DRAFT 1/15/99

To: Lompoc Interagency Work Group

From: Douglas Y. Okumura, Acting Assistant Director

Date: January 15, 1999

Subject: MONITORING PESTICIDE AIR CONCENTRATIONS IN LOMPOC, STAGE ONE, PRELIMINARY RESULTS

The enclosed document contains all the available draft preliminary data from the air monitoring conducted in Lompoc last summer. This includes air monitoring results, meteorological measurements, pesticide use reports, and quality control analyses. This document only contains very preliminary data. Much of this data has not been checked or verified. In addition, several important elements such as methyl bromide results, quality assurance audit report, data analysis, and conclusions have not been completed. These elements will be contained in the final report.

CONFIDENTIALITY REQUIREMENTS

This draft summary is intended only for the members of the Lompoc Interagency Work Group. These results have not been interpreted relative to other factors that may be of air quality concern in the Lompoc area and cannot be released to any person outside the group as explained below.

Senate Bill 661 provides partial funding for this pesticide monitoring project. A letter from the Senate Environmental Quality Committee to the Honorable John Burton, President Pro Tempore of the Senate, was entered into the Senate Journal as an official declaration of the Committee's intent in passing Senate Bill 661. This letter includes the following:

> "It is the intent of the Committee that any study regarding pesticides in the Lompoc area should be released by the Department of Pesticide Regulation, and other agency or department of the state, any vendor of the state or private entity contracted by the state to conduct or analyze studies, or any member of the Lompoc Interagency Work Group, only

when its findings can be interpreted appropriately relative to other factors that may be of air quality concern in the Lompoc area."

The Department of Pesticide Regulation (DPR) would regard, and are convinced that Legislators will as well, any subsequent release of this information to be a breach of good faith with the express intent of the Committee in its action to authorize project funding. Since the Legislature, and the Senate Environmental Quality Committee in particular, may hold the key to funding the completion of this and other Lompoc projects, such a breach could have serious repercussions.

DESCRIPTION OF METHODOLOGY

DPR selected 12 specific pesticides for study in stage one: alachlor, chlorothalonil, chlorpyrifos, diazinon, dimethoate, disulfoton, fenamiphos, fonofos, methyl bromide, methyl isothiocyanate (metam-sodium breakdown product), oxydemeton-methyl, and permethrin. Ten of the specific pesticides (all pesticides except methyl isothiocyanate and methyl bromide were sampled by the Air Resources Board (ARB) and analyzed by the University of California, Davis. Methyl isothiocyanate and methyl bromide were sampled by ARB and analyzed by the University of Nevada, Reno. In addition, several metals were monitored because they are contained in the pesticides mancozeb, maneb, and fosetyl-Al. These samples were collected and analyzed by ARB.

ARB established five monitoring sites in Lompoc: one in the northwest corner of town, one on the west side of town, one in the southwest corner of town, one in the central area of town, and one in the northeast corner of town. Metals monitoring was conducted at the southwest and central sites, plus an additional site on the east side of town.

ARB initiated monitoring on August 17, 1998 and completed monitoring on September 14, 1998. For all pesticides except methyl bromide, methyl isothiocyanate, metals, ARB sampled five random days each week. Methyl bromide samples were collected on four random days during the last two weeks of monitoring. Methyl isothiocyanate samples were collected for five consecutive days coinciding with a metam-sodium application in the Lompoc area. Metal samples were collected two days per week for three weeks.

The University of California, Davis performed the analyses for the semi-volatile pesticides alachlor, chlorothalonil, chlorpyrifos, diazinon, dimethoate, disulfoton, fenamiphos, fonofos, oxydemeton-methyl, permethrin, as well as some breakdown products described below. The pesticides trapped in the XAD-4 sample cartridges were extracted using the solvent ethyl acetate. The initial extract was split into three portions. One portion was analyzed for chlorpyrifos, diazinon, dimethoate, and fonofos using a gas chromatograph equipped with a flame photometric detector. A second portion of the extract was oxidized, reextracted, and analyzed for disulfoton, fenamiphos, and oxydemeton-methyl using a gas chromatograph equipped with a flame photometric detector. A third portion of the extract was analyzed for alachlor, chlorothalonil, and permethrin using a gas chromatograph equipped with a mass selective detector. A flame photometric detector generally has a lower detection limit than a mass selective detector. However, a mass selective detector provides unequivocal identification of a chemical, while the flame photometric detector does not. Samples with detectable amounts of pesticides using the flame photometric detector were confirmed with the mass selective detector whenever possible (i.e. sample confirmed if the amount detected was greater than the detection limit of the mass selective detector).

Many organophosphorous pesticides have oxygen analog breakdown products (an oxygen atom replaces a sulfur atom in the molecule). In general, the oxygen analogs are more toxic than the parent compounds. The laboratory analyzed for the oxygen analogs of chlorpyrifos, diazinon, dimethoate, disulfoton, and fonofos.

The University of Nevada, Reno analyzed for the volatile pesticides methyl bromide and methyl isothiocyanate (metam-sodium breakdown product). For methyl bromide, the charcoal samples were placed into headspace vials with benzyl alcohol. The vials were sealed and heated. A portion of the headspace was withdrawn and injected into a gas chromatograph equipped with an electron capture detector. For methyl isothiocyanate, the charcoal samples were extracted with a mixture of carbon disulfide and ethyl acetate. The extract was filtered and analyzed with a gas chromatograph equipped with a thermionic specific detector.

ARB analyzed for metals, including manganese in the metal-containing pesticides maneb and mancozeb, and aluminum in the metal-containing pesticide fosetyl-Al.

The filter samples were analyzed by placing them in a vacuum and irradiating with X-rays. This X-ray fluorescence method detected other metals and elements including: antimony, arsenic, barium, bromine, calcium, chlorine, chromium, cobalt, copper, iron, lead, mercury, molybdenum, nickel, potassium, rubidium, selenium, silicon, strontium, sulfur, tin, titanium, uranium, vanadium, yttrium, zinc, and zirconium.

Two meteorological stations were set up specifically for this study, in addition to the existing station operated by the Santa Barbara County Air Pollution Control District. DPR set up one station in the agricultural area west of Lompoc for the duration of the monitoring. This station recorded wind speed, wind direction, air temperature, and relative humidity at a height of approximately six meters every five minutes. Air temperature was also recorded at a height of approximately two meters. AeroVironment, Inc. operated a second station, consisting of a mini-SODAR® system to measure the atmospheric mixing height (inversion height). This system recorded horizontal wind speed, vertical wind speed, and horizontal wind direction. The wind parameters were measured at five meter increments starting at an altitude of 15 meters to approximately 200 meters. Data was recorded at the maximum rate of the system, approximately every four seconds. These data provide general trends in wind speeds at different altitudes, and most importantly the mixing height.

By law, all agricultural pesticide applications in California must be reported to the county department of agriculture. These pesticide use reports contain information regarding the pesticide(s) applied, the application rate, the number of acres treated, the crop treated, the date treated, the location of the site treated, the person making the application, the method of application, and other information. The Santa Barbara County Department of Agriculture expedited processing of all pesticide use reports for the Lompoc area and sent this information to DPR so that it could be compared to the monitoring results.

MONITORING RESULTS

For the purposes of this study, there are four categories of results. Samples reported as "none detected" contained no detectable amount of pesticide using the methods described above. Samples reported as "possibly detected" contained a detectable amount of chemical using the flame photometric detector described above, but the amount was too low to unequivocally confirm with the mass selective detector. Samples reported as "trace" contained a detectable amount of chemical unequivocally identified with the mass selective detector, but the amount was too low to quantify. Samples reported with a concentration value contained the amount of chemical indicated and was unequivocally confirmed with the mass selective detector.

Results of each pesticide sample are shown in Tables 1 and 2. Of the 12 specific pesticides selected for monitoring, three were unequivocally identified and quantified in at least one sample: chorpyrifos, diazinon, and methyl isothiocyanate. Two pesticides were unequivocally identified but too low to quantify (trace): chlorothalonil and permethrin. Two pesticides were detected using flame photometric detector, but too low to confirm with mass selective detector (possibly detected): dimethoate and oxydemeton-methyl. Four pesticides were not detected: alachlor, disulfoton, fenamiphos, and fonofos. Analysis for methyl bromide has not been completed.

Other chemicals were also detected (Table 1). Of the five oxygen analog breakdown products analyzed, two were unequivocally identified and quantified in at least one sample: chlorpyrifos oxygen analog and diazinon oxygen analog. In addition, a relatively high concentration of an unknown chemical was detected in several samples. After further investigation, the laboratory unequivocally identified this chemical as cycloate.

Chlorpyrifos was detected most frequently. Of the 119 samples collected 55 were confirmed positive for chlorpyrifos (46%). All other pesticides were confirmed in less than one-quarter of the samples.

Six chemicals had samples with quantifiable concentrations: chlorpyrifos, chlorpyrifos oxygen analog, cycloate, diazinon, diazinon oxygen analog, and methyl isothiocyanate. Methyl isothiocyanate had the highest concentration of 1036

nanograms per cubic meter (ng/m^3). Cycloate had the next highest concentration of 760 ng/m^3. However, since cycloate was not one of the pesticides targeted for analysis, there is no quality control data to indicate the method performance. The accuracy and precision of the method is unknown for cycloate. Actual cycloate concentrations could be higher or lower than reported here. The highest concentrations detected for chlorpyrifos and chlorpyrifos oxygen analog were 83 and 8.5 ng/m^3, respectively. The highest concentrations detected for diazinon and diazinon oxygen analog were 18 and 5.3 ng/m^3, respectively. While the methodology gives an accurate estimate of total concentration (parent plus oxygen analog), the sampling methodology gives an erroneously high proportion of the oxygen analogs and erroneously low proportion of the parent compounds. The quality control samples incorporated into the study may give information to correct the erroneous proportions. This will be discussed in the final report.

Pesticides monitored throughout the four-week period (all pesticides except methyl isothiocyanate, methyl bromide, and metals) possibly showed spatial and temporal patterns. Pesticides were detected at all sites, but sites on the west side of Lompoc had a higher frequency of detection. Of the 320 possible detections (20 days X 16 chemicals), the three west sites had 17 to 25 detections, while the two other sites had 10 and 15 detections (Table 3). Chlorpyrifos is the only pesticide with enough samples to compare concentrations. The northwest site had the highest chlorpyrifos concentrations, with an average concentration of 14 ng/m^3. The other four sites had average chlorpyrifos concentrations ranging from 2 to 6 ng/m^3. Cycloate was the only other pesticide with an obvious spatial pattern. All six cycloate detections occurred at the northwest site.

While pesticides were detected throughout the monitoring period, the most frequent detections and highest concentrations occurred in late-August and early-September. For each day monitored, there are 80 possible detections, not including duplicate samples (5 sites X 16 chemicals). The highest percentage of detections occurred between August 29 and September 5 (10 - 17 percent on each day; Figure 1). Chlorpyrifos is the only pesticide that had quantifiable concentrations in more than 10 percent of the samples. It shows a similar pattern of concentration over time. The average chlorpyrifos concentration detected exceeded 10 ng/m^3 between August 31 and September 5 (Figure 2).

Methyl isothiocyanate (metam-sodium breakdown product) samples were collected September 9 - 14. Additional samples were also collected on August 31. Metam-sodium applications were reported for September 10 and 12. Of the 60 duplicate pairs of samples collected, 14 had detectable concentrations of methyl isothiocyanate (Table 2). Higher concentrations occurred during nighttime hours, compared to daylight hours. There were no other obvious temporal or spatial patterns.

