Monitoring of 1,3-Dichloropropene in Fresno and Merced Counties: Results for 2024

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Air Program
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Introduction

The soil fumigant 1,3-dichloropropene (1,3-D), also known as Telone®, is one of the most widely used fumigants in California and is applied pre-plant to prevent soil-borne diseases. A portion of the applied chemical can disperse into the atmosphere depending on the fumigation method used during application as well as environmental conditions.

In 2016, the California Department of Pesticide Regulation (DPR) evaluated the reported 1,3-D pesticide use to identify and rank communities surrounded by the highest 1,3-D use. DPR prioritized regions outside the coverage area of DPR's Air Monitoring Network and the California Air Resources Board's (CARB) Toxic Air Contaminant programs. As a result, DPR selected two communities in the Central Valley: Delhi (Merced County) and Parlier (Fresno County). This monitoring study aims to identify the presence of ambient air concentrations of 1,3-D in regions of high use, compare measured air concentrations to acute regulatory targets and sub-chronic and chronic human health screening levels, and evaluate the effectiveness of mitigation measures. Although we evaluate short-term exposure as a part of this project for comparison purposes, DPR emphasizes that this study is designed to evaluate long-term ambient air concentrations of 1,3-D in regions of higher use. Therefore, sampling, and analytical methods used for this study are specifically designed to achieve these goals. DPR staff began collecting weekly 24-h air samples to monitor 1,3-D in these two communities in November 2016.

This report evaluates the results of samples collected from January 1, 2024, through December 31, 2024, and is the eighth report for this multi-year study.

Methods

Field and Laboratory Methods

From January 1, 2024, through December 31, 2024, one 24-h ambient air sample (primary sample) was collected each week on a randomly assigned day of the week at Delhi and Parlier. Sample start times varied between 8 am to 4 pm, as they were left to the discretion of individual field staff. Samples were collected using a 6-liter SilcoCan® canister (Restek cat. no. 24142-65) pre-evacuated to a pressure of -30" Hg placed on either a Xonteck Model 901 or a Nutech 2703 automated active sampler. If the active sampler malfunctioned or was unavailable, a Veriflow SC423XL flow controller (i.e., a regulator) attached to the SilcoCan® canister was used to conduct the air sampling. Xonteck flow rates were set to 7.5 mL/min, Nutech flow rates to 3.3 mL/min, and regulator samples were targeted to 3.0 mL/min. Acceptable flow rates ranged within +/- 10% of the targeted rate. Approximately once a month, a collocated sample (which was placed adjacent to the primary samples) was collected. Delhi was chosen as the collocated site and was used as the quality control monitoring station. All samples were collected using the same standard air sampling procedures (Appendix VI).

Samples were analyzed by the California Department of Food and Agriculture's Center for

Analytical Chemistry (CDFA CAC) Laboratory using method EMON-SM-05-019 (Appendix VII). In May 2022, CDFA CAC Laboratory updated their lab method, introducing new method detection limits (MDL) for each 1,3-D isomer and Trace as a reportable result. CDFA CAC Laboratory followed DPR's standard lab quality control procedures and conducted laboratory blanks and laboratory spikes during each analytical run (CDFA 2022). In February 2025, CDFA CAC published the results of an investigation into samples it analyzed between February 16, 2011, and November 27, 2024, concluding that lab error resulted in underreporting of 1,3-D and providing correction factors to apply to quantifiable detections. The error thus impacted all quantifiable detections between the start of this study and November 27, 2024. DPR applied these correction factors on February 24, 2025 (Delgado, 2025; Table 1).

Table 1. Sampling periods, correction factors, total number of samples, and number of affected quantifiable detections analyzed by CDFA-CAC from 2016 to 2024.

Start Date	End Date	Correction Factor	1,3-D Analyzed Samples	1,3-D Quantifiable Detections
11/29/2016	03/15/2023	1.26	636	469
03/16/2023	05/11/2023	1.36	18	7
05/12/2023	11/21/2024	1.58	160	59

Data Analysis

DPR aggregates the laboratory results of 1,3-D isomers (*cis* and *trans*) per sample to calculate total 1,3-D concentrations. Before aggregation, DPR applies a substitution to non-detections (NDs) and trace values. Data collected before the CDFA CAC update in May 2022 substitutes one-half of the reporting limit (RL) for non-detections (ND) before aggregation. However, if either *cis* or *trans* isomers of 1,3-D were detected, then the total 1,3-D result equals the value of that detection, and no substitution is applied to the ND isomer. Following the May 2022 update, substitution of one-half of the MDL is applied to all ND results. This update also introduced Trace values. A Trace detection is a value somewhere between the MDL and the RL. Trace values are substituted using the following formula: (MDL+RL)/2. MDL values were changed as part of this update. MDL values were changed three more times in 2024 (Appendix V). The RL of 0.01 parts per billion (ppb) for each isomer has not changed during this study.

