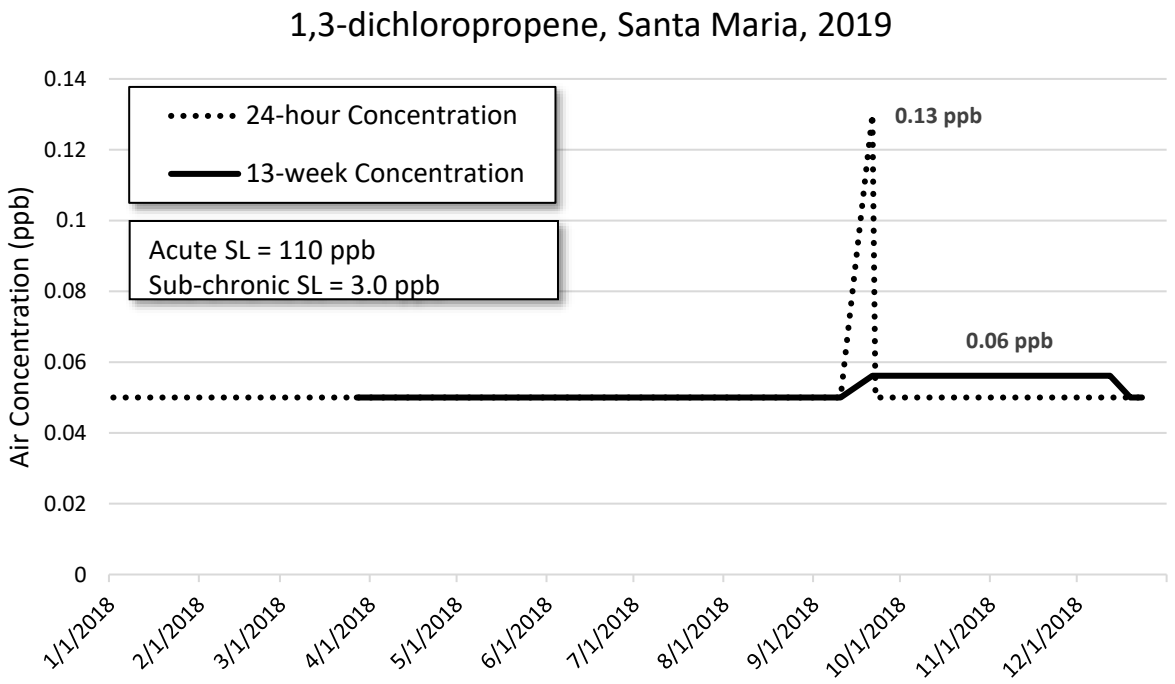

Figure F-1. Temporal trend in 1,3-dichloropropene concentrations in Santa Maria in 2019.

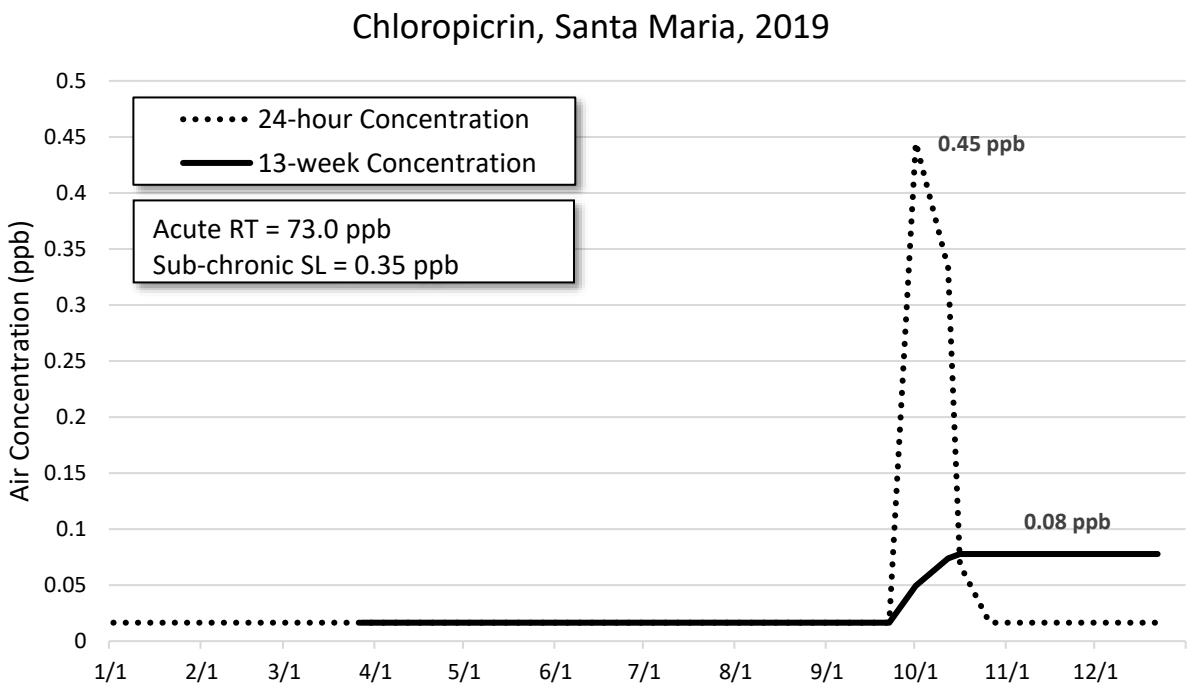

Figure F-2. Temporal trend in chloropicrin concentrations in Santa Maria in 2019.

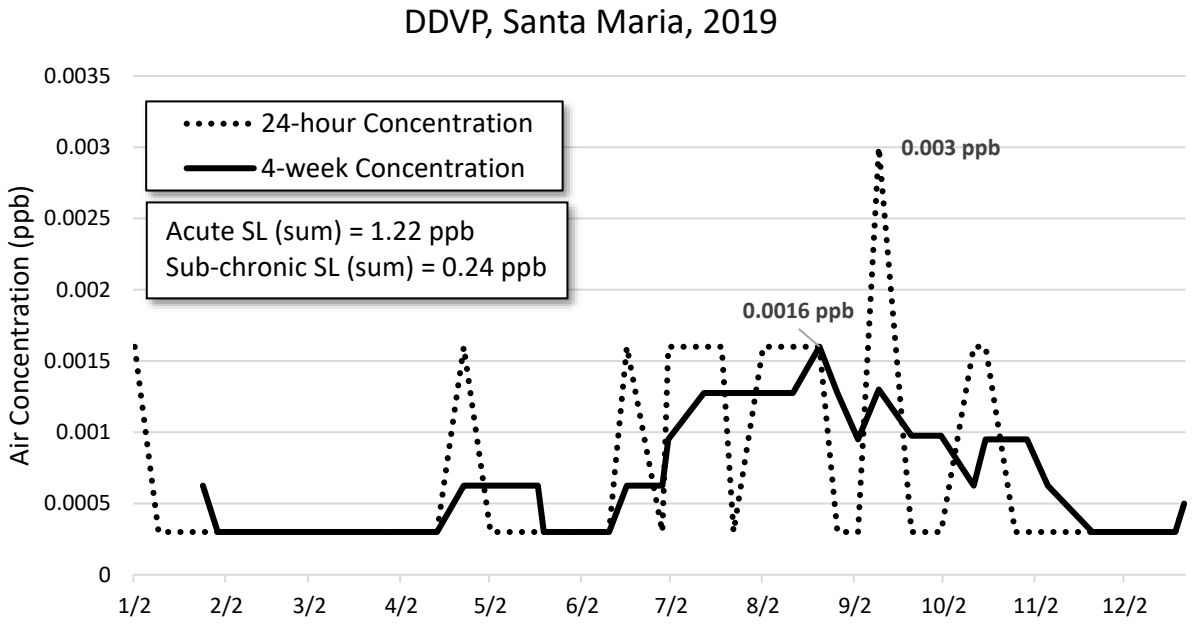

Figure F-3. Temporal trend in DDVP concentrations in Santa Maria in 2019.

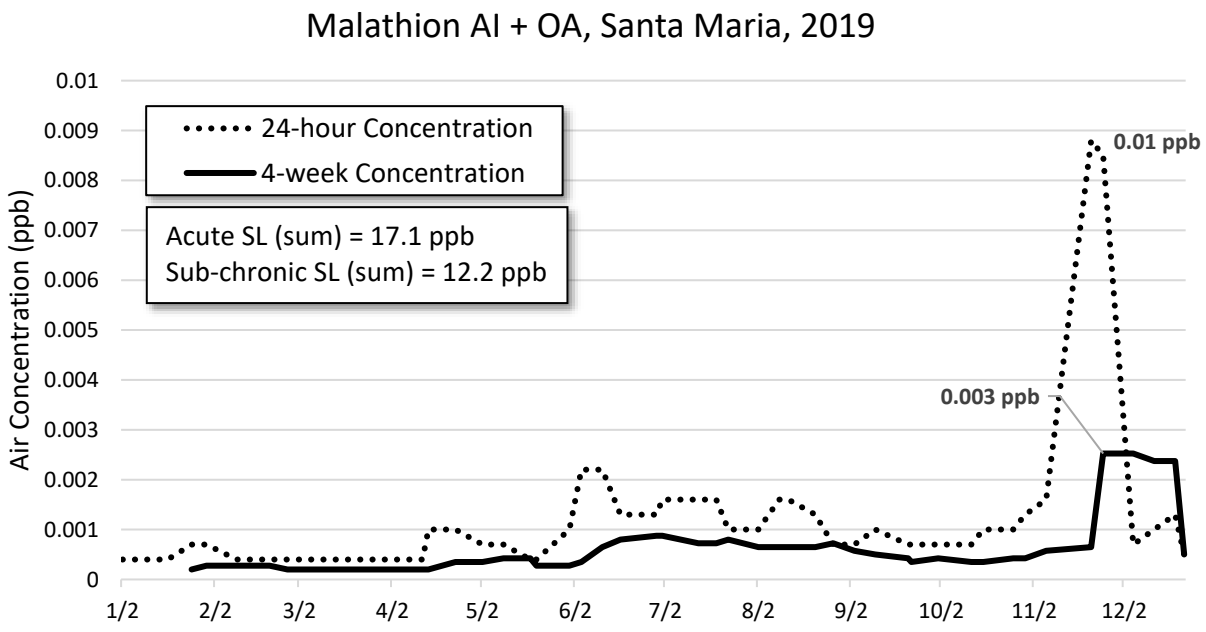

Figure F-4. Temporal trend in summed malathion AI + OA concentrations in Santa Maria in 2019.

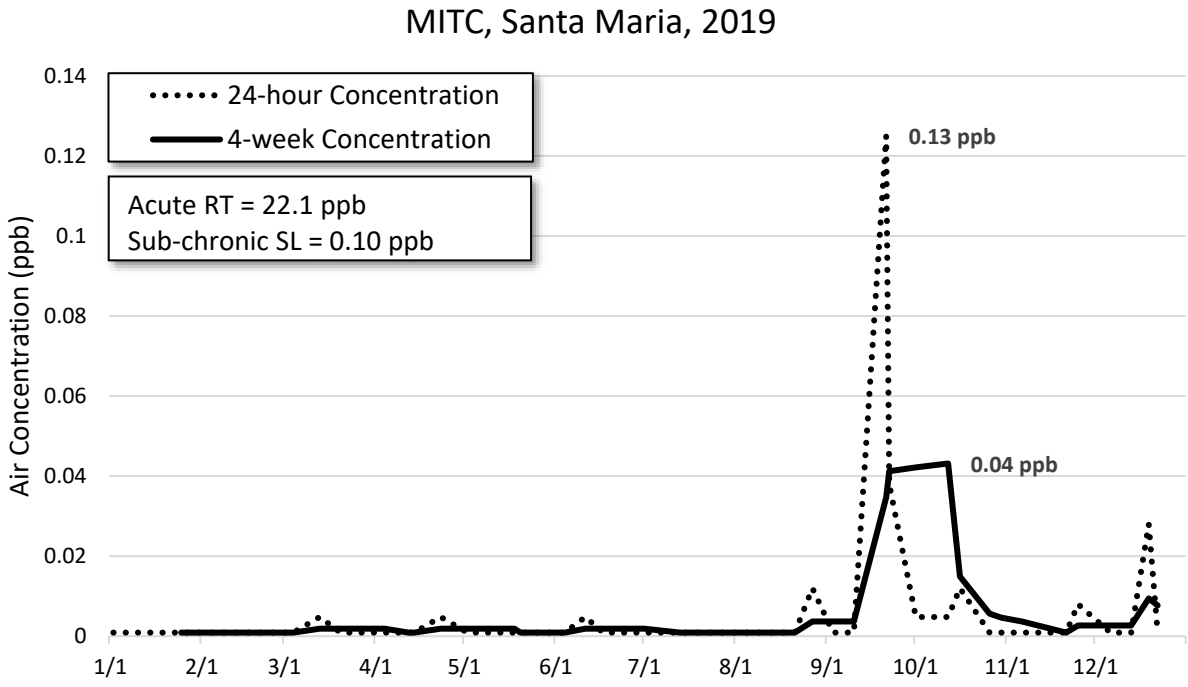

Figure F-5. Temporal trend in MITC concentrations in Santa Maria in 2019.

APPENDIX G: DETAILED RESULTS FOR SHAFTER

Shafter

The Shafter sampling site has continued as a monitoring site from the original three communities in the 2011-2016 Air Monitoring Network (AMN) monitoring period. Shafter is a small city (18 square miles in area) located approximately 18 miles west-northwest of Bakersfield in Kern County. The elevation is 351 feet; it 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 in the northeastern edge of the city. On February 22, 2019, the monitoring site was relocated to the north west corner of Sequoia Elementary School, a half mile north northwest from the original sampling location. Monitoring at this sampling location has continued uninterrupted since February 1, 2011, during which time, it was operated by the California Department of Pesticide Regulation (CDPR). The California Air Resources Board (CARB) assumed operation of this monitoring location on April 2, 2018.

Pesticide Detections

Table G-1 lists the number and percentage of analyses resulting in detections at the Shafter sampling site. The active ingredient with the highest percentage of detections was MITC (59.2%, n = 29), followed by chlorothalonil (40%, n = 20), and then DDVP, EPTC, and 1,3-dichloropropene (10%, n = 5). The highest percentage of quantifiable detections was observed for MITC (40.8%, n = 20), followed by 1,3-dichloropropene (10%, n = 5), and then EPTC (6%, n = 3).

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

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
1,3-dichloropropene	49	5	5	10%	10%
Acephate	50	0	0	0%	0%
Bensulide	50	0	0	0%	0%
Chloropicrin	48	1	1	2.1%	2.1%
Chlorothalonil	50	20	0	40.0%	0%
Chlorpyrifos	50	2	0	4.0%	0%
Chlorpyrifos OA	50	0	0	0%	0%
Cypermethrin	50	1	0	2.0%	0%
Dacthal	50	1	0	2.0%	0%
DDVP	50	5	0	10.0%	0%
DEF	50	0	0	0%	0%
Diazinon	50	0	0	0%	0%
Diazinon OA	50	0	0	0%	0%

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
Dimethoate	50	0	0	0%	0%
Dimethoate OA	50	0	0	0%	0%
Diuron	50	2	0	4.0%	0%
Endosulfan	50	0	0	0%	0%
Endosulfan Sulfate	50	0	0	0%	0%
EPTC	50	5	3	10.0%	6.0%
Iprodione	50	1	0	2.0%	0%
Malathion	50	4	0	8.0%	0%
Malathion OA	50	2	0	4.1%	0%
Methidathion	50	0	0	0%	0%
Methyl Bromide	49	0	0	0%	0%
Metolachlor (S-Metolachlor)	50	0	0	0%	0%
MITC	49	29	20	59.2%	40.8%
Norflurazon	50	0	0	0%	0%
Oryzalin	50	0	0	0%	0%
Oxydemeton Methyl	50	0	0	0%	0%
Oxyfluorfen	50	1	0	2.0%	0%
Permethrin	50	1	0	2.0%	0%
Phosmet	50	0	0	0%	0%
pp-dicofol	50	0	0	0%	0%
Propargite	50	0	0	0%	0%
Simazine	50	0	0	0%	0%
Trifluralin	50	3	0	6.0%	0%
Total	**1,795**	**83**	**29**	**4.6%**	**1.6%**

*Includes both quantifiable and trace detections.

