Monitoring of 1,3-Dicloropropene in Merced and Fresno Counties Results for 2021

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1. Introduction

The soil fumigant 1,3-dichloropropene (1,3-D), also known as Telone®, plays a critical role in California's agricultural industries by protecting soil from nematodes and soil-borne diseases. It continues to be the most used fumigant throughout the state. A portion of the applied chemical can disperse into the atmosphere depending on the field fumigation method used during application as well as environmental conditions. In 2017, the California Department of Pesticide Regulation (CDPR) revised permit conditions which eliminated 1,3-D use in the month of December and restricted the total allotted application amount within each township - a 6x6 square mile area - to a maximum of 136,000 adjusted pounds (a weighting method to account for emissions based on application method, month, and region) in a calendar year (CDPR 2016).

In 2016, CDPR conducted an evaluation on reported 1,3-D pesticide use to rank communities surrounded by highest 1,3-D use. CDPR prioritized regions outside the coverage area of CDPR's Air Monitoring Network and the California Air Resources Board's (CARB) Toxic Air Contaminant programs. As a result, CDPR 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 sub-chronic and chronic human health screening levels, evaluate the effectiveness of the current township cap on chronic ambient concentrations, and determine correlation between pesticide use records and ambient air concentrations. Although we evaluate short term exposure as a part of this project for comparison purposes, CDPR emphasizes that this study is designed to evaluate long-term ambient concentrations of 1,3-D in regions of higher use. As such, the capturing, sampling, and analytical methods used for this study are specifically designed to achieve these goals. CDPR staff collected weekly 24-h air samples to monitor 1,3-D in these two communities beginning in November 2016.

This report evaluates the results of samples collected from January 1, 2021, through December 31, 2021, and is the fifth report for this multi-year study.

2. Methods

2.1 Field and Lab Methods

From January 1, 2021, through December 31, 2021, 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 7 am to 3 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 a Xonteck 901 Model automated active sampler. If the Xonteck 901 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 and regulator samples were targeted to 3.0 mL/min. A more in-depth sampling procedure is included in Appendix V. Approximately once a month, a collocated sample was collected which is placed adjacent to primary samples. Delhi was designated the collocated site and was used as the quality control monitoring station. All samples were collected using the same standard air sampling procedures. 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 VI). CDFA CAC Laboratory followed CDPR's standard lab quality control procedures and conducted lab blanks and lab spikes during each analytical run.

2.2 Data Analysis

CDPR aggregates the laboratory results of 1,3-D isomers (cis and trans) per sample as the total 1,3-D concentration and compares the data collected with current health-based screening levels and regulatory targets for each year. When calculating average concentrations, CDPR applies a substitution to non-detections (ND). The value used is 0.005 parts per billion, which is one-half the reporting limit (0.01 ppb). However, if either cis or trans isomers of 1,3-D were detected, then the total 1,3-D result would equal the value of that detection and no substitution is used for the respective ND isomer.

Average concentrations of 1,3-D are calculated for acute, sub-chronic, chronic, and lifetime periods (Table 1). CDPR's sampling methods are limited to a 24-h sample which is used to compare to the established 72-h acute exposure level. A rolling average of 90 days (13 consecutive weeks) is used to calculate and is evaluated as a sub-chronic exposure. The one-year average concentration is used to determine the chronic exposure. The life-time exposure of 1,3-D has the current regulatory target of 0.56 ppb. This value is derived by submitted toxicology studies and on a set of assumptions of one person's cancer risk over a 70-year average of inhalation exposure (CDPR 2016). In the absence of 70 years' worth of 1,3-D monitoring data, CDPR uses the average concentrations originating from the start of this study, beginning in December 2016, to calculate a lifetime exposure. To determine the risk associated for each exposure period, CDPR uses a Hazard Quotient (HQ). The HQ is calculated as a ratio of the measured 1,3-D concentrations to screening levels or a regulatory target. A HQ of greater than one (HQ > 1) indicates exceedance of the screening level and requires CDPR to take action to further evaluate the data and assess possible mitigation measures (CDPR 2011).

