



2018 Seasonal Ambient Monitoring for the Organophosphate Pesticide Active Ingredients Chlorpyrifos, Diazinon, and Malathion in Fresno and Tulare Counties

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This report has been reviewed by the staff of the California Air Resources Board (CARB) and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of CARB, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Monitoring Report Approval

Report Title: 2018 Seasonal Ambient Monitoring for the Organophosphate Pesticide Active Ingredients Chlorpyrifos, Diazinon, and Malathion in Fresno and Tulare Counties

Project Lead: Pheng Lee, Air Pollution Specialist

Approval: The following monitoring report has been reviewed and approved by the Community Air Monitoring Branch.



Joe Guerrero, Manager
Community Air Monitoring North Section

3-23-19

Date



Kenneth R. Stroud, Chief
Community Air Monitoring Branch

3-29-19

Date

Executive Summary

2018 Seasonal Ambient Monitoring for the Organophosphate Pesticide Active Ingredients Chlorpyrifos, Diazinon, and Malathion in Fresno and Tulare Counties

At the request of the Department of Pesticide Regulation (DPR), the California Air Resources Board (CARB) conducted an air monitoring study for the organophosphate pesticide active ingredients chlorpyrifos, diazinon, and malathion in Fresno and Tulare Counties from June 18 through August 22, 2018. The monitoring was conducted in communities near historical high-use areas. There were five sampling locations throughout the two counties. A total of 189 primary samples were collected by the Community Air Monitoring Branch (CAMB) staff over the ten-week sampling period. The five monitoring sites were set up in Fresno and Tulare Counties in the cities of Lindsay, San Joaquin, and Fresno and in the census designated places (CDP) of Richgrove and Tranquility. An additional site, to be used for quality control (QC), was set up at the Lindsay location due to it being the expected high-use site (based on historical-use data); thirty-three QC samples were collected from this site. Organophosphate samples were collected on XAD-2 sorbent tubes using a vacuum pump air sampling set up. The sampling flow rate for organophosphate was one standard liter per minute (SLPM). The XAD-2 tubes were analyzed by gas chromatography-triple quadrupole mass spectrometry by CARB's Northern Laboratory Branch (NLB) in Sacramento.

Chlorpyrifos Results

Of the 189 analyzed primary samples, 8 had quantifiable chlorpyrifos concentrations, which ranged from 0.02 to 0.03 micrograms per cubic meter (ug/m³). The two samples with the highest concentrations (0.03 ug/m³) were from the Richgrove site on 6/25/2018 and 6/26/2018. The remaining six quantifiable concentrations were 0.02 ug/m³ and were reported from Richgrove on 7/5/2018, San Joaquin on 7/18/2018 and 7/24/2018, and Tranquility on 7/4/2018, 8/15/2018, and 8/22/2018. Twenty-seven samples had trace amounts. The QC results for chlorpyrifos are provided in more detail in the Quality Control Results section on page 13.

Diazinon Results

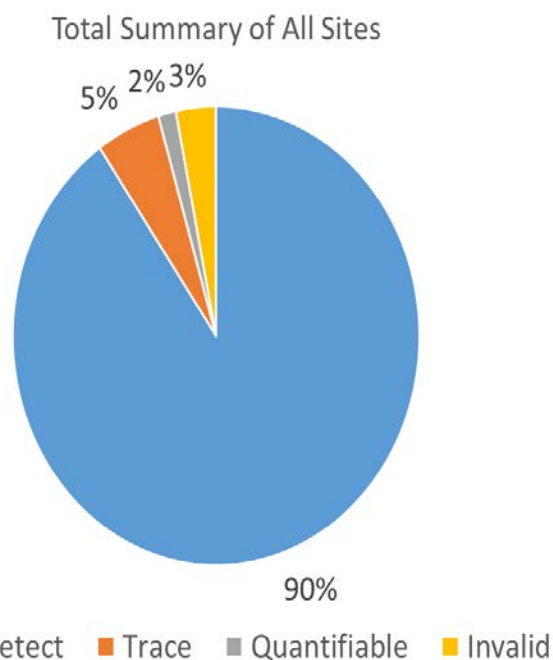
Of the 189 analyzed primary samples, no sample had quantifiable diazinon concentrations. Only one sample, which was from the background site in Fresno on 7/11/2018, had trace amounts. The QC results for diazinon are provided in more detail in the Quality Control Results section on page 13.

Malathion Results

Of the 189 analyzed primary samples, no sample had quantifiable malathion concentrations. Only one sample, which was from the Richgrove site on 6/25/2018, had trace amounts. The QC results for malathion are provided in more detail in the Quality Control Results section on page 13.

The chlorpyrifos, diazinon, and malathion results are summarized in the table and graph below.

		Chlorpyrifos	Diazinon	Malathion	Total Analyses
Lindsay	Non-Detect	31	38	38	107
	Trace	7	0	0	7
	Quantifiable	0	0	0	0
	Invalid	2	2	2	6
Richgrove	Non-Detect	26	37	36	99
	Trace	8	0	1	9
	Quantifiable	3	0	0	3
	Invalid	3	3	3	9
San Joaquin	Non-Detect	30	38	38	106
	Trace	6	0	0	6
	Quantifiable	2	0	0	2
	Invalid	1	1	1	3
Tranquility	Non-Detect	29	37	37	103
	Trace	5	0	0	5
	Quantifiable	3	0	0	3
	Invalid	3	3	3	9
Fresno*	Non-Detect	28	28	29	85
	Trace	1	1	0	2
	Quantifiable	0	0	0	0
	Invalid	1	1	1	3
Total Analyses	Non-Detect	144	178	178	500
	Trace	27	1	1	29
	Quantifiable	8	0	0	8
	Invalid	10	10	10	30
Total Sample		189	189	189	567



*Ten (10) samples were not collected from this site between 6/24/18 and 7/9/18 due to re-roofing of the building.

Additional Pesticide Analyses

Another eight organophosphate pesticide active ingredients were also analyzed in addition to the three primary pesticide compounds, the analysis of which will be addressed in the Deviations from Protocol Section on page 4 because they were added after the study protocol was already drafted. The eight additional pesticide compounds are: chlorpyrifos oxygen analog (OA), diazinon OA, malathion OA, dimethoate, dimethoate OA, S,S,S Tributyl Phosphorotrithioate (DEF), dichlorvos, and phosmet. The laboratory results of these additional compounds will be summarized, however, the main focus of this report will be on chlorpyrifos, diazinon, and malathion.

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Appendix II: Sampling Protocol for Chlorpyrifos, Diazinon, and Malathion in Fresno and Tulare Counties

Appendix III: Photos of Monitoring Sites in the Study

Appendix IV: Standard Operating Procedure for the Determination of Selected Organophosphate Pesticides Collected on XAD-2 Resin by Gas Chromatography-Triple Quadrupole Mass Spectrometry

Appendix V: Monitoring Field Log for Organophosphate

Appendix VI: Mass Flow Meter Certification Report

Appendix VII: Sample Information for Eight Additional Organophosphate Compounds

Appendix VIII: Organophosphate Pesticide Results – Fresno/Tulare Counties

1.0 Background

At the request of the Department of Pesticide Regulation (DPR) and as part of the proposed monitoring requests included in the 2016 Budget Act, the California Air Resources Board (CARB) conducted air monitoring for the pesticide active ingredients chlorpyrifos, diazinon, and malathion in the summer of 2018. Chlorpyrifos is a clear-to-white solid crystalline insecticide and is used to remove termites, mosquitos, and roundworms. Similarly, diazinon and malathion are colorless liquid insecticides used in agriculture to control insects on fruits, vegetables, nuts and field crops. Historically, both pesticides have been used in agriculture in California.