Pesticide Concentrations

Acute (24-h) Concentrations

Table G-2 shows the highest 24-h concentrations observed for all chemicals monitored at the Shafter AMN sampling location in 2019. The active ingredient with the highest concentration relative to its screening level was 1,3-dichloropropene at 2.9%, followed by chloropicrin at 0.1%. The remaining chemicals for which there were quantifiable detections at Shafter in 2019 were EPTC and MITC.

Table G-2. Highest 24-h air concentrations, acute screening levels, and percent of the acute screening levels for all chemicals monitored at the Shafter AMN sampling location in 2019.

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
1,3-dichloropropene	3.2 ppb (14,524 ng/m^3)	110 ppb (505,000 ng/m^3)	2.9%
Chloropicrin	0.1 ppb (694 ng/m^3)	73.0 ppb (491,000 ng/m^3)*	0.1%
EPTC	0.005 ppb (36 ng/m^3)	29.7 ppb (230,000 ng/m^3)	0.02%
MITC	0.106 ppb (316 ng/m^3)	220 ppb (660,000 ng/m^3)*	0.05%
Acephate	ND	1.60 ppb (12,000 ng/m^3)	
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	Trace	0.08 ppb (1,200 ng/m^3)**	
Chlorpyrifos OA	ND	0.09 ppb (1,200 ng/m^3)**	
Cypermethrin	Trace	6.64 ppb (113,000 ng/m^3)	
Dacthal	Trace	1,730 ppb (23,500,000 ng/m^3)	
DDVP	Trace	1.22 ppb (11,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 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	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
Iprodione	Trace	69.6 ppb	

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
		(939,000 ng/m^3)	
Malathion	Trace	8.33 ppb (113,000 ng/m^3)	
Malathion OA	ND	8.76 ppb (113,000 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor	ND	7.33 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb (170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl	ND	3.74 ppb (39,200 ng/m^3)	
Oxyfluorfen	Trace	34.5 ppb (510,000 ng/m^3)	
Permethrin	Trace	10.5 ppb (168,000 ng/m^3)	
Phosmet	ND	5.94 ppb (77,000 ng/m^3)	
pp-dicofol	ND	4.49 ppb (68,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	13.3 ppb (110,000 ng/m^3)	
Trifluralin	Trace	87.5 ppb (1,200,000 ng/m^3)	

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

** CDPR's May 28, 2019, risk management directive for chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m3), 1-h time weighted average (TWA). 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-wk) 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 2019. The active ingredient with the highest concentration relative to its screening level was 1,3-dichloropropene at 12.7%. This was followed by chloropicrin at 7.1% and MITC at 6.5%.

Table G-3. Highest 4- or 13-wk air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored at the Shafter AMN sampling location.

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
1,3-dichloropropene*	0.4 ppb (1,774 ng/m^3)	3.0 ppb (14,000 ng/m^3)	12.7%
Chloropicrin*	0.02 ppb (164 ng/m^3)	0.35 ppb (2,300 ng/m^3)	7.1%
MITC	0.07 ppb (194 ng/m^3)	1.00 ppb (3,000 ng/m^3)	6.5%
EPTC	0.002 ppb (13 ng/m^3)	3.10 ppb (24,000 ng/m^3)	0.05%
Acephate	ND	0.35 ppb (2,300 ng/m^3)	
Bensulide	ND	1.47 ppb (24,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	Trace	0.06 ppb (850 ng/m^3)	
Chlorpyrifos OA	ND	0.06 ppb (850 ng/m^3)	
Cypermethrin	Trace	4.76 ppb (81,000 ng/m^3)	
Dacthal	Trace	34.6 ppb (470,000 ng/m^3)	
DDVP	Trace	0.24 ppb (2,200 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	Trace	1.78 ppb	

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
		(17,000 ng/m^3)	
Endosulfan	ND	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
Iprodione	Trace	21.2 ppb (286,000 ng/m^3)	
Malathion	Trace	0.60 ppb (8100 ng/m^3)	
Malathion OA	ND	6.27 ppb (80,600 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	5.0 ppb (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	12.2 ppb (18,0000 ng/m^3)	
Permethrin	Trace	5.63 ppb (90,000 ng/m^3)	
Phosmet	Trace	2.00 ppb (26,000 ng/m^3)	
pp-dicofol	ND	3.24 ppb (49,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	ND	12.4 ppb (170,000 ng/m^3)	

* These concentrations represent the highest 13-week rolling average, rather than the default 4-week rolling average.

Chronic (2019) Concentrations

Table G-4 shows the annual average concentration for all chemicals monitored at the Shafter AMN sampling location in 2019. The active ingredient with the highest concentration relative to its screening level was MITC at 14.3%, followed by chloropicrin at 6.8% and then 1,3-dichloropropene at 6.7%.

Table G-4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored at the Shafter AMN sampling location.

Chemical	Overall average concentration (ng/m^3)	Chronic screening level (ng/m^3)	% of screening level
MITC	0.01 ppb (43 ng/m^3)	0.10 ppb (300 ng/m^3)	14.3%
Chloropicrin	0.02 ppb (123 ng/m^3)	0.27 ppb (1,800 ng/m^3)	6.8%
1,3-dichloropropene	0.1 ppb (599 ng/m^3)	2.00 ppb (9,000 ng/m^3)	6.7%
EPTC	0.0003 ppb (3.9 ng/m^3)	1.10 ppb (8,500 ng/m^3)	0.05%
Acephate	ND	1.13 ppb (8,500 ng/m^3)	
Bensulide	ND	1.48 ppb (24,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	Trace	0.04 ppb (510 ng/m^3)	
Chlorpyrifos OA	ND	0.04 ppb (510 ng/m^3)	
Cypermethrin	Trace	1.59 ppb (27,000 ng/m^3)	
Dacthal	Trace	3.46 ppb (47,000 ng/m^3)	
DDVP	Trace	0.09 ppb (770 ng/m^3)	
DEF	ND	NA – Seasonal	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.03 ppb (300 ng/m^3)	
Dimethoate OA	ND	0.03 ppb (300 ng/m^3)	
Diuron	Trace	0.60 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb	

Chemical	Overall average concentration (ng/m^3)	Chronic screening level (ng/m^3)	% of screening level
		(330 ng/m^3)	
Endosulfan Sulfate	ND	0.02 ppb (330 ng/m^3)	
Iprodione	Trace	21.2 ppb (286,000 ng/m^3)	
Malathion	Trace	0.60 ppb (8,100 ng/m^3)	
Malathion OA	ND	0.63 ppb (8,100 ng/m^3)	
Methidathion	ND	0.20 ppb (2,500 ng/m^3)	
Methyl Bromide	ND	1.00 ppb (3,900 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	1.64 ppb (232,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	3.45 ppb (51,000 ng/m^3)	
Permethrin	Trace	5.63 ppb (90,000 ng/m^3)	
Phosmet	Trace	1.39 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.32 ppb (20,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	ND	2.99 ppb (41,000 ng/m^3)	

Temporal trends in detected concentrations

Figures G-1 to G-4 present the concentrations over time for monitoring results in 2019 for any chemical detected at a quantifiable concentration in Shafter. Screening levels, as defined in Appendix K, are abbreviated as SL in the following graphs. Regulatory targets, also defined in Appendix K, are abbreviated as RT.

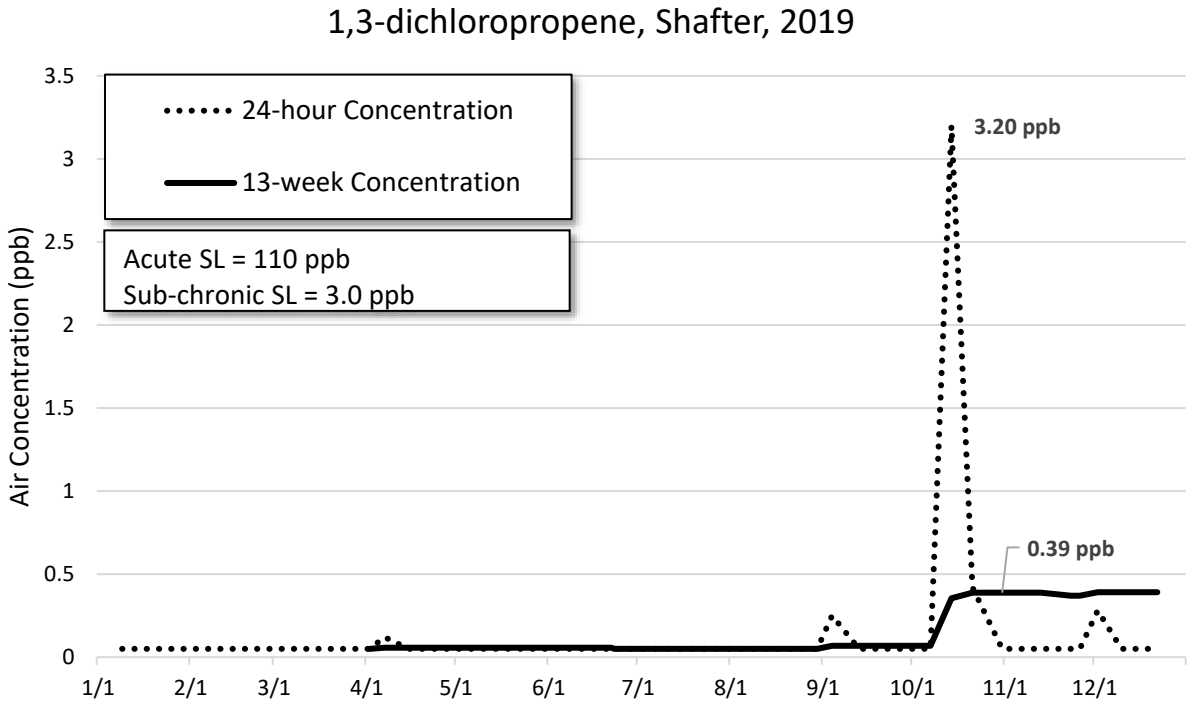

Figure G-1. Temporal trend in 1,3-dichloropropene concentrations in Shafter in 2019.

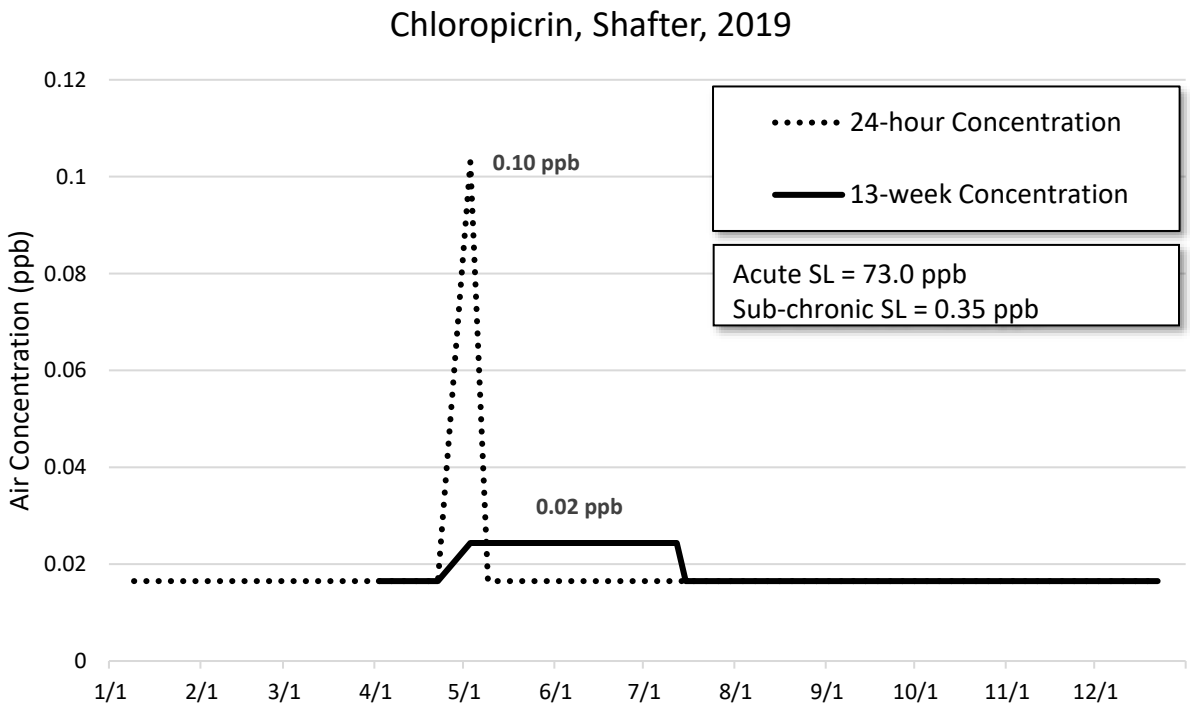

Figure G-2. Temporal trend in chloropicrin concentrations in Shafter in 2019.

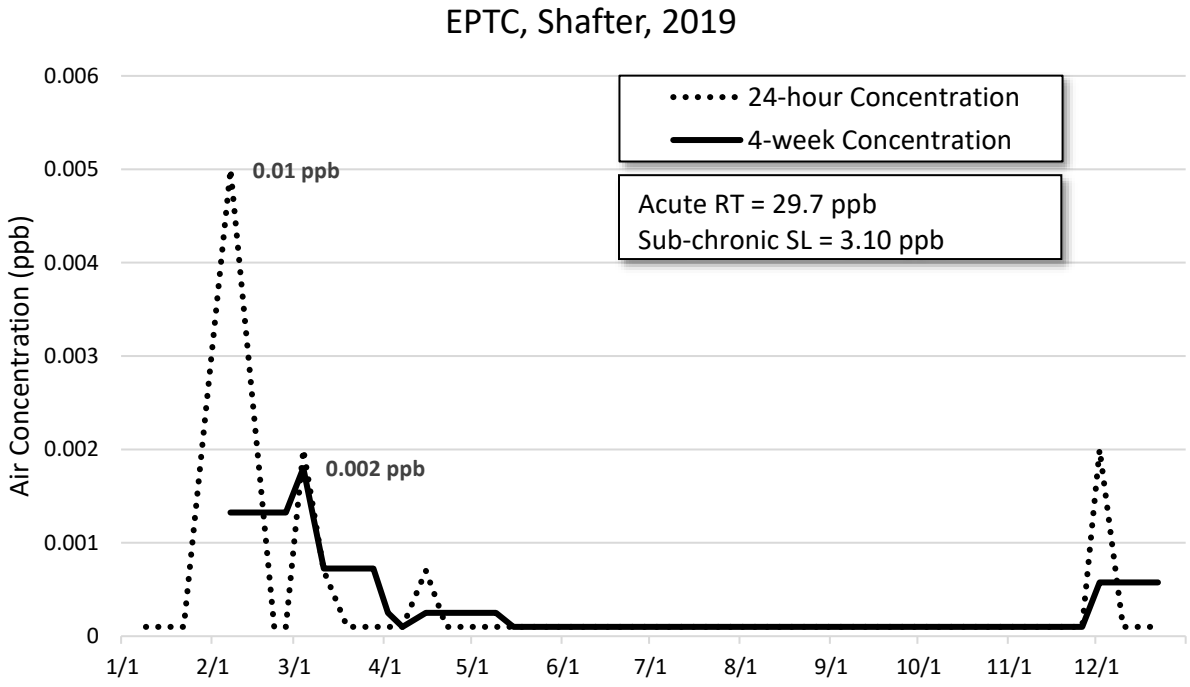

Figure G-3. Temporal trend in EPTC concentrations in Shafter in 2019.