Table 1: Screening Levels and Regulatory Target for 1,3-D

Exposure	Exposure Period	Screening Level (ppb)	Potential Health Effect
Acute	72-hour	110	Change in body weight
Sub-chronic	90-day	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

*Regulatory target rather than a screening level

2.3 Study Limitations

There are several identified limitations in the scope of this study. One limitation of this study is monitoring is conducted once a week for 24-h to address the study's goal of long-term ambient air of 1,3-D monitoring in a high use region. Similarly, air monitoring results are compared to acute screening levels which are based on submitted toxicology studies which reference a 72-h acute period, rather than 24-h. Due to current field methods, CDPR is not able to handle air samples at such durations. Therefore, CDPR practice is to compare 24-h sampling results and compare to them to established screening levels. CDPR monitoring is not intended to capture any

specific application occurring in the community, but rather aims to capture concentrations within the communities at ambient conditions. The lifetime/cancer risk requires 70 years of data. However, this study was initiated in at the end of 2016, so the lifetime risk period is limited to 5 years. Other limitations of this study are from the laboratory methods. Currently, the analytical method detection limit for 1,3-D is 0.01 ppb. Anything under that limit is reported by the CDFA CAC Laboratory as a ND. CDPR then assumes each ND to be half of the reporting limit when performing average calculations.

3. Air Monitoring Results

In 2021, a total of 103 out of 105 valid primary samples were collected from the two sites in Delhi and Parlier (Appendices I and II). Two samples were invalidated due to high ending canister pressure or high flow rates. During the 2021 calendar year, 1,3-D was detected in 73% of air samples collected from both sites.

3.1 Delhi

Fifty-one (51 out of 52 possible samples) valid primary samples were collected at the Delhi site. One sample during the week of July 18 resulted in a canister pressure above 16 PSI and did not meet the criteria for a valid sample. Seventy-one percent of Delhi samples were above the reporting limit (RL) in 2021 (36 out of 51 samples). Quantifiable detections (above the reporting limit of 0.01 ppb) ranged from 0.028 to 9.37 ppb. No detection exceeded established targets for acute, sub-chronic, chronic, or lifetime exposures. The mean annual concentration for Delhi was 0.68 ppb and a median of 0.084 ppb in 2021. A summary of maximum observed concentrations for each exposure period are included in Table 2 for Delhi. Results for acute, sub-chronic, chronic and lifetime exposure categories were below a HQ of 1.0. The highest observed HQ was 0.97 for the sub-chronic exposure period.

Table 2: Delhi's Maximum Concentrations for Each Exposure period

Exposure	Exposure Period	1,3-D (ppb)	Screening Level (ppb)	Hazard Quotient**
Acute	72- hours***	9.37	110	0.09
Sub-chronic	90-days	2.29	3	0.97
Chronic	1 year	0.68	2	0.34
Lifetime*	70 years	0.32	0.56	0.57

*Calculated from available data Dec. 2016-Dec. 2021

**Hazard quotient is calculated as the ratio of measured concentration to screening level.

*** Compared using a 24-hr sample

Figure 1 shows observed concentrations of 1,3-D as a function of time for Delhi in 2021. Concentrations of 1,3-D were consistently above the reporting limit toward the early and later months of the year. The summer months of July and August presented more NDs, which coincides with the region's low 1,3-D use pattern.