A total of 21 samples were analyzed for 29 metals and elements, including manganese in the metal-containing pesticides maneb and mancozeb, and aluminum in the metal-containing pesticide fosetyl-Al. Manganese and aluminum concentrations were less than those detected in the ARB urban area monitoring network (Table 4). However, the Lompoc results can only be qualitatively compared to the statewide data because of differences in sampling methods and general air quality differences between urban and rural areas. Silicon was the only chemical that showed concentrations higher than the statewide concentrations. Silicon concentrations at the east site were among the highest detected in the state. Based on average concentrations in the Earth's crust, the concentration of iron is approximately 50 times higher than the concentration of manganese, and the concentration of silicon is approximately two to three times higher than the concentration of aluminum. Manganese shows the expected ratio, while silicon exceeds the ratio.

Table 1. Preliminary data of Lompoc air monitoring for all chemicals except methyl bromide, methyl isothiocyanate, and metals. Chemicals detected are listed below; alachlor, dimethoate OA, disulfoton, disulfoton OA, fenamiphos, fonofos, fonofos OA were analyzed, but not detected

Site	Date/Time Start	chlorothalonil (ng/m^3)	chlorpyrifos (ng/m^3)	chlorpyrifos OA (ng/m^3)	cycloate (ng/m^3)	diazinon (ng/m^3)	diazinon OA (ng/m^3)	dimethoate (ng/m^3)	oxydemeton-methyl (ng/m^3)	permethrin (ng/m^3)
west	8/17/98 15:55	nd[a]	nd*[b]	nd	nd	nd	nd	nd	nd	nd
central	8/17/98 16:25	nd	nd	nd	nd	nd	nd	nd	nd	nd
southwest	8/17/98 16:35	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northwest	8/17/98 16:50	nd	nd	nd	nd	nd	nd	nd	nd	nd
northeast	8/17/98 17:05	nd	nd	nd	nd	nd	nd	nd	nd	nd
west	8/18/98 10:40	nd	nd*	nd	nd	nd	nd	nd	nd	nd
central	8/18/98 11:35	nd	nd*	nd	nd	nd	nd	nd	nd	nd
southwest	8/18/98 11:55	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northwest	8/18/98 12:20	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northeast	8/18/98 12:35	nd	nd	nd	nd	nd	nd	nd	nd	nd
west	8/19/98 8:40	nd	13.3	nd	nd	nd	nd	nd	nd	nd
central	8/19/98 9:20	nd	nd*	nd	nd	nd	nd	nd	nd	nd
southwest	8/19/98 10:20	nd	10.8	nd	nd	nd	nd	nd	nd	nd
northwest	8/19/98 10:32	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northeast	8/19/98 10:45	nd	nd*	nd	nd	nd	nd	nd	nd	nd
west	8/20/98 8:10	nd	nd*	nd	nd	nd	nd	nd	nd	nd
west	8/20/98 8:12	nd	5.1	nd	nd	nd	nd	nd	nd	nd
central	8/20/98 8:30	nd	nd*	nd	nd	nd	nd	nd	nd	nd
central	8/20/98 8:33	nd	nd*	nd	nd	nd	nd	nd	nd	nd
southwest	8/20/98 9:00	nd	nd*	nd	nd	nd	nd	nd	nd	nd
southwest	8/20/98 9:02	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northwest	8/20/98 9:11	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northwest	8/20/98 9:12	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northeast	8/20/98 9:25	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northeast	8/20/98 9:25	nd	nd*	nd	nd	nd	nd	nd	nd	nd

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Site	Date/Time Start	chlorothalonil (ng/m^3)	chlorpyrifos (ng/m^3)	chlorpyrifos OA (ng/m^3)	cycloate (ng/m^3)	diazinon (ng/m^3)	diazinon OA (ng/m^3)	dimethoate (ng/m^3)	oxydemeton-methyl (ng/m^3)	permethrin (ng/m^3)
west	8/21/98 7:20	nd	nd*	nd	nd	nd	nd	nd	nd	nd
central	8/21/98 7:40	nd	nd*	nd	nd	nd	nd	nd	nd	nd
southwest	8/21/98 8:10	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northwest	8/21/98 8:55	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
northeast	8/21/98 8:30	nd	nd*	nd	nd	nd*	nd	nd*	nd	nd
northwest	8/24/98 8:00	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
northeast	8/24/98 8:12	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
southwest	8/24/98 7:45	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
central	8/24/98 8:27	nd	nd*	nd	nd	nd	nd	nd	nd	nd
west	8/24/98 8:45	nd	nd*	nd	nd	nd	nd	nd	nd	nd
southwest	8/25/98 8:02	nd	nd*	nd	nd	nd	nd	nd	nd	nd
southwest	8/25/98 8:04	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northwest	8/25/98 8:17	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
northwest	8/25/98 8:17	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
northeast	8/25/98 8:29	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
northeast	8/25/98 8:31	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
central	8/25/98 9:15	nd	nd*	nd	nd	nd	nd	nd	nd	nd
central	8/25/98 9:15	nd	nd*	nd	nd	nd	nd	nd	nd	nd
west	8/25/98 9:32	nd	4.8	nd	nd	nd*	nd	nd	nd	nd
west	8/25/98 9:30	nd	nd*	nd	nd	nd	nd	nd	nd	nd
southwest	8/27/98 7:52	nd	nd*	nd	nd	nd	nd	nd	nd	nd
northwest	8/27/98 8:00	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
northeast	8/27/98 8:10	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
central	8/27/98 8:35	nd	nd*	nd	nd	nd	nd	nd	nd	nd
west	8/27/98 8:53	nd	nd*	nd	nd	nd	nd	nd	nd	nd

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Site	Date/Time Start	chlorothalonil (ng/m^3)	chlorpyrifos (ng/m^3)	chlorpyrifos OA (ng/m^3)	cycloate (ng/m^3)	diazinon (ng/m^3)	diazinon OA (ng/m^3)	dimethoate (ng/m^3)	oxydemeton-methyl (ng/m^3)	permethrin (ng/m^3)
southwest	8/28/98 7:55	nd	nd*	nd	nd	18.2	nd	nd	nd	nd
northwest	8/28/98 8:23	nd	4.5	nd	nd	nd*	nd	nd	nd	nd
northeast	8/28/98 8:25	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
central	8/28/98 8:47	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
west	8/28/98 9:01	nd	nd*	nd	nd	nd*	nd	nd*	nd	nd
southwest	8/29/98 8:12	trace[c]	5.7	nd	nd	nd*	5.3	nd	nd	nd
northwest	8/29/98 8:23	trace	11.5	nd	nd	nd*	nd	nd	nd	nd
northeast	8/29/98 8:34	trace	7.9	nd	nd	nd*	nd	nd	nd	nd
central	8/29/98 9:00	trace	nd*	nd	nd	nd	nd	nd	nd	nd
west	8/29/98 9:15	nd	nd*	nd	nd	nd	nd	nd*	nd	nd
southwest	8/31/98 7:56	trace	9.7	nd	nd	nd*	nd	nd*	nd	nd
northwest	8/31/98 8:11	nd	83.1	8.5	nd	nd*	nd	nd*	nd*	nd
northeast	8/31/98 8:55	nd	6.2	nd	nd	nd*	nd	nd*	nd*	nd
central	8/31/98 9:31	trace	6.7	nd	nd	nd*	nd	nd	nd	nd
west	8/31/98 10:10	nd	4.9	nd	nd	nd	nd	nd*	nd	nd
southwest	9/2/98 9:03	trace	8.0	nd	nd	nd*	nd	nd	nd	nd
northwest	9/2/98 8:16	nd	31.3	nd	nd	nd*	nd	nd	nd	nd
northeast	9/2/98 8:30	trace	nd*	nd	nd	nd*	nd	nd	nd	nd
central	9/2/98 8:42	trace	6.3	nd	nd	nd*	nd	nd	nd	nd
west	9/2/98 8:52	trace	7.8	nd	nd	nd*	nd	nd*	nd	nd
northwest	9/3/98 8:07	nd	31.2	4.8	759.6	nd*	nd	nd	nd	nd
northwest	9/3/98 8:08	nd	35.8	5.5	739.2	nd*	nd	nd	nd	nd
northeast	9/3/98 8:24	nd	4.7	nd	nd	nd*	nd	nd	nd	nd
northeast	9/3/98 8:22	nd	4.9	4.1	nd	nd*	nd	nd	nd	nd
central	9/3/98 8:36	trace	4.6	nd	nd	nd*	nd	nd	nd	nd

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Site	Date/Time Start	chlorothalonil (ng/m^3)	chlorpyrifos (ng/m^3)	chlorpyrifos OA (ng/m^3)	cycloate (ng/m^3)	diazinon (ng/m^3)	diazinon OA (ng/m^3)	dimethoate (ng/m^3)	oxydemeton-methyl (ng/m^3)	permethrin (ng/m^3)
central	9/3/98 8:37	trace	nd*	nd	nd	nd*	nd	nd	nd	nd
west	9/3/98 8:51	trace	8.1	nd	nd	nd*	nd	nd*	nd	nd
west	9/3/98 8:52	trace	7.9	nd	nd	nd*	nd	nd*	nd	nd
southwest	9/3/98 7:55	trace	6.9	nd	nd	nd*	nd	nd	nd	nd
southwest	9/3/98 7:55	trace	6.7	nd	nd	nd*	nd	nd	nd	nd
northwest	9/4/98 8:25	trace	25.8	nd	69.2	4.8	nd	nd	nd	nd
northeast	9/4/98 12:16	trace	7.1	nd	nd	nd*	nd	nd	nd	nd
central	9/4/98 9:45	trace	6.1	nd	nd	nd*	nd	nd	nd	nd
west	9/4/98 9:18	trace	9.4	nd	nd	nd*	nd	nd	nd	nd
southwest	9/4/98 8:53	trace	15.7	nd	nd	6.2	nd	nd	nd	nd
northwest	9/5/98 9:40	trace	34.3	nd	7.1	nd*	nd	nd	nd	nd
west	9/5/98 8:50	trace	6.1	nd	nd	nd*	nd	nd*	nd	nd
central	9/5/98 9:20	trace	11.5	nd	nd	nd*	nd	nd	nd	nd
southwest	9/5/98 9:56	trace	20.2	nd	nd	nd*	nd	nd	nd	nd
central	9/6/98 9:10	trace	nd*	nd	nd	nd*	nd	nd	nd	nd
west	9/6/98 9:00	trace	4.8	nd	nd	nd	nd	nd*	nd	nd
northeast	9/6/98 9:25	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
northwest	9/6/98 8:45	nd	16.1	nd	25.4	nd*	nd	nd	nd	nd
southwest	9/6/98 8:30	nd	7.5	nd	nd	nd*	nd	nd	nd	nd
northwest	9/7/98 8:35	nd	13.5	nd	nd	nd*	nd	nd	nd	nd
southwest	9/7/98 8:45	nd	4.5	nd	nd	nd*	nd	nd	nd	nd
west	9/7/98 8:55	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
central	9/7/98 9:05	trace	nd*	nd	nd	nd*	nd	nd	nd	nd
northeast	9/7/98 9:15	nd	6.8	nd	nd	nd*	nd	nd	nd	nd

