Monitoring of 1,3-Dicloropropene in Merced and Fresno Counties
Results for 2020

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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, 2020, through December 31, 2020, and is the fourth report for this multi-year study.

2. Methods

2.1 Field and Lab Methods

From January 1, 2020, through December 31, 2020, 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-hours	110	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

*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 4 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 2020, a total of 103 out of 105 valid primary samples were collected from the two sites (Appendices I and II). Two samples were invalidated due to low pressures or equipment malfunctions. During this period, 1,3-D was detected in 83% of air samples collected from Delhi and Parlier.

3.1 Delhi

Fifty-two (52 out of 53 possible samples) valid primary samples were collected at the Delhi site. One sample during the week of October 10 was invalidated during sample intake at CDFA CAC Laboratory. CDPR was informed by CDFA CAC Laboratory that this sample arrived with canister pressure outside of the minimum required to be analyzed. Samples that had detected 1,3-D concentrations from the Delhi monitoring site were above the reporting limit (RL) in 88% in 2020 (46 out of 52 samples). Quantifiable detections (above the reporting limit of 0.01 ppb) ranged from 0.024 to 3.75 ppb. No detection exceeded established targets for acute, sub-chronic, chronic, or lifetime exposures. The mean annual concentration for Delhi was 0.46 and a median of 0.149 ppb in 2020. A summary of maximum observed concentrations for each exposure period are included in Table 2 for Delhi. Results for acute, sub-chronic, and chronic exposure categories were below a HQ of 1.0. The highest observed HQ was 0.43 for lifetime exposure.

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***	3.75	110	0.03
Sub-chronic	90-day	1.00	3	0.33
Chronic	1 year	0.46	2	0.23
Lifetime*	70 years	0.24	0.56	0.43

*Calculated from available data Dec. 2016-Dec. 2020

**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 2020. The months of July and August presented more NDs, which coincides with the region's low 1,3-D use pattern.

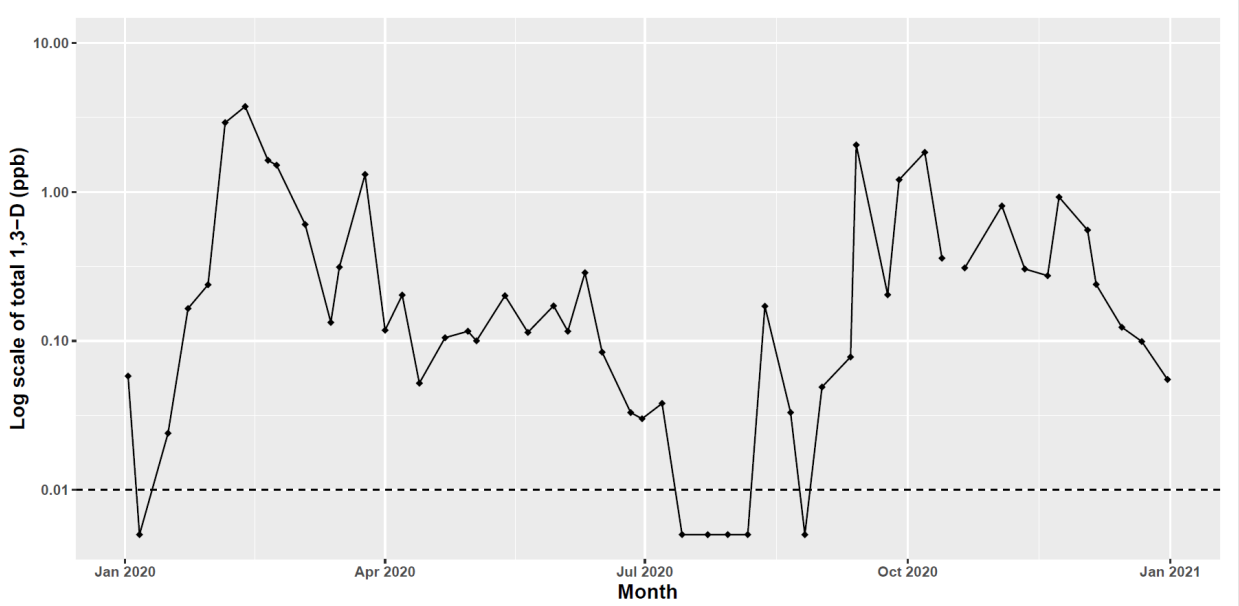

Figure 1: Observed 1,3-D air concentrations over time at Delhi. The data gap represents the invalidated sample from the week of October 20. The dashed horizontal line represents the reporting limit (RL).

