Appendix L: Comparison to previous years of AMN data

Comparison of 2018 to Previous Years of AMN Results

All AMN Sites

This report covers results from the eighth year of monitoring by the AMN, which has been collecting samples since 2011. While there were significant changes to the AMN commencing in 2017, as detailed in the main body of this report, a few comparisons to the overall results from previous years are possible. Among individual sites, Shafter has remained in operation since 2011 and comparisons of the historic data for that site are shown below. Additionally, comparisons between 2018 and 2017 data have been made for the three sites which became operational in 2017 (Chualar, Santa Maria, and Watsonville).

Table 1 shows the number of individual pesticides and breakdown products monitored by the AMN each year, as well as whether that pesticide was detected in a given year. This is further broken down into whether that pesticide was detected at a quantifiable level during monitoring in that year. The initial number of pesticides monitored by the AMN was 39 in 2011 (34 pesticides and 5 breakdown products). On January 1, 2012, acrolein was removed from AMN monitoring because acrolein is mainly produced as a byproduct of automobile emissions and other combustion sources not related to pesticidal uses (ATSDR, 2007), and uncertainties about the laboratory methodology. On March 21, 2012, DPR cancelled the registration of all products containing methyl iodide at the request of the registrant. Therefore, monitoring for methyl iodide as part of the AMN was stopped on June 20, 2012. In December 2016, carbon disulfide was removed from the list of monitored chemicals due to detections originating from non-pesticidal sources, and the voluntary withdrawal of registration of pesticide products that produce carbon disulfide.

The results presented in terms of individual analyses are shown as raw counts in Table 2, which are then summarized into the percentages of possible detections in Table 3. Inspection of these results reveals that the highest number of detections as a percentage of analyses occurred in 2015 (10.3%), and that the highest percentage of quantifiable detections occurred in both 2015 and 2016 (5.2%, each). The lowest percentage of detections occurred in 2012 (5.5%). 2018 and 2012 shared the lowest percentage of quantifiable detections (1.3%, each).

Table 1. Summary of pesticide detection trends in the Air Monitoring Network, aggregated by chemical (2011-2018).

Year	Total monitored chemicals*	Total non-detected chemicals	Total detected chemicals †	Total quantifiable chemicals
2011	39	10	29	9
2012	38	14	24	11
2013	37	13	24	14
2014	37	14	23	11
2015	37	11	26	14
2016	37	12	25	11
2017	36	9	27	10
2018	36	8	28	11

* Includes all pesticides that were monitored as part of the AMN for that year.
† Includes both quantified and trace detections.

Table 2. Summary of pesticide detection trends in the Air Monitoring Network, as individual analyses (2011-2018).

Year	Total analyses	Total non-detected analyses	Total detected analyses †	Total quantifiable analyses
2011	5,676	5,251	425	173
2012	6,002	5,671	331	81
2013	6,033	5,607	426	159
2014	5,966	5,468	498	225
2015	5,892	5,286	606	306
2016	5,928	5,393	535	307
2017	7,396	6,868	528	122
2018	12,058	11,316	742	152

† Includes both quantified and trace detections.

Table 3. Summary of pesticide detection trends in the Air Monitoring Network, as a percentage of possible detections (2011-2018)

Year	Percent of non-detected analyses	Percent of detected analyses †	Percent of quantifiable analyses
2011	92.5%	7.5%	3.0%
2012	94.5%	5.5%	1.3%
2013	92.9%	7.1%	2.6%
2014	91.7%	8.3%	3.8%
2015	89.7%	10.3%	5.2%
2016	91.0%	9.0%	5.2%
2017	92.9%	7.1%	1.6%
2018	93.8%	6.2%	1.3%

† Includes both quantified and trace detections.

Historic Air Concentrations in Chualar

Monitoring began in Chualar on January 1, 2017. Summarized results for the two years of monitoring are shown in Tables 4, 5, 6, and 7.

Table 4 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection. Changes between these two years include an increase in the number of detections for the fumigants 1,3-D and MITC and a decrease in the number of detections of the organophosphate malathion and its oxon.

Table 5 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Chualar. The highest observed 24-h concentration of 1,3-D decreased from 1,996 ng/m^3 (0.4 ppb) in 2017 to 460 ng/m^3 (0.1 ppb) in 2018. The highest observed 24-h concentration of MITC increased from 92 ng/m^3 (0.0 ppb) in 2017 to 340 ng/m^3 (0.11 ppb) in 2018.

Table 6 shows the highest observed rolling 4- or 13- week average concentrations for any chemical with a positive detection during any year of monitoring at Chualar. The highest observed rolling 13-week average of 1,3-D and chloropicrin in 2018 were relatively close to those seen in 2017. The highest

observed rolling 4-week average concentration of MITC increased from 31 ng/m³ (0.0 ppb) in 2017 to 101 ng/m³ (0.034 ppb) in 2018.