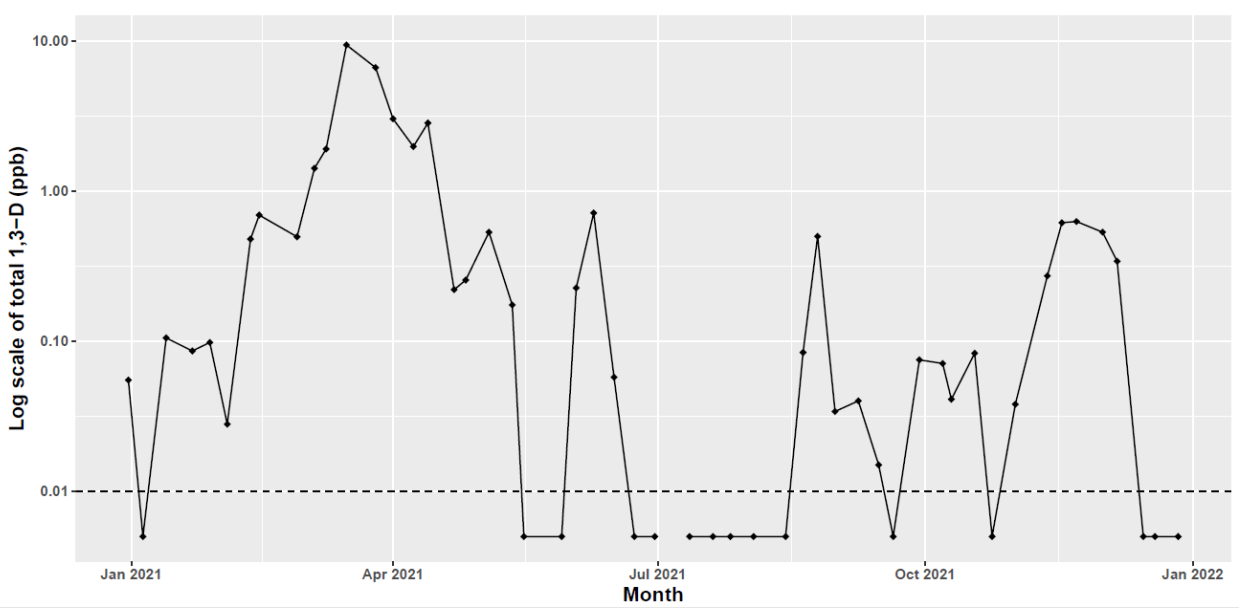

Figure 1: Observed 1,3-D air concentrations over time at Delhi. The data gap represents the invalidated sample from the week of July 8. The dashed horizontal line represents the reporting limit (RL).

3.2 Parlier

In Parlier, 52 air samples (out of 53 possible samples) collected between January and December 2021 were valid. There was one invalid sample causing a one-week gap in data during the week of April 18. The sample did not have initial flow taken and the ending flow was above the acceptable range. Of the remaining samples, 1,3-D was detected in 75% of the air samples (39 of 52 samples). Thirteen samples resulted in NDs. No exceedances for acute and chronic targets were observed in 2021. Exceedances for the sub-chronic target were observed in 2021 (Table 3). Quantifiable detections in 2021 ranged from 0.03 to 24.93 ppb with the annual mean and median concentration of 0.155 ppb and 0.104 ppb, respectively for Parlier.

Aggregating the measured air concentrations at the Parlier monitoring site from December 2016 through December 2021, staff determined that an exceedance of the established regulatory target for the lifetime exposure continues. This exceedance has been largely due to a single high detection of 111 ppb in October 2018 and not a direct result of concentrations from 2021 (Gonzalez, 2019). To address the hazard quotients greater than 1, CDPR is developing regulations and has recently completed edge of field monitoring of newly proposed methods to mitigate exposures to 1,3-D. (CDPR, “Laws & Regulations”)

Table 3: Parlier’s maximum concentrations for each exposure period

Exposure	Exposure Period	1,3-D (ppb)	Screening Level (ppb)	Hazard Quotient**
Acute	72- hours***	24.93	110	0.23
Sub-chronic	90-day	3.30	3	1.1
Chronic	1 year	1.55	2	0.78
Lifetime*	70 years	1.16	0.56	2.07

*Calculated from available data Dec. 2016-Dec. 2021
** Hazard quotient is calculated as the ratio of measured concentration to screening level.
*** Compared using a 24-hr sample