Total 1,3-D concentrations are the basis for exposure estimates that are compared to health-based screening levels and regulatory targets (Table 2). The maximum 24-h concentration is used as an estimate of acute exposure. Sub-chronic exposure equals the maximum 90-day (13 consecutive weeks) rolling average concentration. The one-year average concentration determines chronic exposure. DPR calculates lifetime exposure as the running average concentration since December 2016.

To determine the risk associated with each exposure period, DPR uses a Hazard Quotient (HQ). The HQ is calculated as a ratio of the measured 1,3-D concentrations to a screening level or a regulatory target. An HQ of greater than one indicates exceedance of the regulatory target or

screening level and requires DPR to act to further evaluate the data and assess possible mitigation measures (DPR 2011).

Table 2. Screening levels (SL) and regulatory target (RT) for 1,3-dichloropropene.

Exposure	Exposure Period	SL / RT (ppb)	Potential Health Effect
Acute	72 hours	55	Change in body weight
Sub-chronic	90 days	3	Tissue damage in nose and lung
Chronic	1 year	2	Tissue damage in nose and lung
Lifetime/Cancer Risk	70 years	0.56	Cancer

Study Limitations

To address the study's goal of long-term ambient air monitoring in a region of high 1,3-D use, monitoring is conducted once per week for 24 hours; however, acute regulatory targets are based on submitted toxicology studies that reference a 72-h period. Due to current field methods, DPR is not able to collect 72-h air samples. The estimate of acute exposure is thus based on a 24-h sample.

The regulatory target for lifetime exposure is derived from submitted toxicology studies and is based on a set of assumptions for one person's cancer risk over a 70-year average of inhalation exposure (DPR 2016). The lifetime/cancer risk requires 70 years of data; however, this study was initiated in December 2016. Thus, the estimate of lifetime risk exposure is calculated as the running average concentration since the start of this study.

Air Monitoring Results

In 2024, 104 primary samples were collected from monitoring sites in Delhi and Parlier (Appendices I and II). All samples were valid. 1,3-D was detected in 47% of air samples.

Delhi

Fifty-two valid primary samples were collected at the Delhi site in 2024. Forty-four percent (23 samples) were quantifiable detections above the RL of 0.01 ppb. Quantifiable detections ranged from 0.013 to 1.42 ppb. Twenty-nine samples resulted in NDs. The mean and median annual concentrations were, respectively, 0.11 and 0.007 ppb. No concentration exceeded established targets for acute, sub-chronic, chronic, or lifetime exposures. Acute, sub-chronic, chronic, and lifetime exposure estimates were below an HQ of 1.0. The highest observed HQ in 2024 was 0.57 for the lifetime exposure period (Table 3).

Table 3. Maximum concentration for each exposure period in Delhi.

Exposure	Exposure Period	Concentration (ppb)	SL / RT (ppb)	Hazard Quotient*
Acute	72 hours**	1.42	55	0.03
Sub-chronic	90 days	0.34	3	0.11
Chronic	1 year	0.11	2	0.055
Lifetime	70 years***	0.32	0.56	0.57

* Calculated as the ratio of measured concentration to regulatory target or screening level
** Compared using a 24-h sample
*** Calculated from available data Dec. 2016-Dec. 2024