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Site	Date/Time Start	chlorothalonil (ng/m^3)	chlorpyrifos (ng/m^3)	chlorpyrifos OA (ng/m^3)	cycloate (ng/m^3)	diazinon (ng/m^3)	diazinon OA (ng/m^3)	dimethoate (ng/m^3)	oxydemeton-methyl (ng/m^3)	permethrin (ng/m^3)
northwest	9/8/98 8:50	nd	7.5	nd	nd	nd*	nd	nd	nd	nd
northwest	9/8/98 8:50	nd	7.0	nd	nd	nd*	nd	nd	nd	nd
southwest	9/8/98 9:20	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
southwest	9/8/98 9:21	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
west	9/8/98 9:35	nd	28.5	nd	nd	nd*	nd	nd*	nd	nd
west	9/8/98 9:35	nd	26.0	nd	nd	nd*	nd	nd	nd	nd
central	9/8/98 9:47	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
central	9/8/98 9:47	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
northeast	9/8/98 10:00	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
northeast	9/8/98 10:00	nd	nd*	nd	nd	nd*	nd	nd	nd	nd
southwest	9/9/98 8:57	nd	7.4	nd	nd	nd*	nd	nd	nd	nd
northwest	9/9/98 8:22	nd	5.2	nd	7.2	nd*	nd	nd	nd	nd
west	9/9/98 9:29	nd	9.3	nd	nd	nd*	nd	nd	nd	nd
central	9/9/98 10:15	nd	6.1	nd	nd	nd*	nd	nd	nd	nd
northeast	9/9/98 10:50	nd	7.7	nd	nd	nd*	nd	nd	nd	nd
northwest	9/10/98 8:20	nd	10.7	nd	34.6	nd*	nd	nd	nd	nd
southwest	9/10/98 8:40	nd	12.0	nd	nd	nd*	nd	nd	nd	trace
west	9/10/98 9:25	nd	5.4	nd	nd	nd*	nd	nd	nd	nd
central	9/10/98 9:31	nd	4.5	nd	nd	nd*	nd	nd	nd	nd
northeast	9/10/98 10:03	nd	5.7	nd	nd	nd*	nd	nd	nd	nd

[a] nd = none detected, detection limits given below

[b] nd* = pesticide possibly detected, but not confirmed

[c] trace = pesticide detection confirmed, but less than the quantitation limit given below

	chlorothalonil	chlorpyrifos	chlorpyrifos OA	cycloate	diazinon	diazinon OA	dimethoate	oxydemeton-methyl	permethrin
approx detection limit (ng/m^3)	2	1	5	2	1	5	1	1	2
approx quantitation limit (ng/m^3)	8	4	5	9	5	5	5	5	9

Table 2. Preliminary data of Lompoc air monitoring for methyl isothiocyanate.

	Methyl Isothiocyanate (ng/m^3)				
	Southwest	West	Northwest	Northeast	Central
8/31/98 day	nd	nd	nd	nd	nd
8/31/98 night	nd	nd	nd	nd	nd
9/9/98 day	nd	nd	nd	nd	nd
9/9/98 night	nd	nd	nd	nd	nd
9/10/98 day	nd	1036	nd	nd	nd
9/10/98 night	154	590	46	nd	743
9/11/98 day	nd	nd	nd	nd	nd
9/11/98 night	292	483	210	210	157
9/12/98 day	131	nd	nd	nd	nd
9/12/98 night	58	67	nd	nd	nd
9/13/98 day	nd	nd	nd	65	nd
9/13/98 night	nd	nd	nd	nd	nd

Table 3. Number of confirmed pesticide detections at each monitoring site. There are 320 possible detections at each site (20 days X 16 pesticides).

	Central	Northeast	Northwest	Southwest	West
alachlor	0	0	0	0	0
chlorothalonil	8	3	3	6	5
chlorpyrifos	7	6	13	11	12
chlorpyrifos OA	0	1	2	0	0
cycloate	0	0	6	0	0
diazinon	0	0	1	2	0
diazinon OA	0	0	0	1	0
dimethoate	0	0	0	0	0
dimethoate OA	0	0	0	0	0
disulfoton	0	0	0	0	0
disulfoton OA	0	0	0	0	0
fenamiphos	0	0	0	0	0
fonofos	0	0	0	0	0
fonofos OA	0	0	0	0	0
oxydemeton-methyl	0	0	0	0	0
permethrin	0	0	0	1	0
TOTAL	15	10	25	21	17

Figure 1. Percentage of positive analyses (detections) on each day. There are 80 analyses for each day (5 sites X 16 chemicals).

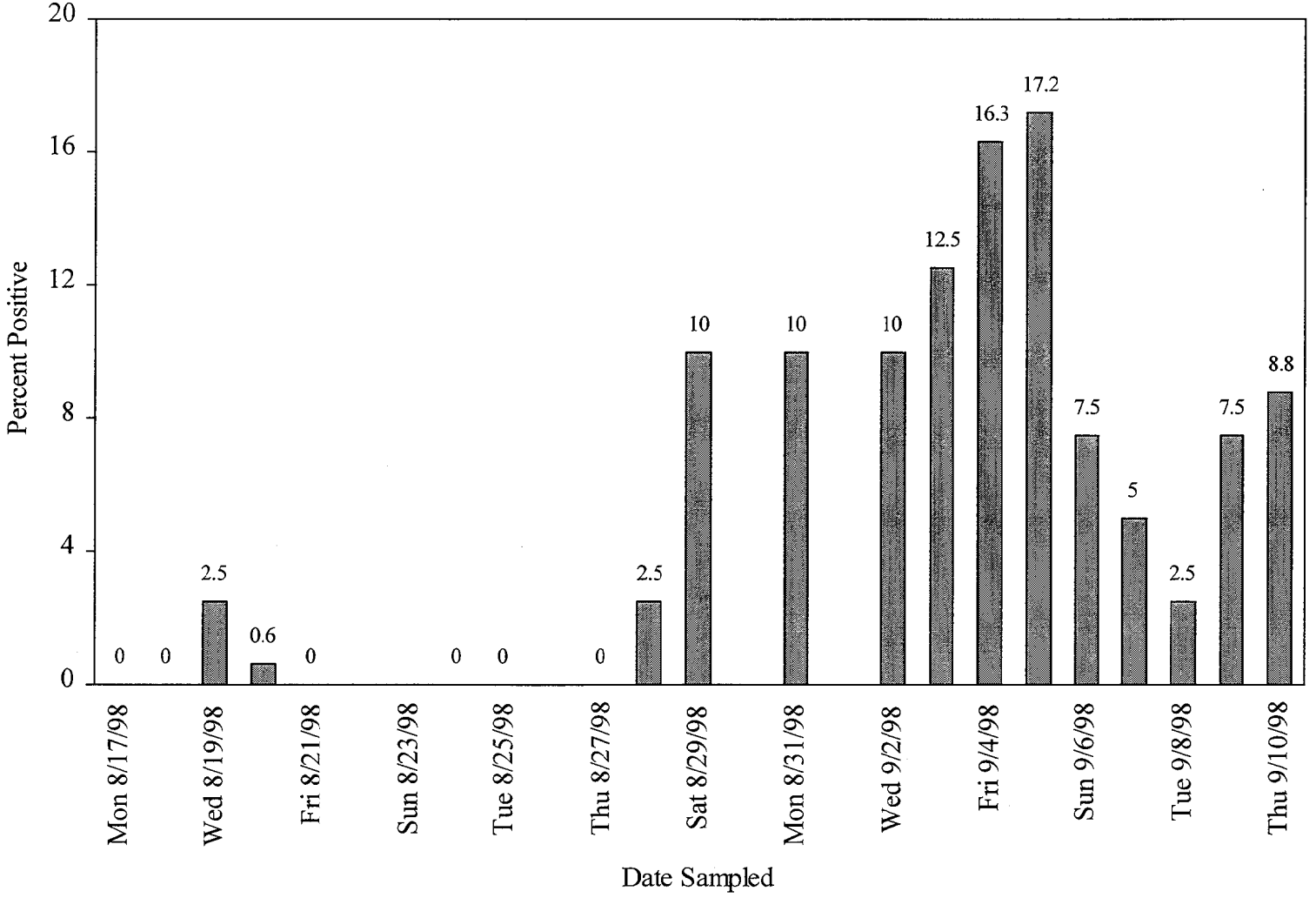

Figure 2. Chlorpyrifos concentration (ng/m^3) detected on each day. Concentration shown is the average from the five sites for each day; assuming samples with none detected are 0.5 ng/m^3 (one-half detection limit) and samples with possible detection are 2.5 ng/m^3 (one half of the detection limit plus quantitation limit).

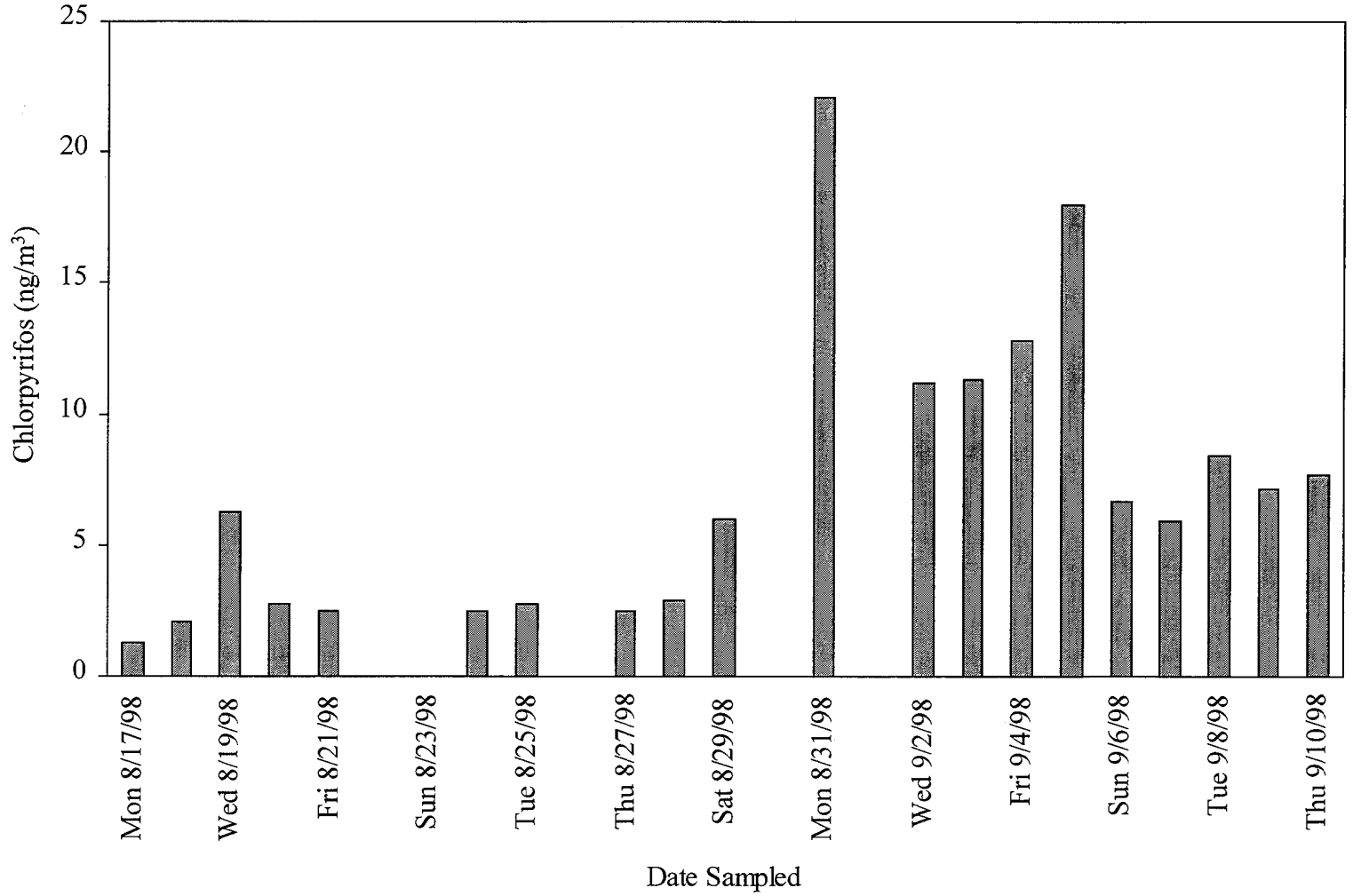

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Table 4. Preliminary data of Lompoc air monitoring for metals.