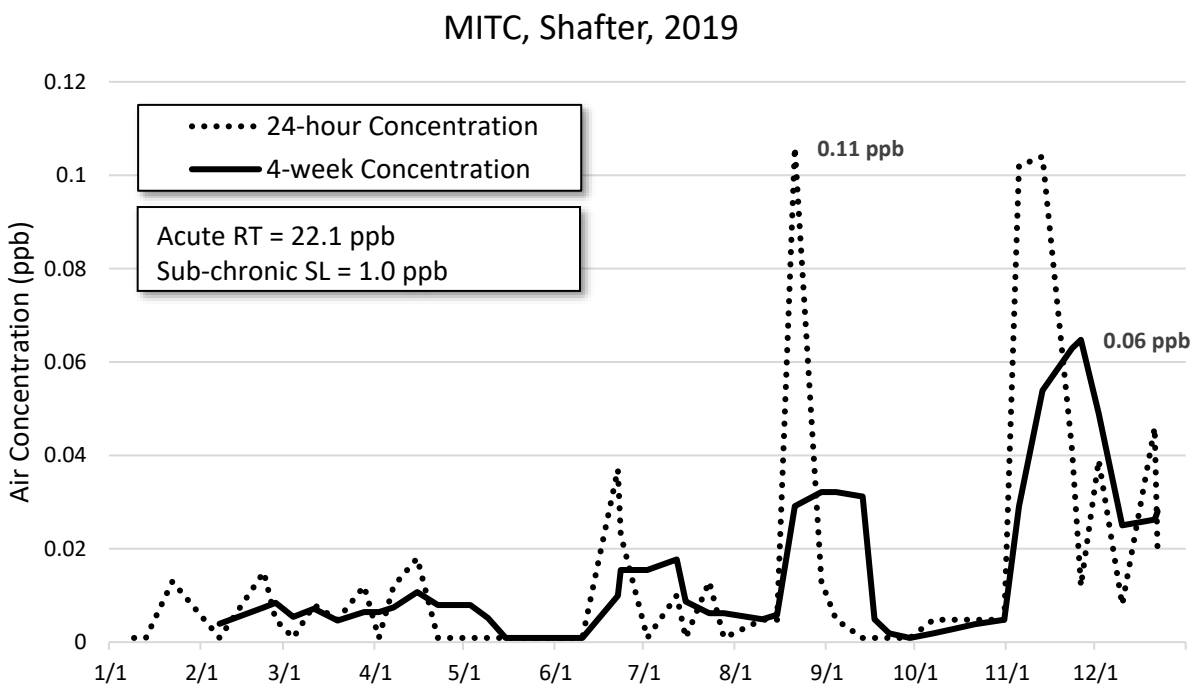

Figure G-4. Temporal trend in MITC concentrations in Shafter in 2019.

APPENDIX H: DETAILED RESULTS FOR WATSONVILLE

Watsonville

Watsonville is a small city (7 square miles in area) located on the southern edge of Santa Cruz County. The elevation is 29 feet; 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.

Pesticide Detections

Table H-1 lists the number and percentage of analyses resulting in detections at the Watsonville sampling site. The active ingredients with the highest percentage of detections were for MITC (30%, n = 15), followed by DDVP (25.5%, n = 13), and then chloropicrin (23.5%, n = 12). The highest percentage of quantifiable detections was observed for MITC (10%, n = 5), followed by chloropicrin (9.8% n = 5), and then 1,3-dichloropropene (3.8%, n = 2).

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

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
1,3-dichloropropene	52	2	2	3.8%	3.8%
Acephate	51	0	0	0%	0%
Bensulide	51	0	0	0%	0%
Chloropicrin	51	12	5	23.5%	9.8%
Chlorothalonil	51	1	0	2.0%	0%
Chlorpyrifos	51	0	0	0%	0%
Chlorpyrifos OA	51	0	0	0%	0%
Cypermethrin	51	0	0	0%	0%
Dacthal	51	9	0	17.6%	0%
DDVP	51	13	0	25.5%	0%
DEF	51	0	0	0%	0%
Diazinon	51	0	0	0%	0%
Diazinon OA	51	0	0	0%	0%
Dimethoate	51	0	0	0%	0%
Dimethoate OA	51	0	0	0%	0%
Diuron	51	1	0	2.0%	0%
Endosulfan	51	0	0	0%	0%
Endosulfan Sulfate	51	0	0	0%	0%
EPTC	51	1	0	2.0%	0%
Iprodione	51	0	0	0%	0%

Chemical	Number of possible detections	Total number of detections*	Number of quantifiable detections	Percent of detections	Percent of quantifiable detections
Malathion	51	7	1	13.7%	2.0%
Malathion OA	51	8	0	15.7%	0%
Methidathion	51	0	0	0%	0%
Methyl Bromide	52	0	0	0%	0%
Metolachlor (S-Metolachlor)	51	0	0	0%	0%
MITC	50	15	5	30.0%	10.0%
Norflurazon	51	0	0	0%	0%
Oryzalin	51	0	0	0%	0%
Oxydemeton Methyl	51	0	0	0%	0%
Oxyfluorfen	51	0	0	0%	0%
Permethrin	51	0	0	0%	0%
Phosmet	51	0	0	0%	0%
pp-dicofol	51	0	0	0%	0%
Propargite	51	0	0	0%	0%
Simazine	51	0	0	0%	0%
Trifluralin	51	2	0	3.9%	0%
Total	**1,837**	**71**	**13**	**3.9%**	**0.7%**

*Includes both quantifiable and trace detections.

Pesticide Concentrations

Acute (24-h) Concentrations

Table H-2 shows the highest observed 24-h concentrations for all chemicals monitored at the Watsonville Air Monitoring Network (AMN) sampling location in 2019. The active ingredients with the highest concentration relative to its screening level was chloropicrin at 1.2%, followed by 1,3-dichloropropene (0.3%), malathion (0.05%), and then MITC (0.02%).

Table H-2. Highest 24-h air concentrations, acute screening levels, and percent of the acute screening level for all chemicals monitored at the Watsonville AMN sampling location in 2019.

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
Chloropicrin	0.9 ppb (5,741 ng/m^3)	73.0 ppb (491,000 ng/m^3)*	1.2%
1,3-dichloropropene	0.29 ppb (1,316 ng/m^3)	110 ppb (505,000 ng/m^3)	0.3%
Malathion	0.004 ppb (56 ng/m^3)	8.33 ppb (113,000 ng/m^3)	0.05%
MITC	0.06 ppb (164 ng/m^3)	220 ppb (660,000 ng/m^3)*	0.02%
Acephate	ND	1.60 ppb (12,000	

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
		ng/m^3)	
Bensulide	ND	15.9 ppb (259,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.08 ppb (1,200 ng/m^3)**	
Chlorpyrifos OA	ND	0.09 ppb (1,200 ng/m^3)**	
Cypermethrin	ND	6.64 ppb (113,000 ng/m^3)	
Dacthal	Trace	1,730 ppb (23,500,000 ng/m^3)	
DDVP	Trace	1.22 ppb (11,000 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 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	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	Trace	29.7 ppb (230,000 ng/m^3)	
Iprodione	ND	69.6 ppb (939,000 ng/m^3)	
Malathion OA	Trace	8.76 ppb (113,000 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	210 ppb (820,000 ng/m^3)*	
Metolachlor	ND	7.33 ppb (85,000 ng/m^3)	
Norflurazon	ND	12.6 ppb	

Chemical	Highest 24-h concentration in ppb (ng/m^3)	24-h acute screening level in ppb (ng/m^3)	% of screening level
		(170,000 ng/m^3)	
Oryzalin	ND	29.7 ppb (420,000 ng/m^3)	
Oxydemeton Methyl	ND	3.74 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	5.94 ppb (77,000 ng/m^3)	
pp-dicofol	ND	4.49 ppb (68,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	13.3 ppb (110,000 ng/m^3)	
Trifluralin	Trace	87.5 ppb (1,200,000 ng/m^3)	

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

** CDPR's May 28, 2019, risk management directive for chlorpyrifos established an acute regulatory target of 0.28 ppb (4,050 ng/m3), 1-h time weighted average (TWA). 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-wk) 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 2019. The active ingredients with the highest concentration relative to its screening level was chloropicrin at 45%. This was followed by 1,3-dichloropicrin at 2.7%, then MITC at 2.4%, and finally malathion at 0.02%.

Table H-3. Highest 4- or 13-wk air concentrations, sub-chronic screening levels, and percent of the sub-chronic screening level for chemicals monitored at the Watsonville AMN sampling location.

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
Chloropicrin*	0.15 ppb (1,042 ng/m^3)	0.35 ppb (2,300 ng/m^3)	45%
1,3-dichloropropene*	0.08 ppb (374 ng/m^3)	3.0 ppb (14,000 ng/m^3)	2.7%
MITC	0.024 ppb (71 ng/m^3)	1.00 ppb (3,000 ng/m^3)	2.4%

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
Malathion	0.0012 ppb (16 ng/m^3)	5.97 ppb (80,600 ng/m^3)	0.02%
Acephate	ND	0.35 ppb (2,300 ng/m^3)	
Bensulide	ND	1.47 ppb (24,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.06 ppb (850 ng/m^3)	
Chlorpyrifos OA	ND	0.06 ppb (850 ng/m^3)	
Cypermethrin	ND	4.76 ppb (81,000 ng/m^3)	
Dacthal	Trace	34.6 ppb (470,000 ng/m^3)	
DDVP	Trace	0.24 ppb (2,200 ng/m^3)	
DEF	ND	0.68 ppb (8,800 ng/m^3)	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.32 ppb (3,000 ng/m^3)	
Dimethoate OA	ND	0.34 ppb (3,000 ng/m^3)	
Diuron	Trace	1.78 ppb (17,000 ng/m^3)	
Endosulfan	ND	0.20 ppb (3,300 ng/m^3)	
Endosulfan Sulfate	ND	0.19 ppb (3,300 ng/m^3)	
EPTC	Trace	3.10 ppb (24,000 ng/m^3)	
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	

Chemical	Highest 4-week rolling average concentration in ppb (ng/m^3)	Sub-chronic screening level in ppb (ng/m^3)	% of screening level
Malathion OA	Trace	6.27 ppb (80,600 ng/m^3)	
Methidathion	ND	0.25 ppb (3,100 ng/m^3)	
Methyl Bromide	ND	5.0 ppb (19,400 ng/m^3)	
Metolachlor (S-Metolachlor)	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	16.2 ppb (230,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	12.2 ppb (18,0000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	2.00 ppb (26,000 ng/m^3)	
pp-dicofol	ND	3.24 ppb (49,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	Trace	12.4 ppb (170,000 ng/m^3)	

* These concentrations represent the highest 13-week rolling average, rather than the default 4-week rolling average.

Chronic (2019) Concentrations

Table H-4 shows the annual average concentration for all chemicals monitored at the Watsonville AMN sampling location in 2019. The highest concentration relative to its screening level was that of chloropicrin at 19.3%. This was followed by MITC at 4%, 1,3-dichloropropene at 2.9%, and then malathion at 0.03%.

Table H-4. Annual average air concentrations, chronic screening levels, and percent of the chronic screening levels for chemicals monitored at the AMN sampling location.

Chemical	Overall average concentration in ppb (ng/m^3)	Chronic screening level in ppb (ng/m^3)	% of screening level
Chloropicrin	0.05 ppb (348 ng/m^3)	0.27 ppb (1,800 ng/m^3)	19.3%
MITC	0.004 ppb (12 ng/m^3)	0.10 ppb (300 ng/m^3)	4%
1,3-dichloropropene	0.06 ppb (260 ng/m^3)	2.00 ppb (9,000 ng/m^3)	2.9%
Malathion	0.0002 ppb (2.6 ng/m^3)	0.60 ppb (8,100 ng/m^3)	0.03%
Acephate	ND	1.13 ppb (8,500 ng/m^3)	
Bensulide	ND	1.48 ppb (24,000 ng/m^3)	
Chlorothalonil	Trace	3.13 ppb (34,000 ng/m^3)	
Chlorpyrifos	ND	0.04 ppb (510 ng/m^3)	
Chlorpyrifos OA	ND	0.04 ppb (510 ng/m^3)	
Cypermethrin	ND	1.59 ppb (27,000 ng/m^3)	
Dacthal	Trace	3.46 ppb (47,000 ng/m^3)	
DDVP	Trace	0.09 ppb (770 ng/m^3)	
DEF	ND	NA – Seasonal	
Diazinon	ND	0.01 ppb (130 ng/m^3)	
Diazinon OA	ND	0.01 ppb (130 ng/m^3)	
Dimethoate	ND	0.03 ppb (300 ng/m^3)	
Dimethoate OA	ND	0.03 ppb (300 ng/m^3)	
Diuron	Trace	0.60 ppb (5,700 ng/m^3)	
Endosulfan	ND	0.02 ppb (330 ng/m^3)	
Endosulfan Sulfate	ND	0.02 ppb (330 ng/m^3)	
EPTC	Trace	1.10 ppb (8,500 ng/m^3)	

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Chemical	Overall average concentration in ppb (ng/m^3)	Chronic screening level in ppb (ng/m^3)	% of screening level
Iprodione	ND	21.2 ppb (286,000 ng/m^3)	
Malathion OA	Trace	0.63 ppb (8,100 ng/m^3)	
Methidathion	ND	0.20 ppb (2,500 ng/m^3)	
Methyl Bromide	ND	1.00 ppb (3,900 ng/m^3)	
Metolachlor	ND	1.29 ppb (15,000 ng/m^3)	
Norflurazon	ND	1.92 ppb (26,000 ng/m^3)	
Oryzalin	ND	1.64 ppb (232,000 ng/m^3)	
Oxydemeton Methyl	ND	0.06 ppb (610 ng/m^3)	
Oxyfluorfen	ND	3.45 ppb (51,000 ng/m^3)	
Permethrin	ND	5.63 ppb (90,000 ng/m^3)	
Phosmet	ND	1.39 ppb (18,000 ng/m^3)	
pp-dicofol	ND	1.32 ppb (20,000 ng/m^3)	
Propargite	ND	0.98 ppb (14,000 ng/m^3)	
Simazine	ND	3.76 ppb (31,000 ng/m^3)	
Trifluralin	Trace	2.99 ppb (41,000 ng/m^3)	

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Temporal trends in detected concentrations

Figures H-1 to H-4 present the concentrations over time for monitoring results in 2019 for any chemical detected at a quantifiable concentration in Watsonville. Screening levels, as defined in Appendix K, are abbreviated as SL in the following graphs. Regulatory targets, also defined in Appendix K, are abbreviated as RT.

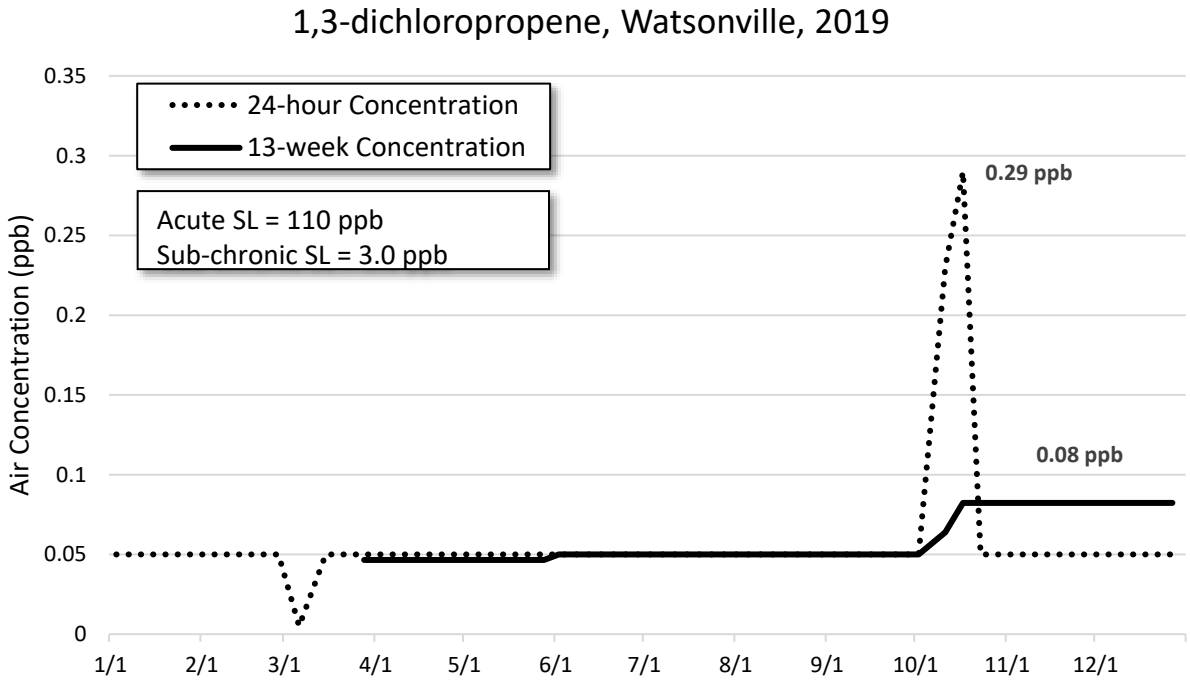

Figure H-1. Temporal trend in 1,3-dichloropropene concentrations in Watsonville in 2019.