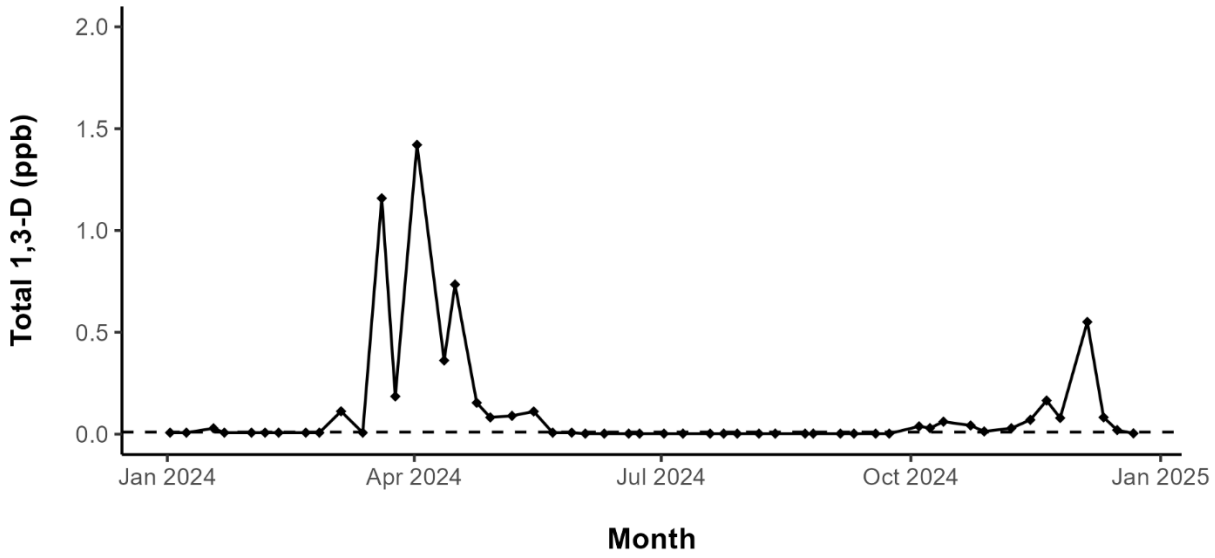

Figure 1. 2024 1,3-D air concentrations in Delhi. The dashed horizontal line is the reporting limit (RL).

Parlier

Fifty-two valid primary samples were collected at the Parlier site in 2024. Fifty percent (26 samples) were quantifiable detections. Quantifiable detections ranged from 0.02 to 2.35 ppb. Twenty-five samples resulted in NDs. The remaining sample was ND/Trace. The mean and median annual concentrations were, respectively, 0.16 and 0.014 ppb. No detection exceeded established targets for acute, sub-chronic, or chronic exposures. Acute, sub-chronic, and chronic exposure estimates were below an HQ of 1.0 (Table 4).

Staff found continued exceedance of the regulatory target for lifetime exposure, after comparison with the exposure estimate based on samples collected between December 2016 and December 2024. This is largely due to a single high detection of 140 ppb in October 2018 and not a direct result of concentrations from 2024.

Table 4. Maximum concentration for each exposure period in Parlier.

Exposure	Exposure Period	Concentration (ppb)	SL / RT (ppb)	Hazard Quotient*
Acute	72 hours**	2.35	55	0.04
Sub-chronic	90 days	0.52	3	0.17
Chronic	1 year	0.16	2	0.08
Lifetime	70 years***	1.07	0.56	1.91

* Calculated as the ratio of measured concentration to screening level
** Compared using a 24-h sample
*** Calculated from available data Dec. 2016-Dec. 2024

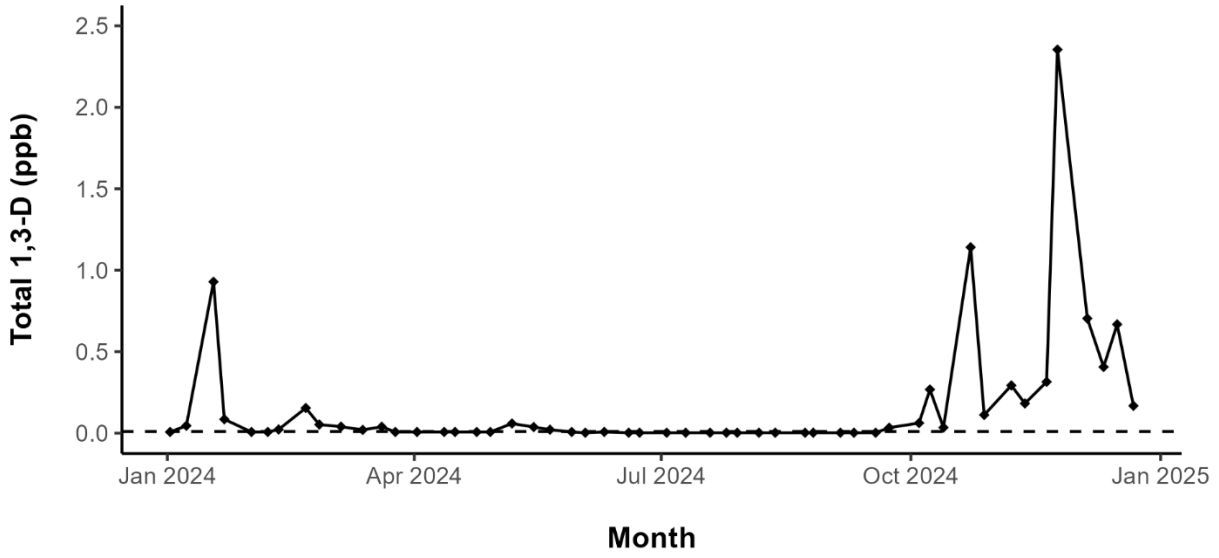

Figure 2. 2024 1,3-D air concentrations in Parlier. The dashed horizontal line is the reporting limit (RL).