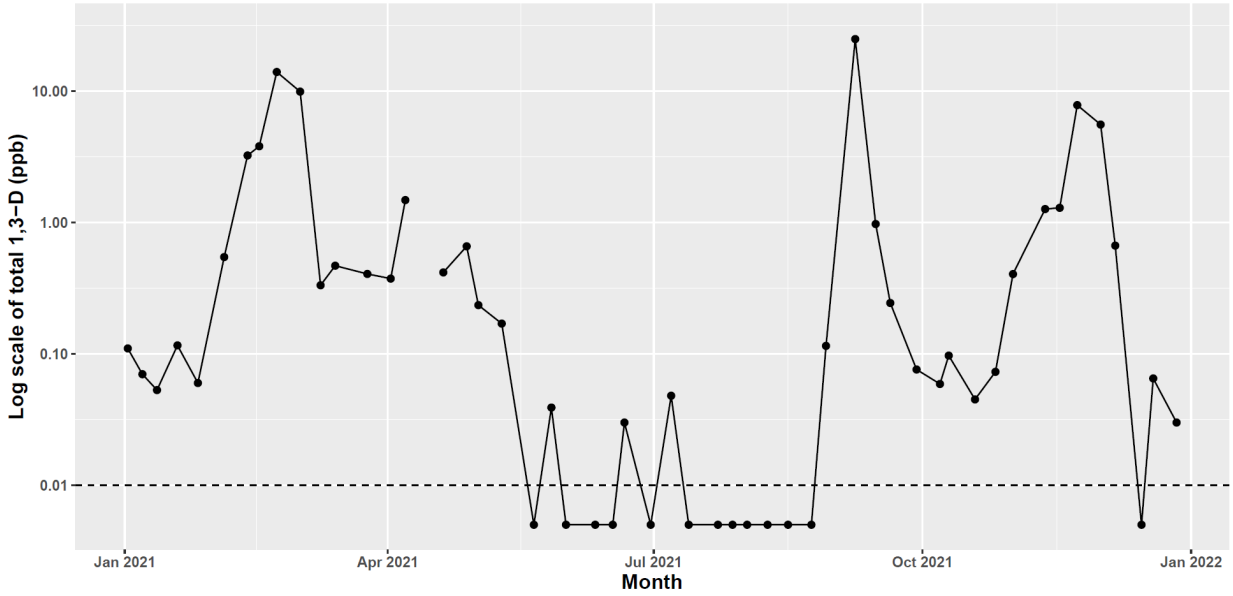

Figure 2: Observed 1,3-D air concentrations over time at Parlier. The dashed horizontal line represents the reporting limit (RL). The data gap represents the invalidated sample from the week of April 18.

4. Quality Assurance Results

4.1 Collocated Samples

During 2021, 12 out of 13 scheduled collocated paired air samples were valid and collected from the Delhi site. Three pairs (309-A315/309-A316, 309-A348/309-A349 and 309-A351/309-A352) of sample results reported NDs for the primary sample and the collocated sample; thus, CDPR was not able to calculate a relative percent difference for that pair. The remaining 9 pairs had measurable detections above the detection limit resulting in an average relative percent difference of 26% (standard deviation [SD] = 28.5). All samples were reviewed and determined valid based on CDPR's acceptable sampling criteria of flow rate, sample run time and ending canister pressure. To minimize differences in calculated relative percent difference largely due to low concentrations, the absolute relative difference was divided by the acute screening level of 110. Table 4 summarizes the 12 collocated results.

Table 4: Summary of collocated sample results and absolute relative percent difference

Sample Date	Primary Sample	Primary Result (ppb)	Collocated Sample	Collocated Result (ppb)	|Relative % Difference|	|Relative % Difference/ Acute|
1/5/2021	A315	ND	A316	ND	N/A	N/A
2/3/2021	A320	0.022	A321	0.028	24%	0.22%

Sample Date	Primary Sample	Primary Result (ppb)	Collocated Sample	Collocated Result (ppb)	|Relative % Difference|	|Relative % Difference/ Acute|
3/5/2021	A325	1.415	A326	1.35	5%	0.04%
6/3/2021	A340	0.226	A341	0.213	6%	0.05%
7/20/2021	A348	ND	A349	ND	N/A	N/A
8/3/2021	A351	ND	A352	ND	N/A	N/A
9/8/2021	A357	0.04	A358	0.079	66%	0.60%
10/7/2021	A362	0.071	A363	0.055	25%	0.23%
10/10/2021	A364	0.041	A365	0.047	14%	0.12%
11/1/2021	A367A	0.038	A368	0.015	87%	0.79%
11/22/2021	A371	0.626	A372	0.642	3%	0.02%
12/1/2021	A373	0.531	A374	0.553	4%	0.04%

4.2 Laboratory Spikes and Blanks

For quality assurance purposes, the CDFA CAC Laboratory conducted 28 laboratory spikes when performing the air sample analysis. Spike recovery rates averaged 98% (SD = 4.2) and 96% (SD = 6.5) for the *cis*- and *trans*- isomers, respectively. In addition, 28 lab blanks were evaluated and resulted in no reports of cross contamination in these samples. Individual results of laboratory spikes and lab blanks are included in Appendices III and IV.

5. **Discussion**

5.1 December Air Concentrations

Current 1,3-D permit conditions do not allow the application of 1,3-D during the month of December. The quantifiable detections of 1,3-D were present in six of the ten samples collected from Delhi and Parlier during the month of December. Delhi experienced decreasing low-level detections for the month ranging from 0.531 to NDs. In Parlier, the sample from December 1 was observed at 5.57 ppb. The next week, the concentration was 0.667 ppb and the following week a ND occurred. In the last two samples of December, results were 0.065 ppb and 0.03 ppb. For untarped applications of 1,3-D, studies have demonstrated that the fumigant's cumulative emission tends to stabilize roughly two weeks after application (Gao et al. 2008, Gao and Trout 2007). This may be one of the contributing factors to the low levels of detections observed during December even in the absence of 1,3-D applications during that month.