Table 7 shows the annual average concentrations for any chemical with a positive detection during any year of monitoring at Chualar. The annual average concentration of 1,3-D in Chualar decreased from 252 ng/m³ (0.1 ppb) in 2017 to 120 ng/m³ (0.027 ppb) in 2018. The annual average concentration of chloropicrin showed a very slight increase from 164 ng/m³ (0.0 ppb) in 2017 to 180 ng/m³ (0.026 ppb) in 2018. The annual average concentration of MITC increased from 7 ng/m³ (0.0 ppb) in 2017 to 15 ng/m³ (0.005 ppb) in 2018.

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

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

* These values include both trace and quantifiable detections.

Table 5. Highest 24-hour concentrations for pesticides with at least one detectable concentration by year (2017-2018) in Chualar, California.

Chemical	2017	2018
1,3-dichloropropene	0.4 ppb (1,996 ng/m³)	0.1 ppb (460 ng/m³)
Acephate	ND	Trace
Bensulide	Trace	Trace
Chloropicrin	0.1 ppb (805 ng/m³)	0.1 ppb (780 ng/m³)
Chlorothalonil	Trace	Trace
Chlorthal-dimethyl	0.0 ppb (22 ng/m³)	0.003 ppb (39 ng/m³)
DDVP	Trace	Trace
Diuron	Trace	ND

Endosulfan	ND	Trace
Malathion	Trace	0.0007 ppb (9.5 ng/m³)
Malathion OA	Trace	Trace
MITC	0.0 ppb (92 ng/m³)	0.11 ppb (340 ng/m³)
Norflurazon	Trace	ND
Oryzalin	Trace	ND
Permethrin	Trace	Trace
Simazine	Trace	ND

Table 6. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2017-2018) in Chualar, California.

Chemical	2017	2018
1,3-dichloropropene (13-wk)	0.1 ppb (398 ng/m³)	0.081 ppb (370 ng/m³)
Acephate	ND	Trace
Bensulide	Trace	Trace
Chloropicrin (13-wk)	0.0 ppb (322 ng/m³)	0.055 ppb (370 ng/m³)
Chlorothalonil	Trace	Trace
Chlorthal-dimethyl	0.0 ppb (16 ng/m³)	0.002 ppb (25 ng/m³)
DDVP	Trace	Trace
Diuron	Trace	ND
Endosulfan	ND	Trace
Malathion	Trace	0.0004 ppb (5.2 ng/m³)
Malathion OA	Trace	Trace
MITC	0.0 ppb (31 ng/m³)	0.034 ppb (101 ng/m³)
Norflurazon	Trace	ND
Oryzalin	Trace	ND
Permethrin	Trace	Trace
Simazine	Trace	ND

Table 7. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration by year (2017-2018) in Chualar, California.

Chemical	2017	2018
1,3-dichloropropene	0.1 ppb (252 ng/m³)	0.027 ppb (120 ng/m³)

Acephate	ND	Trace
Bensulide	Trace	Trace
Chloropicrin	0.0 ppb (164 ng/m³)	0.026 ppb (180 ng/m³)
Chlorothalonil	Trace	Trace
Chlorthal-dimethyl	0.0 ppb (8 ng/m³)	0.0005 ppb (7.1 ng/m³)
DDVP	Trace	Trace
Diuron	Trace	ND
Endosulfan	ND	Trace
Malathion	Trace	0.00009 ppb (1.2 ng/m³)
Malathion OA	Trace	Trace
MITC	0.0 ppb (7 ng/m³)	0.005 ppb (15 ng/m³)
Norflurazon	Trace	ND
Oryzalin	Trace	ND
Permethrin	Trace	Trace
Simazine	Trace	ND

Historic Air Concentrations in Santa Maria

Summarized results for the two years of AMN monitoring are shown in Tables 8, 9, 10, and 11.

Table 8 shows that percentage of analyses during that year which resulted in either a trace or quantifiable detection. Changes between these two years include an increase in the number of detections of MITC, while detections of other analytes were generally observed to have decreased from 2017 to 2018.

Table 9 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Santa Maria. The highest observed 24-h concentration of MITC increased from 457 ng/m³ (0.2 ppb) in 2017 to 1,300 ng/m³ (0.42 ppb) in 2018. Other 24-h concentrations at Santa Maria were relatively consistent between 2017 and 2018.