Site	Date	Aluminum (ng/m^3)	Manganese (ng/m^3)	Silicon (ng/m^3)	Iron (ng/m^3)	Sulfur (ng/m^3)	Chloride (ng/m^3)
southwest	8/18/98	234.1	2.3	1003.4	111.2	377.1	2441.4
southwest	8/19/98	361.3	5.0	1530.2	170.2	563.2	3086.7
southwest	8/19/98	639.9	9.0	2445.1	306.3	969.2	5355.8
southwest	8/21/98	256.4	2.6	1098.2	134.7	367.0	2037.7
southwest	8/25/98	381.9	2.8	1183.0	174.8	902.3	1419.0
southwest	8/27/98	774.9	7.2	3012.3	380.6	1471.7	1015.2
southwest	8/27/98	822.9	9.4	3456.6	459.2	1623.2	1089.6
southwest	8/29/98	322.0	2.4	1072.8	138.4	1049.7	5538.1
southwest	9/4/98	337.3	4.1	1030.7	173.1	1310.6	929.0
southwest	9/4/98	273.5	2.8	822.6	133.7	1032.5	714.1
central	8/18/98	381.9	4.4	1253.8	215.7	576.3	3725.5
central	8/19/98	176.3	0.7	539.2	96.1	278.7	1910.6
central	8/21/98	333.0	3.2	1076.4	177.7	457.6	2797.3
central	8/25/98	386.8	4.4	1135.4	207.8	1191.9	1368.0
central	8/27/98	379.0	3.3	1178.5	204.6	614.1	462.5
central	8/29/98	111.8	1.4	320.8	56.8	191.8	1282.4
east	8/19/98	1975.5	19.1	17782.6	1193.3	1242.8	6069.7
east	8/21/98	893.4	8.6	6992.1	584.5	647.3	3447.1
east	8/25/98	1176.7	14.9	6217.7	911.2	1346.7	1929.8
east	8/27/98	392.7	4.9	1555.0	249.2	761.1	463.6
east	8/29/98	223.4	1.9	738.4	112.7	371.2	2833.5
Statewide maximum[a]		6500.0	120.0	17000.0	5100.0		
Statewide mean		1500.0	23.0	4100.0	1200.0		

[a] Statewide data is from ARB's urban area air monitoring network. Data shown are from 585 samples collected during 1994.

Table 4. Preliminary data of Lompoc air monitoring for metals.

Site	Date	Nickel (ng/m^3)	Copper (ng/m^3)	Zinc (ng/m^3)	Arsenic (ng/m^3)	Selenium (ng/m^3)	Bromide (ng/m^3)
southwest	8/18/98	nd	nd	1.1	nd	nd	1.9
southwest	8/19/98	0.1	nd	3.9	nd	nd	3.3
southwest	8/19/98	0.6	nd	5.1	nd	nd	7.9
southwest	8/21/98	nd	nd	1.0	nd	nd	2.7
southwest	8/25/98	0.9	nd	2.0	nd	nd	4.6
southwest	8/27/98	1.8	2.9	9.8	nd	0.4	7.9
southwest	8/27/98	1.9	nd	8.6	nd	nd	5.9
southwest	8/29/98	0.1	nd	8.5	nd	nd	7.6
southwest	9/4/98	1.7	2.6	3.0	0.1	3.4	6.5
southwest	9/4/98	1.5	4.8	3.0	0.9	2.3	5.5
central	8/18/98	0.6	nd	5.7	nd	nd	4.4
central	8/19/98	nd	nd	1.2	nd	nd	1.1
central	8/21/98	0.1	nd	3.1	nd	nd	4.4
central	8/25/98	1.3	nd	7.4	nd	nd	5.0
central	8/27/98	0.8	5.5	6.5	1.1	0.9	2.4
central	8/29/98	nd	nd	4.1	nd	nd	2.0
east	8/19/98	3.7	nd	19.6	1.7	1.9	9.7
east	8/21/98	0.7	nd	6.9	nd	nd	5.8
east	8/25/98	2.0	2.7	16.8	nd	nd	7.0
east	8/27/98	0.8	2.8	3.2	1.9	0.9	2.0
east	8/29/98	0.3	2.6	1.3	0.5	1.6	6.4
Statewide maximum[a]							
Statewide mean							

[a] Statewide data is from ARB's urban area air monitoring network. Data shown are from 585 samples collected during 1994.

Table 4. Preliminary data of Lompoc air monitoring for metals.

Site	Date	Potassium (ng/m^3)	Calcium (ng/m^3)	Titanium (ng/m^3)	Vanadium (ng/m^3)	Chromium (ng/m^3)	Cobalt (ng/m^3)
southwest	8/18/98	124.3	176.0	9.0	1.1	nd	nd
southwest	8/19/98	144.6	213.1	17.8	0.2	1.7	0.7
southwest	8/19/98	294.4	412.7	23.7	nd	0.6	0.6
southwest	8/21/98	112.6	163.3	9.1	0.2	0.2	0.1
southwest	8/25/98	147.9	194.2	14.3	nd	nd	0.2
southwest	8/27/98	272.6	383.8	44.3	4.0	0.8	1.3
southwest	8/27/98	294.4	438.1	51.4	7.7	1.9	1.7
southwest	8/29/98	242.4	278.4	4.0	1.4	0.4	nd
southwest	9/4/98	194.9	169.3	19.0	4.0	1.5	0.3
southwest	9/4/98	151.7	142.9	13.2	2.8	0.2	0.1
central	8/18/98	204.8	268.1	16.8	nd	0.6	nd
central	8/19/98	91.2	122.1	3.0	nd	0.1	nd
central	8/21/98	166.3	214.0	12.0	1.0	nd	nd
central	8/25/98	200.3	245.2	27.1	5.9	1.3	0.8
central	8/27/98	152.8	193.2	24.5	0.7	0.9	0.6
central	8/29/98	60.1	68.2	10.2	0.5	1.7	0.3
east	8/19/98	704.0	1119.7	119.4	17.9	8.2	5.6
east	8/21/98	353.6	517.6	67.0	4.5	3.6	1.4
east	8/25/98	426.5	669.5	83.2	9.6	2.0	3.7
east	8/27/98	154.5	200.4	21.2	3.3	nd	0.7
east	8/29/98	129.5	159.5	13.7	2.0	0.5	0.7
Statewide maximum[a]							
Statewide mean							

[a] Statewide data is from ARB's urban area air monitoring network. Data shown are from 585 samples collected during 1994.

Table 4. Preliminary data of Lompoc air monitoring for metals.

Site	Date	Rubidium (ng/m^3)	Strontium (ng/m^3)	Yttrium (ng/m^3)	Zirconium (ng/m^3)	Molybdenum (ng/m^3)	Tin (ng/m^3)
southwest	8/18/98	0.7	3.0	1.7	1.4	1.0	nd
southwest	8/19/98	0.5	4.0	1.1	1.2	nd	nd
southwest	8/19/98	1.4	5.9	1.5	2.9	0.2	nd
southwest	8/21/98	1.4	3.8	2.0	2.1	1.4	nd
southwest	8/25/98	0.7	3.4	1.4	2.7	1.4	nd
southwest	8/27/98	3.5	4.4	0.3	1.9	nd	1.8
southwest	8/27/98	2.2	6.4	1.7	0.7	nd	nd
southwest	8/29/98	1.6	4.1	1.4	1.4	nd	nd
southwest	9/4/98	1.4	3.3	1.3	1.4	1.1	6.9
southwest	9/4/98	1.2	2.0	0.7	0.7	1.1	nd
central	8/18/98	1.6	5.9	2.4	1.5	0.7	nd
central	8/19/98	1.1	2.2	2.8	3.4	0.6	nd
central	8/21/98	2.0	4.0	2.2	2.0	1.0	3.0
central	8/25/98	0.7	4.0	1.7	2.2	1.1	4.4
central	8/27/98	0.6	2.4	1.0	1.8	nd	0.5
central	8/29/98	1.5	3.7	1.9	1.5	1.9	1.5
east	8/19/98	3.5	12.2	3.7	9.3	5.9	nd
east	8/21/98	1.4	7.0	3.6	4.8	3.5	nd
east	8/25/98	2.5	7.7	1.6	1.4	0.3	5.5
east	8/27/98	0.9	2.3	1.6	1.1	1.8	nd
east	8/29/98	1.4	2.4	nd	nd	nd	5.9
Statewide maximum[a]							
Statewide mean							

[a] Statewide data is from ARB's urban area air monitoring network. Data shown are from 585 samples collected during 1994.

Table 4. Preliminary data of Lompoc air monitoring for metals.

Site	Date	Antimony (ng/m^3)	Barium (ng/m^3)	Mercury (ng/m^3)	Lead (ng/m^3)	Uranium (ng/m^3)
southwest	8/18/98	1.5	8.5	nd	nd	5.0
southwest	8/19/98	1.9	nd	nd	nd	1.1
southwest	8/19/98	0.3	22.0	nd	nd	2.3
southwest	8/21/98	nd	12.2	nd	nd	2.8
southwest	8/25/98	1.8	16.5	nd	nd	2.2
southwest	8/27/98	4.5	7.7	1.7	7.8	4.6
southwest	8/27/98	nd	nd	nd	2.9	2.3
southwest	8/29/98	nd	24.4	nd	2.6	3.1
southwest	9/4/98	2.8	nd	2.6	4.4	3.1
southwest	9/4/98	nd	6.0	2.5	2.1	1.8
central	8/18/98	1.0	18.5	nd	nd	1.8
central	8/19/98	nd	24.4	nd	nd	4.3
central	8/21/98	nd	22.0	nd	nd	2.0
central	8/25/98	2.6	nd	nd	nd	1.8
central	8/27/98	nd	15.7	1.6	nd	nd
central	8/29/98	nd	6.8	0.6	3.2	2.5
east	8/19/98	3.8	19.0	nd	nd	2.7
east	8/21/98	7.6	15.9	nd	nd	1.1
east	8/25/98	2.6	nd	0.8	2.0	nd
east	8/27/98	nd	nd	2.5	0.9	nd
east	8/29/98	2.9	4.6	1.3	2.0	0.8
Statewide maximum[a]						
Statewide mean						

[a] Statewide data is from ARB's urban area air monitoring network. Data shown are from 585 samples collected during 1994.

METEOROLOGICAL MEASUREMENT RESULTS

The preliminary data from DPR's meteorological station shows weather patterns similar to previous years for this area during the time of monitoring. The data show typical diurnal patterns with low temperature, high humidity, and low wind speed at night in comparison to daylight hours. Wind direction was consistently from the west-northwest (Figure 3). Temperature ranged from 40 to 77 degrees Fahrenheit (Figure 4). Relative humidity ranged from 51 to 100 percent (Figure 5). Wind speed ranged from 0 to 23 miles per hour (Figure 6). DPR's meteorological station did not record a complete set of data. No data were recorded on August 24 due to loss of electrical power. At least some of the humidity data between September 5 and 9 is incorrect. Humidity greater than 100 percent was recorded on several occasions during this period. Data from the Air Pollution Control District station have not been summarized yet.