5.2 Comparisons to Previous Year

Over a one-year period, all maximum exposures calculated for Delhi increased. The maximum acute exposure increased from 3.75 to 9.37 ppb. The sub-chronic concentration increased from 1 ppb to 2.29 in 2021 and chronic (1 year) concentrations increased from 0.46 to 0.68 ppb. Annual summaries are presented in Table 5.

In Parlier, maximum concentrations of acute, sub-chronic and chronic increased from the previous year. The maximum acute concentration increased from 10.61 ppb to 24.93 ppb. The sub-chronic concentration increased from 0.51 to 1.55 ppb. The lifetime average exposure

increased slightly from 1.06 to 1.16 ppb during 2021. Annual summaries are presented in Table 6.

Table 5: Maximum Delhi Air Concentrations (ppb) by Year

Monitoring Period	2017	2018	2019	2020	2021
1 day	1.06	1.80	2.04	3.75	9.37
90 days	0.29	0.48	0.42	1.00	2.29
1 year	0.13	0.19	0.15	0.46	0.68
Lifetime	0.32				

Table 6: Maximum Parlier Air Concentrations (ppb) by Year

Monitoring Period	2017	2018	2019	2020	2021
1 day	15.96	111.29	2.07	10.61	24.93
90 days	1.83	10.53	0.78	1.62	3.30
1 year	0.62	2.94	0.27	0.51	1.55
Lifetime	1.16				

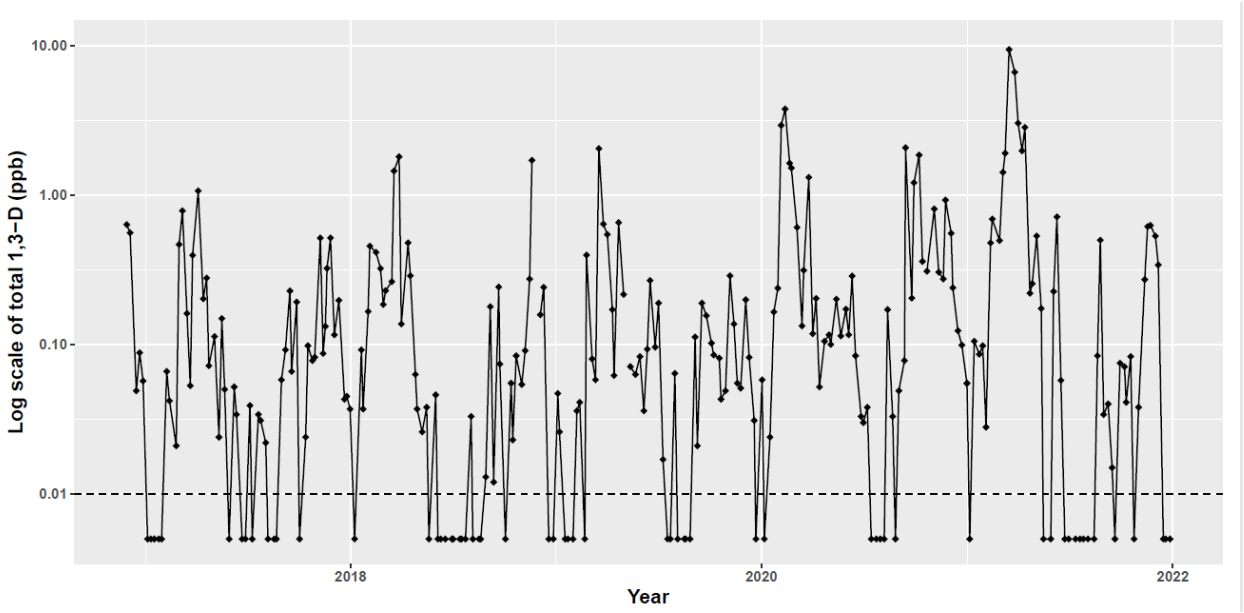

Figure 3: Log scale of Delhi air concentrations since the beginning of the study from December 2016-December 2021. The dashed horizontal line represents the reporting limit (RL).