3.2 Parlier

In Parlier, 51 air samples (out of 52 possible samples) collected between January and December 2020 were valid. There was one invalid sample causing a one-week gap in data during the week of May 8. The sample arrived at the lab at ambient air pressure and the lab determined it was a broken canister. Of the remaining samples, 1,3-D was detected in 78% of the air samples (40 of 51 samples). Eleven samples resulted in NDs. No exceedances for acute, sub-chronic and chronic targets were observed in 2020. Quantifiable detections in 2020 ranged from 0.02 to 10.61 ppb with the annual mean and median concentration of 0.51 ppb and 0.078 ppb, respectively in Table 3 for Parlier.

Aggregating the measured air concentrations at the Parlier monitoring site from December 2016 through December 2020, staff determined that an exceedance of the established regulatory target for lifetime exposures 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 2020 (Gonzalez, 2019). To address the hazard quotients greater than 1, CDPR is developing regulations and conducting 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***	10.61	110	0.10
Sub-chronic	90-days	1.62	3	0.54
Chronic	1 year	0.51	2	0.26
Lifetime*	70 years	1.06	0.56	1.89

*Calculated from available data Dec. 2016-Dec. 2020
** Hazard quotient is calculated as the ratio of measured concentration to screening level
*** Compared using a 24-hr sample

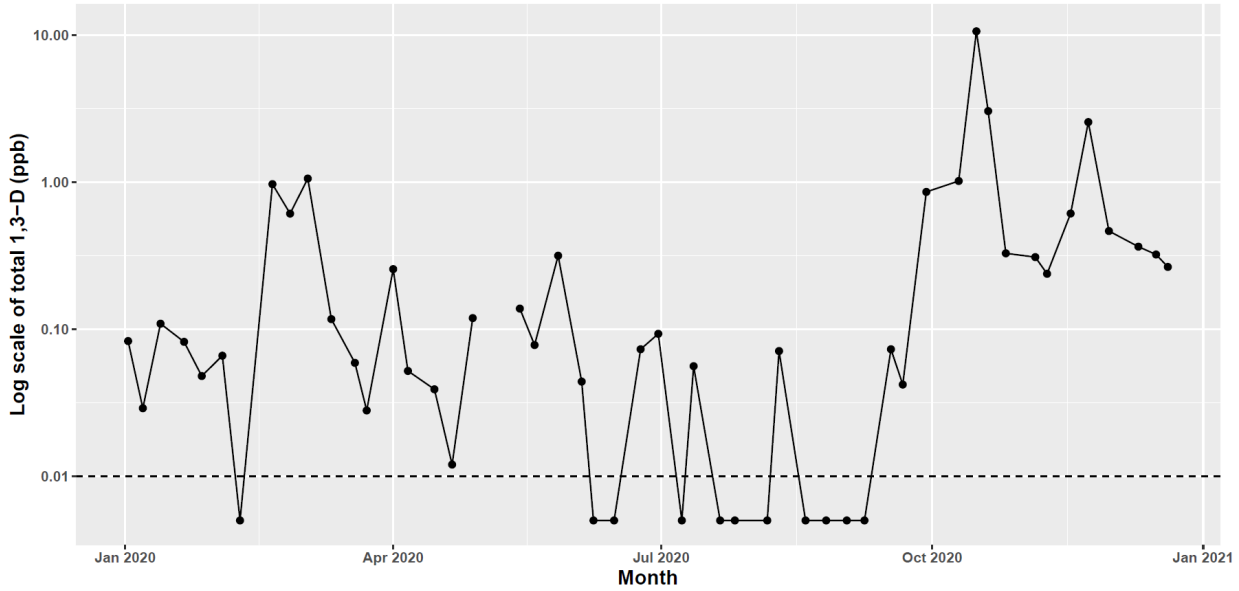

Figure 2: Observed 1,3-D air concentrations over time at Parlier. The dashed horizontal line represents the reporting limit (RL).