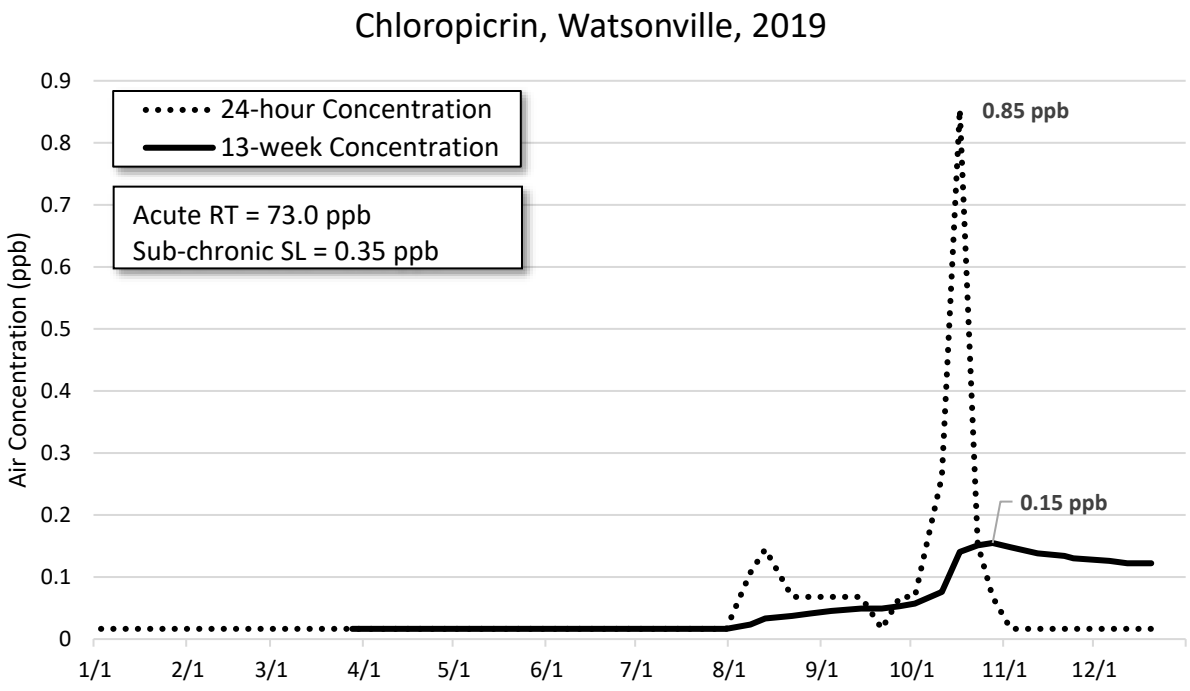

Figure H-2. Temporal trend in chloropicrin concentrations in Watsonville in 2019.

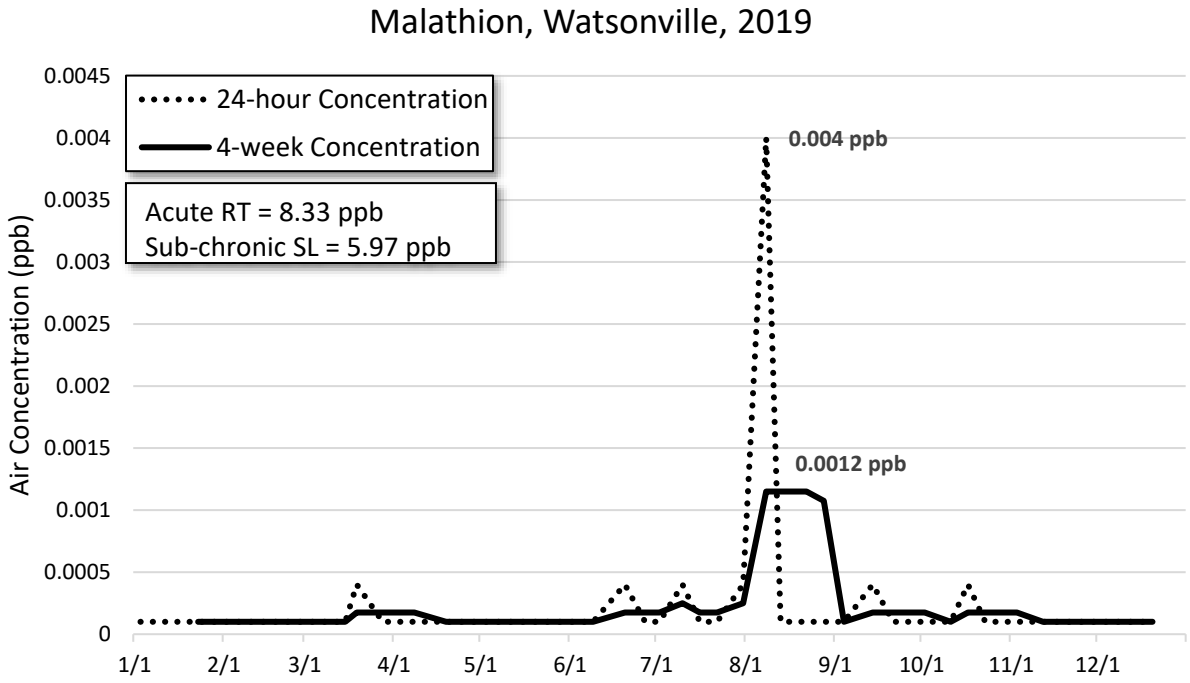

Figure H-3. Temporal trend in malathion concentrations in Watsonville in 2019.

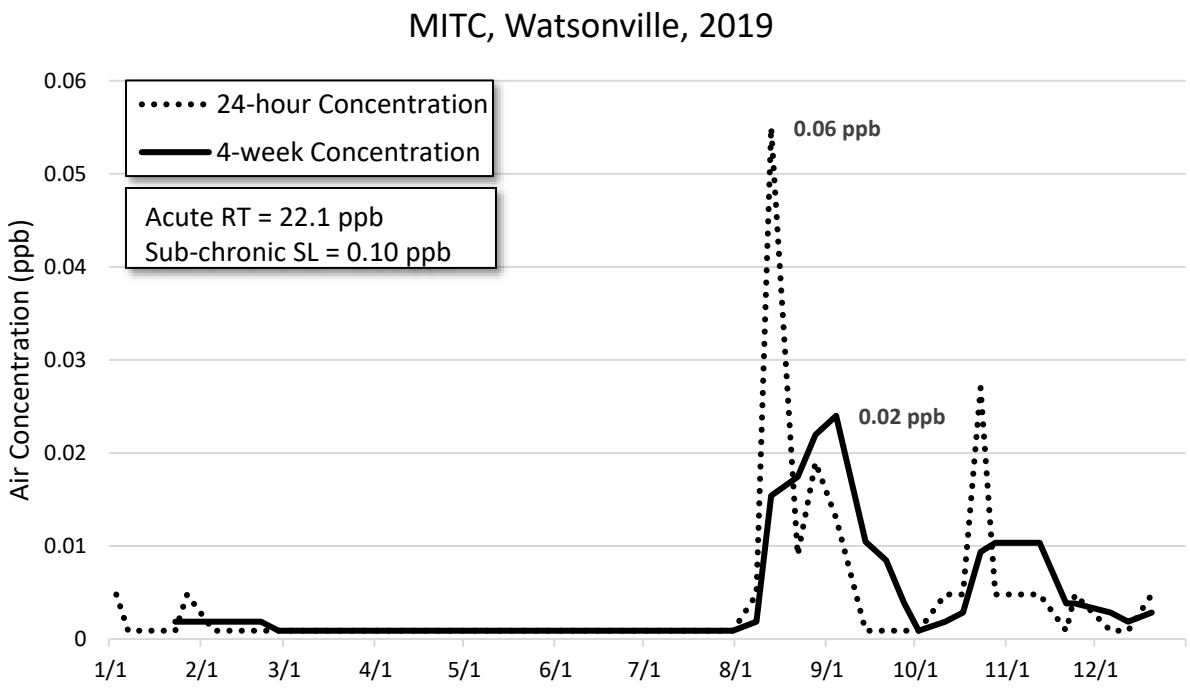

Figure H-4. Temporal trend in MITC concentrations in Watsonville in 2019.

APPENDIX I: LABORATORY ANALYSIS

Pesticides Monitored

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

1. Multi-pesticide residue analysis
2. Volatile organic compounds (VOC) analysis
3. MITC analysis
4. Chloropicrin analysis

Multi-Pesticide Residue Analysis

Prior to sampling, personnel from the California Department of Food and Agriculture Center for Analytical Chemistry laboratory (CDFA CAC laboratory) washed, rinsed, and packed 30 mL of XAD-4 sorbent material into a custom-built Teflon® cartridge to be used for the collection of 32 analytes via multi-pesticide residue analysis.

Multi-pesticide residue analysis using XAD-4 resin was performed by laboratory staff using gas chromatography – mass spectrometry (GC-MS) and liquid chromatography – mass spectrometry (LC-MS) methods as described elsewhere (CDFA, 2018a). 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-1 lists the 32 analytes included in the multi-pesticide residue analysis.

Table I-1. 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	Organophosphate	Degradate
Chlorthal-dimethyl (DCPA, Dacthal)	Phthalate	Herbicide
Cypermethrin	Pyrethroid	Insecticide
DDVP	Organophosphate	Insecticide
DEF (SSS-tributyl phosphorotrithioate)	Organophosphate	Defoliant
Diazinon	Organophosphate	Insecticide
Diazinon Oxygen Analog	Organophosphate	Degradate
Dicofol	Organochlorine	Insecticide
Dimethoate	Organophosphate	Insecticide
Dimethoate Oxygen Analog	Organophosphate	Degradate
Diuron	Urea	Herbicide
Endosulfan	Organochlorine	Insecticide
Endosulfan Sulfate	Organochlorine	Degradate

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Chemical	Chemical Class	Pesticide Group
EPTC	Carbamate	Herbicide
Iprodione	Dicarboximide	Fungicide
Malathion	Organophosphate	Insecticide
Malathion Oxygen Analog	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

Volatile Organic Compound Analysis

Collected air canisters were analyzed for the presence of two analytes (Table I-2) using a volatile organic compound (VOC) GC-MS method similar to the United States Environmental Protection Agency's (US EPA) Method TO-15. The standard operating procedure for this analysis is described in detail elsewhere (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.

Table I-2. 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 CDFA CAC laboratory for the presence of MITC by GC-MS as described by CDFA (2018b). MITC extraction from the sorbent medium involves using carbon disulfide in ethyl acetate. The proportion of carbon disulfide used was recently increased to 1.0% (CDFA, 2018b). This is followed by analysis using a gas chromatography-nitrogen phosphorous detector (GC-NPD) (Table I-3).

Chloropicrin

Samples collected on XAD-4 sorbent tubes were analyzed by CDFA CAC laboratory for the presence of chloropicrin by gas chromatography-electron capture detector (GC-ECD) as described by CDFA (1999). Each tube was desorbed in hexane and analyzed by a GC equipped with an ECD (Table I-3).

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Table I-3. Target analytes in individual analyte residue analysis.

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

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.

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. **Error! Reference source not found.** and I-5 list all the q uantitation and detection limits for AMN analytes.

Table I-4. Quantitation and detection limits for Air Monitoring Network 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	0.000087	0.0012	0.65	9.3
Bensulide	0.000054	0.00057	0.88	9.3
Chloropicrin	0.033	0.10	222	694
Chlorothalonil	0.000081	0.0021	0.88	23.1
Chlorpyrifos	0.000061	0.0016	0.88	23.1
Chlorpyrifos OA	0.000058	0.00068	0.79	9.3
Cypermethrin	0.00014	0.0014	2.31	23.1
Chlorthal-dimethyl	0.000065	0.00068	0.88	9.3
DDVP	0.000082	0.0026	0.74	23.1
DEF	0.000022	0.00072	0.28	9.3
Diazinon	0.000030	0.00075	0.37	9.3
Diazinon OA	0.000031	0.00079	0.37	9.3

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Chemical	MDL (ppb)	LOQ (ppb)	MDL (ng/m^3)	LOQ (ng/m^3)
Dimethoate	0.000079	0.00099	0.74	9.3
Dimethoate OA	0.000069	0.0011	0.6	9.3
Diuron	0.000039	0.00098	0.37	9.3
Endosulfan	0.00011	0.0014	1.76	23.1
Endosulfan Sulfate	0.000051	0.0013	0.88	23.1
EPTC	0.00019	0.0030	1.44	23.1
Iprodione	0.000076	0.0017	1.02	23.1
Malathion	0.000096	0.00069	1.3	9.3
Malathion OA	0.000029	0.00072	0.37	9.3
Methidathion	0.000071	0.00075	0.88	9.3
Metolachlor	0.000091	0.00080	1.06	9.3
MITC	0.0019	0.0077	5.44	23.1
Norflurazon	0.000044	0.00069	0.6	9.3
Oryzalin	0.00012	0.0016	1.67	23.1
Oxydemeton methyl	0.00014	0.00089	1.44	9.3
Oxyfluorfen	0.000088	0.0016	1.3	23.1
Permethrin	0.00010	0.0014	1.62	23.1
Phosmet	0.00029	0.00072	3.7	9.3
pp-Dicofol	0.00030	0.0015	4.49	23.1
Propargite	0.000071	0.0016	1.02	23.1
Simazine	0.000039	0.0011	0.32	9.3
Trifluralin	0.000085	0.0017	1.16	23.1

Table I-5. Method detection limits for Air Monitoring Network volatile organic compound (VOC) samples, by laboratory.

Chemical	MDL (ARB-OLS) (ppb)	MDL (ARB-OLS) (ng/m^3)	MDL (CDFA CAC) (ppb)	MDL (CDFA CAC) (ng/m^3)
1,3-dichloropropene	0.1	454	0.01	45.4
Methyl bromide	0.1	396	0.01	39.6

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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:

$$\frac{Sample\ results\ (ug) x\ 1000\ L/m^3}{Flow\ rate\ \left(\frac{L}{\min}\right) x\ run\ time\ (\min)} \text{ x } 1000\ ng/\mu g = ng/m^3$$

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

$$\frac{Sample\ results\ (ppb) x\ Molecular\ weight\ (g/mol)}{24.45} \times 1000 = ng/m^3$$

The calculation above assumes 1 atmosphere of pressure at 25°C and 24.45 is obtained from multiplication of the Universal Gas Constant (R) (82.06 atm.cm^3/(mol·K)) and temperature in Kelvin (298 K) with appropriate unit conversions based on the ideal gas law[6].

Per standard CDPR practice, when calculating average concentrations from multiple samples, samples with no detectable amounts were assumed to contain one-half the MDL (ND=0.5*MDL), and samples with trace amounts were assumed to contain the value halfway between the MDL and the LOQ (Trace= 0.5*(MDL+LOQ)).

Data Validation/Quality Assurance

Method Validation

An acceptable range of spike recoveries was established by analyzing laboratory spike samples in five replicate analyses at five different spike levels. The mean percent recovery and standard deviation were determined based on these 25 data points. The control limits were established as the mean percent recovery ± 3 SDs. In addition, a method trapping efficiency was determined by collecting 2-stage air samples that were analyzed to determine the proportion of the spike trapped in the bottom stage to assess for possible sample breakthrough.