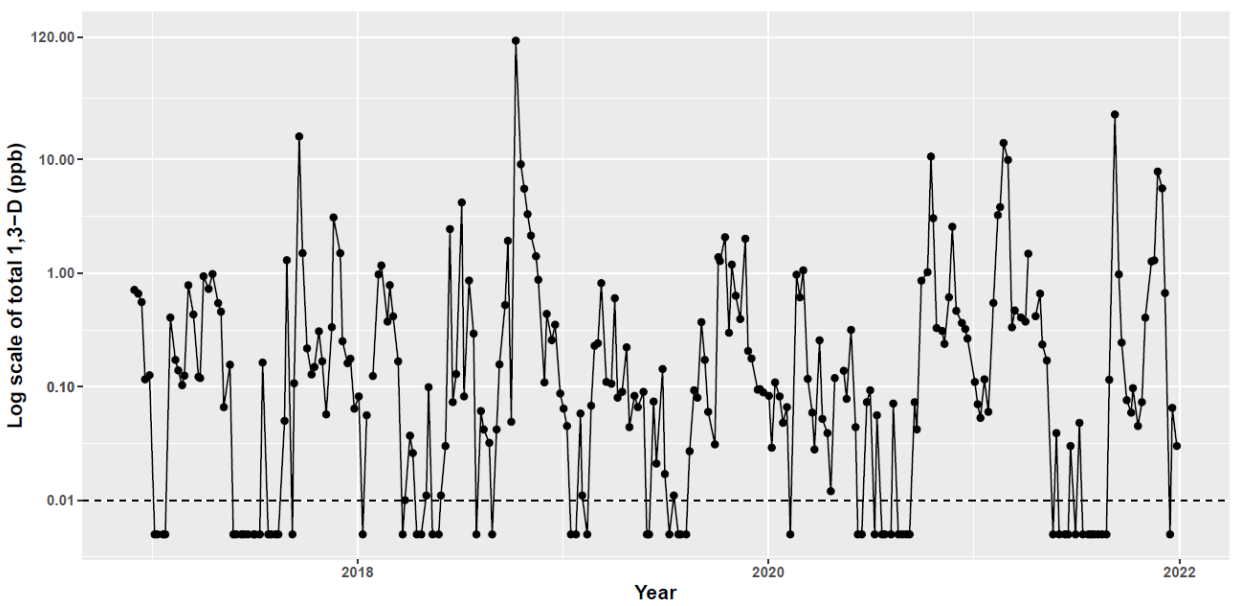

Figure 4: Log scale of Parlier air concentrations since the beginning of the study from December 2016-December 2021. The dashed horizontal line shows the reporting limit (RL).

6. Conclusion

2021 marked the fifth consecutive year of 1,3-D ambient monitoring in the communities of Delhi and Parlier. The ambient 1,3-D results collected from this study has continued to provide meaningful information for the evaluation of acute, sub-chronic, chronic and lifetime exposures in high use communities. The 1,3-D concentrations observed in calendar year 2021 in Delhi were below currently established thresholds of 1,3-D for acute, sub-chronic, chronic and lifetime exposures. In, Parlier concentrations of 1,3-D were below acute and chronic exposures. Sub-chronic and lifetime exposures were above currently established thresholds in Parlier. CDPR plans to move forward with rulemaking to address 1,3-D mitigation in California. Data collected from this study, the Air Monitoring Network (Study 257), and the 1,3-D mitigation pilot projects provide the scientific foundation for future department efforts.

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Appendix

Appendix I: Raw Results for Delhi

Sample Date	Sample ID	Total 1,3-D (ppb)	Cis 1,3-D (ppb)	Trans 1,3-D (ppb)
1/5/2021	309-A315	0.005	0.005	0.005
1/13/2021	309-A317	0.105	0.033	0.072
1/22/2021	309-A318	0.086	0.024	0.062
1/28/2021	309-A319	0.098	0.03	0.068
2/3/2021	309-A320	0.028	0.028	0.005
2/11/2021	309-A322	0.478	0.182	0.296
2/14/2021	309-A323	0.690	0.285	0.405
2/27/2021	309-A324	0.495	0.149	0.346
3/5/2021	309-A325	1.415	0.493	0.922
3/9/2021	309-A327	1.902	0.716	1.186
3/16/2021	309-A328	9.370	3.69	5.68
3/26/2021	309-A329	6.620	2.36	4.26
4/1/2021	309-A330	3.020	1.09	1.93
4/8/2021	309-A331	1.973	0.703	1.27
4/13/2021	309-A332	2.830	1.06	1.77
4/22/2021	309-A333	0.220	0.075	0.145
4/26/2021	309-A335	0.255	0.08	0.175
5/4/2021	309-A336	0.531	0.158	0.373
5/12/2021	309-A337	0.174	0.039	0.135
5/16/2021	309-A338	0.005	0.005	0.005
5/29/2021	309-A339	0.005	0.005	0.005
6/3/2021	309-A340	0.226	0.148	0.078
6/9/2021	309-A342	0.713	0.368	0.345
6/16/2021	309-A343	0.058	0.0315	0.026
6/23/2021	309-A344	0.005	0.005	0.005
6/30/2021	309-A345	0.005	0.005	0.005
7/8/2021	309-A346	Invalid	Invalid	invalid
7/12/2021	309-A347	0.005	0.005	0.005
7/20/2021	309-A348	0.005	0.005	0.005
7/26/2021	309-A350	0.005	0.005	0.005
8/3/2021	309-A351	0.005	0.005	0.005
8/14/2021	309-A353	0.005	0.005	0.005
8/20/2021	309-A354	0.084	0.072	0.012
8/25/2021	309-A355	0.498	0.273	0.225
8/31/2021	309-A356	0.034	0.014	0.02
9/8/2021	309-A357	0.040	0.021	0.019
9/15/2021	309-A359	0.015	0.015	0.005
9/20/2021	309-A360	0.005	0.005	0.005