DPR's 2016 Use Information and Air Monitoring Recommendation Report (included in Appendix I), shows that Fresno and Tulare Counties had the highest and third highest combined usage of chlorpyrifos, diazinon, and malathion for years 2012 – 2014 in the State, respectively. The report also showed that for those years, the total reported usage for all three active ingredients in Fresno and Tulare Counties was over 1.5 million pounds. Based on these numbers, DPR requested pesticide sampling in Fresno and Tulare Counties in 2018.

A total of 222 pesticide samples, including both primary (189 samples) and quality control (33 samples), were collected by the Community Air Monitoring Branch (CAMB) staff in Fresno and Tulare Counties from June 18 through August 22, 2018. Throughout the study, monitoring occurred continuously for 24-hour periods, four times per week on random days. The "Sampling Protocol for Chlorpyrifos, Diazinon, and Malathion Monitoring in Fresno and Tulare Counties" is included in Appendix II.

2.0 Sampling Sites

The choice of air monitoring was guided by DPR's recommendations which specifically stated that sampling sites should be located on school grounds or on other public properties, near the edge of the recommended communities and downwind of the pesticide high-use areas. The five monitoring sites, which included a collocated and a background site for the study, were as follows:

- Lindsay City – Reagan Elementary School (collocated site)
- Richgrove Census Designated Place (CDP) – Richgrove Elementary School
- San Joaquin City – San Joaquin Elementary School
- Tranquility CDP – Tranquility Air Monitoring Station
- Fresno City – Fresno Air Monitoring Station (background site)

The geographic latitude and longitude coordinates of the monitoring sites were obtained from Google Earth and are included in Table 1. Also included in Table 1 are the addresses of the schools or the air monitoring stations where the pesticide monitoring sites were located. Figure 1 shows an aerial view of the monitoring sites in Fresno and Tulare Counties with the site locations marked by yellow pins. The samplers were placed either on top of buildings or on school grounds with a fence enclosure. As an example, Figure 2 shows the collocated samplers at the Lindsay site. Photographs of the samplers at each monitoring site can be seen in Appendix III.

Table 1: Sampler Locations

Monitoring locations	Address	Lat/Long Coordinates (WGS84)	Probe Height from Ground
Lindsay - Reagan Elementary School	340 N. Harvard Ave., Lindsay CA 93249	36.206, -119.0816	1.7 meters
Richgrove - Richgrove Elementary School	20898 Grove Dr., Richgrove CA 93261	35.8001, -119.1041	1.8 meters
San Joaquin - San Joaquin Elementary School	8535 9th St., San Joaquin CA 93660	36.6107, -120.1866	2.6 meters
Tranquility - Air Monitoring Station	32650 West Adams Ave., Tranquility CA 93668	36.6342, -120.3822	1.7 meters
Fresno - Air Monitoring Station	3727 N. 1st St., Fresno CA 93705	36.7854, -119.7733	4.8 meters

Figure 1: Aerial Overview of Monitored Area

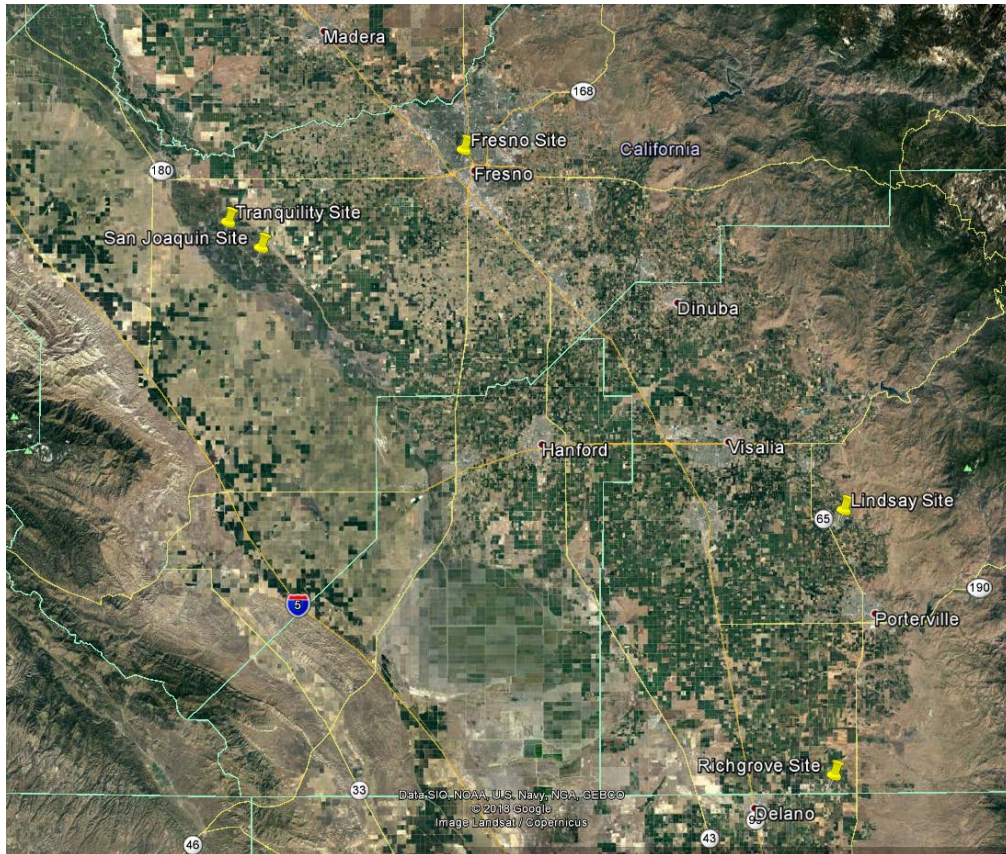


Figure 2: Collocated Samplers at the Lindsay Site



3.0 Methods

At each monitoring site, a vacuum pump capable of drawing air at least 5 liters per minute was used for sampling. Sample flow was controlled by an in-line rotameter, and flow was verified with an Alicat mass flow meter before and after each run. The flow rate was set to one standard liter per minute (SLPM). Intake air was drawn continuously through an XAD-2 sorbent tube during the entire 24-hour sampling period. Samples were collected, stored with dry ice, and sent to CARB's laboratory for analysis.

At the end of each sampling day, the sorbent tubes were documented in field logs. At the end of each sampling week, the collected samples were transported to CARB's MLD Northern Laboratory Branch (NLB) and were either stored in a freezer or given to laboratory staff for analysis.

NLB performed all analyses of samples from this pesticide study. The collected pesticide samples were analyzed following the Standard Operating Procedure (SOP) "Standard Operating Procedure for the Determination of Selected Organophosphate Pesticides Collected on XAD-2 Resin by Gas Chromatography-Triple Quadrupole Mass Spectrometry". This SOP is included in Appendix IV.

The detailed field log and the certification of the mass flow meter are located in Appendices V and VI.

4.0 Deviations from Protocol

This study included five deviations from the study protocol.