Table 10 shows the highest observed rolling 4- or 13- week average concentrations for any chemical with a positive detection at Santa Maria. The highest observed rolling 13-wk average concentration of 1,3-D decreased from 1,152 ng/m³ (0.3 ppb) in 2017 to 440 ng/m³ (0.097 ppb) in 2018. The highest observed rolling 4-wk average concentration of MITC increased from 140 ng/m³ (0.0 ppb) in 2017 to 320 ng/m³ (0.11 ppb) in 2018.

Table 11 shows the annual average concentrations for any chemical with a positive detection during any year of monitoring at Santa Maria. The annual average concentration of 1,3-D decreased from 366 ng/m³ (0.1 ppb) in 2017 o 280 ng/m³ (0.062 ppb) in 2018. The annual average concentration of MITC increased from 23 ng/m³ (0.0 ppb) in 2017 to 37 ng/m³ (0.012 ppb) in 2018.

Table 8. Percentage of analyses performed resulting in a detection at Santa Maria, by year.

Chemical	2017	2018
1,3-dichloropropene	13%	6%
Chloropicrin	21%	17%
Chlorothalonil	10%	8%
Chlorpyrifos	0%	4%
Chlorthal-dimethyl	40%	39%
DDVP	23%	16%
Diazinon OA	0%	2%
Diuron	0%	2%
Endosulfan	0%	4%
Iprodione	0%	2%
Malathion	60%	59%
Malathion OA	69%	63%
MITC	33%	50%
Simazine	0%	2%
Trifluralin	33%	22%

* These values include both trace and quantifiable detections.

Table 9. Highest 24-hour concentrations for pesticides with at least one detectable concentration by year (2017-2018) in Santa Maria, California.

Chemical	2017	2018
1,3-dichloropropene	0.5 ppb (2,450 ng/m^3)	0.48 ppb (2,200 ng/m^3)
Chloropicrin	0.5 ppb (3,095 ng/m^3)	0.46 ppb (3,100 ng/m^3)
Chlorothalonil	Trace	Trace
Chlorpyrifos	ND	Trace
Chlorthal-dimethyl	Trace	Trace
DDVP	Trace	Trace
Diazinon OA	ND	Trace
Diuron	ND	Trace
Endosulfan	ND	Trace
Malathion	0.0 ppb (15 ng/m^3)	0.0007 ppb (9.8 ng/m^3)
Malathion OA	Trace	Trace
MITC	0.2 ppb (457 ng/m^3)	0.42 ppb (1,300 ng/m^3)
Simazine	ND	Trace
Trifluralin	Trace	Trace

Table 10. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2017-2018) in Santa Maria, California.

Chemical	2017	2018
1,3-dichloropropene (13-wk)	0.3 ppb (1,152 ng/m³)	0.097 ppb (440 ng/m³)
Chloropicrin (13-wk)	0.1 ppb (849 ng/m³)	0.11 ppb (750 ng/m³)
Chlorothalonil	Trace	Trace
Chlorpyrifos	ND	Trace
Chlorthal-dimethyl	Trace	Trace
DDVP	Trace	Trace
Diazinon OA	ND	Trace
Diuron	ND	Trace
Endosulfan	ND	Trace
Malathion	0.0 ppb (12 ng/m³)	0.0005 ppb (6.4 ng/m³)
Malathion OA	Trace	Trace
MITC	0.0 ppb (140 ng/m³)	0.11 ppb (320 ng/m³)
Simazine	ND	Trace
Trifluralin	Trace	Trace

Table 11. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration by year (2017-2018) in Santa Maria, California.

Chemical	2017	2018
1,3-dichloropropene	0.1 ppb (366 ng/m³)	0.062 ppb (280 ng/m³)
Chloropicrin	0.0 ppb (317 ng/m³)	0.041 ppb (280 ng/m³)
Chlorothalonil	Trace	Trace
Chlorpyrifos	ND	Trace
Chlorthal-dimethyl	Trace	Trace
DDVP	Trace	Trace
Diazinon OA	ND	Trace
Diuron	ND	Trace
Endosulfan	ND	Trace
Malathion	0.0 ppb (5 ng/m³)	0.0003 ppb (3.5 ng/m³)
Malathion OA	Trace	Trace
MITC	0.0 ppb (23 ng/m³)	0.012 ppb (37 ng/m³)
Simazine	ND	Trace
Trifluralin	Trace	Trace

Historic Air Concentrations in Shafter

Shafter is one of the original AMN monitoring locations with available pesticide concentration air monitoring data going back to February of 2011. Summarized results for monitoring data from Shafter are presented in Tables 12, 13, 14, and 15.

Table 12 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection. Patterns in the percentage of positive detections generally held across all chemicals monitored for the duration of monitoring at Shafter. Chlorpyrifos and its oxon produced a slightly lower number of positive detections than the average of previous years while MITC was detected more often in 2018 than in any previous year. Chloropicrin has not been detected at Shafter during any year of AMN monitoring.