Sample Date	Sample ID	Total 1,3-D (ppb)	Cis 1,3-D (ppb)	Trans 1,3-D (ppb)
9/29/2021	309-A361	0.075	0.043	0.032
10/7/2021	309-A362	0.071	0.03	0.041
10/10/2021	309-A364	0.041	0.017	0.024
10/18/2021	309-A366	0.083	0.036	0.047
10/24/2021	309-A367	0.005	0.005	0.005
11/1/2021	309-A367A	0.038	0.023	0.015
11/12/2021	309-A369	0.272	0.143	0.129
11/17/2021	309-A370	0.614	0.342	0.272
11/22/2021	309-A371	0.626	0.322	0.304
12/1/2021	309-A373	0.531	0.281	0.25
12/6/2021	309-A375	0.340	0.145	0.195
12/15/2021	309-A376	0.005	0.005	0.005
12/19/2021	309-A377	0.005	0.005	0.005
12/27/2021	309-A378	0.005	0.005	0.005

Results listed as “0.005” are Non- Detections (ND) substituted for one-half of the Reporting Limit (0.01)

Appendix II: Raw Results for Parlier

Sample Date	Sample ID	Total 1,3-D (ppb)	Cis 1,3-D (ppb)	Trans 1,3-D (ppb)
1/2/2021	309-B221	0.110	0.025	0.085
1/7/2021	309-B222	0.070	0.014	0.149
1/12/2021	309-B223	0.053	0.011	0.042
1/19/2021	309-B224	0.116	0.03	0.086
1/26/2021	309-B225	0.060	0.014	0.046
2/4/2021	309-B226	0.546	0.254	0.292
2/12/2021	309-B227	3.240	1.37	1.87
2/16/2021	309-B228	3.810	1.7	2.11
2/22/2021	309-B229	14.000	5.74	8.26
3/2/2021	309-B230	9.920	3.67	6.25
3/9/2021	309-B231	0.333	0.105	0.228
3/14/2021	309-B232	0.469	0.171	0.298
3/25/2021	309-B233	0.406	0.125	0.281
4/2/2021	309-B234	0.374	0.13	0.244
4/7/2021	309-B235	1.482	0.586	0.896
4/18/2021	309-B236	Invalid	Invalid	invalid
4/20/2021	309-B237	0.417	0.124	0.293
4/28/2021	309-B238	0.659	0.223	0.436
5/2/2021	309-B239	0.235	0.055	0.18
5/10/2021	309-B240	0.170	0.037	0.133
5/21/2021	309-B241	0.005	0.005	0.005
5/27/2021	309-B242	0.039	0.014	0.025
6/1/2021	309-B243	0.005	0.005	0.005
6/11/2021	309-B244	0.005	0.005	0.005
6/17/2021	309-B245	0.005	0.005	0.005
6/21/2021	309-B246	0.030	0.013	0.017
6/30/2021	309-B247	0.005	0.005	0.005
7/7/2021	309-B248	0.048	0.013	0.035
7/13/2021	309-B249	0.005	0.005	0.005
7/23/2021	309-B250	0.005	0.005	0.005
7/28/2021	309-B251	0.005	0.005	0.005
8/2/2021	309-B252	0.005	0.005	0.005
8/9/2021	309-B253	0.005	0.005	0.005
8/16/2021	309-B254	0.005	0.005	0.005
8/24/2021	309-B255	0.005	0.005	0.005
8/29/2021	309-B256	0.115	0.054	0.061
9/8/2021	309-B257	24.930	14.53	10.4
9/15/2021	309-B258	0.974	0.446	0.528
9/20/2021	309-B259	0.244	0.111	0.133
9/29/2021	309-B260	0.076	0.033	0.043