Quality Assurance Results

Collocated Samples

During 2024, 10 collocated paired air samples were collected from the Delhi site. Six pairs of sample results reported NDs for both the primary and collocated samples, which prevented DPR from calculating a relative percent difference for these pairs. Similarly, two paired samples (A515/A515 and A560/A561) resulted in a quantifiable and Trace detection for one or more isomers, and no relative percent difference was determined. Two paired samples (A532/A533 and A568/A569) had measurable detections above the RL, resulting in an average relative

percent difference of 12%. Table 5 summarizes the results of the 10 collocated samples.

Table 5. Summary of collocated sample results and absolute relative percent difference.

Sample Date	Primary Sample	Primary Result (ppb)	Collocated Sample	Collocated Result (ppb)	|Relative % Difference|
1/19/2024	A514	0.013/Trace	A515	0.02/Trace	N/A
2/7/2024	A518	ND	A519	ND	N/A
3/14/2024	A524	ND	A525	ND	N/A
4/30/2024	A532	0.05	A533	0.07	23%
6/11/2024	A540	ND	A541	ND	N/A
6/20/2024	A542	ND	A543	ND	N/A
7/20/2024	A547	ND	A548	ND	N/A
9/6/2024	A555	ND	A556	ND	N/A
10/5/2024	A560	0.04	A561	0.03/Trace	N/A
11/21/2024	A568	0.17	A569	0.17	0.48%

Laboratory Spikes and Blanks

For quality assurance purposes, the CDFA CAC Laboratory conducted 41 laboratory spikes when performing the air sample analysis. Spike recovery rates averaged 97.1% (SD = 9.2) and 94% (SD = 11.5) for the *cis*- and *trans*- isomers, respectively. In addition, 38 laboratory blanks were evaluated; no cross-contamination was detected in these samples. Appendices III and IV include Individual results of laboratory spikes and laboratory blanks.

Discussion

December Air Concentrations

Current 1,3-D permit conditions do not allow the application of 1,3-D during December. Quantifiable, low-level detections of 1,3-D were present in seven out of eight samples collected from Delhi and Parlier during December. In Delhi, total 1,3-D concentrations decreased from 0.55 ppb to non-detectable levels. Similarly, in Parlier, there was a decrease in low-level detections from 0.70 to 0.17 ppb. For untarped applications of 1,3-D, studies have shown that the fumigant's cumulative emission tends to stabilize roughly two weeks after application (Gao

et al. 2008, Gao and Trout 2007), which may partially explain the low levels of detections seen during December even in the absence of 1,3-D applications.

Comparisons to the Previous Year

In Delhi, the acute concentration increased from 0.35 to 1.42 ppb, the sub-chronic concentration decreased from 0.39 to 0.34 ppb, the chronic concentration increased from 0.04 to 0.11 ppb, and the long-term (8-year) concentration decreased from 0.35 to 0.32 ppb (Table 6, Figure 3).

In Parlier, acute concentration increased from 1.09 to 2.35 ppb, sub-chronic concentration decreased from 2.64 to 0.52 ppb, chronic concentration increased from 0.1 to 0.16 ppb, and long-term (8-year) concentration decreased from 1.2 to 1.07 ppb (Table 7, Figure 4).

Table 6. Concentration of 1,3-D (ppb) in the ambient air in Delhi between 2017 and 2024.

Year	Acute	Sub-chronic	Chronic	Long-Term
2017	1.34	0.37	0.17	0.18
2018	2.27	0.61	0.25	0.21
2019	2.57	0.48	0.19	0.21
2020	4.72	1.26	0.59	0.30
2021	11.81	2.89	0.86	0.41
2022	3.52	0.78	0.35	0.40
2023	0.35	0.39	0.04	0.35
2024	1.42	0.34	0.11	0.32

Table 7. Concentration of 1,3-D (ppb) in the ambient air in Parlier between 2017 and 2024.

Year	Acute	Sub-chronic	Chronic	Long-Term
2017	20.11	2.31	0.78	0.76
2018	140.23	13.27	3.71	2.15
2019	2.61	2.30	0.34	1.56
2020	13.37	2.03	0.64	1.34
2021	31.41	4.15	1.95	1.46
2022	13.63	3.00	0.98	1.39
2023	1.09	2.64	0.10	1.20
2024	2.35	0.52	0.16	1.07