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 the Air Resources Board – Organic Laboratory Section (ARB-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 have storage stability data for a minimum of 28 days. Each extraction set consisted of 1 to 20 actual samples and 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 QC program. The matrix spikes are conducted to assess accuracy and precision; the blanks are 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 81% to 99% for all chemicals analyzed.

Field blanks, blind field spikes, and duplicate samples are part of CDPR's field and laboratory QC program. The field spikes were fortified by a CDFA chemist not associated with the analysis. The field

[6] Ideal gas law: pV = nRT
where p = pressure, V = volume, n = number of moles, R = universal gas constant, and T = temperature

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spikes were given to CDPR staff, relabeled, and then intermingled and delivered with field samples to the laboratory for analysis. Table I-6 lists the average percent recovery results which ranged from 81% to 97%.

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. All field blanks resulted in non-detections. These results are shown in Table I-6.

Table I-7 summarizes the results of duplicate samples. A duplicate sample is a sample that is collocated 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. This was possible for a total of eight sample pairs, and range from 4% to 9%.

Table I-6. Average results for quality control/quality assurance samples from the 2019 AMN.

Chemical	Lab spikes (% recovery)	Lab blanks (ng/m^3)	Field blanks (ng/m^3)
1,3-dichloropropene	94%	ND	None Taken
Acephate	93%	ND	ND
Bensulide	85%	ND	ND
Chloropicrin	95%	ND	ND
Chlorothalonil	92%	ND	ND
Chlorpyrifos	94%	ND	ND
Chlorpyrifos OA	87%	ND	ND
Cypermethrin	93%	ND	ND
Dacthal	90%	ND	ND
DDVP	82%	ND	ND
DEF	88%	ND	ND
Diazinon	93%	ND	ND
Diazinon OA	94%	ND	ND
Dimethoate	93%	ND	ND
Dimethoate OA	92%	ND	ND
Diuron	93%	ND	ND
Endosulfan	92%	ND	ND
Endosulfan Sulfate	95%	ND	ND
EPTC	89%	ND	ND
Iprodione	95%	ND	ND
Malathion	96%	ND	ND
Malathion OA	95%	ND	ND
Methidathion	88%	ND	ND
Methyl bromide	97%	ND	None Taken
Metolachlor	88%	ND	ND
MITC	81%	ND	ND
Norflurazon	93%	ND	ND
Oryzalin	89%	ND	ND

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Chemical	Lab spikes (% recovery)	Lab blanks (ng/m^3)	Field blanks (ng/m^3)
Oxydemeton methyl	93%	ND	ND
Oxyfluorfen	97%	ND	ND
Permethrin	94%	ND	ND
Phosmet	87%	ND	ND
pp-Dicofol	96%	ND	ND
Propargite	95%	ND	ND
Simazine	94%	ND	Trace
Trifluralin	94%	ND	ND

Table I-7. Results for duplicate (collocated) sample pairs in 2019.

Primary/duplicate paired results category	Chloropicrin	MITC	Multi-residue	VOC
ND †/ND	17	11	567	34
Trace ‡/Trace	0	2	6	0
Trace/ND	0	0	2	0
ND/Trace	0	0	1	0
LOQ/ND	0	0	0	1
ND/ > LOQ	0	0	0	0
Trace/ > LOQ	0	0	0	0
> LOQ/ > LOQ	1	4	0	3
Relative Difference *	9%	5%	N/A	4%

† ND = Not Detected.

‡ Trace = Pesticide detection confirmed, but less than the quantitation limit.

* For pairs with both concentrations >LOQ.

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APPENDIX J – FIELD METHODS

Materials and Methods

Air Sampling Equipment and Methods

There were a total of four methods used for the collection of air samples as part of the AMN. Each of these methods required specific equipment as described below.

Multi-Pesticide Residue Sampling

Current Equipment:

As part of sample collection, ambient air was drawn through the XAD-4 media using channel 1 of a custom-built 3-channel pesticide sampling version of a Speciation Air Sampling System (SASS) 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.

Legacy AMN Equipment (2011-2018):

As part of sample collection, ambient air was drawn through the XAD-4 media with an SKC® AirChek HV30 air pump, calibrated at a flow rate of 15 L/min (± 10%) for a continuous 24-h period. The cartridge was 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. This method is used as a backup method should the current equipment fail or become unavailable.

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Volatile Organic Compounds

Current Equipment:

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 SilcoCan 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.

Legacy AMN Equipment (2011-2018):

As part of sample collection, ambient air was drawn into a 6-L SilcoCan canister (cat. # 24142) pre-evacuated to a pressure of -30” Hg for VOC analysis. A Restek flow controller (cat. # 24160) was attached to the canister inlet to achieve a flow rate of 3.0 mL/min (± 10%) for a continuous 24-h sampling period. The air sampling inlet of the flow controller was placed at a sampling height of 3-10 meters, depending on the 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. This method is used as a backup method should the current equipment fail or become unavailable.

MITC

Current Equipment:

As part of sample collection, ambient air was drawn through the SKC® Anasorb® CSC sorbent sample tubes 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 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 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.

Legacy AMN Equipment (2011-2018):

As part of sample collection, Anasorb sorbent sample tubes containing activated charcoal as the sampling media (cat. # 226-16-02) were used for the collection of MITC. These tubes measured 10mm in diameter by 160mm in length and contained 1,800 mg of sorbent in the primary sample region. Ambient air was drawn through the media by an SKC® XR series pump (PCXR8 or PCXR4) at a flow rate of 1.5 L/min (± 10%) for a continuous 24-h sampling period. The glass tube containing the sample media was connected to the pump with approximately 8 feet of Tygon® tubing, downstream of the sample media. The glass tips sealing the sampling media were broken open immediately prior to sampling. Bios Defender 530® or DC-Lite® flow meters were used to obtain flow rates at the start and finish of the sampling period. This method is used as a backup method should the current equipment fail or become unavailable.

Chloropicrin

Current Equipment:

As part of sample collection, ambient air was drawn through the SKC® XAD-4 sorbent sample tubes 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 allowed for more certainty than from 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 AMN Equipment (2011-2018):

As part of sample collection, SKC® XAD-4 sorbent sample tubes (cat. # 226-175) were used for the collection of the analyte chloropicrin. These tubes measured 8mm in diameter and 150 mm in length, and contained 400 mg of sorbent material in the primary sample region. Ambient air was drawn through the media by an SKC® XR series pump (PCXR8 or PCXR4) at a flow rate of 50 mL/min (± 10%) for a continuous 24-h sampling period. The glass tube containing the sample media was connected to an adjustable low-flow single tube holder (SKC cat. # 224-26-01) which was in turn connected to the pump

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with approximately 8 feet of Tygon® tubing, all of which were downstream of the sample media. The glass tips sealing the sampling media were broken to allow airflow immediately prior to sampling and the inlet was open directly 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. This method is used as a backup method should the current equipment fail or become unavailable.

Field Sampling Procedure

One 24-h 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.

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Quality Control Methods

In addition to the primary samples, CDPR collected quality control (QC) samples including trip blanks, field spikes, and co-located duplicate samples at a rate of at least 10% of primary samples. The QC results section located at the end of this report summarizes the results of these QC procedures.

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 field spike is a sample with a known amount of chemical spiked onto the sample media, which is placed next to a primary sample that undergoes the same air flow and run time conditions. The field spike is stored under dry ice (-78.5° C) during transport for sorbent tubes and cartridges, and at ambient temperature for canisters. It is treated like a field sample, undergoing the same storage and shipping conditions. The field spiked sample, when compared to the primary sample, provides some information

about any changes in the ability to recover the analyte during air sampling. CDPR collected one field spike sample per month for each sample type. The multi-pesticide residue XAD cartridge was spiked with two different analytes every month at various concentrations. For chloropicrin- and MITC-spiked samples, concentrations varied every month. VOC canister spike samples were scheduled for collection once per month at the monitoring station in Watsonville.

An acceptable range of spike recoveries for the AMN was established by analyzing blank-matrix spike samples at five replicate analyses at five different spike levels. The mean percent recovery and standard deviation (SD) were determined based on these 25 data points. The control limits are then established at the mean percent recovery ± 3 SDs. Spike samples outside the control limits established for each pesticide do not necessarily indicate that the obtained results are deemed invalid or unusable, however, it would indicate the need for a further and more refined assessment of the field and laboratory procedures to determine the root issue. Depending on the results of this assessment, changes to field and laboratory procedures may be necessary.

Additionally, to look for sample analyte breakthrough in the sampling media, a method trapping efficiency was conducted for AMN sample collection media with the exception of air canisters (CDPR, 1995). Two-stage air samples were collected and analyzed to determine the proportion of the spike trapped in the bottom stage to assess for possible sample breakthrough.

A duplicate sample is a sample that is co-located with a regular field sample. These samples evaluate 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

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APPENDIX K: HEALTH EVALUATION AND CALCULATIONS

Calculation of Sub-chronic Rolling Averages

13-week 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 (1,3-D) and chloropicrin for comparisons to sub-chronic screening levels and regulatory targets. This determination was based on an evaluation conducted by CDPR's Human Health Assessment Branch that looked at seasonal reference concentrations for these two chemicals. Greater details are provided elsewhere (CDPR, 2016b)

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. Vidrio et al. (2013a) summarizes the potential health effects of each pesticide. 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 (OEHHA) 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. A measured air concentration below 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. Vidrio et al. (2013a) 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). Four of the pesticides monitored in the AMN (chloropicrin, MeBr, MITC, and 1,3-D) 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 that have a common mode of action (such as cholinesterase inhibitors). 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

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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). In this case,

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

If the HQ is greater than 1, then the air concentration exceeds the screening level. Such a results would indicate the need for 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.

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APPENDIX L: COMPARISON TO PREVIOUS YEARS OF AIR MONITORING NETWORK DATA

All Air Monitoring Network Sites

This report covers results from the ninth year of monitoring by the Air Monitoring Network (AMN), which has been collecting samples since 2011. While there were significant changes to the AMN in 2017, as detailed in last year's report (CDPR, 2019), a few comparisons to the overall results from previous years are possible. Among individual sites, Shafter has remained in operation since 2011 and comparisons of the historic data for that site are shown below. Additionally, comparisons of annual averages between 2019 and 2018 datasets have been made for all remaining sites which became operational in 2017 (Chualar, Santa Maria, and Watsonville).

Table L-1 shows the number of individual pesticides and breakdown products monitored by the AMN each year, as well as whether that pesticide was detected in a given year. This data is further broken down into whether that pesticide was detected at a quantifiable level during monitoring in that year. 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 acrolein 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 cancelled the registration of all products containing methyl iodide at the request of the registrant. Therefore, monitoring for methyl iodide as part of the AMN stopped on June 20, 2012. In December 2016, carbon disulfide was removed from the list of monitored chemicals due to detections originating from non-pesticidal sources and the voluntary withdrawal of registration of pesticide products that produce carbon disulfide.

The results presented in terms of individual analyses are shown as raw counts in Table L-2, which are then summarized into the percentages of possible detections in Table L-3. Inspection of these results reveals that the highest number of detections as a percentage of analyses occurred in 2015 (10.3%), and that the highest percentage of quantifiable detections occurred in both 2015 and 2016 (5.2%, each). The lowest percentage of detections occurred in 2019 (3.8%); 2019 also had the lowest percentage of quantifiable detections (0.95%).

Table L-1. Summary of pesticide detection trends in the Air Monitoring Network, aggregated by chemical (2011 – 2019).

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

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

* Includes all pesticides that were monitored as part of the AMN for that year.

† Includes both quantified and trace detections.

Table L-2. Summary of pesticide detection trends in the Air Monitoring Network, as individual analyses (2011 – 2019).

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	14,616	14,061	555	139

† Includes both quantified and trace detections.

Table L-3. Summary of pesticide detection trends in the Air Monitoring Network, as a percentage of possible detections (2011 – 2019).

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%

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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%

† Includes both quantified and trace detections.

Historic Air Concentrations in Chualar

Monitoring began in Chualar on January 1, 2017. Tables L-4 to L-7 summarize results for three years of monitoring.

Table L-4 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection. Detections were variable between the three years of monitoring, the number of detections for the fumigants 1,3-dichloropropene (1,3-D) and methyl isothiocyanate (MITC) increased in year two, but subsequently decreased in year three.

Table L-5 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Chualar. The highest observed 24-h concentration of 1,3-D decreased from 1,996 ng/m³ (0.4 ppb) in 2017 to 460 ng/m³ (0.1 ppb) in 2018 to 286 ng/m³ (0.06 ppb) in 2019. The highest observed 24-h concentration of MITC increased from 92 ng/m³ (0.03 ppb) in 2017 to 340 ng/m³ (0.11 ppb) in 2018 and then decreased to 34 ng/m³ (0.01 ppb) in 2019.

Table L-6 shows the highest observed rolling 4- or 13- week average concentrations for any chemical with a positive detection during any year of monitoring at Chualar. The highest observed rolling 13-week average of chloropicrin in 2019 decreased compared to the previous two years. The highest observed rolling 4-week average concentration of MITC also decreased from 101 ng/m³ (0.034 ppb) in 2018 to 21.7 ng/m³ (0.007 ppb) in 2019.

Table L-7 shows the annual average concentrations for any chemical with a positive detection during any year of monitoring at Chualar. The annual average concentration of 1,3-D in Chualar decreased from 252 ng/m³ (0.1 ppb) in 2017 to 120 ng/m³ (0.027 ppb) in 2018 and then increased to 193 ng/m³ (0.04 ppb). The annual average concentration of chloropicrin showed a very slight increase from 164 ng/m³ (0.02 ppb) in 2017 to 180 ng/m³ (0.026 ppb) in 2018 and then a slight decrease to 152 ng/m³ (0.02 ppb) in 2019. The annual average concentration of MITC increased from 7 ng/m³ (0.002 ppb) in 2017 to 15 ng/m³ (0.005 ppb) in 2018 and decreased to 5.6 ng/m³ (0.002 ppb) in 2019.

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Table L-4. Percentage of analyses performed resulting in a detection at Chualar, by year.*

Chemical	2017	2018	2019
1,3-dichloropropene	4%	18%	2%
Acephate	0%	2%	0%
Bensulide	4%	2%	2%
Chloropicrin	12%	15%	10%
Chlorothalonil	25%	8%	0%
Chlorpyrifos	0%	0%	4%
Chlorthal-dimethyl	100%	98%	80%
DDVP	6%	12%	16%
Diuron	4%	0%	0%
Endosulfan	0%	2%	0%
Malathion	18%	10%	0%
Malathion OA	16%	8%	8%
MITC	25%	42%	16%
Norflurazon	4%	0%	0%
Oryzalin	4%	0%	0%
Permethrin	2%	4%	0%
pp-dicofol	0%	0%	2%
Simazine	2%	0%	0%
Trifluralin	0%	0%	2%

* These values include both trace and quantifiable detections.

Table L-5. Highest 24-h concentrations for pesticides with at least one detectable concentration by year (2017 – 2019) in Chualar, California.

Chemical	2017	2018	2019
1,3-dichloropropene	0.4 ppb (1,996 ng/m³)	0.1 ppb (460 ng/m³)	0.06 ppb (286 ng/m³)
Acephate	ND	Trace	ND

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Chemical	2017	2018	2019
Bensulide	Trace	Trace	Trace
Chloropicrin	0.1 ppb (805 ng/m³)	0.1 ppb (780 ng/m³)	0.1 ppb (835 ng/m³)
Chlorothalonil	Trace	Trace	ND
Chlorpyrifos	ND	ND	Trace
Chlorthal-dimethyl	0.002 ppb (22 ng/m³)	0.003 ppb (39 ng/m³)	0.002 ppb (34 ng/m³)
DDVP	Trace	Trace	Trace
Diuron	Trace	ND	ND
Endosulfan	ND	Trace	ND
Malathion	Trace	0.0007 ppb (9.5 ng/m³)	ND
Malathion OA	Trace	Trace	Trace
MITC	0.03 ppb (92 ng/m³)	0.11 ppb (340 ng/m³)	0.011 ppb (34 ng/m³)
Norflurazon	Trace	ND	ND
Oryzalin	Trace	ND	ND
pp-dicofol	ND	ND	0.001 ppb (19 ng/m³)
Permethrin	Trace	Trace	ND
Simazine	Trace	ND	ND
Trifluralin	ND	ND	Trace

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Table L-6. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2017 – 2019) in Chualar, California.