- The monitoring recommendation for the study was 12 weeks. However, CARB and DPR collectively agreed that the study could be shortened to ten weeks.
- The DPR protocol required that at least 10% of the total number of collected samples be QC samples (i.e., collocated, blank and spike), however, an agreement between DPR and CARB allowed for one QC sample per week. During the ten-week study, twelve collocated, twelve field blanks, and nine field spikes were collected at the Lindsay site.
- Typically, sorbent tubes used for sampling should only be opened just prior to utilization and then collected right after sampling stops. This ensures no passive contamination and/or degradation of the sorbent materials in the tubes due to humidity or temperature fluctuations. During the study, the first sample tube of each week was opened and the pump programmed to begin to run between 3 to 5 days later, depending on the sampling schedule for the week. All of the first sample tubes of each week throughout the study resulted in non-detectable.
- DPR originally recommended monitoring of chlorpyrifos, diazinon, and malathion. However, DPR subsequently requested that analysis of eight additional pesticide active ingredients be included in the study: chlorpyrifos OA, diazinon OA, malathion OA, dimethoate, dimethoate OA, DEF, dichlorvos, and phosmet. The summary results of these additional eight compounds are included in Table 2. The detailed sample information for these additional compounds include sampling time, start and end flows, volume, and concentrations can be found in Appendix VII. Inclusion of these eight compounds resulted in more than 1,400 additional laboratory analyses of which only four analyses had quantifiable concentrations, twenty-six analyses had trace amounts, and forty analyses were invalidated. The remaining 1,442 analyses were non-detectable.

The four quantifiable concentrations were:

- Lindsay – dimethoate OA (0.03 ug/m³ on 7/24/18)
 - Lindsay – dimethoate OA (0.02 ug/m³ on 7/25/18)
 - San Joaquin – dichlorvos (0.06 ug/m³ on 7/27/18)
 - Richgrove – dichlorvos (0.02 ug/m³ on 8/22/18)
- The San Joaquin Elementary, Richgrove Elementary, and Tranquility sites may not meet US EPA siting criteria. These sites were purposely located inside a fence enclosure for a multitude of reasons. During site acquisitions, best judgements were made to find the best possible locations for these sites, however, the security of staff, access to the monitoring equipment and power, and the safety of the students don't always allow staff to place the samplers at a location which meets all US EPA siting requirements.

Table 2. Summary Results for Eight Additional Pesticide Compounds

		Chlorpyrifos OA	Diazinon OA	Malathion OA	Dimethoate	Dimethoate OA	DEF	Dichlorvos	Phosmet	Total Analyses
Lindsay	Non-Detect	39	39	39	37	35	39	38	39	305
	Trace	0	0	0	2	2	0	1	0	5
	Quantifiable	0	0	0	0	2	0	0	0	2
	Invalid	1	1	1	1	1	1	1	1	8
Richgrove	Non-Detect	36	38	38	38	38	38	36	38	300
	Trace	2	0	0	0	0	0	1	0	3
	Quantifiable	0	0	0	0	0	0	1	0	1
	Invalid	2	2	2	2	2	2	2	2	16
San Joaquin	Non-Detect	35	38	38	38	36	38	34	38	295
	Trace	3	0	0	0	2	0	3	0	8
	Quantifiable	0	0	0	0	0	0	1	0	1
	Invalid	1	1	1	1	1	1	1	1	8
Tranquility	Non-Detect	32	39	39	39	39	39	36	39	302
	Trace	7	0	0	0	0	0	3	0	10
	Quantifiable	0	0	0	0	0	0	0	0	0
	Invalid	1	1	1	1	1	1	1	1	8
Fresno (Bkgnd)	Non-Detect	30	30	30	30	30	30	30	30	240
	Trace	0	0	0	0	0	0	0	0	0
	Quantifiable	0	0	0	0	0	0	0	0	0
	Invalid	0	0	0	0	0	0	0	0	0
Total Analyses	Non-Detect	172	184	184	182	178	184	174	184	1442
	Trace	12	0	0	2	4	0	8	0	26
	Quantifiable	0	0	0	0	2	0	2	0	4
	Invalid	5	5	5	5	5	5	5	5	40

5.0 Results

Many of the collected pesticide samples resulted in non-detectable concentrations. Of the 189 analyzed primary samples, 8 had quantifiable chlorpyrifos concentrations, which ranged from 0.02 to 0.03 micrograms per cubic meter (ug/m³). The two samples with the highest chlorpyrifos concentrations (0.03 ug/m³) were from the Richgrove site collected on 6/25/2018 and 6/26/2018.

For diazinon and malathion, while there were some trace amounts found at Fresno on 7/11/18 and Richgrove on 6/25/18, respectively, there were no quantifiable concentrations collected throughout the study at any of the five monitoring sites.

Table 3 summarizes the individual site results of the study. The sampling results of each site are included in Tables 4 through 8. The full analytical laboratory report is included in Appendix VIII.

Table 3: Summary Results for Chlorpyrifos, Diazinon, and Malathion

		Chlorpyrifos	Diazinon	Malathion	Total Analyses
Lindsay	Non-Detect	31	38	38	107
	Trace	7	0	0	7
	Quantifiable	0	0	0	0
	Invalid	2	2	2	6
Richgrove	Non-Detect	26	37	36	99
	Trace	8	0	1	9
	Quantifiable	3	0	0	3
	Invalid	3	3	3	9
San Joaquin	Non-Detect	30	38	38	106
	Trace	6	0	0	6
	Quantifiable	2	0	0	2
	Invalid	1	1	1	3
Tranquility	Non-Detect	29	37	37	103
	Trace	5	0	0	5
	Quantifiable	3	0	0	3
	Invalid	3	3	3	9
Fresno (Bkgnd)*	Non-Detect	28	28	29	85
	Trace	1	1	0	2
	Quantifiable	0	0	0	0
	Invalid	1	1	1	3
Total Analyses	Non-Detect	144	178	178	500
	Trace	27	1	1	29
	Quantifiable	8	0	0	8
	Invalid	10	10	10	30
Total Sample		189	189	189	567

*Ten (10) samples were not collected from this site between 6/24/18 and 7/9/18 due to re-roofing of the building.

5.1 Invalidations

From the 189 samples collected in the study, over 500 laboratory analyses were conducted for chlorpyrifos, diazinon, and malathion. Samples¹ were invalidated for one of four reasons:

1. The end flow rate was out of flow criteria (+/- 20% of 1 SLPM; 2 samples).
2. The sample was outside of the sampling time (24 hour +/- 1 hour; 3 samples).
3. The sampler malfunctioned (4 samples).
4. The sampler was not set to run (1 sample).

¹Eleven analyses were conducted on each sample. If a sample was invalidated, all analyses of the sample were invalidated as well.

In total, 10 samples were invalidated, and 11 samples were not collected.

Samples that were invalidated:

Lindsay (LD)

- 6/28/18 and 7/8/18

Richgrove (RG)

- 6/28/18, 7/4/18, and 7/11/18

San Joaquin (SJ)

- 6/28/18

Tranquility (TQ)

- 6/28/18, 7/9/18, and 7/25/18

Fresno (FR)

- 8/19/18

Samples that were not collected:

San Joaquin (SJ)

- 7/4/18

Fresno (FR)

- 6/24/18, 6/25/18, 6/26/18, 6/27/18, 6/28/18, 7/2/18, 7/4/18, 7/5/18, 7/8/18, and 7/9/18 (These 10 samples were not collected due to re-roofing of the building at the Fresno site)