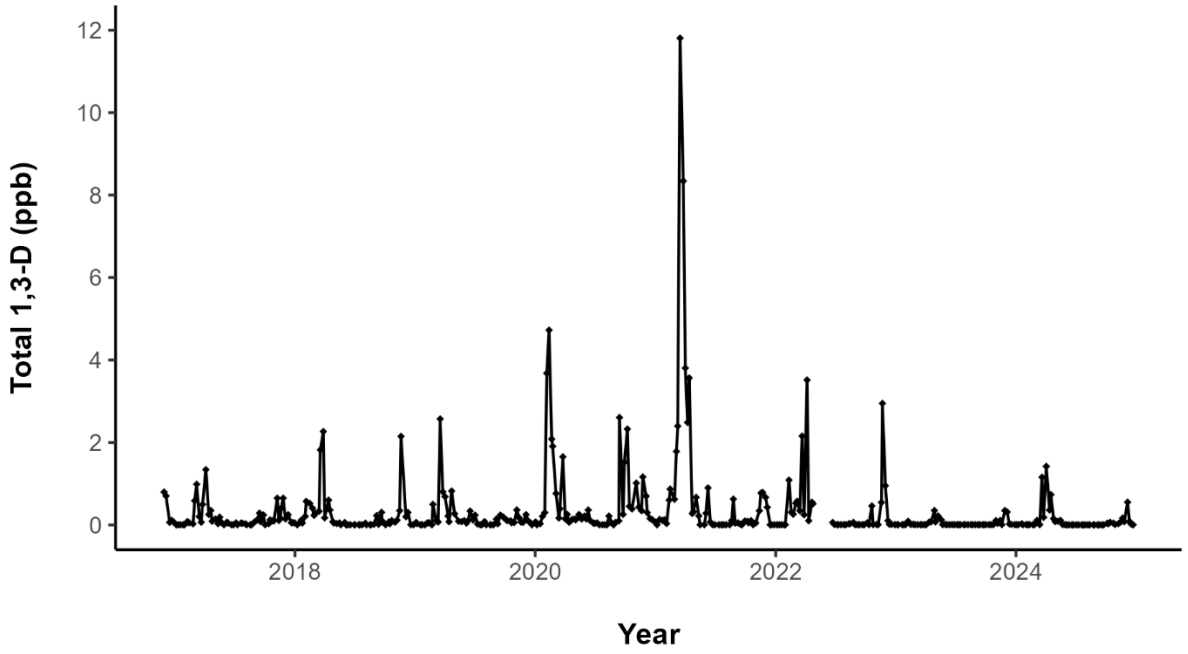

Figure 3. Delhi air concentrations since the beginning of the study from December 2016 to December 2024.

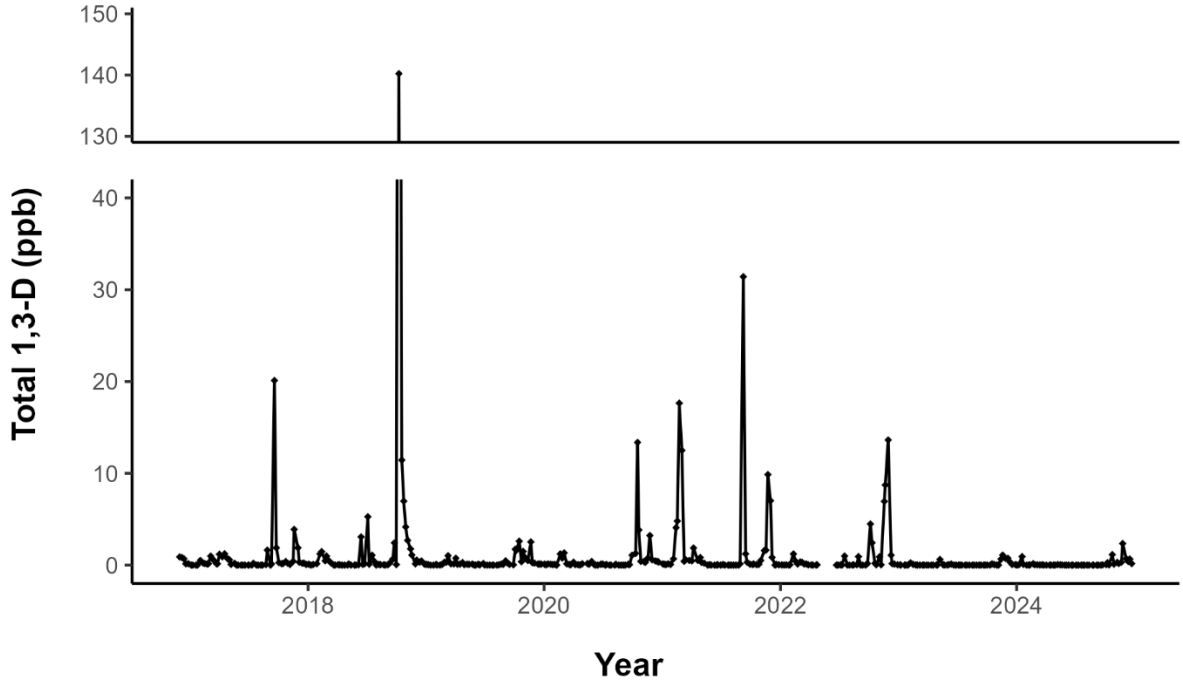

Figure 4. Parlier air concentrations since the beginning of the study from December 2016 to December 2024.