Chemical	2017	2018	2019
1,3-dichloropropene (13-wk)	0.1 ppb (398 ng/m³)	0.081 ppb (370 ng/m³)	0.06 ppb (227 ng/m³)cdfa/arb
Acephate	ND	Trace	ND
Bensulide	Trace	Trace	Trace
Chloropicrin (13-wk)	0.05 ppb (322 ng/m³)	0.055 ppb (370 ng/m³)	0.04 ppb (273 ng/m³)
Chlorothalonil	Trace	Trace	ND
Chlorpyrifos	ND	ND	Trace
Chlorthal-dimethyl	0.001 ppb (16 ng/m³)	0.002 ppb (25 ng/m³)	0.001 ppb (15.5 ng/m³)
DDVP	Trace	Trace	Trace
Diuron	Trace	ND	ND
Endosulfan	ND	Trace	ND
Malathion	Trace	0.0004 ppb (5.2 ng/m³)	ND
Malathion OA	Trace	Trace	Trace
MITC	0.01 ppb (31 ng/m³)	0.034 ppb (101 ng/m³)	0.007 ppb (21.7 ng/m³)
Norflurazon	Trace	ND	ND
Oryzalin	Trace	ND	ND
Permethrin	Trace	Trace	ND
Simazine	Trace	ND	ND
Trifluralin	ND	ND	Trace

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Table L-7. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration by year (2017 – 2019) in Chualar, California.

Chemical	2017	2018	2019
1,3-dichloropropene	0.1 ppb (252 ng/m^3)	0.027 ppb (120 ng/m^3)	0.04 (193 ng/m^3)
Acephate	ND	Trace	ND
Bensulide	Trace	Trace	Trace
Chloropicrin	0.02 ppb (164 ng/m^3)	0.026 ppb (180 ng/m^3)	0.02 ppb (152 ng/m^3)
Chlorothalonil	Trace	Trace	ND
Chlorpyrifos	ND	ND	Trace
Chlorthal-dimethyl	0.0006 ppb (8 ng/m^3)	0.0005 ppb (7.1 ng/m^3)	0.0005 (6.6 ng/m^3)
DDVP	Trace	Trace	Trace
Diuron	Trace	ND	ND
Endosulfan	ND	Trace	ND
Malathion	Trace	0.00009 ppb (1.2 ng/m^3)	ND
Malathion OA	Trace	Trace	Trace
MITC	0.002 ppb (7 ng/m^3)	0.005 ppb (15 ng/m^3)	0.002 ppb (5.6 ng/m^3)
Norflurazon	Trace	ND	ND
Oryzalin	Trace	ND	ND
Permethrin	Trace	Trace	ND
pp-dicofol	ND	ND	0.0002 ppb (2.6 ng/m^3)
Simazine	Trace	ND	ND
Trifluralin	ND	ND	Trace

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Historic Air Concentrations in Cuyama

Monitoring began in Cuyama on May 10, 2018. Tables L-8 to L-10 summarized results for two years of monitoring. Since monitoring at Chualar began in May of 2018, it is not possible to compare annual concentrations of monitored chemicals.

Table L-8 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection. Changes between these two years include a significant decrease in the detection of both MITC and trifluralin. However, since monitoring for 2018 was only conducted for approximately six months and not a full year, the overall percentage of detected chemicals in 2018 versus 2019 is not directly comparable.

Table L-9 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Cuyama. The highest observed 24-h concentration for MITC significantly increased from 60 ng/m^3 (0.02 ppb) in 2018 to 381 ng/m^3 (0.13 ppb) in 2019. Conversely, the highest observed 24-h concentration for trifluralin significantly increased from 410 ng/m^3 (0.03 ppb) in 2018 to 10 ng/m^3 (0.001 ppb) in 2019.

Table L-10 shows the highest observed rolling 4-week average concentrations for any chemical with a positive detection during either year of monitoring at Cuyama. The highest observed rolling 4-week average concentration of MITC increased from 32 ng/m^3 (0.011 ppb) in 2018 to 125 ng/m^3 (0.04 ppb) in 2019. The highest observed rolling 4-week average concentration of trifluralin decreased from 170 ng/m^3 (0.012 ppb) in 2018 to 12.2 ng/m^3 (0.001 ppb) in 2019.

Table L-8. Percentage of analyses performed resulting in a detection at Cuyama, by year.*

Chemical	2018	2019
Acephate	0%	2%
Chlorothalonil	9%	4%
DDVP	3%	4%
Diazinon	0%	2%
Diazinon OA	0%	2%
EPTC	0%	10%
Iprodione	3%	0%
Malathion	0%	2%
Malathion OA	3%	2%
MITC	89%	25%
Trifluralin	31%	14%

* These values include both trace and quantifiable detections.

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Table L-9. Highest 24-h concentrations for pesticides with at least one detectable concentration by year (2018 – 2019) in Cuyama, California.

Chemical	2018	2019
Acephate	ND	Trace
Chlorothalonil	Trace	Trace
DDVP	Trace	Trace
Diazinon	ND	Trace
Diazinon OA	ND	Trace
EPTC	ND	0.009 ppb (73 ng/m³)
Iprodione	Trace	ND
Malathion	ND	Trace
Malathion OA	Trace	Trace
MITC	0.02 ppb (60 ng/m³)	0.13 ppb (381 ng/m³)
Trifluralin	0.03 ppb (410 ng/m³)	0.001 ppb (10 ng/m³)

Table L-10. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2018 – 2019) in Cuyama, California.

Chemical	2018	2019
Acephate	ND	Trace
Chlorothalonil	Trace	Trace
DDVP	Trace	Trace
Diazinon	ND	Trace
Diazinon OA	ND	Trace
EPTC	ND	0.003 ppb (26.9 ng/m³)

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Iprodione	Trace	ND
Malathion	ND	Trace
Malathion OA	Trace	Trace
MITC	0.011 ppb (32 ng/m³)	0.04 ppb (125 ng/m³)
Trifluralin	0.012 ppb (170 ng/m³)	0.001 ppb (12.2 ng/m³)

Historic Air Concentrations in Lindsay

Monitoring began in Lindsay on April 26, 2018. Tables L-11 to L-13 summarized results for two years of monitoring. Since monitoring at Chualar began in April of 2018, it is not possible to compare annual concentrations of monitored chemicals.

Table L-11 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection. Changes between these two years include a general decrease in detections of organophosphates and also a decrease in detections for the fumigant MITC. However, since monitoring for 2018 was only conducted for seven months and not a full year, the overall percentage of detected chemicals in 2018 versus 2019 is not directly comparable.

Table L-12 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Lindsay. There were no quantifiable detections of organophosphates in 2019 to compare to 2018. However, the highest observed 24-h concentration for MITC increased approximately 10-fold in 2019 at 880 ng/m^3 (0.29 ppb) compared to 2018 at 84 ng/m^3 (0.028 ppb).

Table L-13 shows the highest observed rolling 4-week average concentrations for any chemical with a positive detection during either year of monitoring at Lindsay. The only chemical with a quantifiable concentration in 2019 was MITC; its 4-week rolling average increased from in 2018 51 ng/m^3 (0.02 ppb) to 239 ng/m^3 (0.08 ppb) in 2019.

Table L-11. Percentage of analyses performed resulting in a detection at Lindsay, by year.*

Chemical	2018	2019
Acephate	3%	0%
Chlorothalonil	50%	9%
Chlorpyrifos	17%	0%
Chlorpyrifos OA	22%	0%
Dacthal	0%	4%
DDVP	3%	6%
Dimethoate	3%	4%
Dimethoate OA	8%	2%
Diuron	6%	0%

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Chemical	2018	2019
EPTC	0%	2%
Malathion	3%	6%
Malathion OA	8%	6%
MITC	61%	40%
Propargite	3%	0%
Simazine	3%	0%

* These values include both trace and quantifiable detections.

Table L-12. Highest 24-h concentrations for pesticides with at least one detectable concentration by year (2018 – 2019) in Lindsay, California.

Chemical	2018	2019
Acephate	Trace	ND
Chlorothalonil	Trace	Trace
Chlorpyrifos	Trace	ND
Chlorpyrifos OA	0.001 ppb (14 ng/m^3)	ND
Dacthal	ND	Trace
DDVP	Trace	Trace
Dimethoate	Trace	Trace
Dimethoate OA	0.002 ppb (17 ng/m^3)	Trace
Diuron	Trace	ND
EPTC	ND	Trace
Malathion	Trace	Trace
Malathion OA	Trace	Trace
MITC	0.028 ppb (84 ng/m^3)	0.29 ppb (880 ng/m^3)
Propargite	Trace	ND
Simazine	Trace	ND

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Table L-13. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2018 – 2019) in Lindsay, California.

Chemical	2018	2019
Acephate	Trace	ND
Chlorothalonil	Trace	Trace
Chlorpyrifos	Trace	ND
Chlorpyrifos OA	0.0005 ppb (7.3 ng/m^3)	ND
Dacthal	ND	Trace
DDVP	Trace	Trace
Dimethoate	Trace	Trace
Dimethoate OA	0.0008 ppb (6.9 ng/m^3)	Trace
Diuron	Trace	ND
EPTC	ND	Trace
Malathion	Trace	Trace
Malathion OA	Trace	Trace
MITC	0.02 ppb (51 ng/m^3)	0.08 ppb (239 ng/m^3)
Propargite	Trace	ND
Simazine	Trace	ND

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Historic Air Concentrations in Oxnard

Monitoring began in Oxnard on August 14, 2018. Table L-14 to L-16 summarized results for two years of monitoring. Since monitoring at Oxnard began in August of 2018, it is not possible to compare annual concentrations of monitored chemicals.

Table L-14 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection at Oxnard. Changes between these two years include a general decrease in detections of organophosphates (DDVP and malathion being exceptions) and also a decrease in detections for the fumigants chloropicrin and MITC. However, since monitoring for 2018 was only

conducted for seven months and not a full year, the overall percentage of detected chemicals in 2018 versus 2019 is not directly comparable.

Table L-15 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Oxnard. The highest observed 24-h concentration for the fumigants 1,3-D, chloropicrin, and MITC all increased in 2019 relative to 2018. The observed 24-h concentration for 1,3-D increased from 0.1 ppb (450 ng/m^3) in 2018 to 0.51 ppb (2,315 ng/m^3) 2019; for chloropicrin, the highest observed 24-h concentration increased from 0.8 ppb (5,400 ng/m^3) in 2018 to 1.0 ppb (6,939 ng/m^3) in 2019; for MITC, the highest observed 24-h concentration increased from 0.016 ppb (48 ng/m^3) in 2018 to 0.03 ppb (84 ng/m^3) in 2019.

Table L-16 shows the highest observed rolling 4- or 13- week average concentrations for any chemical with a positive detection during either year of monitoring at Oxnard. The highest rolling averages for all chemicals detected at a quantifiable level in 2018 increased in 2019. The 13-week rolling for 1,3-D increased from 0.054 ppb (240 ng/m^3) to 0.09 ppb (417 ng/m^3); the 13-week rolling average for chloropicrin increased from 0.035 ppb (240 ng/m^3) to 0.2 ppb (1,359 ng/m^3). The 4-week rolling average for MITC slightly increased from 0.01 ppb (32 ng/m^3) to 0.01 ppb (40 ng/m^3).

Table L-14. Percentage of analyses performed resulting in a detection at Oxnard, by year.*

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

* These values include both trace and quantifiable detections.

Table L-15. Highest 24-h concentrations for pesticides with at least one detectable concentration by year (2018 – 2019) in Oxnard, California.

Chemical	2018	2019
1,3-dichloropropene	0.1 ppb (450 ng/m^3)	0.51 ppb (2,315 ng/m^3)
Chloropicrin	0.8 ppb (5,400 ng/m^3)	1.0 ppb (6,939 ng/m^3)
Dacthal	Trace	0.002 ppb (21 ng/m^3)
Malathion	Trace	0.008 ppb (113 ng/m^3)

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Malathion OA	Trace	0.001 ppb (19 ng/m^3)
MITC	0.016 ppb (48 ng/m^3)	0.03 ppb (84 ng/m^3)

Table L-16. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2018 – 2019) in Oxnard, California.

Chemical	2018	2019
1,3-dichloropropene (13-wk)	0.054 ppb (240 ng/m^3)	0.09 ppb (417 ng/m^3)
Chloropicrin (13-wk)	0.035 ppb (240 ng/m^3)	0.2 ppb (1,359 ng/m^3)
Dacthal	Trace	0.0007 ppb (8.2 ng/m^3)
Malathion	Trace	0.005 ppb (62 ng/m^3)
Malathion OA	Trace	0.0007 ppb (10 ng/m^3)
MITC	0.011 ppb (32 ng/m^3)	0.01 ppb (40 ng/m^3)

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Historic Air Concentrations in San Joaquin

Monitoring began in San Joaquin on April 26, 2018. Table L-17 to L-19 summarized results for two years of monitoring. Since monitoring at San Joaquin began in April of 2018, it is not possible to compare annual concentrations of monitored chemicals.

Table L-17 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection at San Joaquin. Changes between these two years include an overall decrease in the detection of organophosphates while detections of the fumigants MITC and methyl bromide also decreased and 1,3-D remained stable. However, since monitoring for 2018 was only conducted for eight months and not a full year, the overall percentage of detected chemicals in 2018 versus 2019 is not directly comparable.

Table L-18 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at San Joaquin. The highest observed 24-h concentration for the fumigant 1,3-D decreased from 0.74 ppb (3,359 ng/m^3) in 2018 to 2,542 ng/m^3 (0.56 ppb) in 2019; for the fumigant MITC, the highest observed 24-h concentration increased from 0.32 ppb (949 ng/m^3) to 4,580 ng/m^3 (1.53 ppb) in 2019.

Table L-19 shows the highest observed rolling 4- or 13- week average concentrations for any chemical with a positive detection during either year of monitoring at San Joaquin. The 13-week rolling average

for 1,3-D was approximately the same for both 2018 and 2019. The 4-week rolling average for MITC increased significantly from in 0.14 (949 ng/m^3) 2018 to in 0.43 ppb (1,284 ng/m^3) in 2019.

Table L-17. Percentage of analyses performed resulting in a detection at San Joaquin, by year.*

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

* These values include both trace and quantifiable detections.

Table L-18. Highest 24-h concentrations for pesticides with at least one detectable concentration by year (2018 – 2019) in San Joaquin, California.

Chemical	2018	2019
1,3-dichloropropene	0.74 ppb (3,359 ng/m^3)	0.56 ppb (2,542 ng/m^3)
Chlorpyrifos OA	0.001 ppb (14 ng/m^3)	ND
Methyl Bromide	0.038 ppb (147 ng/m^3)	ND
MITC	0.32 ppb (949 ng/m^3)	1.53 ppb (4,580 ng/m^3)

Table L-19. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2018 – 2019) in San Joaquin, California.

Chemical	2018	2019
1,3-dichloropropene (13-wk)	0.10 ppb (468 ng/m^3)	0.09 ppb (405 ng/m^3)

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Chlorpyrifos OA	0.0005 ppb (7.2 ng/m^3)	ND
Methyl Bromide	0.024 ppb (93 ng/m^3)	ND
MITC	0.14 ppb (422 ng/m^3)	0.43 ppb (1,284 ng/m^3)

Historic Air Concentrations in Santa Maria

Monitoring began in Santa Maria on January 1, 2017. Tables L-20 to L-23 summarized results for the three years of AMN monitoring.

Table L-20 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection. Changes between these three years show an overall decrease for most analytes. Exceptions include dacthal, DDVP, and trifluralin where detections were mostly steady between 2017 and 2019.

Table L-21 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Santa Maria. The highest observed 24-h concentration of MITC increased from 457 ng/m^3 (0.2 ppb) in 2017 to 1,300 ng/m^3 (0.42 ppb) in 2018 and then decreased to 375 ng/m^3 (0.13 ppb) in 2019. Other 24-h concentrations at Santa Maria were relatively consistent or slightly declined between 2017 and 2019.