Table 13 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Shafter. The highest observed 24-h concentration (230,000 ng/m³, 50 ppb) of 1,3-D in 2018 was larger than that observed in any previous year of monitoring at that location. The highest observed 24-h concentration of MITC in 2018 (3,700 ng/m³, 1.2 ppb) was also the highest observed in any year of monitoring at that location.

Table 14 shows the highest observed rolling 4- or 13-week average concentrations for any chemical with a positive detection during any year of monitoring at Shafter. The highest observed rolling 13-wk average concentration (25,000 ng/m³, 5.6 ppb) of 1,3-D in 2018 was larger than that observed in any previous year of monitoring at that location. The highest observed rolling 4-wk average concentration of MITC in 2018 (1,500 ng/m³, 0.5 ppb) was also the highest observed in any year of monitoring at that location.

Table 15 shows the annual average concentrations for any chemical with a positive detection during any year of monitoring at Shafter. The annual average concentration (6,900 ng/m³, 1.5 ppb) of 1,3-D in 2018 was larger than that observed in any previous year of monitoring at Shafter. The annual average concentration (170 ng/m³, 0.058 ppb) of MITC was also the highest observed in any year of monitoring at that location.

Table 12. Percentage of analyses performed resulting in a detection at Shafter, by year.

Chemical	2011	2012	2013	2014	2015	2016	2017	2018
1,3-dichloropropene	ND	6%	26%	37%	42%	50%	48%	38%
Acephate	ND	2%	ND	ND	ND	ND	2%	ND
Acrolein †	60%	--	--	--	--	--	--	--
Bensulide	2%	ND	ND	ND	ND	ND	ND	4%
Carbon Disulfide †	ND	ND	15%	50%	90%	92%	--	--
Chlorothalonil	13%	23%	60%	13%	75%	62%	69%	64%
Chlorpyrifos	53%	48%	75%	56%	61%	29%	48%	30%
Chlorpyrifos OA	45%	48%	55%	62%	53%	50%	58%	25%
Chlorthal-dimethyl	15%	ND	8%	ND	2%	15%	10%	4%
DDVP	2%	ND	6%	2%	8%	2%	2%	8%
Diazinon	11%	4%	6%	ND	ND	ND	4%	ND
Diazinon OA	4%	8%	8%	ND	ND	2%	2%	2%
Diuron	6%	12%	2%	10%	10%	ND	4%	4%

EPTC	17%	4%	9%	12%	10%	6%	10%	6%
Iprodione	2%	4%	4%	6%	8%	8%	6%	2%
Malathion	ND	2%	4%	2%	ND	ND	6%	ND
Malathion OA	6%	10%	9%	6%	6%	ND	4%	2%
Methyl bromide	9%	4%	4%	15%	13%	8%	ND	13%
Metolachlor	ND	ND	ND	ND	ND	ND	10%	ND
MITC	40%	56%	57%	42%	35%	42%	62%	83%
Norflurazon	2%	ND	ND	ND	2%	ND	2%	ND
Oryzalin	2%	2%	2%	2%	6%	ND	8%	2%
Oxyfluorfen	ND	ND	ND	ND	ND	ND	6%	9%
Permethrin	2%	ND	2%	ND	ND	ND	ND	ND
Propargite	2%	ND	11%	ND	ND	ND	2%	ND
Simazine	4%	12%	ND	4%	4%	6%	6%	6%
Trifluralin	9%	6%	4%	4%	8%	ND	2%	2%

* These values include both trace and quantifiable detections.

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

Table 13. Highest 24-hour concentrations for pesticides with at least one detectable concentration by year (2011-2018) in Shafter, California.

Chemical	2011	2012	2013	2014	2015	2016	2017	2018
1,3-dichloropropene	ND	0.8 ppb (3,643 ng/m³)	8.8 ppb (39,969 ng/m³)	2 ppb (9,251 ng/m³)	2.1 ppb (9,713 ng/m³)	10.0 ppb (45,323 ng/m³)	0.7 ppb (3,394 ng/m³)	50 ppb (230,000 ng/m³)
Acephate	ND	Trace	ND	ND	ND	ND	Trace	ND
Acrolein†	1.2 ppb (2,796 ng/m³)	-	-	-	-	-	-	-
Bensulide	Trace	ND	ND	ND	ND	ND	ND	Trace
Carbon Disulfide†	ND	ND	0.3 ppb (897 ng/m³)	0.2 ppb (548 ng/m³)	0.3 ppb (812 ng/m³)	0.3 ppb (946 ng/m³)	-	-
Chlorothalonil	Trace	Trace	0.0 ppb (80 ng/m³)	0.0 ppb (118 ng/m³)	0.0 ppb (39 ng/m³)	0.0 ppb (58 ng/m³)	0.0 ppb (55 ng/m³)	0.005 ppb (50 ng/m³)
Chlorpyrifos	0.0 ppb (27 ng/m³)	0.0 ppb (131 ng/m³)	0.0 ppb (423 ng/m³)	0.0 ppb (338 ng/m³)	0.0 ppb (78 ng/m³)	0.0 ppb (52 ng/m³)	0.0 ppb (138 ng/m³)	0.004 ppb (50 ng/m³)
Chlorpyrifos OA	0.0 ppb (9 ng/m³)	0.0 ppb (17 ng/m³)	0.0 ppb (143 ng/m³)	0.0 ppb (110 ng/m³)	0.0 ppb (13 ng/m³)	Trace	0.0 ppb (59 ng/m³)	Trace
Chlorthal-dimethyl	Trace	ND	Trace	ND	Trace	Trace	Trace	Trace