Conclusion

The year 2024 marked the eighth consecutive year of 1,3-D ambient monitoring in the communities of Delhi and Parlier. The ambient 1,3-D results collected in this study continue to provide meaningful information for the evaluation of acute, sub-chronic, chronic, and lifetime concentrations in high-use communities. Delhi's 1,3-D concentrations observed in calendar year 2024 were below the currently established thresholds of 1,3-D for acute, sub-chronic, chronic, and lifetime (70-year average) concentrations. Over the last four years, the annual concentration in Delhi has decreased from 0.86 ppb in 2021 to 0.35 ppb in 2022, 0.04 ppb in 2023, and 0.11 ppb in 2024. In Parlier, concentrations of 1,3-D were also below acute, sub-chronic, and chronic exposure thresholds. Lifetime (8-year average) concentration was above the currently established lifetime (70-year average) threshold in Parlier. Over the last four years, the annual concentration has decreased from 1.95 ppb in 2021 to 0.98 ppb in 2022, 0.10 ppb in 2023, and 0.16 ppb in 2024.

References

CDFA (2022). Determination of Bromomethane, cis-1,3-Dichloropropene and trans-1,3-dichloropropene in Air Samples Collected in Summa Canisters. California Department of Food and Agriculture. Sacramento, CA.

Delgado, Y. (2025). Updating 1,3-Dichloropropene and Methyl Bromide Detections from 2011 to 2023. California Department of Pesticide Regulation. Sacramento, CA.

DPR (2011). Air monitoring network study: Long-term ambient air monitoring for pesticides in multiple California communities. Sacramento, CA: Department of Pesticide Regulation, California Environmental Protection Agency.

DPR (2016). Risk management directive and mitigation guidance for cancer risk from 1,3-dichloropropene (1,3-D). California Department of Pesticide Regulation. Sacramento, CA.

DPR (2023). DPR 22-005 Health Risk Mitigation and Volatile Organic Compound Emission Reduction for 1,3-Dichloropropene. California Department of Pesticide Regulation. Sacramento, CA.

Gao, S., Trout, T. J., & Schneider, S. (2008). Evaluation of fumigation and surface seal methods on fumigant emissions in an orchard replant field. Journal of Environmental Quality, 37(2), 369-377.

Gao, S., & Trout, T. J. (2007). Surface seals reduce 1, 3-dichloropropene and chloropicrin emissions in field tests. Journal of Environmental Quality, 36(1), 110-119.

Appendices

Appendix I. Raw data for Delhi. Total 1,3-D is the sum of *cis* and *trans* 1,3-d.

Sample Date	Sample ID	Total 1,3-D (ppb)	Cis 1,3-D (ppb)	Trans 1,3-D (ppb)
1/2/2024	309-A511	0.00735	ND	ND
1/8/2024	309-A513	0.00735	ND	ND
1/18/2024	309-A514	0.0288	0.0205	Trace
1/22/2024	309-A516	0.00735	ND	ND
2/1/2024	309-A517	0.00735	ND	ND
2/6/2024	309-A518	0.00735	ND	ND
2/11/2024	309-A520	0.00735	ND	ND
2/21/2024	309-A521	0.00735	ND	ND
2/26/2024	309-A522	0.00735	ND	ND
3/5/2024	309-A523	0.112	0.0706	0.0416
3/13/2024	309-A524	0.00735	ND	ND
3/20/2024	309-A526	1.16	0.539	0.619
3/25/2024	309-A527	0.185	0.0929	0.0924
4/2/2024	309-A528	1.42	0.89	0.531
4/12/2024	309-A529	0.362	0.21	0.152
4/16/2024	309-A530	0.735	0.455	0.28
4/24/2024	309-A531	0.154	0.0907	0.0634
4/29/2024	309-A532	0.0822	0.0444	0.0378
5/7/2024	309-A535	0.0899	0.0512	0.0387
5/15/2024	309-A536	0.111	0.0619	0.0495
5/22/2024	309-A537	0.00735	ND	ND
5/29/2024	309-A538	0.00735	ND	ND
6/3/2024	309-A539	0.00265	ND	ND
6/10/2024	309-A540	0.00265	ND	ND
6/19/2024	309-A542	0.00265	ND	ND
6/23/2024	309-A544	0.00265	ND	ND
7/2/2024	309-A545	0.00265	ND	ND
7/9/2024	309-A546	0.00265	ND	ND
7/19/2024	309-A547	0.00265	ND	ND
7/24/2024	309-A549	0.00265	ND	ND
7/29/2024	309-A550	0.00265	ND	ND
8/6/2024	309-A551	0.00265	ND	ND
8/12/2024	309-A552	0.00265	ND	ND
8/23/2024	309-A553	0.00265	ND	ND