4. Quality Assurance Results

4.1 Collocated Samples

During 2020, 13 out of 13 scheduled collocated paired air samples were valid and collected from the Delhi site. Two pairs (309-A283/309-A284 and 309-A290/309-A291) 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 paired samples collected on Dec 31 resulted in one quantifiable detection and a collocated result as a ND. CDPR was not able to calculate a relative percent difference for that paired sample. The other 10 pairs had measurable detections above the detection limit resulting in an average relative percent difference of 24% (standard deviation [SD] = 36). All samples were reviewed and determined valid based on CDPR's acceptable sampling criteria of flow rate 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 13 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|
1/30/2020	309-A249	0.238	309-A250	0.245	3	0.03
3/13/2020	309-A257	0.133	309-A258	0.308	79	0.72

Sample Date	Primary Sample	Primary Result (ppb)	Collocated Sample	Collocated Result (ppb)	|Relative % Difference|	|Relative % Difference/ Acute|
5/13/2020	309-A269	0.201	309-A270	0.182	10	0.09
5/30/2020	309-A272	0.172	309-A273	0.168	2	0.02
6/10/2020	309-A275	0.287	309-A276	0.342	17	0.16
6/26/2020	309-A278	0.033	309-A279	0.01	107	0.97
6/30/2020	309-A280	0.03	309-A280	0.035	15	0.14
7/14/2020	309-A283	ND	309-A284	ND	N/A	N/A
8/26/2020	309-A290	ND	309-A291	ND	N/A	N/A
10/7/2020	309-A297	1.846	309-A298	1.922	4	0.04
10/21/2020	309-A300	0.309	309-A301	0.308	0	0
11/19/2020	309-A306	0.274	309-A307	0.264	4	0.03
12/31/2020	309-A313	0.055	309-A314	ND	N/A	N/A

4.2 Laboratory Spikes and Blanks

For quality assurance purposes, the CDFA CAC Laboratory conducted 29 laboratory spikes when performing the air sample analysis. Spike recovery rates averaged 93% (SD = 6.3) and 95% (SD = 6.3) for the *cis*- and *trans*- isomers, respectively. In addition, 29 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 all of the samples collected from Delhi and Parlier during the month of December (8 out of 8 samples). Delhi experienced decreasing low level detections for the month ranging from 0.554 to 0.055 ppb. In Parlier, there were three scheduled samples in December, all of which resulted in low 1,3-D detections ranging from 0.364 to 0.265 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 slightly from 2.04 to 3.75 ppb. Sub-chronic concentration increased from 0.42 to 1 ppb in 2020 and chronic concentrations increased from 0.15 to 0.46 ppb. Annual summaries are presented in Table 5.

In Parlier, maximum concentrations of acute, sub-chronic and chronic increased from the previous year. Maximum acute concentrations increased from 2.07 to 10.61 ppb. Chronic

concentration increased slightly from 0.27 to 0.51 ppb. The lifetime average exposures were reduced from 1.24 to 1.06 ppb during 2020. Annual summaries are presented in Table 6.

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

Monitoring Period	2017	2018	2019	2020
1 day	1.06	1.80	2.04	3.75
90 days	0.29	0.48	0.42	1.00
1 year	0.13	0.19	0.15	0.46
Lifetime	0.24			

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

Monitoring Period	2017	2018	2019	2020
1 day	15.96	111.29	2.07	10.61
90 days	1.83	10.53	0.78	1.62
1 year	0.62	2.94	0.27	0.51
Lifetime	1.06			