The miniSODAR™ recorded data about the mixing level between August 25 and September 14, 1998 (sampling started August 17). The mixing level is defined by a level in the atmosphere above ground that an airborne particle would potentially mix to within surface based instability. Typically with light winds overnight the ground surface air immediately above ground will cool quicker than the atmosphere aloft resulting in a surface based radiation inversion. The mixing level is limited by the height of this inversion and is detectable due to the higher levels of turbulence at or above the inversion. Figure 7 shows that the mean mixing level, like the atmosphere, varies throughout the day. The average mean mixing during this study when detected was 151 meters above ground level. The minimum mean mixing level was recorded at 84 meters with a maximum level detected at 200 meters. During late-August as well as September 9 and 13, 1998, no mixing level was detected within the mechanical mixing throughout the profiles. Finally, the data shows that on most days, the mixing level was difficult to detect once the solar driven thermals established, as discussed earlier. During maximum solar heating the mixing level was dissipated by the turbulent thermals or lifted out of the sodar detection range.

Figure 3. Wind direction during Lompoc air monitoring.

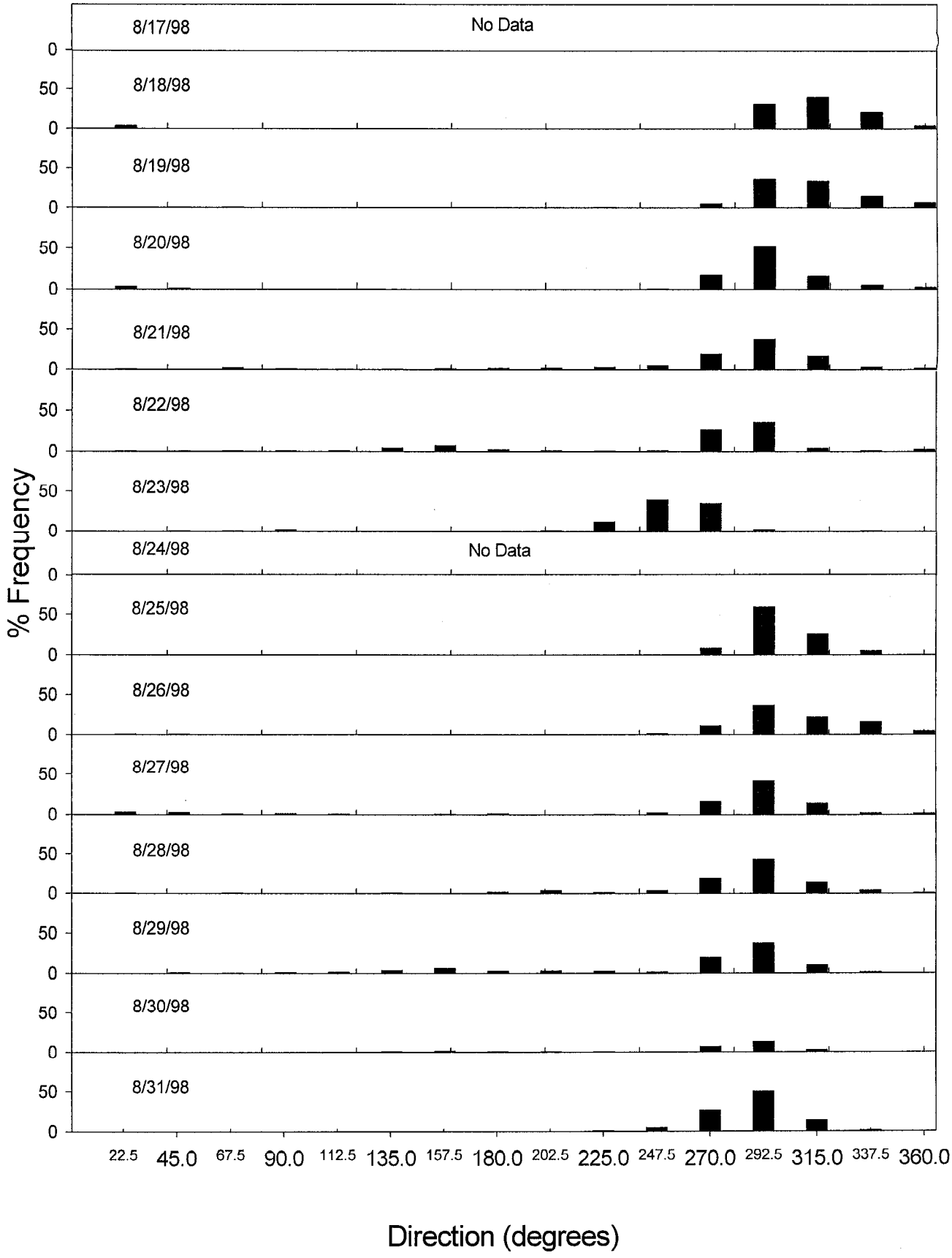


Figure 3. Wind direction during Lompoc air monitoring (cont.).

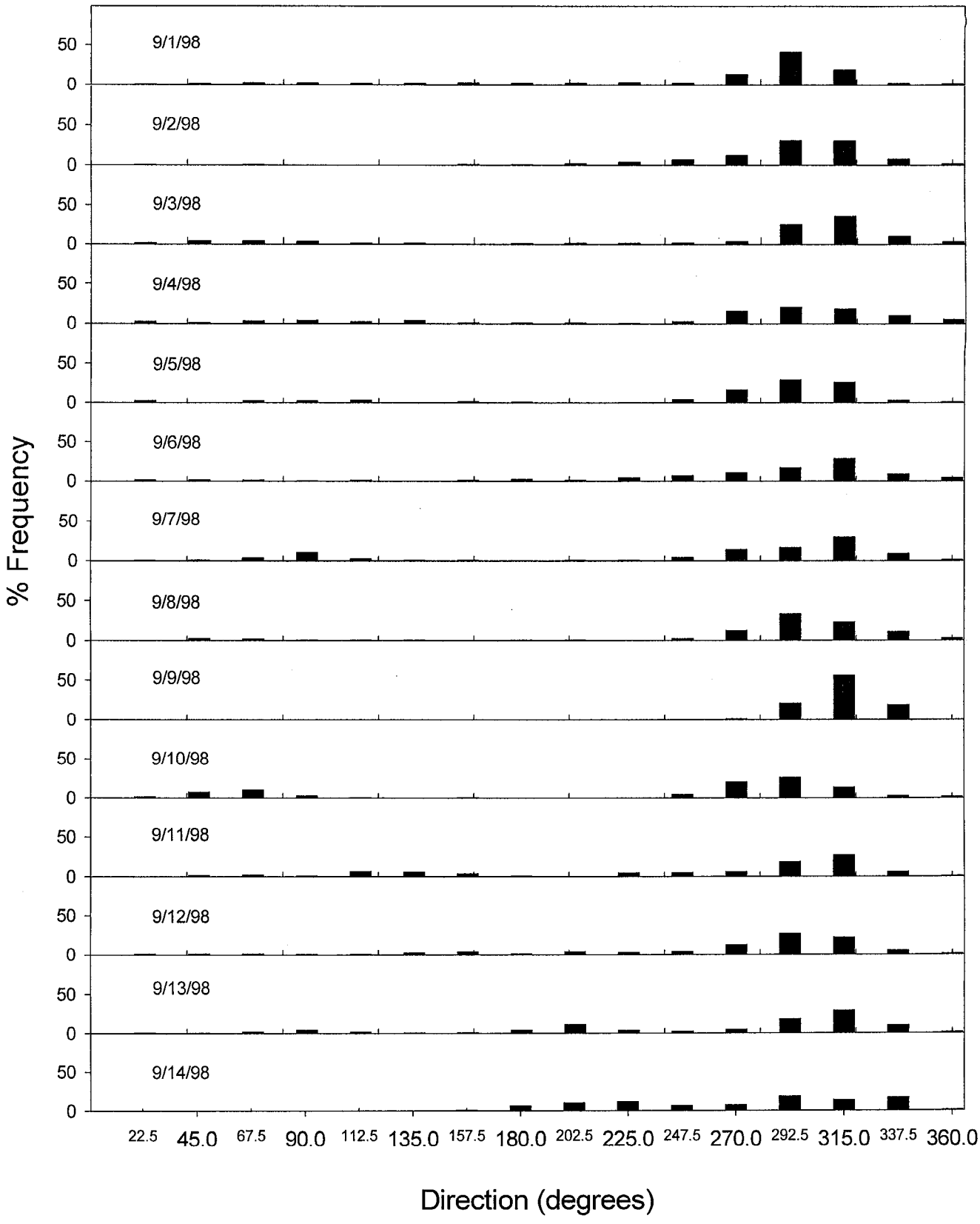


Figure 4. Air temperature during Lompoc air monitoring.

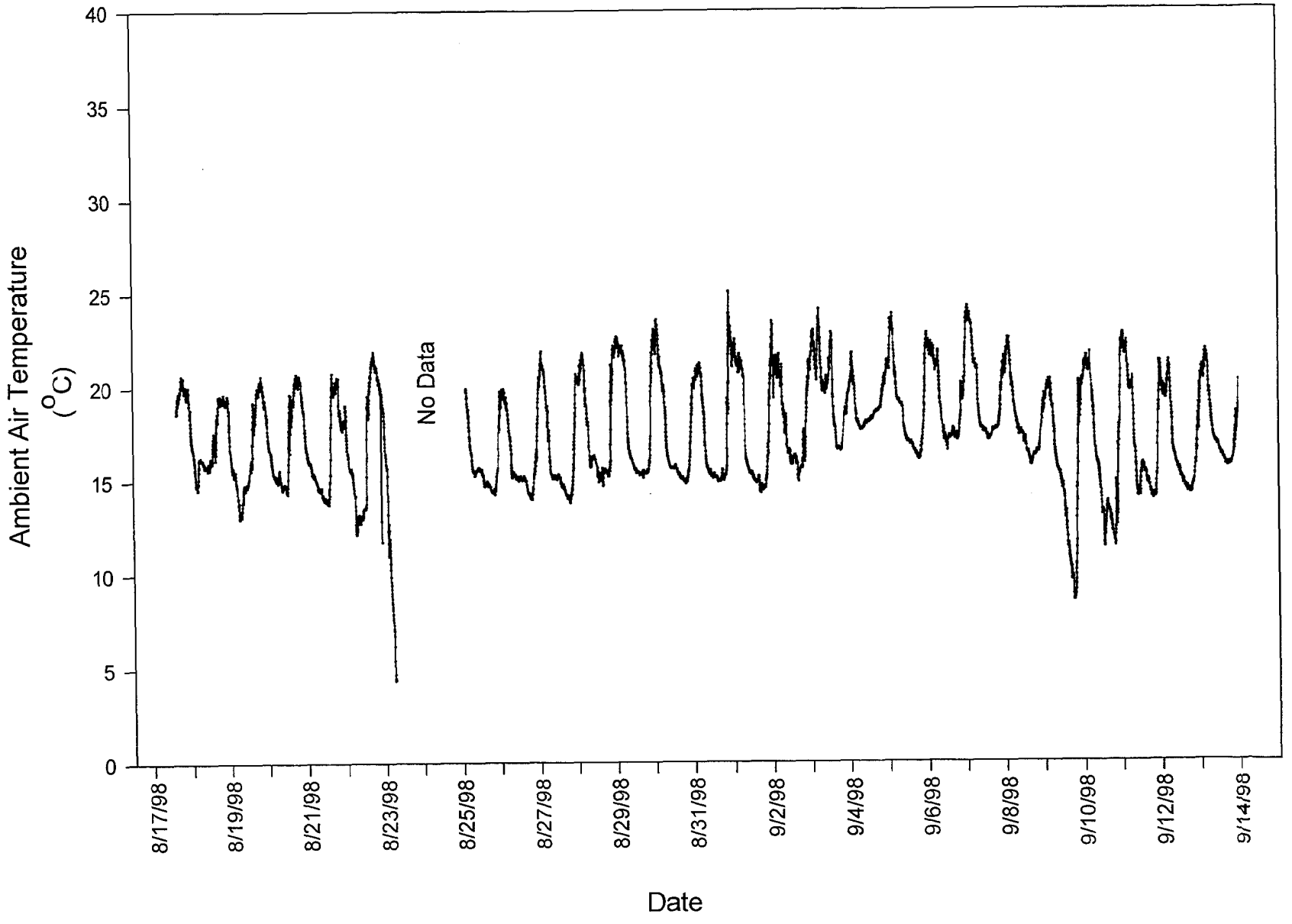


Figure 5. Relative humidity during Lompoc air monitoring.