DDVP	Trace	ND	Trace	Trace	Trace	0.0 ppb (49 ng/m³)	0.0 ppb (65 ng/m³)	Trace
Diazinon	0.0 ppb (60 ng/m³)	Trace	0.0 ppb (29 ng/m³)	ND	ND	ND	Trace	ND
Diazinon OA	0.0 ppb (36 ng/m³)	0.0 ppb (10 ng/m³)	Trace	ND	ND	Trace	Trace	Trace
Diuron	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace
EPTC	0.0 ppb (187 ng/m³)	0.0 ppb (18 ng/m³)	0.0 ppb (250 ng/m³)	0.0 ppb (216 ng/m³)	0.0 ppb (29 ng/m³)	0.0 ppb (27 ng/m³)	0.0 ppb (12 ng/m³)	Trace
Iprodione	Trace	Trace	Trace	Trace	Trace	0.0 ppb (17 ng/m³)	Trace	Trace
Malathion	ND	Trace	Trace	Trace	ND	ND	0.0 ppb (15 ng/m³)	ND
Malathion OA	Trace	0.0 ppb (11 ng/m³)	Trace	Trace	Trace	ND	Trace	Trace
Methyl bromide	0.8 ppb (2,934 ng/m³)	0.6 ppb (2,135 ng/m³)	0.1 ppb (209 ng/m³)	0.2 ppb (963 ng/m³)	0.1 ppb (283 ng/m³)	0.0 ppb (113 ng/m³)	ND	0.097 ppb (380 ng/m³)
Metolachlor	ND	ND	ND	ND	ND	ND	Trace	ND
MITC	0.3 ppb (930 ng/m³)	0.1 ppb (347 ng/m³)	0.3 ppb (762 ng/m³)	0.0 ppb (113 ng/m³)	0.1 ppb (232 ng/m³)	0.0 ppb (109 ng/m³)	0.1 ppb (382 ng/m³)	1.2 ppb (3,700 ng/m³)
Norflurazon	Trace	ND	ND	ND	Trace	ND	Trace	ND
Oryzalin	Trace	Trace	Trace	Trace	0.0 ppb (62 ng/m³)	ND	Trace	Trace
Oxyfluorfen	ND	ND	ND	ND	ND	ND	Trace	Trace
Permethrin	Trace	ND	Trace	ND	ND	ND	ND	ND
Propargite	Trace	ND	Trace	ND	ND	ND	Trace	ND
Simazine	Trace	Trace	ND	Trace	Trace	Trace	Trace	Trace
Trifluralin	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace

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

Table 14. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2011-2018) in Shafter, California.