Table 4: Sampling Results for Chlorpyrifos, Diazinon, and Malathion at Lindsay

Barcode	Sample Name	Start Date	Sampling Time (Hr)	Start Flow (lpm)	End Flow (lpm)	Volume (m3)	Chlorpyrifos (ug/m3)	Diazinon (ug/m3)	Malathion (ug/m3)
DPR20000	LD-1	6/18/18	23.1	1.001	0.988	1.4	ND	ND	ND
DPR20007	LD-2	6/19/18	23.0	1.005	1.027	1.4	ND	ND	ND
DPR20014	LD-3	6/20/18	23.0	1.010	1.017	1.4	ND	ND	ND
DPR20021	LD-4	6/21/18	23.0	1.017	1.034	1.4	ND	ND	ND
DPR20028	LD-5	6/24/18	24.0	1.003	1.017	1.5	ND	ND	ND
DPR20035	LD-6	6/25/18	23.4	1.008	1.007	1.4	ND	ND	ND
DPR20042	LD-7	6/26/18	23.3	1.000	1.004	1.4	ND	ND	ND
DPR20049	LD-8	6/27/18	23.8	1.000	1.009	1.4	ND	ND	ND
DPR20056	LD-9	6/28/18	INVALIDATED						
DPR20063	LD-10	7/2/18	23.0	1.020	1.036	1.4	trace	ND	ND
DPR20070	LD-11	7/4/18	23.4	1.024	1.013	1.4	trace	ND	ND
DPR20077	LD-12	7/5/18	23.4	1.004	1.055	1.4	ND	ND	ND
DPR20084	LD-13	7/8/18	INVALIDATED						
DPR20091	LD-14	7/9/18	23.7	1.021	1.024	1.5	ND	ND	ND
DPR20098	LD-15	7/10/18	23.3	1.021	1.018	1.4	trace	ND	ND
DPR20105	LD-16	7/11/18	23.8	1.017	1.004	1.4	trace	ND	ND
DPR20112	LD-17	7/15/18	24.2	1.021	1.060	1.5	ND	ND	ND
DPR20119	LD-18	7/16/18	23.3	1.011	0.998	1.4	ND	ND	ND
DPR20126	LD-19	7/17/18	23.7	1.018	0.993	1.4	trace	ND	ND
DPR20133	LD-20	7/18/19	23.2	1.011	1.007	1.4	trace	ND	ND
DPR20140	LD-21	7/24/18	23.1	1.000	0.960	1.4	ND	ND	ND
DPR20147	LD-22	7/25/18	23.6	0.999	0.997	1.4	ND	ND	ND
DPR20154	LD-23	7/26/18	23.2	1.000	1.004	1.4	ND	ND	ND
DPR20161	LD-24	7/27/18	23.1	1.001	0.992	1.4	ND	ND	ND
DPR20168	LD-25	8/1/18	23.2	1.001	1.009	1.4	ND	ND	ND
DPR20175	LD-26	8/2/18	23.1	1.000	0.994	1.4	ND	ND	ND
DPR20182	LD-27	8/3/18	23.1	1.002	1.013	1.4	ND	ND	ND
DPR20189	LD-28	8/4/18	23.4	1.004	1.003	1.4	ND	ND	ND
DPR20196	LD-29	8/7/18	23.2	1.001	1.005	1.4	ND	ND	ND
DPR20203	LD-30	8/8/18	23.9	1.006	1.020	1.5	ND	ND	ND
DPR20210	LD-31	8/9/18	23.7	1.025	1.045	1.5	ND	ND	ND
DPR20217	LD-32	8/10/18	23.7	1.050	1.050	1.5	ND	ND	ND
DPR20224	LD-33	8/12/18	24.0	1.009	1.015	1.5	ND	ND	ND
DPR20231	LD-34	8/13/18	23.1	1.000	1.006	1.4	ND	ND	ND
DPR20238	LD-35	8/14/18	23.1	1.001	1.021	1.4	ND	ND	ND
DPR20245	LD-36	8/15/18	23.1	1.000	1.025	1.4	ND	ND	ND
DPR20252	LD-37	8/19/18	24.5	1.000	1.010	1.5	ND	ND	ND
DPR20259	LD-38	8/20/18	23.5	1.005	1.014	1.4	ND	ND	ND
DPR20266	LD-39	8/21/18	23.2	1.006	1.009	1.4	ND	ND	ND
DPR20273	LD-40	8/22/18	23.0	1.003	1.028	1.4	trace	ND	ND

ND (non-detect): chlorpyrifos < 0.0011 ug/mL, diazinon < 0.00080 ug/mL, malathion < 0.00090 ug/mL.

Trace: chlorpyrifos < 0.0055 ug/mL, diazinon < 0.0040 ug/mL, malathion < 0.0045 ug/mL.

Seven (7) samples had trace amounts of chlorpyrifos. Two (2) samples were invalidated due to pump failure (6/28/18) and for not meeting sampling time criteria (22.4 hours on 7/8/18). The rest of the analyses were non-detectable.

Table 5: Sampling Results for Chlorpyrifos, Diazinon, and Malathion at Richgrove

Barcode	Sample Name	Start Date	Sampling Time (Hr)	Start Flow (lpm)	End Flow (lpm)	Volume (m3)	Chlorpyrifos (ug/m3)	Diazinon (ug/m3)	Malathion (ug/m3)		
DPR20002	RG-1	6/18/18	23.2	1.012	0.998	1.4	ND	ND	ND		
DPR20009	RG-2	6/19/18	23.0	1.025	1.011	1.4	ND	ND	ND		
DPR20016	RG-3	6/20/18	23.1	1.003	1.003	1.4	ND	ND	ND		
DPR20023	RG-4	6/21/18	23.0	1.009	1.009	1.4	ND	ND	ND		
DPR20030	RG-5	6/24/18	24.2	1.014	1.022	1.5	trace	ND	ND		
DPR20037	RG-6	6/25/18	23.3	1.007	0.990	1.4	0.03	ND	trace		
DPR20044	RG-7	6/26/18	23.3	1.001	1.001	1.4	0.03	ND	ND		
DPR20051	RG-8	6/27/18	23.7	1.003	1.003	1.4	trace	ND	ND		
DPR20058	RG-9	6/28/18	INVALIDATED								
DPR20065	RG-10	7/2/18	23.0	1.023	1.029	1.4	trace	ND	ND		
DPR20072	RG-11	7/4/18	INVALIDATED								
DPR20079	RG-12	7/5/18	23.2	1.001	0.997	1.4	0.02	ND	ND		
DPR20086	RG-13	7/8/18	23.5	1.024	1.017	1.4	ND	ND	ND		
DPR20093	RG-14	7/9/18	23.4	1.017	0.998	1.5	ND	ND	ND		
DPR20100	RG-15	7/10/18	23.6	1.022	0.979	1.4	trace	ND	ND		
DPR20107	RG-16	7/11/18	INVALIDATED								
DPR20114	RG-17	7/15/18	24.3	1.032	1.115	1.6	ND	ND	ND		
DPR20121	RG-18	7/16/18	23.2	1.014	0.986	1.4	trace	ND	ND		
DPR20128	RG-19	7/17/18	23.8	1.003	1.016	1.4	ND	ND	ND		
DPR20135	RG-20	7/18/19	23.3	1.007	1.009	1.4	ND	ND	ND		
DPR20142	RG-21	7/24/18	23.1	1.016	1.055	1.4	trace	ND	ND		
DPR20149	RG-22	7/25/18	23.9	1.000	0.992	1.4	ND	ND	ND		
DPR20156	RG-23	7/26/18	24.0	1.003	1.009	1.4	ND	ND	ND		
DPR20163	RG-24	7/27/18	23.2	1.002	1.012	1.4	trace	ND	ND		
DPR20170	RG-25	8/1/18	23.4	1.004	1.024	1.4	ND	ND	ND		
DPR20177	RG-26	8/2/18	23.2	1.002	0.995	1.4	ND	ND	ND		
DPR20184	RG-27	8/3/18	23.3	1.006	1.003	1.4	ND	ND	ND		
DPR20191	RG-28	8/4/18	23.2	1.004	0.961	1.4	ND	ND	ND		
DPR20198	RG-29	8/7/18	23.3	1.003	0.990	1.4	ND	ND	ND		
DPR20205	RG-30	8/8/18	24.0	1.003	1.020	1.5	ND	ND	ND		
DPR20212	RG-31	8/9/18	23.7	1.015	1.060	1.5	ND	ND	ND		
DPR20219	RG-32	8/10/18	23.6	1.002	0.988	1.4	ND	ND	ND		
DPR20226	RG-33	8/12/18	24.3	1.004	1.085	1.5	ND	ND	ND		
DPR20233	RG-34	8/13/18	23.1	1.001	0.990	1.4	ND	ND	ND		
DPR20240	RG-35	8/14/18	23.1	1.000	0.985	1.4	ND	ND	ND		
DPR20247	RG-36	8/15/18	23.1	1.000	1.061	1.4	ND	ND	ND		
DPR20254	RG-37	8/19/18	24.8	0.999	0.973	1.5	ND	ND	ND		
DPR20261	RG-38	8/20/18	23.7	1.008	1.011	1.4	ND	ND	ND		
DPR20268	RG-39	8/21/18	23.2	1.004	1.022	1.4	ND	ND	ND		
DPR20275	RG-40	8/22/18	23.0	1.019	1.001	1.4	trace	ND	ND		