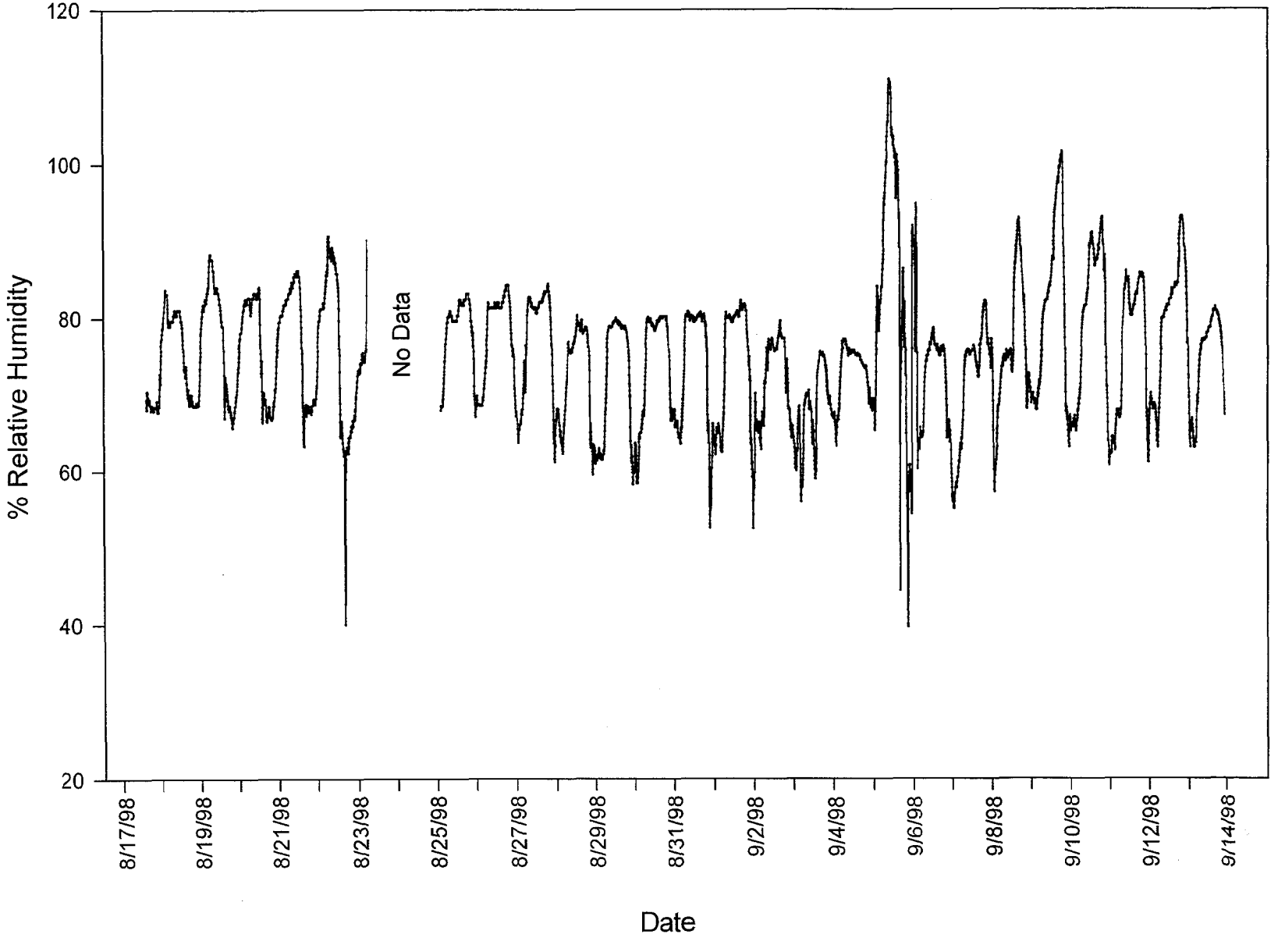


Figure 6. Wind speed during Lompoc air monitoring.

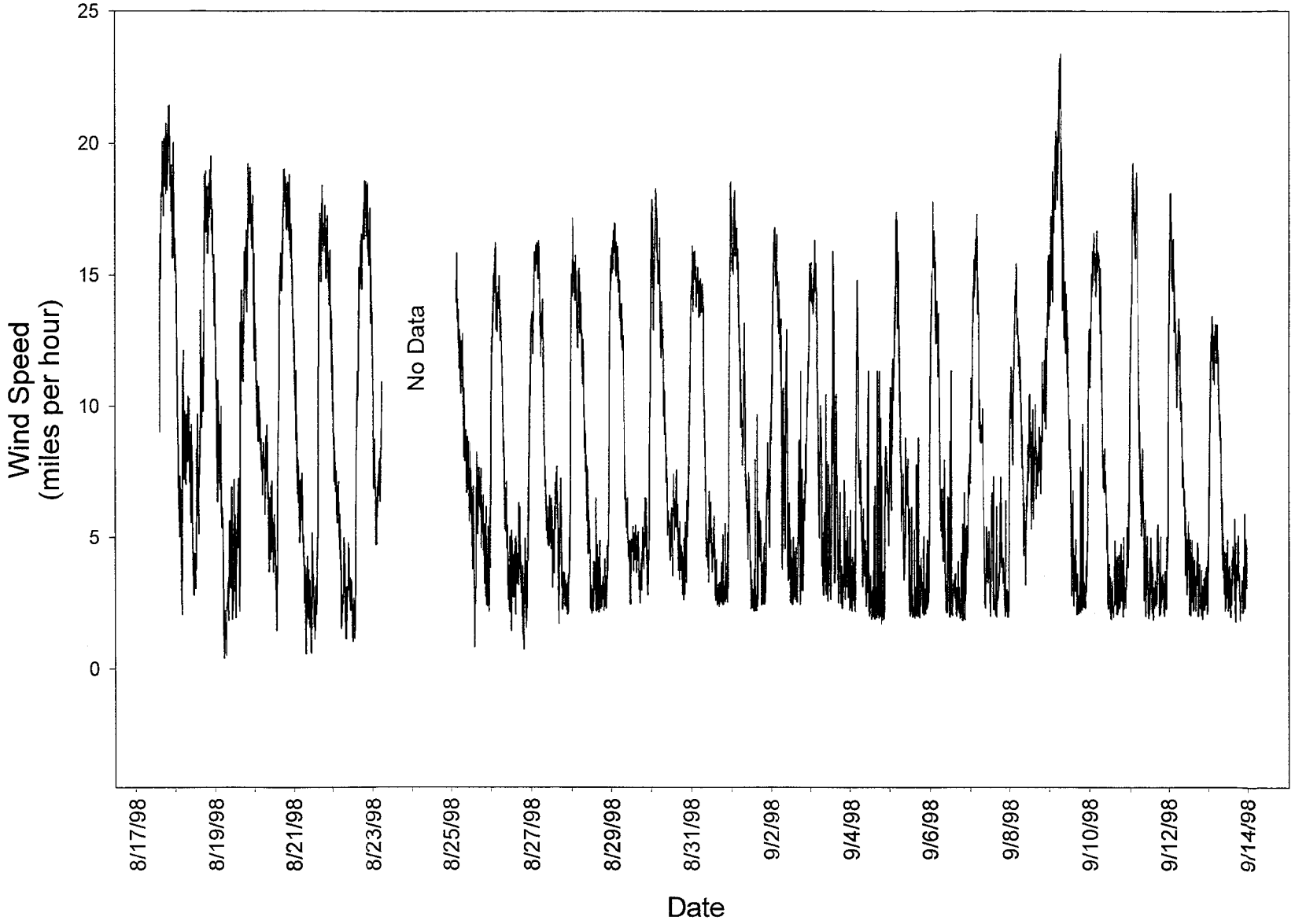
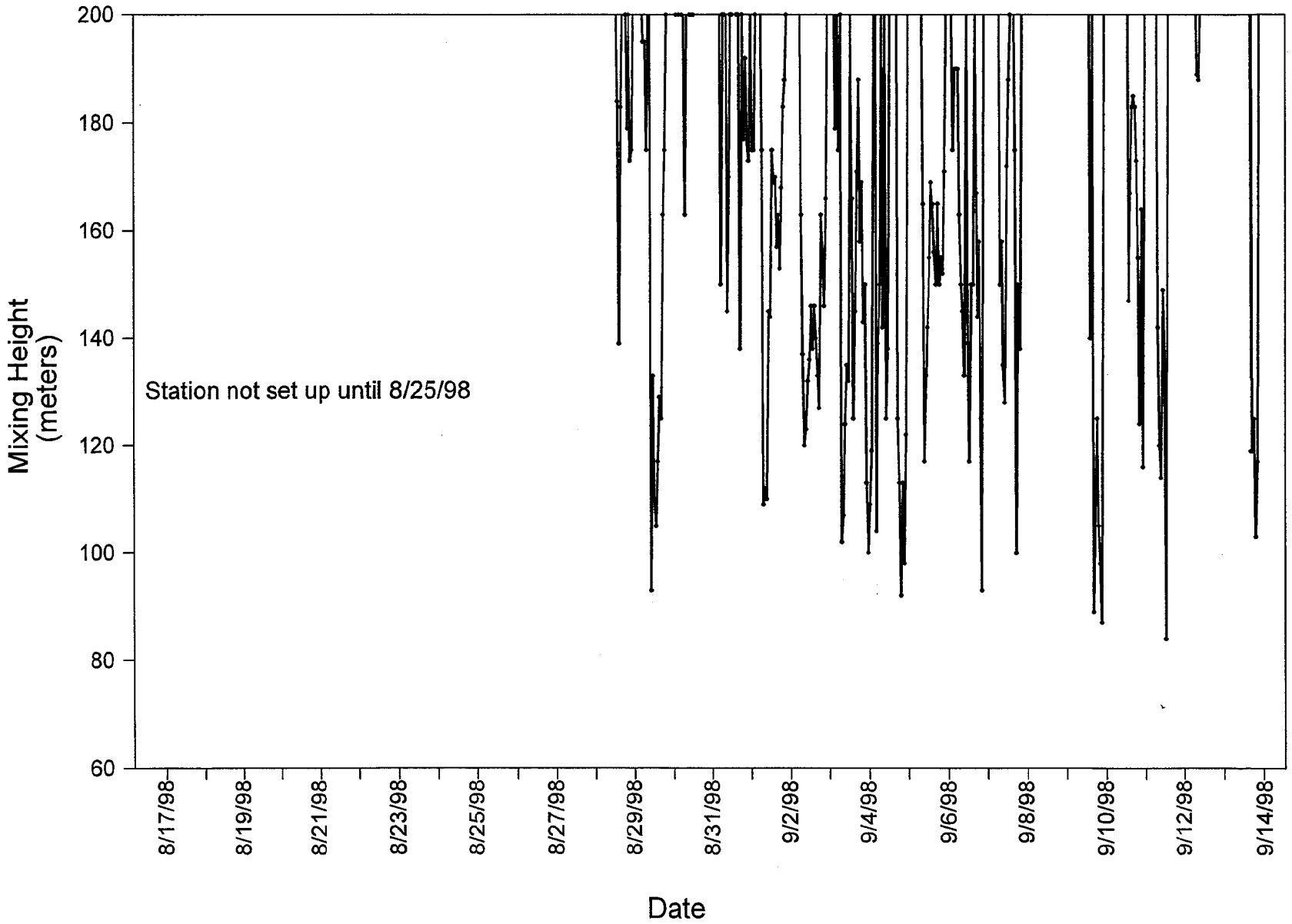


Figure 7. Mixing height during Lompoc air monitoring.