Chemical	2011	2012	2013	2014	2015	2016	2017	2018

1,3-dichloropropene (13-wk)	ND	0.1 ppb (594 ng/m³)	2 ppb (9,190 ng/m³)	2.2 ppb (10,119 ng/m³)	0.5 ppb (2,176 ng/m³)	1 ppb (4,678 ng/m³)	1.1 ppb (4,812 ng/m³)	5.6 ppb (25,000 ng/m³)
Acephate	ND	Trace	ND	ND	ND	ND	Trace	Trace
Bensulide	Trace	ND	ND	ND	ND	ND	ND	ND
Chlorothalonil	Trace	Trace	0.0 ppb (38 ng/m³)	Trace	0.0 ppb (25 ng/m³)	0.0 ppb (24 ng/m³)	0.0 ppb (38 ng/m³)	0.003 ppb (35 ng/m³)
Chlorpyrifos	0.0 ppb (15 ng/m³)	0.0 ppb (46 ng/m³)	0.0 ppb (113 ng/m³)	0.0 ppb (92 ng/m³)	0.0 ppb (60 ng/m³)	0.0 ppb (39 ng/m³)	0.0 ppb (51 ng/m³)	0.002 ppb (22 ng/m³)
Chlorpyrifos OA	0.0 ppb (7 ng/m³)	0.0 ppb (13 ng/m³)	0.0 ppb (44 ng/m³)	0.0 ppb (32 ng/m³)	0.0 ppb (9 ng/m³)	Trace	0.0 ppb (19 ng/m³)	Trace
Chlorthal-dimethyl	Trace	ND	Trace	ND	Trace	Trace	Trace	Trace
DDVP	Trace	ND	Trace	Trace	Trace	0.0 ppb (13 ng/m³)	0.0 ppb (17 ng/m³)	Trace
Diazinon	0.0 ppb (18 ng/m³)	Trace	0.0 ppb (10 ng/m³)	ND	ND	ND	Trace	ND
Diazinon OA	0.0 ppb (11 ng/m³)	Trace	ND	ND	ND	Trace	Trace	Trace
Diuron	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace
EPTC	0.0 ppb (76 ng/m³)	Trace	0.0 ppb (139 ng/m³)	0.0 ppb (86 ng/m³)	0.0 ppb (19 ng/m³)	0.0 ppb (10 ng/m³)	0.0 ppb (9 ng/m³)	Trace
Iprodione	Trace	Trace	Trace	Trace	Trace	0.0 ppb (10 ng/m³)	Trace	Trace
Malathion	ND	Trace	Trace	Trace	ND	ND	0.0 ppb (5 ng/m³)	ND
Malathion OA	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace
Methyl bromide	0.4 ppb (1,403 ng/m³)	0.2 ppb (683 ng/m³)	0.1 ppb (198 ng/m³)	0.1 ppb (389 ng/m³)	0.0 ppb (186 ng/m³)	0.0 ppb (81 ng/m³)	ND	0.004 ppb (160 ng/m³)
Metolachlor	ND	ND	ND	ND	ND	ND	Trace	ND
MITC	0.2 ppb (564 ng/m³)	0.1 ppb (177 ng/m³)	0.1 ppb (319 ng/m³)	0.0 ppb (74 ng/m³)	0.1 ppb (156 ng/m³)	0.0 ppb (51 ng/m³)	0.1 ppb (236 ng/m³)	0.5 ppb (1,500 ng/m³)
Norflurazon	Trace	ND	ND	ND	Trace	ND	Trace	ND

Oryzalin	Trace	Trace	Trace	Trace	0.0 ppb (16 ng/m³)	ND	Trace	Trace
Oxyfluorfen	ND	ND	ND	ND	ND	ND	Trace	Trace
Permethrin	Trace	ND	Trace	ND	ND	ND	ND	ND
Propargite	Trace	ND	Trace	ND	ND	ND	Trace	ND
Simazine	Trace	Trace	ND	Trace	Trace	Trace	Trace	Trace
Trifluralin	ND	ND	ND	ND	ND	ND	Trace	Trace

Table 15. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration by year (2011-2018) in Shafter, California.

Chemical	2011	2012	2013	2014	2015	2016	2017	2018
1,3-dichloropropene	ND	0.1 ppb (453 ng/m³)	0.6 ppb (2,589 ng/m³)	0.2 ppb (909 ng/m³)	0.2 ppb (800 ng/m³)	0.3 ppb (1,559 ng/m³)	0.1 ppb (486 ng/m³)	1.5 ppb (6,900 ng/m³)
Acephate	ND	Trace	ND	ND	ND	ND	Trace	Trace
Bensulide	Trace	ND	ND	ND	ND	ND	ND	ND
Chlorothalonil	Trace	Trace	0.0 ppb (16 ng/m³)	0.0 ppb (22 ng/m³)	Trace	0.0 ppb (15 ng/m³)	0.0 ppb (16 ng/m³)	0.0009 ppb (10 ng/m³)
Chlorpyrifos	Trace	Trace	0.0 ppb (20 ng/m³)	0.0 ppb (16 ng/m³)	Trace	0.0 ppb (8 ng/m³)	0.0 ppb (11 ng/m³)	0.0004 ppb (5.3 ng/m³)
Chlorpyrifos OA	Trace	Trace	0.0 ppb (8 ng/m³)	0.0 ppb (7 ng/m³)	Trace	Trace	0.0 ppb (6 ng/m³)	Trace
Chlorthal-dimethyl	Trace	ND	Trace	ND	Trace	Trace	Trace	Trace
DDVP	Trace	ND	Trace	Trace	Trace	0.0 ppb (3 ng/m³)	0.0 ppb (3 ng/m³)	Trace
Diazinon	Trace	Trace	Trace	ND	ND	ND	Trace	ND
Diazinon OA	Trace	Trace	ND	ND	ND	Trace	Trace	Trace
Diuron	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace
EPTC	Trace	Trace	Trace	Trace	Trace	0.0 ppb (2 ng/m³)	0.0 ppb (2 ng/m³)	Trace
Iprodione	Trace	Trace	Trace	Trace	Trace	0.0 ppb (2 ng/m³)	Trace	Trace