Sample Date	Sample ID	Total 1,3-D (ppb)	Cis 1,3-D (ppb)	Trans 1,3-D (ppb)
8/26/2024	309-A554	0.00265	ND	ND
9/5/2024	309-A555	0.00265	ND	ND
9/10/2024	309-A557	0.00265	ND	ND
9/18/2024	309-A558	0.00265	ND	ND
9/23/2024	309-A559	0.00265	ND	ND
10/4/2024	309-A560	0.0384	0.0185	0.0199
10/8/2024	309-A562	0.0298	Trace	0.0234
10/13/2024	309-A563	0.0615	0.0297	0.0318
10/23/2024	309-A564	0.0426	Trace	0.0362
10/28/2024	309-A565	0.0134	ND	0.012
11/7/2024	309-A566	0.0292	0.0122	0.017
11/14/2024	309-A567	0.0703	0.0336	0.0367
11/20/2024	309-A568	0.165	0.0934	0.0717
11/25/2024	309-A570	0.0795	0.0348	0.0447
12/5/2024	309-A571	0.551	0.27	0.281
12/11/2024	309-A572	0.0825	0.0365	0.046
12/16/2024	309-A573	0.0202	ND	0.0171
12/22/2024	309-A574	0.0038	ND	ND

Appendix II. Raw data for Parlier. Total 1,3-D is the sum of cis and trans 1,3-d.

Sample Date	Sample ID	Total 1,3-D (ppb)	Cis 1,3-D (ppb)	Trans 1,3-D (ppb)
1/2/2024	309-B379	0.00735	ND	ND
1/8/2024	309-B380	0.0455	0.0261	0.0194
1/18/2024	309-B381	0.929	0.517	0.412
1/22/2024	309-B382	0.0853	0.0458	0.0395
2/1/2024	309-B383	0.00735	ND	ND
2/7/2024	309-B385	0.00735	ND	ND
2/11/2024	309-B386	0.0227	0.0194	ND
2/21/2024	309-B387	0.155	0.0918	0.0627
2/26/2024	309-B388	0.0528	0.0291	0.0237
3/5/2024	309-B389	0.04	0.0216	0.0183
3/13/2024	309-B390	0.02	0.0167	ND
3/20/2024	309-B391	0.0393	0.0209	0.0185
3/25/2024	309-B392	0.00735	ND	ND
4/2/2024	309-B393	0.00735	ND	ND
4/12/2024	309-B394	0.00735	ND	ND
4/16/2024	309-B395	0.00735	ND	ND
4/24/2024	309-B396	0.00735	ND	ND
4/29/2024	309-B397	0.00735	ND	ND
5/7/2024	309-B398	0.0592	0.0341	0.0251
5/15/2024	309-B399	0.0376	0.0193	0.0183
5/21/2024	309-B400	0.0214	0.0182	ND
5/29/2024	309-B401	0.00735	ND	ND
6/3/2024	309-B402	0.00265	ND	ND
6/10/2024	309-B403	0.00765	ND	Trace
6/19/2024	309-B404	0.00265	ND	ND
6/23/2024	309-B405	0.00265	ND	ND
7/3/2024	309-B407	0.00265	ND	ND
7/10/2024	309-B409	0.00265	ND	ND
7/19/2024	309-B410	0.00265	ND	ND
7/25/2024	309-B412	0.00265	ND	ND
7/29/2024	309-B413	0.00265	ND	ND
8/6/2024	309-B414	0.00265	ND	ND
8/12/2024	309-B415	0.00265	ND	ND
8/23/2024	309-B416	0.00265	ND	ND
8/26/2024	309-B417	0.00265	ND	ND
9/5/2024	309-B418	0.00265	ND	ND

Sample Date	Sample ID	Total 1,3-D (ppb)	Cis 1,3-D (ppb)	Trans 1,3-D (ppb)
9/10/2024	309-B419	0.00265	ND	ND
9/18/2024	309-B420	0.00265	ND	ND
9/23/2024	309-B421	0.0336	Trace	0.0272
10/4/2024	309-B422	0.0622	0.0297	0.0325
10/8/2024	309-B423	0.268	0.141	0.127
10/13/2024	309-B424	0.0345	Trace	0.0281
10/23/2024	309-B425	1.14	0.594	0.547
10/28/2024	309-B426	0.112	0.0633	0.0485
11/7/2024	309-B427	0.293	0.143	0.15
11/12/2024	309-B428	0.182	0.0993	0.0831
11/20/2024	309-B429	0.315	0.148	0.167
11/24/2024	309-B430	2.35	1.43	0.924
12/5/2024	309-B431	0.704	0.38	0.324
12/11/2024	309-B432	0.406	0.199	0.207
12/16/2024	309-B433	0.668	0.341	0.327
12/22/2024	309-B434	0.168	0.0877	0.0802

Appendix III. Laboratory and spike recovery data.