PESTICIDE USE DATA

Preliminary unvalidated pesticide use reports show possible correlation to air monitoring results. All of the pesticides possibly or confirmed detected (chlorothalonil, chlorpyrifos, cycloate, diazinon, dimethoate, methyl isothiocyanate, oxydemeton-methyl, and permethrin) were applied in the Lompoc area during the monitoring period (Table 5). All of the pesticides not detected (alachlor, disulfoton, fenamiphos, and fonofos) were not applied in the Lompoc area during the monitoring period.

While the data are unvalidated and incomplete (December 1998 not yet available), it appears as if the amount applied for most pesticides was high during the monitoring period in comparison to other times of the year (Table 6). August or September were among the highest three months in pounds applied for eight of the pesticides: chlorothalonil, chlorpyrifos, cycloate, diazinon, mancozeb, maneb, oxydemeton-methyl, and permethrin. Of the remaining seven pesticides of interest three had no use during 1998 (not including December): disulfoton, fenamiphos, and methyl bromide. Only alachlor, metam-sodium, and oxydemeton-methyl had months with the amount applied more than twice the amount used in August or September.

Table 5. Pesticide use report information for the Lompoc area between August 1 - September 14, 1998.

CHEMICAL	DATE	POUNDS APPLIED	ACRES TREATED	NUMBER APPLICATIONS ON DATE
CHLOROTHALONIL	1-Aug-98	2.02	0.90	1
CHLOROTHALONIL	4-Aug-98	4.13	2.00	2
CHLOROTHALONIL	7-Aug-98	0.26	0.23	1
CHLOROTHALONIL	8-Aug-98	12.74	10.47	4
CHLOROTHALONIL	10-Aug-98	8.09	7.00	1
CHLOROTHALONIL	12-Aug-98	10.74	10.80	2
CHLOROTHALONIL	14-Aug-98	40.69	18.00	1
CHLOROTHALONIL	15-Aug-98	2.33	1.07	2
CHLOROTHALONIL	20-Aug-98	9.28	7.50	1
CHLOROTHALONIL	22-Aug-98	0.06	0.07	1
CHLOROTHALONIL	26-Aug-98	0.75	3.00	1
CHLOROTHALONIL	29-Aug-98	1.70	0.75	1
CHLOROTHALONIL	30-Aug-98	40.69	18.00	1
CHLOROTHALONIL	1-Sep-98	3.61	1.75	2
CHLOROTHALONIL	4-Sep-98	13.25	10.50	3
CHLOROTHALONIL	6-Sep-98	11.55	2.00	1
CHLOROTHALONIL	8-Sep-98	26.32	11.80	3
CHLOROTHALONIL	11-Sep-98	1.79	1.89	3
CHLOROTHALONIL	12-Sep-98	1.16	2.00	1
CHLORPYRIFOS	1-Aug-98	6.38	8.50	2
CHLORPYRIFOS	2-Aug-98	17.00	34.00	2
CHLORPYRIFOS	5-Aug-98	7.84	9.50	3
CHLORPYRIFOS	7-Aug-98	8.50	15.40	2
CHLORPYRIFOS	8-Aug-98	16.25	32.50	2
CHLORPYRIFOS	9-Aug-98	6.00	12.00	1
CHLORPYRIFOS	10-Aug-98	14.55	17.80	2
CHLORPYRIFOS	11-Aug-98	12.25	16.50	2
CHLORPYRIFOS	12-Aug-98	28.10	37.10	6
CHLORPYRIFOS	13-Aug-98	1.22	7.25	2
CHLORPYRIFOS	14-Aug-98	2.05	4.10	2
CHLORPYRIFOS	15-Aug-98	2.63	5.25	1
CHLORPYRIFOS	19-Aug-98	52.14	71.70	10
CHLORPYRIFOS	20-Aug-98	12.30	19.80	2
CHLORPYRIFOS	21-Aug-98	15.25	16.00	3
CHLORPYRIFOS	22-Aug-98	15.60	14.00	1
CHLORPYRIFOS	23-Aug-98	9.00	12.00	1
CHLORPYRIFOS	25-Aug-98	0.70	11.70	1
CHLORPYRIFOS	26-Aug-98	19.20	19.20	4
CHLORPYRIFOS	27-Aug-98	18.30	16.50	1
CHLORPYRIFOS	28-Aug-98	13.50	18.00	1

Table 5. Pesticide use report information for the Lompoc area between August 1 - September 14, 1998.

CHEMICAL	DATE	POUNDS APPLIED	ACRES TREATED	NUMBER APPLICATIONS ON DATE
CHLORPYRIFOS	29-Aug-98	13.70	35.00	7
CHLORPYRIFOS	30-Aug-98	22.50	30.00	2
CHLORPYRIFOS	31-Aug-98	25.93	32.30	4
CHLORPYRIFOS	1-Sep-98	14.80	14.80	2
CHLORPYRIFOS	2-Sep-98	7.05	11.80	4
CHLORPYRIFOS	3-Sep-98	17.70	30.00	3
CHLORPYRIFOS	4-Sep-98	1.35	1.80	1
CHLORPYRIFOS	5-Sep-98	29.00	46.00	4
CHLORPYRIFOS	8-Sep-98	11.20	32.50	2
CHLORPYRIFOS	9-Sep-98	59.38	82.00	9
CHLORPYRIFOS	10-Sep-98	14.70	22.20	3
CHLORPYRIFOS	12-Sep-98	2.20	14.80	2
CYCLOATE	1-Aug-98	3.37	2.00	1
CYCLOATE	7-Aug-98	5.26	4.50	1
CYCLOATE	8-Aug-98	3.37	2.00	1
CYCLOATE	15-Aug-98	8.63	7.00	2
CYCLOATE	21-Aug-98	9.98	7.00	2
CYCLOATE	26-Aug-98	9.02	7.50	1
CYCLOATE	28-Aug-98	3.97	2.00	1
CYCLOATE	4-Sep-98	3.97	2.00	1
CYCLOATE	7-Sep-98	5.64	5.50	1
CYCLOATE	11-Sep-98	5.64	5.40	1
CYCLOATE	12-Sep-98	4.93	2.50	1
DIAZINON	5-Aug-98	32.02	8.00	1
DIAZINON	13-Aug-98	5.50	11.00	1
DIAZINON	14-Aug-98	10.00	20.00	1
DIAZINON	15-Aug-98	60.05	15.00	1
DIAZINON	20-Aug-98	96.07	24.00	1
DIAZINON	29-Aug-98	9.00	18.00	1
DIMETHOATE	3-Aug-98	0.49	6.00	1
DIMETHOATE	4-Aug-98	8.00	48.00	4
DIMETHOATE	6-Aug-98	3.20	10.00	2
DIMETHOATE	8-Aug-98	13.41	47.50	2
DIMETHOATE	10-Aug-98	4.68	27.00	2
DIMETHOATE	11-Aug-98	0.98	14.00	2
DIMETHOATE	13-Aug-98	0.99	11.00	2
DIMETHOATE	14-Aug-98	0.49	14.00	1
DIMETHOATE	21-Aug-98	0.98	16.00	2
DIMETHOATE	24-Aug-98	7.49	15.00	2
DIMETHOATE	26-Aug-98	3.70	19.50	3
DIMETHOATE	27-Aug-98	5.92	12.00	1

Table 5. Pesticide use report information for the Lompoc area between August 1 - September 14, 1998.

CHEMICAL	DATE	POUNDS APPLIED	ACRES TREATED	NUMBER APPLICATIONS ON DATE
DIMETHOATE	31-Aug-98	0.49	17.00	1
DIMETHOATE	1-Sep-98	5.17	41.00	3
DIMETHOATE	10-Sep-98	8.85	35.50	2
DIMETHOATE	11-Sep-98	0.98	15.00	2
METAM-SODIUM	15-Aug-98	1,058.33	5.00	1
METAM-SODIUM	10-Sep-98	952.49	7.50	1
METAM-SODIUM	12-Sep-98	1,667.50	13.00	2
OXYDEMETON-METHYL	1-Aug-98	13.25	30.00	3
OXYDEMETON-METHYL	3-Aug-98	13.63	35.50	5
OXYDEMETON-METHYL	4-Aug-98	2.00	44.00	4
OXYDEMETON-METHYL	5-Aug-98	9.50	19.00	1
OXYDEMETON-METHYL	7-Aug-98	0.50	5.00	1
OXYDEMETON-METHYL	8-Aug-98	6.50	13.00	1
OXYDEMETON-METHYL	10-Aug-98	11.62	33.00	3
OXYDEMETON-METHYL	11-Aug-98	2.00	34.50	4
OXYDEMETON-METHYL	13-Aug-98	7.00	23.00	3
OXYDEMETON-METHYL	14-Aug-98	8.00	42.50	3
OXYDEMETON-METHYL	17-Aug-98	6.26	12.50	1
OXYDEMETON-METHYL	18-Aug-98	3.00	6.00	1
OXYDEMETON-METHYL	19-Aug-98	8.78	22.50	3
OXYDEMETON-METHYL	20-Aug-98	9.50	19.00	2
OXYDEMETON-METHYL	21-Aug-98	13.49	41.00	4
OXYDEMETON-METHYL	22-Aug-98	8.76	17.50	2
OXYDEMETON-METHYL	24-Aug-98	6.56	17.50	1
OXYDEMETON-METHYL	26-Aug-98	8.77	41.20	5
OXYDEMETON-METHYL	27-Aug-98	5.26	10.50	1
OXYDEMETON-METHYL	28-Aug-98	8.00	16.00	2
OXYDEMETON-METHYL	29-Aug-98	0.50	6.00	1
OXYDEMETON-METHYL	31-Aug-98	0.50	17.00	1
OXYDEMETON-METHYL	1-Sep-98	7.26	36.50	5
OXYDEMETON-METHYL	2-Sep-98	3.56	9.50	1
OXYDEMETON-METHYL	3-Sep-98	16.75	36.00	2
OXYDEMETON-METHYL	4-Sep-98	7.00	14.00	1
OXYDEMETON-METHYL	5-Sep-98	3.00	8.00	1
OXYDEMETON-METHYL	10-Sep-98	13.25	26.50	3
OXYDEMETON-METHYL	11-Sep-98	5.80	24.60	4
OXYDEMETON-METHYL	12-Sep-98	14.51	29.00	2
PERMETHRIN	1-Aug-98	4.60	24.50	2
PERMETHRIN	4-Aug-98	13.57	82.25	8
PERMETHRIN	5-Aug-98	8.93	61.00	6
PERMETHRIN	6-Aug-98	13.41	90.00	7

Table 5. Pesticide use report information for the Lompoc area between August 1 - September 14, 1998.