Malathion	ND	Trace	Trace	Trace	ND	ND	0.0 ppb (2 ng/m³)	ND
Malathion OA	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace
Methyl bromide	0.1 ppb (425 ng/m³)	0.1 ppb (247 ng/m³)	0.0 ppb (163 ng/m³)	0.0 ppb (70 ng/m³)	0.0 ppb (40 ng/m³)	0.0 ppb (26 ng/m³)	ND	0.018 ppb (71 ng/m³)
Metolachlor	ND	ND	ND	ND	ND	ND	Trace	ND
MITC	0.0 ppb (73 ng/m³)	0.0 ppb (51 ng/m³)	0.0 ppb (66 ng/m³)	0.0 ppb (21 ng/m³)	0.0 ppb (27 ng/m³)	0.0 ppb (17 ng/m³)	0.0 ppb (51 ng/m³)	0.058 ppb (170 ng/m³)
Norflurazon	Trace	ND	ND	ND	Trace	ND	Trace	ND
Oryzalin	Trace	Trace	Trace	Trace	Trace	ND	Trace	Trace
Oxyfluorfen	ND	ND	ND	ND	ND	ND	Trace	Trace
Permethrin	Trace	ND	Trace	ND	ND	ND	ND	ND
Propargite	Trace	ND	Trace	ND	ND	ND	Trace	ND
Simazine	Trace	Trace	ND	Trace	Trace	Trace	Trace	Trace
Trifluralin	ND	ND	ND	ND	ND	ND	Trace	Trace

Historic Air Concentrations in Watsonville

Summarized results for AMN monitoring at Watsonville are presented in Tables 16, 17, 18, and 19.

Table 16 shows the percentage of analyses during that year which resulted in either a trace or quantifiable detection. Changes between these two years include a decrease in the number of detections of 1,3-D and an increase in the number of detections of MITC.

Table 17 shows the highest observed 24-h concentration for any chemical with a positive detection during any year of monitoring at Watsonville. The highest observed 24-h concentration of 1,3-D decreased from 1,860 ng/m³ (0.4 ppb) in 2017 to 1,200 ng/m³ (0.27 ppb) in 2018. The highest observed 24-h concentration of chloropicrin decreased from 3,221 ng/m³ (0.5 ppb) in 2017 to 780 ng/m³ (0.12 ppb) in 2018. The highest observed 24-h concentration of MITC increased from 56 ng/m³ (0.0 ppb) in 2017 to 120 ng/m³ (0.042 ppb) in 2018.

Table 18 shows the highest observed rolling 4- or 13-wk average concentration for any chemical with a positive detection during any year of monitoring at Watsonville. The highest observed rolling 13-wk average concentration of 1,3-D decreased from 904 ng/m³ (0.2 ppb) in 2017 to 430 ng/m³ (0.094 ppb) in 2018. The highest observed rolling 13-wk average concentration of chloropicrin decreased from 974 ng/m³ (0.1 ppb) in 2017 to 480 ng/m³ (0.071 ppb) in 2018. The highest observed rolling 4-wk average concentration of MITC increased from 19 ng/m³ (0.0 ppb) in 2017 to 44 ng/m³ (0.015 ppb) in 2018.

Table 19 shows the annual average concentrations for any chemical with a positive detection during any year of monitoring at Watsonville. The annual average concentration of 1,3-D decreased from 397 ng/m³ (0.1 ppb) in 2017 to 210 ng/m³ (0.046 ppb) in 2018. The annual average concentration of

chloropicrin decreased from 347 ng/m³ (0.1 ppb) in 2017 to 200 ng/m³ (0.03 ppb) in 2018. The annual average concentration of MITC increased from 6 ng/m³ (0.0 ppb) in 2017 to 15 ng/m³ (0.005 ppb) in 2018.

Table 16. Percentage of analyses performed resulting in a detection at Watsonville, by year.

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

* These values include both trace and quantifiable detections.

Table 17. Highest 24-hour concentrations for pesticides with at least one detectable concentration by year (2017-2018) in Watsonville, California.