Table L-22 shows the highest observed rolling 4- or 13- week average concentrations for any chemical with a positive detection at Santa Maria. The highest observed rolling 13-week average concentration of 1,3-D decreased from 1,152 ng/m^3 (0.3 ppb) in 2017 to 440 ng/m^3 (0.097 ppb) in 2018 and decreased again to 405 ng/m^3 (0.09 ppb). The highest observed rolling 4-week average concentration of MITC increased from 140 ng/m^3 (0.05 ppb) in 2017 to 320 ng/m^3 (0.11 ppb) in 2018, and then increased significantly to 1,284 ng/m^3 (0.43 ppb) in 2019.

Table L-23 shows the annual average concentrations for any chemical with a positive detection during any year of monitoring at Santa Maria. The annual average concentration of 1,3-D decreased from 366 ng/m^3 (0.1 ppb) in 2017 to 280 ng/m^3 (0.062 ppb) in 2018 and further decreased to 234 ng/m^3 (0.05 ppb) in 2019. The annual average concentration of MITC increased from 23 ng/m^3 (0.008 ppb) in 2017 to 37 ng/m^3 (0.012 ppb) in 2018 then decreased to 17 ng/m^3 (0.006 ppb) in 2019. The annual average concentration of chloropicrin steadily decreased from 317 ng/m^3 (0.05 ppb) in 2017 to 280 ng/m^3 (0.04 ppb) in 2018 and down to 216 ng/m^3 (0.04 ppb) in 2019.

Table L-20. Percentage of analyses performed resulting in a detection at Santa Maria, by year.

Chemical	2017	2018	2019
1,3-dichloropropene	13%	6%	2%
Acephate	0%	0%	2%
Chloropicrin	21%	17%	6%

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Chlorothalonil	10%	8%	6%
Chlorpyrifos	0%	4%	0%
Chlorthal-dimethyl	40%	39%	43%
Cypermethrin	0%	0%	2%
DDVP	23%	16%	26%
Diazinon OA	0%	2%	0%
Dimethoate OA	0%	0%	2%
Diuron	0%	2%	0%
Endosulfan	0%	4%	0%
EPTC	0%	0%	0%
Iprodione	0%	2%	0%
Malathion	60%	59%	49%
Malathion OA	69%	63%	39%
Methidathion	0%	0%	0%
MITC	33%	50%	21%
Simazine	0%	2%	0%
Trifluralin	33%	22%	24%

* These values include both trace and quantifiable detections.

Table L-21. Highest 24-h concentrations for pesticides with at least one detectable concentration by year (2017 – 2019) in Santa Maria, California.

Chemical	2017	2018	2019
1,3-dichloropropene	0.5 ppb (2,450 ng/m³)	0.48 ppb (2,200 ng/m³)	0.13 ppb (590 ng/m³)
Chloropicrin	0.5 ppb (3,095 ng/m³)	0.46 ppb (3,100 ng/m³)	0.45 ppb (2,992 ng/m³)
Acephate	ND	ND	Trace
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos	ND	Trace	ND
Chlorthal-dimethyl	Trace	Trace	Trace
Cypermethrin	ND	ND	Trace
DDVP	Trace	Trace	0.003 ppb (24 ng/m³)
Diazinon OA	ND	Trace	ND

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Chemical	2017	2018	2019
Diuron	ND	Trace	ND
Endosulfan	ND	Trace	ND
Dimethoate OA	ND	ND	Trace
Malathion	0.001 ppb (15 ng/m³)	0.0007 ppb (9.8 ng/m³)	0.007 ppb (97 ng/m³)
Malathion OA	Trace	Trace	0.001 ppb (13 ng/m³)
MITC	0.2 ppb (457 ng/m³)	0.42 ppb (1,300 ng/m³)	0.125 ppb (375 ng/m3)
Simazine	ND	Trace	ND
Trifluralin	Trace	Trace	Trace

Table L-22. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2017-2018) in Santa Maria, California.

Chemical	2017	2018	2019
1,3-dichloropropene (13-wk)	0.3 ppb (1,152 ng/m³)	0.097 ppb (440 ng/m³)	0.09 ppb (405 ng/m3)
Chloropicrin (13-wk)	0.1 ppb (849 ng/m³)	0.11 ppb (750 ng/m³)	0.08 ppb (523 ng/m³)
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos	ND	Trace	Trace
Chlorthal-dimethyl	Trace	Trace	ND
DDVP	Trace	Trace	0.001 ppb (11 ng/m³)
Diazinon OA	ND	Trace	ND
Diuron	ND	Trace	Trace
Endosulfan	ND	Trace	ND

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Malathion	0.0009 ppb (12 ng/m³)	0.0005 ppb (6.4 ng/m³)	0.002 ppb (28 ng/m³)
Malathion OA	Trace	Trace	0.0005 ppb (6.2 ng/m³)
MITC	0.05 ppb (140 ng/m³)	0.11 ppb (320 ng/m³)	0.43 ppb (1,284 ng/m³)
Propargite	ND	ND	Trace
Simazine	ND	Trace	ND
Trifluralin	Trace	Trace	Trace

Table L-23. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration by year (2017 – 2019) in Santa Maria, California.

Chemical	2017	2018	2019
1,3-dichloropropene	0.1 ppb (366 ng/m³)	0.062 ppb (280 ng/m³)	0.05 ppb (234 ng/m³)
Acephate	ND	ND	Trace
Chloropicrin	0.05 ppb (317 ng/m³)	0.041 ppb (280 ng/m³)	0.03 ppb (216 ng/m³)
Chlorothalonil	Trace	Trace	Trace
Chlorpyrifos	ND	Trace	ND
Chlorthal-dimethyl	Trace	Trace	Trace
Cypermethrin	ND	ND	Trace
DDVP	Trace	Trace	0.0007 ppb (5.5 ng/m³)
Dimethoate OA	ND	ND	Trace
Diazinon OA	ND	Trace	ND
Diuron	ND	Trace	ND
Endosulfan	ND	Trace	ND

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Chemical	2017	2018	2019
EPTC	ND	ND	Trace
Malathion	0.0004 ppb (5 ng/m³)	0.0003 ppb (3.5 ng/m³)	0.0004 ppb (5.3 ng/m³)
Malathion OA	Trace	Trace	0.0002 ppb (2.7 ng/m³)
Methidathion	ND	ND	Trace
MITC	0.008 ppb (23 ng/m³)	0.012 ppb (37 ng/m³)	0.006 ppb (17 ng/m³)
Simazine	ND	Trace	ND
Trifluralin	Trace	Trace	Trace

Historic Air Concentrations in Shafter

Shafter is the only remaining site of the original AMN monitoring locations with available pesticide concentration air monitoring data going back to February of 2011. Table L-24 to L-27 summarized results for monitoring data from Shafter.

Table L-24 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection. Patterns in the percentage of positive detections generally held for all organophosphates monitored for the duration of monitoring at Shafter. Detections for the fumigant 1,3-D in 2019 greatly decreased compared to the previous six years of monitoring. Chlorpyrifos was also detected at a greatly reduced frequency compared to previous years and its oxygen analog was not detected at all in 2019. Chloropicrin was detected for the first time at Shafter in 2019.

Table L-25 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Shafter. The amounts of detected chemicals generally decreased relative to previous years. The highest observed 24-h concentration of 1,3-D in 2019 was 3.2 ppb (14,524 ng/m³), significantly less than 2018. Chloropicrin was detected for the first time at Shafter with its highest observed 24-h concentration measured to be 0.1 ppb (694 ng/m³).

Table L-26 shows the highest observed rolling 4- or 13-week average concentrations for any chemical with a positive detection during any year of monitoring at Shafter. The highest observed rolling 13-week average concentration of 1,3-D in 2019 (0.4 ppb 1,774 ng/m³) was one of the lowest observed since the beginning of the study. The observed rolling 13-week average concentration of chloropicrin in 2019 (0.02 ppb 164 ng/m³) was the first time a sub-chronic rolling average could be determined for that chemical.

Table L-27 shows the annual average concentrations for any chemical with a positive detection during any year of monitoring at Shafter. The annual average concentration of 1,3-D in 2019 (0.1 ppb 599

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ng/m³) was one of the lowest observed since the beginning of the study. The annual average concentration of chloropicrin in 2019 was determined to be 0.02 pbb (123 ng/m³).

Table L-24. Percentage of analyses performed resulting in a detection at Shafter, by year.

Chemical	2011	2012	2013	2014	2015	2016	2017	2018	2019
1,3-dichloropropene	ND	6%	26%	37%	42%	50%	48%	38%	10%
Acephate	ND	2%	ND	ND	ND	ND	2%	ND	ND
Acrolein †	60%	--	--	--	--	--	--	--	--
Bensulide	2%	ND	ND	ND	ND	ND	ND	4%	ND
Carbon Disulfide †	ND	ND	15%	50%	90%	92%	--	--	--
Chloropicrin	ND	ND	ND	ND	ND	ND	ND	ND	2%
Chlorothalonil	13%	23%	60%	13%	75%	62%	69%	64%	43%
Chlorpyrifos	53%	48%	75%	56%	61%	29%	48%	30%	4%
Chlorpyrifos OA	45%	48%	55%	62%	53%	50%	58%	25%	ND
Cypermethrin	ND	ND	ND	ND	ND	ND	ND	ND	2%
Dacthal	15%	ND	8%	ND	2%	15%	10%	4%	2%
DDVP	2%	ND	6%	2%	8%	2%	2%	8%	10%
Diazinon	11%	4%	6%	ND	ND	ND	4%	ND	ND
Diazinon OA	4%	8%	8%	ND	ND	2%	2%	2%	ND
Diuron	6%	12%	2%	10%	10%	ND	4%	4%	4%
EPTC	17%	4%	9%	12%	10%	6%	10%	6%	10%
Iprodione	2%	4%	4%	6%	8%	8%	6%	2%	2%
Malathion	ND	2%	4%	2%	ND	ND	6%	ND	6%
Malathion OA	6%	10%	9%	6%	6%	ND	4%	2%	4%
Methyl bromide	9%	4%	4%	15%	13%	8%	ND	13%	ND
Metolachlor	ND	ND	ND	ND	ND	ND	10%	ND	ND
MITC	40%	56%	57%	42%	35%	42%	62%	83%	59%
Norflurazon	2%	ND	ND	ND	2%	ND	2%	ND	ND
Oryzalin	2%	2%	2%	2%	6%	ND	8%	2%	ND
Oxyfluorfen	ND	ND	ND	ND	ND	ND	6%	9%	2%
Permethrin	2%	ND	2%	ND	ND	ND	ND	ND	2%
Propargite	2%	ND	11%	ND	ND	ND	2%	ND	ND
Simazine	4%	12%	ND	4%	4%	6%	6%	6%	ND
Trifluralin	9%	6%	4%	4%	8%	ND	2%	2%	6%

* These values include both trace and quantifiable detections.
† Monitoring for acrolein was discontinued on January 1, 2012. Monitoring for carbon disulfide was discontinued on January 1, 2017.

Table L-25. Highest 24-h concentrations for pesticides with at least one detectable concentration by year (2011 – 2019) in Shafter, California.

Chemical	2011	2012	2013	2014	2015	2016	2017	2018	2019
1,3-dichloropropene	ND	0.8 ppb (3,643 ng/m³)	8.8 ppb (39,969 ng/m³)	2 ppb (9,251 ng/m³)	2.1 ppb (9,713 ng/m³)	10.0 ppb (45,323 ng/m³)	0.7 ppb (3,394 ng/m³)	50 ppb (230,000 ng/m³)	3.2 ppb (14,524 ng/m³)
Acephate	ND	Trace	ND	ND	ND	ND	Trace	ND	ND
Acrolein†	1.2 ppb	-	-	-	-	-	-	-	-

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Chemical	2011	2012	2013	2014	2015	2016	2017	2018	2019
	(2,796 ng/m³)								
Bensulide	Trace	ND	ND	ND	ND	ND	ND	Trace	ND
Carbon Disulfide†	ND	ND	0.3 ppb (897 ng/m³)	0.2 ppb (548 ng/m³)	0.3 ppb (812 ng/m³)	0.3 ppb (946 ng/m³)	-	-	-
Chloropicrin	ND	ND	ND	ND	ND	ND	ND	ND	0.1 ppb (694 ng/m³)
Chlorothalonil	Trace	Trace	0.007 ppb (80 ng/m³)	0.01 ppb (118 ng/m³)	0.004 ppb (39 ng/m³)	0.005 ppb (58 ng/m³)	0.005 ppb (55 ng/m³)	0.005 ppb (50 ng/m³)	Trace
Chlorpyrifos	0.002 ppb (27 ng/m³)	0.009 ppb (131 ng/m³)	0.03 ppb (423 ng/m³)	0.02 ppb (338 ng/m³)	0.005 ppb (78 ng/m³)	0.004 ppb (52 ng/m³)	0.01 ppb (138 ng/m³)	0.004 ppb (50 ng/m³)	Trace
Chlorpyrifos OA	0.0007 ppb (9 ng/m³)	0.002 ppb (17 ng/m³)	0.01 ppb (143 ng/m³)	0.008 ppb (110 ng/m³)	0.001 ppb (13 ng/m³)	Trace	0.004 ppb (59 ng/m³)	Trace	ND
Dacthal	Trace	ND	Trace	ND	Trace	Trace	Trace	Trace	Trace
DDVP	Trace	ND	Trace	Trace	Trace	0.0 ppb (49 ng/m³)	0.0 ppb (65 ng/m³)	Trace	Trace
Diazinon	0.005 ppb (60 ng/m³)	Trace	0.002 ppb (29 ng/m³)	ND	ND	ND	Trace	ND	ND
Diazinon OA	0.003 ppb (36 ng/m³)	0.0008 ppb (10 ng/m³)	Trace	ND	ND	Trace	Trace	Trace	ND
Diuron	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace	Trace
EPTC	0.02 ppb (187 ng/m³)	0.002 ppb (18 ng/m³)	0.03 ppb (250 ng/m³)	0.03 ppb (216 ng/m³)	0.004 ppb (29 ng/m³)	0.003 ppb (27 ng/m³)	0.002 ppb (12 ng/m³)	Trace	0.005 ppb (36 ng/m³)
Iprodione	Trace	Trace	Trace	Trace	Trace	0.001 ppb (17 ng/m³)	Trace	Trace	Trace
Malathion	ND	Trace	Trace	Trace	ND	ND	0.001 ppb (15 ng/m³)	ND	Trace
Malathion OA	Trace	0.0009 ppb (11 ng/m³)	Trace	Trace	Trace	ND	Trace	Trace	ND
Methyl bromide	0.8 ppb (2,934 ng/m³)	0.6 ppb (2,135 ng/m³)	0.1 ppb (209 ng/m³)	0.2 ppb (963 ng/m³)	0.1 ppb (283 ng/m³)	0.03 ppb (113 ng/m³)	ND	0.097 ppb (380 ng/m³)	ND
Metolachlor	ND	ND	ND	ND	ND	ND	Trace	ND	ND
MITC	0.3 ppb (930 ng/m³)	0.1 ppb (347 ng/m³)	0.3 ppb (762 ng/m³)	0.04 ppb (113 ng/m³)	0.1 ppb (232 ng/m³)	0.004 ppb (109 ng/m³)	0.1 ppb (382 ng/m³)	1.2 ppb (3,700 ng/m³)	0.11 ppb (316 ng/m³)
Norflurazon	Trace	ND	ND	ND	Trace	ND	Trace	ND	ND
Oryzalin	Trace	Trace	Trace	Trace	0.004 ppb (62 ng/m³)	ND	Trace	Trace	ND

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Chemical	2011	2012	2013	2014	2015	2016	2017	2018	2019
Oxyfluorfen	ND	ND	ND	ND	ND	ND	Trace	Trace	Trace
Permethrin	Trace	ND	Trace	ND	ND	ND	ND	ND	Trace
Propargite	Trace	ND	Trace	ND	ND	ND	Trace	ND	ND
Simazine	Trace	Trace	ND	Trace	Trace	Trace	Trace	Trace	ND
Trifluralin	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace	Trace

† Monitoring for acrolein was discontinued on January 1, 2012. Monitoring for carbon disulfide was discontinued on January 1, 2017.