ND (non-detect): chlorpyrifos < 0.0011 ug/mL, diazinon < 0.00080 ug/mL, malathion < 0.00090 ug/mL.

Trace: chlorpyrifos < 0.0055 ug/mL, diazinon < 0.0040 ug/mL, malathion < 0.0045 ug/mL.

Three (3) samples had quantifiable chlorpyrifos concentrations. Eight (8) samples had trace amounts of chlorpyrifos and one (1) sample had trace amounts of malathion. Three (3) samples were invalidated due to pump failure (6/28/18 and 7/11/18) and for not meeting sampling time criteria of 24 hours +/- 1 hour (25.4 hours on 7/4/18). The rest of the analyses were non-detectable.

Table 6: Sampling Results for Chlorpyrifos, Diazinon, and Malathion at San Joaquin

Barcode	Sample Name	Start Date	Sampling Time (Hr)	Start Flow (lpm)	End Flow (lpm)	Volume (m3)	Chlorpyrifos (ug/m3)	Diazinon (ug/m3)	Malathion (ug/m3)
DPR20003	SJ-1	6/18/18	23.5	1.018	1.022	1.4	ND	ND	ND
DPR20010	SJ-2	6/19/18	23.0	1.025	1.026	1.4	ND	ND	ND
DPR20017	SJ-3	6/20/18	23.0	1.020	1.043	1.4	ND	ND	ND
DPR20024	SJ-4	6/21/18	23.1	1.012	1.003	1.4	ND	ND	ND
DPR20031	SJ-5	6/24/18	23.7	1.028	1.032	1.5	ND	ND	ND
DPR20038	SJ-6	6/25/18	23.4	1.007	0.998	1.4	ND	ND	ND
DPR20045	SJ-7	6/26/18	23.6	1.003	1.002	1.4	ND	ND	ND
DPR20052	SJ-8	6/27/18	23.0	1.004	1.016	1.4	trace	ND	ND
DPR20059	SJ-9	6/28/18	INVALIDATED						
DPR20066	SJ-10	7/2/18	23.0	1.033	1.037	1.4	ND	ND	ND
xxxxxxx	SJ-11	7/4/18	NO SAMPLE						
DPR20080	SJ-12	7/5/18	23.3	1.007	1.002	1.4	ND	ND	ND
DPR20087	SJ-13	7/8/18	23.4	1.018	1.015	1.4	ND	ND	ND
DPR20094	SJ-14	7/9/18	23.5	1.014	1.022	1.4	ND	ND	ND
DPR20101	SJ-15	7/10/18	23.4	1.027	1.008	1.4	ND	ND	ND
DPR20108	SJ-16	7/11/18	23.9	1.029	0.967	1.4	trace	ND	ND
DPR20115	SJ-17	7/15/18	24.7	1.016	1.087	1.5	ND	ND	ND
DPR20122	SJ-18	7/16/18	23.1	1.006	0.995	1.4	ND	ND	ND
DPR20129	SJ-19	7/17/18	23.4	1.006	0.990	1.4	ND	ND	ND
DPR20136	SJ-20	7/18/19	23.1	1.023	1.015	1.4	0.02	ND	ND
DPR20143	SJ-21	7/24/18	23.4	1.020	0.958	1.4	0.02	ND	ND
DPR20150	SJ-22	7/25/18	23.9	1.000	1.037	1.5	ND	ND	ND
DPR20157	SJ-23	7/26/18	23.4	1.001	0.990	1.4	ND	ND	ND
DPR20164	SJ-24	7/27/18	23.3	1.002	0.995	1.4	ND	ND	ND
DPR20171	SJ-25	8/1/18	23.8	1.001	1.001	1.4	ND	ND	ND
DPR20178	SJ-26	8/2/18	23.1	1.002	0.997	1.4	ND	ND	ND
DPR20185	SJ-27	8/3/18	23.3	1.002	0.994	1.4	trace	ND	ND
DPR20192	SJ-28	8/4/18	23.1	1.003	0.993	1.4	ND	ND	ND
DPR20199	SJ-29	8/7/18	23.2	1.003	0.990	1.4	trace	ND	ND
DPR20206	SJ-30	8/8/18	24.0	1.015	1.005	1.5	ND	ND	ND
DPR20213	SJ-31	8/9/18	23.7	1.005	1.005	1.4	ND	ND	ND
DPR20220	SJ-32	8/10/18	24.1	1.009	1.003	1.5	ND	ND	ND
DPR20227	SJ-33	8/12/18	24.8	1.001	1.008	1.5	ND	ND	ND
DPR20234	SJ-34	8/13/18	23.2	1.001	1.005	1.4	trace	ND	ND
DPR20241	SJ-35	8/14/18	23.1	1.001	1.008	1.4	ND	ND	ND
DPR20248	SJ-36	8/15/18	23.3	1.000	1.003	1.4	ND	ND	ND
DPR20255	SJ-37	8/19/18	24.8	1.001	0.997	1.5	ND	ND	ND
DPR20262	SJ-38	8/20/18	23.7	1.010	0.962	1.4	ND	ND	ND
DPR20269	SJ-39	8/21/18	23.4	1.016	1.062	1.4	trace	ND	ND
DPR20276	SJ-40	8/22/18	23.0	1.011	1.010	1.4	ND	ND	ND

ND (non-detect): chlorpyrifos < 0.0011 ug/mL, diazinon < 0.00080 ug/mL, malathion < 0.00090 ug/mL.

Trace: chlorpyrifos < 0.0055 ug/mL, diazinon < 0.0040 ug/mL, malathion < 0.0045 ug/mL.

Two (2) samples had quantifiable chlorpyrifos concentrations. Six (6) samples had trace amounts of chlorpyrifos. One (1) sample was invalidated due to pump failure (6/28/18) and there was no sample collected on 7/4/18 due to timer issue. The rest of the analyses were non-detectable.