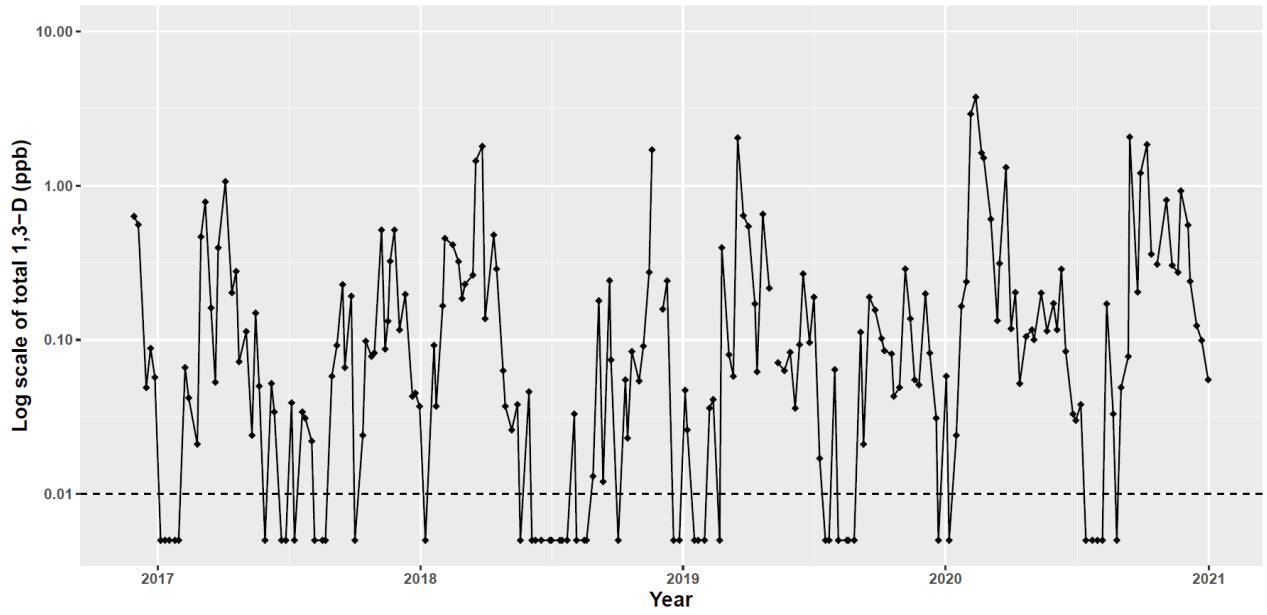

Figure 3: Log scale of Delhi air concentrations since the beginning of the study from December 2016-December 2020. The dashed horizontal line represents the reporting limit (RL).

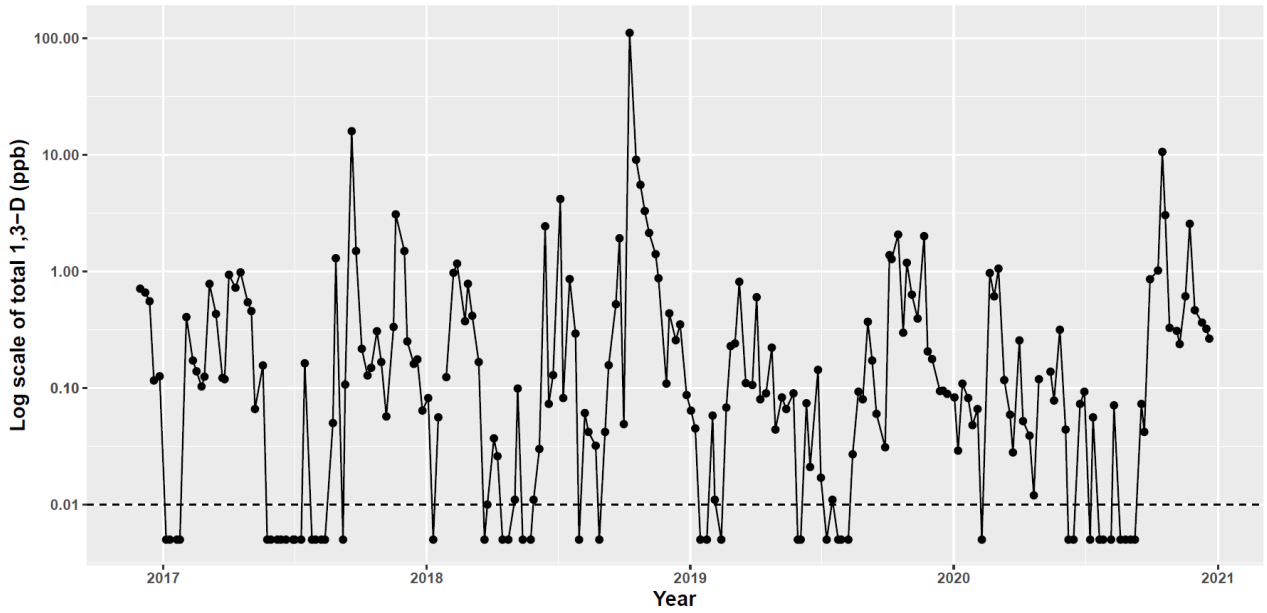

Figure 4: Log scale of Parlier air concentrations since the beginning of the study from December 2016-December 2020. The dashed horizontal line shows the reporting limit (RL).