Sample Date	Sample ID	Total 1,3-D (ppb)	Cis 1,3-D (ppb)	Trans 1,3-D (ppb)
10/7/2021	309-B261	0.059	0.024	0.035
10/10/2021	309-B262	0.097	0.019	0.078
10/19/2021	309-B263	0.045	0.023	0.022
10/26/2021	309-B264	0.073	0.034	0.039
11/1/2021	309-B265	0.405	0.251	0.154
11/12/2021	309-B267	1.266	0.636	0.63
11/17/2021	309-B266	1.294	0.658	0.636
11/23/2021	309-B268	7.830	3.74	4.09
12/1/2021	309-B269	5.570	2.97	2.6
12/6/2021	309-B270	0.667	0.277	0.39
12/15/2021	309-B271	0.005	0.005	0.005
12/19/2021	309-B272	0.065	0.03	0.035
12/27/2021	309-B273	0.030	0.013	0.017

Results listed as “0.005” are Non- Detections (ND) substituted for one-half of the Reporting Limit (0.01)

Appendix III: Lab Spike Recovery Rates

Analysis Date	Spike Amount (ppb)	Cis Result (ppb)	Cis 1,3-D Recovery (%)	Trans Result (ppb)	Trans 1,3-D Recovery (%)
1/19/2021	0.15	0.142	94.7	0.149	99.3
1/29/2021	0.15	0.134	95.3	0.141	94
2/9/2021	0.15	0.139	92.7	0.149	99.3
2/25/2021	0.15	0.147	98	0.131	87.3
3/4/2021	0.15	0.149	99.3	0.147	98
3/5/2021	0.15	0.147	98	0.149	99.3
3/18/2021	0.15	0.149	99.3	0.151	101
3/26/2021	0.15	0.137	91.3	0.143	95.3
4/30/2021	0.15	0.149	99.3	0.15	100
5/10/2021	0.15	0.158	105	0.157	105
5/14/2021	0.15	0.149	99.3	0.147	98
6/3/2021	0.15	0.148	98.7	0.137	91.3
6/9/2021	0.15	0.154	103	0.155	103
6/25/2021	0.15	0.146	97.3	0.146	97.3
7/1/2021	0.15	0.143	95.3	0.131	87.3
7/12/2021	0.15	0.155	103	0.134	89.3
7/23/2021	0.15	0.154	103	0.159	106
8/13/2021	0.15	0.141	94	0.131	87.3
8/20/2021	0.15	0.149	99.3	0.145	96.7
9/3/2021	0.15	0.154	103	0.164	109
9/23/2021	0.15	0.154	103	0.156	104
10/7/2021	0.15	0.153	102	0.153	102
10/18/2021	0.15	0.146	97.3	0.142	94.7
10/29/2021	0.15	0.148	98.7	0.138	92
11/16/2021	0.15	0.145	96.7	0.132	88
12/2/2021	0.15	0.152	101	0.147	98
12/10/2021	0.15	0.152	101	0.144	96
12/30/2021	0.15	0.128	85.3	0.122	81.3

Appendix IV: Lab Blank Recovery Results

Analysis Date	Cis Result	Trans Result
1/19/2021	ND	ND
1/29/2021	ND	ND
2/9/2021	ND	ND
2/25/2021	ND	ND
3/4/2021	ND	ND
3/5/2021	ND	ND
3/18/2021	ND	ND
3/26/2021	ND	ND
4/30/2021	ND	ND
5/10/2021	ND	ND
5/14/2021	ND	ND
6/3/2021	ND	ND
6/9/2021	ND	ND
6/25/2021	ND	ND
7/1/2021	ND	ND
7/12/2021	ND	ND
7/23/2021	ND	ND
8/13/2021	ND	ND
8/20/2021	ND	ND
9/3/2021	ND	ND
9/23/2021	ND	ND
10/7/2021	ND	ND
10/18/2021	ND	ND
10/29/2021	ND	ND
11/16/2021	ND	ND
12/2/2021	ND	ND
12/10/2021	ND	ND
12/30/2021	ND	ND

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

Appendix VI: Determination of Bromomethane, Carbon Disulfide, cis-1,3 Dichloropropene and trans-1,3-Dichloropropene in air samples collected in summa canisters (Document Attached)