Table 7: Sampling Results for Chlorpyrifos, Diazinon, and Malathion at Tranquility

Barcode	Sample Name	Start Date	Sampling Time (Hr)	Start Flow (lpm)	End Flow (lpm)	Volume (m3)	Chlorpyrifos (ug/m3)	Diazinon (ug/m3)	Malathion (ug/m3)
DPR20004	TQ-1	6/18/18	23.6	1.017	1.029	1.4	ND	ND	ND
DPR20011	TQ-2	6/19/18	23.0	1.008	1.009	1.4	ND	ND	ND
DPR20018	TQ-3	6/20/18	23.1	1.008	1.024	1.4	ND	ND	ND
DPR20025	TQ-4	6/21/18	23.1	1.022	1.022	1.4	ND	ND	ND
DPR20032	TQ-5	6/24/18	24.0	1.019	1.038	1.5	ND	ND	ND
DPR20039	TQ-6	6/25/18	23.4	1.003	0.996	1.4	ND	ND	ND
DPR20046	TQ-7	6/26/18	23.5	1.005	0.998	1.4	ND	ND	ND
DPR20053	TQ-8	6/27/18	23.9	1.000	1.012	1.4	ND	ND	ND
DPR20060	TQ-9	6/28/18	INVALIDATED						
DPR20067	TQ-10	7/2/18	23.0	1.017	1.012	1.4	trace	ND	ND
DPR20074	TQ-11	7/4/18	24.2	1.014	1.017	1.5	0.02	ND	ND
DPR20081	TQ-12	7/5/18	23.1	1.009	1.017	1.4	trace	ND	ND
DPR20088	TQ-13	7/8/18	23.2	1.038	1.102	1.5	ND	ND	ND
DPR20095	TQ-14	7/9/18	INVALIDATED						
DPR20102	TQ-15	7/10/18	23.4	1.020	1.063	1.4	ND	ND	ND
DPR20109	TQ-16	7/11/18	23.8	1.030	1.028	1.4	trace	ND	ND
DPR20116	TQ-17	7/15/18	24.4	1.030	1.104	1.5	ND	ND	ND
DPR20123	TQ-18	7/16/18	23.2	1.005	1.004	1.4	ND	ND	ND
DPR20130	TQ-19	7/17/18	23.6	1.050	1.019	1.4	ND	ND	ND
DPR20137	TQ-20	7/18/19	23.0	1.048	1.040	1.4	ND	ND	ND
DPR20144	TQ-21	7/24/18	23.5	1.027	0.961	1.4	ND	ND	ND
DPR20151	TQ-22	7/25/18	INVALIDATED						
DPR20158	TQ-23	7/26/18	23.5	1.001	0.993	1.4	ND	ND	ND
DPR20165	TQ-24	7/27/18	23.1	0.999	0.996	1.4	ND	ND	ND
DPR20172	TQ-25	8/1/18	24.0	1.004	1.005	1.4	ND	ND	ND
DPR20179	TQ-26	8/2/18	23.4	1.003	0.965	1.4	ND	ND	ND
DPR20186	TQ-27	8/3/18	23.1	1.004	0.983	1.4	trace	ND	ND
DPR20193	TQ-28	8/4/18	23.2	1.002	1.014	1.4	ND	ND	ND
DPR20200	TQ-29	8/7/18	23.0	1.004	0.990	1.4	ND	ND	ND
DPR20207	TQ-30	8/8/18	24.0	1.031	1.015	1.5	ND	ND	ND
DPR20214	TQ-31	8/9/18	23.7	1.015	1.017	1.4	ND	ND	ND
DPR20221	TQ-32	8/10/18	24.3	1.006	1.013	1.5	ND	ND	ND
DPR20228	TQ-33	8/12/18	24.4	1.004	0.996	1.5	ND	ND	ND
DPR20235	TQ-34	8/13/18	23.2	1.001	1.006	1.4	ND	ND	ND
DPR20242	TQ-35	8/14/18	23.2	1.001	1.023	1.4	trace	ND	ND
DPR20249	TQ-36	8/15/18	23.2	0.999	0.994	1.4	0.02	ND	ND
DPR20256	TQ-37	8/19/18	25.0	1.000	0.981	1.5	ND	ND	ND
DPR20263	TQ-38	8/20/18	23.8	1.010	1.047	1.4	ND	ND	ND
DPR20270	TQ-39	8/21/18	23.3	1.027	1.039	1.4	ND	ND	ND
DPR20277	TQ-40	8/22/18	23.1	1.001	1.010	1.4	0.02	ND	ND

ND (non-detect): chlorpyrifos < 0.0011 ug/mL, diazinon < 0.00080 ug/mL, malathion < 0.00090 ug/mL.

Trace: chlorpyrifos < 0.0055 ug/mL, diazinon < 0.0040 ug/mL, malathion < 0.0045 ug/mL.

Three (3) samples had quantifiable chlorpyrifos concentrations. Five (5) samples had trace amounts of chlorpyrifos. Three (3) samples were invalidated due to pump failure (6/28/18) and the end flow not meeting flow criteria of 1 SLPM +/- 20% (1.45 SLPM on 7/9/18 and 1.23 SLPM on 7/25/18). The rest of the analyses were non-detectable.

Table 8: Sampling Results for Chlorpyrifos, Diazinon, and Malathion at Fresno

Barcode	Sample Name	Start Date	Sampling Time (Hr)	Start Flow (lpm)	End Flow (lpm)	Volume (m3)	Chlorpyrifos (ug/m3)	Diazinon (ug/m3)	Malathion (ug/m3)
DPR20005	FR-1	6/18/18	23.7	1.014	1.013	1.4	ND	ND	ND
DPR20012	FR-2	6/19/18	23.1	1.007	0.985	1.4	ND	ND	ND
DPR20019	FR-3	6/20/18	23.0	1.010	1.031	1.4	ND	ND	ND
DPR20026	FR-4	6/21/18	23.1	1.002	0.982	1.4	ND	ND	ND
xxxxxx	FR-5	6/24/18	NO SAMPLE						
xxxxxx	FR-6	6/25/18	NO SAMPLE						
xxxxxx	FR-7	6/26/18	NO SAMPLE						
xxxxxx	FR-8	6/27/18	NO SAMPLE						
xxxxxx	FR-9	6/28/18	NO SAMPLE						
xxxxxx	FR-10	7/2/18	NO SAMPLE						
xxxxxx	FR-11	7/4/18	NO SAMPLE						
xxxxxx	FR-12	7/5/18	NO SAMPLE						
xxxxxx	FR-13	7/8/18	NO SAMPLE						
xxxxxx	FR-14	7/9/18	NO SAMPLE						
DPR20103	FR-15	7/10/18	23.6	1.020	1.047	1.5	ND	ND	ND
DPR20110	FR-16	7/11/18	23.4	1.024	1.036	1.4	ND	trace	ND
DPR20117	FR-17	7/15/18	24.7	1.022	1.040	1.5	ND	ND	ND
DPR20124	FR-18	7/16/18	23.2	1.003	1.004	1.4	ND	ND	ND
DPR20131	FR-19	7/17/18	23.8	1.022	1.010	1.5	ND	ND	ND
DPR20138	FR-20	7/18/19	23.4	1.016	1.018	1.4	ND	ND	ND
DPR20145	FR-21	7/24/18	23.0	1.014	0.990	1.4	ND	ND	ND
DPR20152	FR-22	7/25/18	23.5	1.000	0.985	1.4	ND	ND	ND
DPR20159	FR-23	7/26/18	23.2	1.001	1.007	1.4	trace	ND	ND
DPR20166	FR-24	7/27/18	23.2	1.001	0.971	1.4	ND	ND	ND
DPR20173	FR-25	8/1/18	23.3	1.001	0.981	1.4	ND	ND	ND
DPR20180	FR-26	8/2/18	23.3	1.002	1.026	1.4	ND	ND	ND
DPR20187	FR-27	8/3/18	23.2	1.004	0.973	1.4	ND	ND	ND
DPR20194	FR-28	8/4/18	23.1	1.004	0.984	1.4	ND	ND	ND
DPR20201	FR-29	8/7/18	23.3	1.002	1.035	1.4	ND	ND	ND
DPR20208	FR-30	8/8/18	24.0	1.014	1.008	1.5	ND	ND	ND
DPR20215	FR-31	8/9/18	23.8	1.010	0.994	1.4	ND	ND	ND
DPR20222	FR-32	8/10/18	23.1	1.005	0.973	1.4	ND	ND	ND
DPR20229	FR-33	8/12/18	24.1	1.004	0.996	1.4	ND	ND	ND
DPR20236	FR-34	8/13/18	23.1	1.000	0.995	1.4	ND	ND	ND
DPR20243	FR-35	8/14/18	23.1	1.000	1.000	1.4	ND	ND	ND
DPR20250	FR-36	8/15/18	23.3	1.001	0.994	1.4	ND	ND	ND
DPR20257	FR-37	8/19/18	INVALIDATED						
DPR20264	FR-38	8/20/18	23.7	1.001	0.990	1.4	ND	ND	ND
DPR20271	FR-39	8/21/18	23.3	1.010	1.078	1.4	ND	ND	ND
DPR20278	FR-40	8/22/18	23.0	1.012	0.999	1.4	ND	ND	ND