Chemical	2017	2018
1,3-dichloropropene	0.4 ppb (1,860 ng/m³)	0.27 ppb (1,200 ng/m³)
Chloropicrin	0.5 ppb (3,221 ng/m³)	0.12 ppb (780 ng/m³)
Chlorothalonil	Trace	ND
Chlorpyrifos	Trace	ND
Chlorthal-dimethyl	Trace	Trace
DDVP	Trace	Trace
Diuron	Trace	ND
Endosulfan	Trace	ND
Malathion	Trace	Trace
Malathion OA	Trace	Trace
Metolachlor	Trace	ND
MITC	0.0 ppb (56 ng/m³)	0.042 ppb (120 ng/m³)

Norflurazon	Trace	ND
Oryzalin	Trace	ND
pp-Dicofol	Trace	ND
Simazine	Trace	ND
Trifluralin	Trace	Trace

Table 18. Highest rolling 4-week average concentrations for pesticides with at least one detectable concentration by year (2017-2018) in Watsonville, California.

Chemical	2017	2018
1,3-dichloropropene (13-wk)	0.2 ppb (904 ng/m³)	0.094 ppb (430 ng/m³)
Chloropicrin (13-wk)	0.1 ppb (974 ng/m³)	0.071 ppb (480 ng/m³)
Chlorothalonil	Trace	ND
Chlorpyrifos	Trace	ND
Chlorthal-dimethyl	Trace	Trace
DDVP	Trace	Trace
Diuron	Trace	ND
Endosulfan	Trace	ND
Malathion	Trace	Trace
Malathion OA	Trace	Trace
Metolachlor	Trace	ND
MITC	0.0 ppb (19 ng/m³)	0.015 ppb (44 ng/m³)
Norflurazon	Trace	ND
Oryzalin	Trace	ND
pp-Dicofol	Trace	ND
Simazine	Trace	ND
Trifluralin	Trace	Trace

Table 19. Comparison of the 1-year average concentration for pesticides with at least one detectable concentration by year (2017-2018) in Watsonville, California.

Chemical	2017	2018
1,3-dichloropropene	0.1 ppb (397 ng/m³)	0.046 ppb (210 ng/m³)
Chloropicrin	0.1 ppb (347 ng/m³)	0.03 ppb (200 ng/m³)
Chlorothalonil	Trace	ND
Chlorpyrifos	Trace	ND
Chlorthal-dimethyl	Trace	Trace
DDVP	Trace	Trace
Diuron	Trace	ND
Endosulfan	Trace	ND
Malathion	Trace	Trace

Malathion OA	Trace	Trace
Metolachlor	Trace	ND
MITC	0.0 ppb (6 ng/m³)	0.005 ppb (15 ng/m³)
Norflurazon	Trace	ND
Oryzalin	Trace	ND
pp-Dicofol	Trace	ND
Simazine	Trace	ND
Trifluralin	Trace	Trace

Appendix M: Comparison to Other Studies

Additional Monitoring of Toxic Air Contaminants

As part of DPR's TAC monitoring program, both DPR and CARB monitor ambient air for a variety of pesticides, specifically in counties with the highest reported use for that particular pesticide and during the season of its highest reported use. Previous TAC monitoring performed by CARB include results for 15 of the pesticides monitored in the AMN: 1,3-D, chlorpyrifos, chlorpyrifos OA, chlorothalonil, diazinon, endosulfan, EPTC, malathion, malathion OA, MITC, MeBr, permethrin, propargite, simazine, and DEF which are listed in Table 1. In general, the concentrations detected by the AMN in 2018 were lower than those of these previous studies. The exception to this is the concentration of 228,936 ng/m^3 detected in Shafter in 2018.

Table 1. Highest 24-h concentrations of pesticides monitored by the AMN in 2018 compared to previous DRP and CARB monitoring studies in California.

Chemical	County, Year (Other Study)	Concentration (ng/m^3) (Other Study)	Community (AMN, 2018)	Concentration (ng/m^3) (AMN, 2018)
1,3-dichloropropene	Kern, 2000	135,000	Shafter	228,936
Chlorothalonil	Fresno, 2002	14	Shafter	50
Chlorpyrifos	Tulare, 1996	815	Shafter	50
Chlorpyrifos OA	Tulare, 1996	230	Lindsay	14
Diazinon	Fresno, 1997	290	*all sites*	ND
Endosulfan	Fresno, 1996	140	*multiple*	Trace
EPTC	Imperial, 1996	240	Shafter	Trace
Malathion	Imperial, 1998	90	Santa Maria	10
Malathion OA	Imperial, 1998	28	*multiple*	Trace
Methyl bromide	Santa Cruz, 2001	142,000	Shafter	376
MITC	Kern, 1993	18,000	Shafter	3,726
Permethrin	Monterey, 1997	Trace	Chualar	Trace
Propargite	Fresno, 1999	1,300	*multiple*	Trace
Simazine	Fresno, 1998	18	*multiple*	Trace
DEF	Fresno, 1987	340	*all sites*	ND