Analysis Date	Spike Amount (ppb)	Cis Result (ppb)	Cis 1,3-D Recovery (%)	Trans Result (ppb)	Trans 1,3-D Recovery (%)
1/18/2024	0.150	0.173	115	0.172	115
1/19/2024	0.150	0.147	98	0.149	99.3
1/26/2024	0.150	0.15	100	0.151	101
2/9/2024	0.150	0.15	100	0.147	98
2/15/2024	0.150	0.175	117	0.176	117
2/29/2024	0.150	0.156	104	0.153	102
3/7/2024	0.150	0.17	113	0.165	110
3/29/2024	0.150	0.144	96	0.146	97.3
4/5/2024	0.150	0.162	108	0.157	105
4/16/2024	0.150	0.157	105	0.137	91.3
4/18/2024	0.150	0.153	102	0.154	103
5/2/2024	0.150	0.167	111	0.169	113
5/9/2024	0.150	0.146	97.3	0.143	95.3
5/23/2024	0.150	0.144	96	0.145	96.7
6/19/2024	0.150	0.146	97.3	0.145	96.7
6/25/2024	0.150	0.134	89.3	0.132	88
7/2/2024	0.150	0.141	94	0.139	92.7
7/3/2024	0.150	0.143	95.3	0.137	91.3
7/9/2024	0.150	0.134	89.3	0.141	94
7/18/2024	0.150	0.143	95.3	0.142	94.7
7/30/2024	0.150	0.137	91.3	0.109	72.7
8/6/2024	0.150	0.135	90	0.114	76
8/12/2024	0.150	0.139	92.7	0.129	86
8/27/2024	0.150	0.151	100.7	0.146	97.3
9/3/2024	0.150	0.135	90	0.138	92
9/16/2024	0.150	0.129	85.8	0.117	78
9/27/2024	0.150	0.0537	107.4	0.0516	103.2
10/1/2024	0.150	0.045	90	0.0394	78.8
10/17/2024	0.150	0.146	97.3	0.147	98
10/22/2024	0.150	0.149	99.3	0.15	99.7
10/25/2024	0.150	0.134	89.3	0.135	90
11/19/2024	0.150	0.126	84	0.128	85.3
11/21/2024	0.150	0.141	94	0.142	94.7
11/26/2024	0.150	0.145	96.7	0.147	98
12/10/2024	0.150	0.105	69.9	0.0954	63.6
12/12/2024	0.150	0.141	94	0.142	94.7

12/23/2024	0.150	0.162	108	0.161	107.3
1/15/2025	0.150	0.1303	86.9	0.1222	81.5

Appendix IV. Laboratory and blank recovery data.

Analysis Date	Cis Result	Trans Result
1/18/2024	ND	ND
1/19/2024	ND	ND
1/26/2024	ND	ND
2/9/2024	ND	ND
2/15/2024	ND	ND
2/29/2024	ND	ND
3/7/2024	ND	ND
3/29/2024	ND	ND
4/5/2024	ND	ND
4/16/2024	ND	ND
4/18/2024	ND	ND
5/2/2024	ND	ND
5/9/2024	ND	ND
5/23/2024	ND	ND
6/19/2024	ND	ND
6/25/2024	ND	ND
7/2/2024	ND	ND
7/3/2024	ND	ND
7/9/2024	ND	ND
7/18/2024	ND	ND
7/30/2024	ND	ND
8/6/2024	ND	ND
8/12/2024	ND	ND
8/27/2024	ND	ND
9/3/2024	ND	ND
9/16/2024	ND	ND
9/27/2024	ND	ND
10/1/2024	ND	ND
10/17/2024	ND	ND
10/22/2024	ND	ND
10/25/2024	ND	ND
11/19/2024	ND	ND
11/21/2024	ND	ND
11/26/2024	ND	ND
12/10/2024	ND	ND
12/12/2024	ND	ND

12/23/2024	ND	ND
1/15/2025	ND	ND

Appendix V. Method Detection Limits

First Applicable Sample Date	cis-1,3-D (ppb)	trans-1,3-D (ppb)
N/A	0.01	0.01
05/01/2022	0.00815	0.00655
5/18/2024	0.00278	0.00252
11/17/2024	0.00621	0.00342
12/5/2024	0.00281	0.00479

Appendix VI. Study #309: Monitoring of 1,3-dichloropropene in Merced and Fresno Counties. (Document Attached)

Appendix VII. Determination of bromomethane, carbon disulfide, cis-1,3-dichloropropene and trans- 1,3-dichloropropene in air samples collected in summa canisters, Revision 3. (Document Attached)