ND (non-detect): chlorpyrifos < 0.0011 ug/mL, diazinon < 0.00080 ug/mL, malathion < 0.00090 ug/mL.

Trace: chlorpyrifos < 0.0055 ug/mL, diazinon < 0.0040 ug/mL, malathion < 0.0045 ug/mL.

One (1) sample had trace amounts of chlorpyrifos and one (1) sample had trace amounts of diazinon. One (1) sample was invalidated because the sample ran for 25.3 hours. Ten (10) samples were not collected between 6/24/18 and 7/9/18 due to re-roofing of the building. The rest of the analyses were non-detectable.

6.0 Quality Control Results

This section summarizes the quality control (QC) samples collected at the Lindsay site. The Lindsay site was chosen as the QC site due to its location in a historically high-use pesticide area. An additional vacuum pump sampling set-up was added to this site to collect QC samples. In total, 12 collocated, 12 field blanks, and 9 field spikes were collected in the study.

The formula for calculating the Relative Percent Difference (RPD) is as follows:

$$RPD = (Collocate\ result,\ ppb - Primary\ result,\ ppb) \div (Average,\ ppb\ of\ Collocate\ and\ Primary) \times 100$$

Twelve collocated samples were collected in the study, all of which were non-detectable. For this reason, the RPD of the collocated samples could not be determined. Table 9 summarizes the RPD of the collocated samples at the Lindsay site.

Table 9: Collocated Relative Percent Difference at Lindsay

Barcode	Sample Name	Type	Start Date-Time	Conc. (ug/mL)	Extr Vol (mL)	Conc. (ug/sample)	Colloc. RPD*
DPR20008	LD-2-CO	Collocated	06/19/2018 10:13	ND	4.0	ND	<EQL
DPR20043	LD-7-CO	Collocated	06/26/2018 08:36	ND	4.0	ND	<EQL
DPR20078	LD-12-CO	Collocated	07/05/2018 09:31	ND	4.0	ND	<EQL
DPR20099	LD-15-CO	Collocated	07/10/2018 09:17	ND	4.0	ND	<EQL
DPR20120	LD-18-CO	Collocated	07/16/2018 10:46	ND	4.0	ND	<EQL
DPR20127	LD-19-CO	Collocated	07/18/2018 09:48	ND	4.0	ND	<EQL
DPR20134	LD-20-CO	Collocated	07/19/2018 09:05	ND	4.0	ND	<EQL
DPR20155	LD-23-CO	Collocated	07/26/2018 10:38	ND	4.0	ND	<EQL
DPR20183	LD-27-CO	Collocated	08/03/2018 09:36	ND	4.0	ND	<EQL
DPR20218	LD-32-CO	Collocated	08/10/2018 09:01	ND	4.0	ND	<EQL
DPR20239	LD-35-CO	Collocated	08/14/2018 09:52	ND	4.0	ND	<EQL
DPR20260	LD-38-CO	Collocated	08/20/2018 10:39	ND	4.0	ND	<EQL

*The RPD was less than the Estimated Quantitation Limit (EQL) of the pesticide compound so it could not be determined.

The formula for calculating the Spike Percent Recovery (SPR) is as follows:

$$SPR = (Conc., ug/sample \div Spike Amt, ug/sample) \times 100$$

Nine field spike samples were collected in the study. The SPR ranged from 93.8% - 125.0% which was within spike recovery criteria (70% - 130%). Table 10 summarizes the SPR of the spike samples at the Lindsay site for chlorpyrifos, diazinon, and malathion.

Table 10: Spike Percent Recovery at Lindsay

Barcode	Sample Name	Type	Start Date-Time	Compound	Conc. (ug/sample)	Spike Amt (ug/sample)	SPR*
DPR20015	LD-3-FS	Field Spike	06/20/2018 09:17	chlorpyrifos	1.7	1.6	106.3
DPR20036	LD-6-FS	Field Spike	06/25/2018 09:09	chlorpyrifos	1.8	1.6	112.5
DPR20064	LD-10-FS	Field Spike	07/02/2018 09:47	chlorpyrifos	2.0	1.6	125.0
DPR20092	LD-14-FS	Field Spike	07/09/2018 09:31	chlorpyrifos	1.6	1.6	100.0
DPR20148	LD-22-FS	Field Spike	07/25/2018 10:34	chlorpyrifos	2.0	1.6	125.0
DPR20176	LD-26-FS	Field Spike	08/02/2018 10:20	chlorpyrifos	1.8	1.6	112.5
DPR20204	LD-30-FS	Field Spike	08/08/2018 09:19	chlorpyrifos	2.0	1.6	125.0
DPR20232	LD-34-FS	Field Spike	08/13/2018 10:41	chlorpyrifos	1.9	1.6	118.8
DPR20267	LD-39-FS	Field Spike	08/21/2018 10:13	chlorpyrifos	1.8	1.6	112.5
DPR20015	LD-3-FS	Field Spike	06/20/2018 09:17	Diazinon	1.7	1.6	106.3
DPR20036	LD-6-FS	Field Spike	06/25/2018 09:09	Diazinon	1.8	1.6	112.5
DPR20064	LD-10-FS	Field Spike	07/02/2018 09:47	Diazinon	2.0	1.6	125.0
DPR20092	LD-14-FS	Field Spike	07/09/2018 09:31	Diazinon	1.6	1.6	100.0
DPR20148	LD-22-FS	Field Spike	07/25/2018 10:34	Diazinon	2.0	1.6	125.0
DPR20176	LD-26-FS	Field Spike	08/02/2018 10:20	Diazinon	1.7	1.6	106.3
DPR20204	LD-30-FS	Field Spike	08/08/2018 09:19	Diazinon	2.0	1.6	125.0
DPR20232	LD-34-FS	Field Spike	08/13/2018 10:41	Diazinon	1.9	1.6	118.8
DPR20267	LD-39-FS	Field Spike	08/21/2018 10:13	Diazinon	1.8	1.6	112.5
DPR20015	LD-3-FS	Field Spike	06/20/2018 09:17	Malathion	1.6	1.6	100.0
DPR20036	LD-6-FS	Field Spike	06/25/2018 09:09	Malathion	1.7	1.6	106.3
DPR20064	LD-10-FS	Field Spike	07/02/2018 09:47	Malathion	1.9	1.6	118.8
DPR20092	LD-14-FS	Field Spike	07/09/2018 09:31	Malathion	1.5	1.6	93.8
DPR20148	LD-22-FS	Field Spike	07/25/2018 10:34	Malathion	1.9	1.6	118.8
DPR20176	LD-26-FS	Field Spike	08/02/2018 10:20	Malathion	1.6	1.6	100.0
DPR20204	LD-30-FS	Field Spike	08/08/2018 09:19	Malathion	2.0	1.6	125.0
DPR20232	LD-34-FS	Field Spike	08/13/2018 10:41	Malathion	1.8	1.6	112.5
DPR20267	LD-39-FS	Field Spike	08/21/2018 10:13	Malathion	1.7	1.6	106.3

*All SPRs met criteria (70% - 130%).