Table L-26. Highest rolling 4- and 13-week average concentrations for pesticides with at least one detectable concentration by year (2011 – 2019) in Shafter, California.

Chemical	2011	2012	2013	2014	2015	2016	2017	2018	2019
1,3-dichloropropene (13-wk)	ND	0.1 ppb (594 ng/m³)	2 ppb (9,190 ng/m³)	2.2 ppb (10,119 ng/m³)	0.5 ppb (2,176 ng/m³)	1 ppb (4,678 ng/m³)	1.1 ppb (4,812 ng/m³)	5.6 ppb (25,000 ng/m³)	0.4 ppb (1,774 ng/m³)
Acephate	ND	Trace	ND	ND	ND	ND	Trace	Trace	ND
Bensulide	Trace	ND	ND	ND	ND	ND	ND	ND	ND
Chloropicrin (13-wk)	ND	ND	ND	ND	ND	ND	ND	ND	0.02 ppb (164 ng/m³)
Chlorothalonil	Trace	Trace	0.003 ppb (38 ng/m³)	Trace	0.002 ppb (25 ng/m³)	0.002 ppb (24 ng/m³)	0.003 ppb (38 ng/m³)	0.003 ppb (35 ng/m³)	Trace
Chlorpyrifos	0.001 ppb (15 ng/m³)	0.003 ppb (46 ng/m³)	0.008 ppb (113 ng/m³)	0.006 ppb (92 ng/m³)	0.004 ppb (60 ng/m³)	0.003 ppb (39 ng/m³)	0.004 ppb (51 ng/m³)	0.002 ppb (22 ng/m³)	Trace
Chlorpyrifos OA	0.0005 ppb (7 ng/m³)	0.001 ppb (13 ng/m³)	0.003 ppb (44 ng/m³)	0.002 ppb (32 ng/m³)	0.0007 ppb (9 ng/m³)	Trace	0.001 ppb (19 ng/m³)	Trace	ND
Cypermethrin	ND	ND	ND	ND	ND	ND	ND	ND	Trace
Dacthal	Trace	ND	Trace	ND	Trace	Trace	Trace	Trace	Trace
DDVP	Trace	ND	Trace	Trace	Trace	0.001 ppb (13 ng/m³)	0.002 ppb (17 ng/m³)	Trace	Trace
Diazinon	0.001 ppb (18 ng/m³)	Trace	0.0008 ppb (10 ng/m³)	ND	ND	ND	Trace	ND	ND
Diazinon OA	0.0009 ppb (11 ng/m³)	Trace	ND	ND	ND	Trace	Trace	Trace	ND
Diuron	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace	Trace
EPTC	0.01 ppb (76 ng/m³)	Trace	0.02 ppb (139 ng/m³)	0.01 ppb (86 ng/m³)	0.002 ppb (19 ng/m³)	0.001 ppb (10 ng/m³)	0.001 ppb (9 ng/m³)	Trace	0.0018 ppb (13.3 ng/m³)
Iprodione	Trace	Trace	Trace	Trace	Trace	0.0007 ppb (10 ng/m³)	Trace	Trace	Trace
Malathion	ND	Trace	Trace	Trace	ND	ND	0.0004	ND	Trace

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Chemical	2011	2012	2013	2014	2015	2016	2017	2018	2019
							ppb (5 ng/m³)		
Malathion OA	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace	ND
Methyl bromide	0.4 ppb (1,403 ng/m³)	0.2 ppb (683 ng/m³)	0.1 ppb (198 ng/m³)	0.1 ppb (389 ng/m³)	0.05 ppb (186 ng/m³)	0.02 ppb (81 ng/m³)	ND	0.004 ppb (160 ng/m³)	ND
Metolachlor	ND	ND	ND	ND	ND	ND	Trace	ND	ND
MITC	0.2 ppb (564 ng/m³)	0.1 ppb (177 ng/m³)	0.1 ppb (319 ng/m³)	0.02 ppb (74 ng/m³)	0.1 ppb (156 ng/m³)	0.02 ppb (51 ng/m³)	0.1 ppb (236 ng/m³)	0.5 ppb (1,500 ng/m³)	0.07 ppb (194 ng/m³)
Norflurazon	Trace	ND	ND	ND	Trace	ND	Trace	ND	ND
Oryzalin	Trace	Trace	Trace	Trace	0.001 ppb (16 ng/m³)	ND	Trace	Trace	ND
Oxyfluorfen	ND	ND	ND	ND	ND	ND	Trace	Trace	ND
Permethrin	Trace	ND	Trace	ND	ND	ND	ND	ND	Trace
Propargite	Trace	ND	Trace	ND	ND	ND	Trace	ND	ND
Simazine	Trace	Trace	ND	Trace	Trace	Trace	Trace	Trace	ND
Trifluralin	ND	ND	ND	ND	ND	ND	Trace	Trace	ND

Table L-27. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration by year (2011 – 2019) in Shafter, California.

Chemical	2011	2012	2013	2014	2015	2016	2017	2018	2019
1,3-dichloropropene	ND	0.1 ppb (453 ng/m³)	0.6 ppb (2,589 ng/m³)	0.2 ppb (909 ng/m³)	0.2 ppb (800 ng/m³)	0.3 ppb (1,559 ng/m³)	0.1 ppb (486 ng/m³)	1.5 ppb (6,900 ng/m³)	0.1 ppb (599 ng/m³)
Acephate	ND	Trace	ND	ND	ND	ND	Trace	Trace	ND
Bensulide	Trace	ND	ND	ND	ND	ND	ND	ND	ND
Chloropicrin	ND	ND	ND	ND	ND	ND	ND	ND	0.02 ppb (123 ng/m³)
Chlorothalonil	Trace	Trace	0.001 ppb (16 ng/m³)	0.002 ppb (22 ng/m³)	Trace	0.001 ppb (15 ng/m³)	0.001 ppb (16 ng/m³)	0.0009 ppb (10 ng/m³)	Trace
Chlorpyrifos	Trace	Trace	0.001 ppb (20 ng/m³)	0.001 ppb (16 ng/m³)	Trace	0.0006 ppb (8 ng/m³)	0.0008 ppb (11 ng/m³)	0.0004 ppb (5.3 ng/m³)	Trace
Chlorpyrifos OA	Trace	Trace	0.0006 ppb (8 ng/m³)	0.0005 ppb (7 ng/m³)	Trace	Trace	0.0004 ppb (6 ng/m³)	Trace	ND
Cypermethrin	ND	ND	ND	ND	ND	ND	ND	ND	Trace
Dacthal	Trace	ND	Trace	ND	Trace	Trace	Trace	Trace	Trace
DDVP	Trace	ND	Trace	Trace	Trace	0.0003 ppb (3 ng/m³)	0.0003 ppb (3 ng/m³)	Trace	Trace
Diazinon	Trace	Trace	Trace	ND	ND	ND	Trace	ND	ND

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Diazinon OA	Trace	Trace	ND	ND	ND	Trace	Trace	Trace	ND
Diuron	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace	Trace
EPTC	Trace	Trace	Trace	Trace	Trace	0.003 ppb (2 ng/m³)	0.0003 ppb (2 ng/m³)	Trace	0.0003 ppb (3.9 ng/m³)
Iprodione	Trace	Trace	Trace	Trace	Trace	0.0001 ppb (2 ng/m³)	Trace	Trace	Trace
Malathion	ND	Trace	Trace	Trace	ND	ND	0.0001 ppb (2 ng/m³)	ND	Trace
Malathion OA	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace	ND
Methyl bromide	0.1 ppb (425 ng/m³)	0.1 ppb (247 ng/m³)	0.04 ppb (163 ng/m³)	0.02 ppb (70 ng/m³)	0.01 ppb (40 ng/m³)	0.007 ppb (26 ng/m³)	ND	0.018 ppb (71 ng/m³)	ND
Metolachlor	ND	ND	ND	ND	ND	ND	Trace	ND	ND
MITC	0.02 ppb (73 ng/m³)	0.02 ppb (51 ng/m³)	0.02 ppb (66 ng/m³)	0.007 ppb (21 ng/m³)	0.009 ppb (27 ng/m³)	0.006 ppb (17 ng/m³)	0.02 ppb (51 ng/m³)	0.058 ppb (170 ng/m³)	0.01 ppb (43 ng/m³)
Norflurazon	Trace	ND	ND	ND	Trace	ND	Trace	ND	ND
Oryzalin	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace	ND
Oxyfluorfen	ND	ND	ND	ND	ND	ND	Trace	Trace	ND
Permethrin	Trace	ND	Trace	ND	ND	ND	ND	ND	Trace
Propargite	Trace	ND	Trace	ND	ND	ND	Trace	ND	ND
Simazine	Trace	Trace	ND	Trace	Trace	Trace	Trace	Trace	ND
Trifluralin	ND	ND	ND	ND	ND	ND	Trace	Trace	ND

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Historic Air Concentrations in Watsonville

Monitoring began at Watsonville on January 1, 2017. Table L-28 to L-31 summarized results for AMN monitoring at Watsonville.

Table L-28 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection. Patterns between these three years include steady detections of chloropicrin and a consistent increase in detections of DDVP.

Table L-29 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Watsonville. The highest observed 24-h concentration of 1,3-D decreased from 1,860 ng/m³ (0.4 ppb) in 2017 to 1,200 ng/m³ (0.27 ppb) in 2018 and then slightly increased to 1,316 ng/m³ (0.29 ppb) in 2019. The highest observed 24-h concentration of chloropicrin decreased from 3,221 ng/m³ (0.5 ppb) in 2017 to 780 ng/m³ (0.12 ppb) in 2018 and then greatly increased to 5,741 ng/m³ (0.9 ppb) in 2019. The highest observed 24-h concentration of MITC increased from 56 ng/m³ (0.02 ppb) in 2017 to 120 ng/m³ (0.042 ppb) in 2018 and increased again in 2019 to 164 ng/m³ (0.06 ppb).

Table L-30 shows the highest observed rolling 4- or 13-week average concentration for any chemical with a positive detection during any year of monitoring at Watsonville. The highest observed rolling 13-

week average concentration of 1,3-D decreased from 904 ng/m³ (0.2 ppb) in 2017 to 430 ng/m³ (0.094 ppb) in 2018 and decreased again in 2019 down to 374 ng/m3 (0.08 ppb). The highest observed rolling 13-week average concentration of chloropicrin decreased from 974 ng/m³ (0.1 ppb) in 2017 to 480 ng/m³ (0.071 ppb) in 2018 then increased to 1,042 ng/m³ in 2019. The highest observed rolling 4-week average concentration of MITC increased from 19 ng/m³ (0.0 ppb) in 2017 to 44 ng/m³ (0.015 ppb) in 2018 and increased again in 2019 to 71 ng/m³ (0.024 ppb).

Table L-31 shows the annual average concentrations for any chemical with a positive detection during any year of monitoring at Watsonville. The annual average concentration of 1,3-D decreased from 397 ng/m³ (0.1 ppb) in 2017 to 210 ng/m³ (0.046 ppb) in 2018 and increased to 260 ng/m³ (0.06 ppb). The annual average concentration of chloropicrin decreased from 347 ng/m³ (0.1 ppb) in 2017 to 200 ng/m³ (0.03 ppb) in 2018 and increased to 348 ng/m³ (0.05 ppb) in 2019. The annual average concentration of MITC increased from 6 ng/m³ (0.002 ppb) in 2017 to 15 ng/m³ (0.005 ppb) in 2018 and then decreased to 12 ng/m³ (0.004 ppb) in 2019.

Table L-28. Percentage of analyses performed resulting in a detection at Watsonville, by year.

Chemical	2017	2018	2019
1,3-dichloropropene	20%	6%	4%
Chloropicrin	25%	25%	24%
Chlorothalonil	4%	0%	2%
Chlorpyrifos	2%	0%	0%
Chlorthal-dimethyl	8%	2%	18%
DDVP	2%	10%	26%
Diuron	2%	0%	2%
Endosulfan	2%	0%	0%
Malathion	14%	6%	14%
Malathion OA	10%	6%	16%
Metolachlor	2%	0%	0%
MITC	18%	48%	30%
Norflurazon	2%	0%	0%
Oryzalin	2%	0%	0%
pp-Dicofol	2%	0%	0%
Simazine	2%	0%	0%
Trifluralin	14%	2%	4%

* These values include both trace and quantifiable detections.

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Table L-29. Highest 24-h concentrations for pesticides with at least one detectable concentration by year (2017 – 2019) in Watsonville, California.

Chemical	2017	2018	2019
1,3-dichloropropene	0.4 ppb (1,860 ng/m³)	0.27 ppb (1,200 ng/m³)	0.29 ppb (1,316 ng/m³)
Chloropicrin	0.5 ppb (3,221 ng/m³)	0.12 ppb (780 ng/m³)	0.9 ppb (5,741 ng/m³)
Chlorothalonil	Trace	ND	Trace
Chlorpyrifos	Trace	ND	ND
Chlorthal-dimethyl	Trace	Trace	Trace
DDVP	Trace	Trace	Trace
Diuron	Trace	ND	Trace
Endosulfan	Trace	ND	ND
EPTC	ND	ND	Trace
Malathion	Trace	Trace	0.004 ppb (56 ng/m³)
Malathion OA	Trace	Trace	Trace
Metolachlor	Trace	ND	ND
MITC	0.02 ppb (56 ng/m³)	0.042 ppb (120 ng/m³)	0.06 ppb (164 ng/m³)
Norflurazon	Trace	ND	ND
Oryzalin	Trace	ND	ND
pp-Dicofol	Trace	ND	ND
Simazine	Trace	ND	ND
Trifluralin	Trace	Trace	Trace

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Table L-30. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2017 – 2019) in Watsonville, California.

Chemical	2017	2018	2019
1,3-dichloropropene (13-wk)	0.2 ppb (904 ng/m³)	0.094 ppb (430 ng/m³)	0.08 ppb (374 ng/m³)
Chloropicrin (13-wk)	0.1 ppb (974 ng/m³)	0.071 ppb (480 ng/m³)	0.15 ppb (1,042 ng/m³)
Chlorothalonil	Trace	ND	Trace
Chlorpyrifos	Trace	ND	ND
Chlorthal-dimethyl	Trace	Trace	Trace
DDVP	Trace	Trace	Trace
Diuron	Trace	ND	Trace
Endosulfan	Trace	ND	ND
Malathion	Trace	Trace	0.0012 ppb (16 ng/m³)
Malathion OA	Trace	Trace	Trace
Metolachlor	Trace	ND	ND
MITC	0.006 ppb (19 ng/m³)	0.015 ppb (44 ng/m³)	0.024 ppb (71 ng/m³)
Norflurazon	Trace	ND	ND
Oryzalin	Trace	ND	ND
pp-Dicofol	Trace	ND	ND
Simazine	Trace	ND	ND
Trifluralin	Trace	Trace	Trace

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Table L-31. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration by year (2017 – 2019) in Watsonville, California.

Chemical	2017	2018	2019
1,3-dichloropropene	0.1 ppb (397 ng/m³)	0.046 ppb (210 ng/m³)	0.06 ppb (260 ng/m³)
Chloropicrin	0.1 ppb (347 ng/m³)	0.03 ppb (200 ng/m³)	0.05 ppb (348 ng/m³)
Chlorothalonil	Trace	ND	Trace
Chlorpyrifos	Trace	ND	ND
Chlorthal-dimethyl	Trace	Trace	Trace
DDVP	Trace	Trace	Trace
Diuron	Trace	ND	Trace
Endosulfan	Trace	ND	ND
Malathion	Trace	Trace	0.0002 ppb (2.6 ng/m³)
Malathion OA	Trace	Trace	Trace
Metolachlor	Trace	ND	ND
MITC	0.002 ppb (6 ng/m³)	0.005 ppb (15 ng/m³)	0.004 ppb (12 ng/m³)
Norflurazon	Trace	ND	ND
Oryzalin	Trace	ND	ND
pp-Dicofol	Trace	ND	ND
Simazine	Trace	ND	ND
Trifluralin	Trace	Trace	Trace

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APPENDIX M – REFERENCES

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