6. Conclusion

CDPR has completed the fourth year of monitoring in the communities of Delhi and Parlier as part of Study 309. 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 2020 in the communities of Delhi and Parlier were below currently established thresholds of 1,3-D for acute, sub-chronic and chronic exposures. Also, the lifetime exposures concentrations in Parlier continue to decrease since the high concentration measured in 2018. 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 to 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)
1/2/2020	309-A244	0.058	0.011	0.047
1/6/2020	309-A246	0.005	0.005	0.005
1/16/2020	309-A247	0.024	0.005	0.024
1/23/2020	309-A248	0.165	0.048	0.117
1/30/2020	309-A249	0.238	0.091	0.147
2/5/2020	309-A251	2.92	1.71	1.21
2/12/2020	309-A252	3.75	1.92	1.83
2/20/2020	309-A253	1.63	0.763	0.89
2/23/2020	309-A255	1.513	0.668	0.845
3/4/2020	309-A256	0.606	0.294	0.312
3/13/2020	309-A257	0.133	0.057	0.076
3/16/2020	309-A259	0.313	0.146	0.167
3/25/2020	309-A260	1.311	0.717	0.594
4/1/2020	309-A261	0.118	0.046	0.072
4/7/2020	309-A263	0.203	0.091	0.112
4/13/2020	309-A264	0.052	0.019	0.033
4/22/2020	309-A266	0.105	0.041	0.064
4/30/2020	309-A267	0.116	0.048	0.068
5/3/2020	309-A268	0.1	0.038	0.062
5/13/2020	309-A269	0.201	0.075	0.126
5/21/2020	309-A271	0.114	0.044	0.07
5/30/2020	309-A272	0.172	0.067	0.105
6/4/2020	309-A274	0.116	0.036	0.08
6/10/2020	309-A275	0.287	0.153	0.134
6/16/2020	309-A277	0.084	0.025	0.059
6/26/2020	309-A278	0.033	0.017	0.016
6/30/2020	309-A280	0.03	0.017	0.013
7/7/2020	309-A282	0.038	0.013	0.025
7/14/2020	309-A283	0.005	0.005	0.005
7/23/2020	309-A285	0.005	0.005	0.005
7/30/2020	309-A286	0.005	0.005	0.005
8/6/2020	309-A287	0.005	0.005	0.005
8/12/2020	309-A288	0.171	0.084	0.087
8/21/2020	309-A289	0.033	0.014	0.019
8/26/2020	309-A290	0.005	0.005	0.005
9/1/2020	309-A292	0.049	0.021	0.028
9/11/2020	309-A293	0.078	0.043	0.035
9/13/2020	309-A294	2.068	0.95	1.118

Sample Date	Sample ID	Total 1,3-D (ppb)	Cis 1,3-D (ppb)	Trans 1,3-D (ppb)
9/24/2020	309-A295	0.204	0.077	0.127
9/28/2020	309-A296	1.207	0.449	0.758
10/7/2020	309-A297	1.846	0.724	1.122
10/13/2020	309-A299	0.359	0.154	0.205
10/21/2020	309-A300	0.309	0.105	0.204
10/20/2020	309-A302	Invalid	Invalid	Invalid
11/3/2020	309-A304	0.806	0.317	0.489
11/11/2020	309-A305	0.304	0.135	0.207
11/19/2020	309-A306	0.274	0.101	0.173
11/23/2020	309-A308	0.924	0.451	0.473
12/3/2020	309-A309	0.554	0.238	0.316
12/6/2020	309-A310	0.2393	0.0843	0.155
12/15/2020	309-A311	0.1235	0.035	0.0885
12/22/2020	309-A312	0.099	0.027	0.072
12/31/2020	309-A313	0.055	0.012	0.043