In addition to collocated and field spike samples, field blanks were also collected at the Lindsay site. All 12 field blanks were non-detectable. Table 11 summarizes the blank results at the Lindsay site.

Table 11: Field Blank Results at Lindsay

Barcode	Sample Name	Type	Start Date-Time	Conc. (ug/mL)	Extr Vol (mL)	Conc. (ug/sample)
DPR20001	LD-1-FB	Field Blank	06/18/2018 10:55	ND	4.0	ND
DPR20029	LD-5-FB	Field Blank	06/24/2018 09:00	ND	4.0	ND
DPR20057	LD-9-FB	Field Blank	06/28/2018 07:50	ND	4.0	ND
DPR20071	LD-11-FB	Field Blank	07/03/2018 08:51	ND	4.0	ND
DPR20085	LD-13-FB	Field Blank	07/08/2018 10:00	ND	4.0	ND
DPR20113	LD-17-FB	Field Blank	07/12/2018 08:28	ND	4.0	ND
DPR20141	LD-21-FB	Field Blank	07/24/2018 11:30	ND	4.0	ND
DPR20169	LD-25-FB	Field Blank	07/28/2018 09:00	ND	4.0	ND
DPR20197	LD-29-FB	Field Blank	08/05/2018 08:12	ND	4.0	ND
DPR20211	LD-31-FB	Field Blank	08/09/2018 09:16	ND	4.0	ND
DPR20225	LD-33-FB	Field Blank	08/11/2018 08:55	ND	4.0	ND
DPR20253	LD-37-FB	Field Blank	08/16/2018 08:04	ND	4.0	ND

7.0 Breakthrough Results

Breakthrough analysis refers to analysis of the secondary sorbent bed of the XAD-2 resin tube to determine if any of the sample was not retained in the primary sorbent bed. Breakthrough analyses were conducted on 29 primary and 9 field spike samples; all 38 samples were non-detectable, indicating that none had breakthrough. One sample (7/1/18) was invalidated because the pump malfunctioned. The breakthrough sample results are summarized in Table 12.

Table 12: Breakthrough Sampling Results at Lindsay

Barcode	Sample Name	Type	Start Date-Time	Conc. (ug/mL)	Extr Vol (mL)	Conc. (ug/sample)
DPR10094	<i>RG-1-BT</i>	Break Thru	6/18/2018	ND	4.0	ND
DPR10095	<i>LD-2-BT</i>	Break Thru	6/19/2018	ND	4.0	ND
DPR10096	LD-3-FS-BT	Break Thru	6/20/2018	ND	4.0	ND
DPR10097	<i>TQ-4-BT</i>	Break Thru	6/21/2018	ND	4.0	ND
DPR10098	<i>RG-5-BT</i>	Break Thru	6/24/2018	ND	4.0	ND
DPR10099	LD-6-FS-BT	Break Thru	6/25/2018	ND	4.0	ND
DPR10100	<i>RG-7-BT</i>	Break Thru	6/26/2018	ND	4.0	ND
DPR10101	<i>RG-9-BT</i>	Break Thru	7/1/2018	Invalid	Invalid	Invalid
DPR10102	LD-10-FS-BT	Break Thru	7/2/2018	ND	4.0	ND
DPR10103	<i>SJ-12-BT</i>	Break Thru	7/5/2018	ND	4.0	ND
DPR10104	<i>SJ-13-BT</i>	Break Thru	7/8/2018	ND	4.0	ND
DPR10105	LD-14-FS-BT	Break Thru	7/9/2018	ND	4.0	ND
DPR10106	<i>TQ-15-BT</i>	Break Thru	7/10/2018	ND	4.0	ND
DPR10107	<i>FR-16-BT</i>	Break Thru	7/11/2018	ND	4.0	ND
DPR10108	<i>LD-17-BT</i>	Break Thru	7/15/2018	ND	4.0	ND
DPR10109	<i>FR-18-BT</i>	Break Thru	7/16/2018	ND	4.0	ND
DPR10110	<i>SJ-19-BT</i>	Break Thru	7/17/2018	ND	4.0	ND
DPR10111	<i>TQ-20-BT</i>	Break Thru	7/18/2018	ND	4.0	ND
DPR10112	<i>LD-21-BT</i>	Break Thru	7/24/2018	ND	4.0	ND
DPR10113	LD-22-FS-BT	Break Thru	7/25/2018	ND	4.0	ND
DPR10114	<i>RG-23-BT</i>	Break Thru	7/26/2018	ND	4.0	ND
DPR10115	<i>FR-24-BT</i>	Break Thru	7/27/2018	ND	4.0	ND
DPR10116	<i>TQ-25-BT</i>	Break Thru	8/1/2018	ND	4.0	ND
DPR10117	LD-26-FS-BT	Break Thru	8/2/2018	ND	4.0	ND
DPR10118	<i>SJ-27-BT</i>	Break Thru	8/3/2018	ND	4.0	ND
DPR10119	<i>RG-28-BT</i>	Break Thru	8/4/2018	ND	4.0	ND
DPR10120	<i>LD-29-BT</i>	Break Thru	8/7/2018	ND	4.0	ND
DPR10121	LD-30-FS-BT	Break Thru	8/8/2018	ND	4.0	ND
DPR10122	<i>SJ-31-BT</i>	Break Thru	8/9/2018	ND	4.0	ND
DPR10123	<i>RG-32-BT</i>	Break Thru	8/10/2018	ND	4.0	ND
DPR10124	<i>FR-33-BT</i>	Break Thru	8/12/2018	ND	4.0	ND
DPR10125	LD-34-FS-BT	Break Thru	8/13/2018	ND	4.0	ND
DPR10126	<i>LD-35-BT</i>	Break Thru	8/14/2018	ND	4.0	ND
DPR10127	<i>TQ-36-BT</i>	Break Thru	8/15/2018	ND	4.0	ND
DPR10128	<i>SJ-37-BT</i>	Break Thru	8/19/2018	ND	4.0	ND
DPR10129	<i>FR-38-BT</i>	Break Thru	8/20/2018	ND	4.0	ND
DPR10130	LD-39-FS-BT	Break Thru	8/21/2018	ND	4.0	ND
DPR10131	<i>TQ-40-BT</i>	Break Thru	8/22/2018	ND	4.0	ND

Note: The Sample Names that are bold and italicized are the primary samples, and the non-italicized Sample Names are the field spike samples.

8.0 Summary

Ninety percent (90%) of the pesticide samples collected in the study were below the method detection limit for all three pesticide active ingredients: chlorpyrifos, diazinon, and malathion. While approximately five percent (5%) of the samples had trace amounts, only two percent (2%) were quantifiable.

The highest chlorpyrifos concentrations (0.03 ug/m³) were from the Richgrove site on 6/25/2018 and 6/26/2018. Only one trace sample was collected for diazinon and malathion throughout the study at Richgrove and Fresno, respectively. The low percentage of quantifiable concentrations suggests that minimal pesticides were present at the monitoring sites during the time of the study.