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)
1/2/2020	309-B168	0.083	0.02	0.063
1/7/2020	309-B169	0.029	0.005	0.029
1/13/2020	309-B170	0.109	0.031	0.078
1/21/2020	309-B171	0.082	0.019	0.063
1/27/2020	309-B172	0.048	0.018	0.03
2/3/2020	309-B173	0.066	0.028	0.038
2/9/2020	309-B174	0.005	0.005	0.005
2/20/2020	309-B175	0.969	0.483	0.486
2/26/2020	309-B176	0.611	0.271	0.34
3/3/2020	309-B177	1.058	0.446	0.612
3/11/2020	309-B178	0.117	0.039	0.078
3/19/2020	309-B179	0.059	0.025	0.034
3/23/2020	309-B180	0.028	0.012	0.016
4/1/2020	309-B181	0.256	0.115	0.141
4/6/2020	309-B182	0.052	0.017	0.035
4/15/2020	309-B183	0.039	0.015	0.024
4/21/2020	309-B184	0.012	0.005	0.012
4/28/2020	309-B185	0.119	0.056	0.063
5/8/2020	309-B186	Invalid	Invalid	Invalid
5/14/2020	309-B187	0.138	0.043	0.095
5/19/2020	309-B188	0.078	0.013	0.065
5/27/2020	309-B189	0.316	0.137	0.179
6/4/2020	309-B191	0.044	0.013	0.031
6/8/2020	309-B192	0.005	0.005	0.005
6/15/2020	309-B193	0.005	0.005	0.005
6/24/2020	309-B194	0.073	0.043	0.03
6/30/2020	309-B195	0.093	0.04	0.053
7/8/2020	309-B196	0.005	0.005	0.005
7/12/2020	309-B197	0.056	0.024	0.032
7/21/2020	309-B198	0.005	0.005	0.005
7/26/2020	309-B199	0.005	0.005	0.005
8/6/2020	309-B200	0.005	0.005	0.005
8/10/2020	309-B201	0.071	0.036	0.035
8/19/2020	309-B202	0.005	0.005	0.005
8/26/2020	309-B203	0.005	0.005	0.005
9/2/2020	309-B204	0.005	0.005	0.005
9/8/2020	309-B205	0.005	0.005	0.005
9/17/2020	309-B206	0.073	0.029	0.044
9/21/2020	309-B207	0.042	0.016	0.026
9/29/2020	309-B208	0.858	0.356	0.502

Sample Date	Sample ID	Total 1,3-D (ppb)	Cis 1,3-D (ppb)	Trans 1,3-D (ppb)
10/10/2020	309-B209	1.018	0.38	0.638
10/16/2020	309-B210	10.610	3.75	6.86
10/20/2020	309-B211	3.042	0.952	2.09
10/26/2020	309-B212	0.328	0.115	0.213
11/5/2020	309-B213	0.309	0.127	0.182
11/9/2020	309-B214	0.238	0.085	0.153
11/17/2020	309-B215	0.612	0.3	0.312
11/23/2020	309-B216	2.561	1.131	1.43
11/30/2020	309-B217	0.465	0.198	0.267
12/10/2020	309-B218	0.364	0.137	0.227
12/16/2020	309-B219	0.322	0.113	0.209
12/20/2020	309-B220	0.265	0.086	0.179

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	Cis 1,3-D Recovery (%)	Trans 1,3-D Recovery (%)
1/17/2020	90	96
1/30/2020	86	94.7
2/10/2020	105	109
2/20/2020	94	94.7
3/9/2020	96	100
4/6/2020	86.7	92
4/7/2020	92.7	90
4/17/2020	93.3	84
5/7/2020	92	97.3
5/15/2020	90	82.7
6/4/2020	92	94.7
6/12/2020	91.3	90
7/10/2020	81.3	103
7/24/2020	96.7	96.7
8/13/2020	106	98.7
8/14/2020	97.3	96.7
9/14/2020	82	94.7
9/24/2020	101	100
10/6/2020	91.3	90.7
10/16/2020	97.3	98.7
11/6/2020	80.7	83.3
11/16/2020	96.7	97.3
11/19/2020	95.3	101
11/20/2020	98	99.3
12/3/2020	101	106
12/15/2020	92.7	90.7
12/15/2020	87.3	89.3
1/13/2021	96	98.7
1/19/2021	94.7	99.3

Appendix IV: Lab Blank Recovery Rates

Analysis Date	Cis 1,3-D Recovery (%)	Trans 1,3-D Recovery (%)
1/17/2020	ND	ND
1/30/2020	ND	ND
2/10/2020	ND	ND
2/20/2020	ND	ND
3/9/2020	ND	ND
4/6/2020	ND	ND
4/7/2020	ND	ND
4/17/2020	ND	ND
5/7/2020	ND	ND
5/15/2020	ND	ND
6/4/2020	ND	ND
6/12/2020	ND	ND
7/10/2020	ND	ND
7/24/2020	ND	ND
8/13/2020	ND	ND
8/14/2020	ND	ND
9/14/2020	ND	ND
9/24/2020	ND	ND
10/6/2020	ND	ND
10/16/2020	ND	ND
11/6/2020	ND	ND
11/16/2020	ND	ND
11/19/2020	ND	ND
11/20/2020	ND	ND
12/3/2020	ND	ND
12/15/2020	ND	ND
12/15/2020	ND	ND
1/13/2021	ND	ND
1/19/2021	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)