CHEMICAL	DATE	POUNDS APPLIED	ACRES TREATED	NUMBER APPLICATIONS ON DATE
PERMETHRIN	7-Aug-98	3.12	28.60	3
PERMETHRIN	8-Aug-98	9.47	87.00	9
PERMETHRIN	9-Aug-98	3.75	20.00	1
PERMETHRIN	10-Aug-98	6.44	43.00	3
PERMETHRIN	11-Aug-98	8.12	68.20	8
PERMETHRIN	12-Aug-98	4.69	25.00	2
PERMETHRIN	13-Aug-98	14.46	83.80	9
PERMETHRIN	14-Aug-98	12.05	81.10	9
PERMETHRIN	15-Aug-98	6.47	34.50	3
PERMETHRIN	17-Aug-98	1.88	10.00	1
PERMETHRIN	18-Aug-98	8.26	49.00	3
PERMETHRIN	19-Aug-98	15.05	99.90	9
PERMETHRIN	20-Aug-98	21.02	115.50	9
PERMETHRIN	21-Aug-98	17.57	107.00	7
PERMETHRIN	22-Aug-98	2.89	18.00	3
PERMETHRIN	25-Aug-98	14.44	106.46	7
PERMETHRIN	26-Aug-98	7.73	43.40	3
PERMETHRIN	27-Aug-98	9.12	63.10	6
PERMETHRIN	28-Aug-98	0.68	4.60	3
PERMETHRIN	29-Aug-98	1.84	9.80	1
PERMETHRIN	31-Aug-98	2.53	13.50	2
PERMETHRIN	1-Sep-98	5.79	30.75	5
PERMETHRIN	2-Sep-98	3.56	23.00	4
PERMETHRIN	3-Sep-98	4.50	24.00	1
PERMETHRIN	4-Sep-98	9.93	62.50	6
PERMETHRIN	5-Sep-98	5.37	28.00	2
PERMETHRIN	6-Sep-98	6.47	33.70	2
PERMETHRIN	7-Sep-98	9.81	51.00	3
PERMETHRIN	8-Sep-98	15.89	82.40	6
PERMETHRIN	9-Sep-98	3.26	24.00	5
PERMETHRIN	10-Sep-98	25.87	154.25	12
PERMETHRIN	11-Sep-98	10.17	53.00	3
PERMETHRIN	12-Sep-98	2.53	52.60	6
PERMETHRIN	14-Sep-98	2.81	15.00	1
MANCOZEB	1-Aug-98	10.20	8.50	2
MANCOZEB	4-Aug-98	5.40	7.50	2
MANCOZEB	5-Aug-98	10.20	8.50	2
MANCOZEB	7-Aug-98	3.00	2.50	1
MANCOZEB	10-Aug-98	3.60	3.00	1
MANCOZEB	12-Aug-98	4.80	4.00	1
MANCOZEB	14-Aug-98	1.68	1.40	1
MANCOZEB	18-Aug-98	0.80	5.00	1
MANCOZEB	19-Aug-98	7.08	15.90	4

Table 5. Pesticide use report information for the Lompoc area between August 1 - September 14, 1998.

CHEMICAL	DATE	POUNDS APPLIED	ACRES TREATED	NUMBER APPLICATIONS ON DATE
MANCOZEB	21-Aug-98	6.00	5.00	2
MANCOZEB	25-Aug-98	1.20	6.00	1
MANCOZEB	27-Aug-98	22.80	19.00	3
MANCOZEB	29-Aug-98	35.37	39.00	7
MANCOZEB	31-Aug-98	2.40	2.00	1
MANCOZEB	2-Sep-98	1.20	1.00	1
MANCOZEB	4-Sep-98	2.16	1.80	1
MANCOZEB	5-Sep-98	1.20	4.00	1
MANCOZEB	9-Sep-98	24.84	25.70	5
MANCOZEB	10-Sep-98	2.88	2.40	1
MANCOZEB	12-Sep-98	1.44	1.20	1
MANEB	1-Aug-98	6.84	10.57	3
MANEB	3-Aug-98	30.00	20.00	1
MANEB	4-Aug-98	60.37	46.25	5
MANEB	5-Aug-98	310.59	57.07	7
MANEB	6-Aug-98	30.00	20.00	1
MANEB	8-Aug-98	72.75	54.50	4
MANEB	9-Aug-98	30.00	20.00	1
MANEB	10-Aug-98	39.00	26.00	2
MANEB	11-Aug-98	48.08	52.77	6
MANEB	12-Aug-98	11.06	34.50	2
MANEB	13-Aug-98	57.00	38.00	3
MANEB	14-Aug-98	54.75	38.70	4
MANEB	15-Aug-98	37.50	31.00	2
MANEB	17-Aug-98	15.00	10.00	1
MANEB	19-Aug-98	287.64	45.97	5
MANEB	20-Aug-98	102.00	68.00	5
MANEB	21-Aug-98	61.50	41.00	3
MANEB	22-Aug-98	58.50	45.00	5
MANEB	24-Aug-98	22.50	15.00	2
MANEB	25-Aug-98	97.50	65.00	4
MANEB	26-Aug-98	46.50	37.00	3
MANEB	27-Aug-98	82.80	55.20	4
MANEB	28-Aug-98	3.00	2.00	1
MANEB	29-Aug-98	2.53	18.00	1
MANEB	1-Sep-98	65.34	43.57	4
MANEB	3-Sep-98	52.50	41.00	3
MANEB	4-Sep-98	25.50	17.00	1
MANEB	5-Sep-98	15.00	10.00	1
MANEB	7-Sep-98	60.00	40.00	2
MANEB	8-Sep-98	80.65	71.97	6
MANEB	9-Sep-98	37.50	25.00	3
MANEB	10-Sep-98	85.13	62.75	6

Table 5. Pesticide use report information for the Lompoc area between August 1 - September 14, 1998.

CHEMICAL	DATE	POUNDS APPLIED	ACRES TREATED	NUMBER APPLICATIONS ON DATE
MANEB	12-Sep-98	74.25	49.50	3
MANEB	14-Sep-98	22.50	15.00	1
FOSETYL-AL	1-Aug-98	114.85	39.07	7
FOSETYL-AL	4-Aug-98	105.60	35.00	2
FOSETYL-AL	5-Aug-98	140.25	47.07	4
FOSETYL-AL	6-Aug-98	167.20	60.00	4
FOSETYL-AL	7-Aug-98	65.60	31.10	4
FOSETYL-AL	8-Aug-98	17.60	11.00	1
FOSETYL-AL	10-Aug-98	116.80	43.00	3
FOSETYL-AL	11-Aug-98	16.25	10.07	2
FOSETYL-AL	13-Aug-98	96.80	26.50	3
FOSETYL-AL	14-Aug-98	41.60	13.00	1
FOSETYL-AL	18-Aug-98	114.40	42.00	2
FOSETYL-AL	19-Aug-98	45.85	19.07	2
FOSETYL-AL	20-Aug-98	201.60	58.00	4
FOSETYL-AL	21-Aug-98	269.60	87.00	6
FOSETYL-AL	22-Aug-98	31.20	13.00	1
FOSETYL-AL	23-Aug-98	80.00	20.00	1
FOSETYL-AL	25-Aug-98	32.00	10.00	1
FOSETYL-AL	26-Aug-98	7.04	4.40	1
FOSETYL-AL	27-Aug-98	58.72	28.70	2
FOSETYL-AL	29-Aug-98	46.20	26.70	3
FOSETYL-AL	31-Aug-98	9.94	13.50	2
FOSETYL-AL	1-Sep-98	69.88	23.07	4
FOSETYL-AL	3-Sep-98	148.00	49.00	3
FOSETYL-AL	4-Sep-98	74.40	26.00	2
FOSETYL-AL	5-Sep-98	24.00	10.00	1
FOSETYL-AL	6-Sep-98	107.84	33.70	2
FOSETYL-AL	7-Sep-98	96.00	40.00	2
FOSETYL-AL	8-Sep-98	223.25	76.57	6
FOSETYL-AL	9-Sep-98	23.00	10.00	3
FOSETYL-AL	10-Sep-98	43.20	26.40	2
FOSETYL-AL	11-Sep-98	54.40	17.00	1

NO APPLICATIONS FOR
ALACHLOR
DISULFOTON
FENAMIPHOS
FONOFOS
METHYL BROMIDE

Table 6. Pesticide use report information for the Lompoc area by month. Data for December not yet processed. Data not validated.

	Amount Applied (pounds)											
Chemical	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	D
alachlor	0	0	0	0	977	120	0	0	0	0	0	
chlorothalonil	4	0.2	26	137	187	253	18	133	331	550	62	
chlorpyrifos	99	0	88	320	280	382	393	341	431	258	25	
cycloate	16	5	21	35	16	18	28	44	52	25	9	
diazinon	3	2	7	11	31	163	237	213	29	8	0	
dimethoate	0	0	23	100	77	48	110	51	58	70	2	
disulfoton	0	0	0	0	0	0	0	0	0	0	0	
fenamiphos	0	0	0	0	0	0	0	0	0	0	0	
fonofos	0	0	130	0	0	90	0	0	0	0	0	
mancozeb	2	2	7	45	173	237	116	114	156	73	66	
maneb	128	349	999	989	1347	1419	1232	1567	1158	454	0	
metam-sodium	11874	0	7145	3429	4750	0	0	1058	2619	2857	2984	
methyl bromide	0	0	0	0	0	0	0	0	0	0	0	
oxydemeton-methyl	12	4	23	76	90	102	657	153	152	52	15	
permethrin	18	11	90	98	273	352	283	212	258	231	13	
TOTAL	12156	373	8559	5240	8201	3184	3074	3886	5244	4578	3176	

QUALITY ASSURANCE

Standard quality control tests were conducted to determine the performance of the sampling and analytical methods. These tests indicate that precision and accuracy of the methods vary from chemical to chemical. In most cases recovery of spiked samples (samples containing a known amount of chemical) was greater than 100 percent. Results of the quality control tests have not been used to adjust the field sample results. Quality control results for methyl bromide, methyl isothiocyanate, and metals are not yet available.

Performance of the sampling and laboratory methods was measured in six parts. The first part consisted of determining the laboratory detection and quantitation limits. The method detection limit was measured for all parent compounds using the U.S. Environmental Protection Agency method (40 CFR, Part 136, Appendix B). Assuming the normal sampler air flow rates, the method detection limits ranged from 1 to 5 ng/m^3 for most of the targeted pesticides (Table 7). Limit of quantitation for methyl isothiocyanate was approximately 50 ng/m^3. No detection limit information is available yet for methyl bromide or the metals.

The second part for measuring method performance consisted of analyzing laboratory samples containing a known amount of pesticide (spiked samples) to check the precision and accuracy of the analytical method. Recoveries ranged from 93 to 143 percent (Table 8).

The third part consisted of passing air through spiked samples to check for breakthrough (pesticide passing through the sampling tube), transformations, precision, and accuracy associated with the sampling method. Recoveries from these trapping efficiency tests ranged from 78 to 133 percent (Table 9). The trapping efficiency tests also showed some conversion of the parent compounds to their oxygen analogs. This was verified with field spike samples (Table 10).

The fourth part consisted of testing for degradation of the pesticides while under storage. Spiked samples were stored under the same conditions as actual samples and analyzed 0, 15, and 30 days after spiking. Results show that only disulfoton had low recoveries after 30 days of storage (Table 11).

The fifth part consisted of precision of field samples by collecting duplicates. Differences between duplicate samples ranged from one to seven percent of the average concentration (Table 12).

The sixth part consisted of analyzing laboratory and field blanks to check for sampling and laboratory contamination. None of the blanks contained detectable amounts of pesticides.

Quality assurance personnel from ARB, DPR, and the U.S. Environmental Protection Agency conducted audits of the laboratories in December, 1998. Their report has not been completed.

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Table 7. Method detection limits and quantitation limits. The values shown here are nanograms (ng) pesticide per milliliter (ml) of sample extract. The normal sample extraction volume is 4.0 ml. The detection and quantitation limits in ng/sample are four times the values shown here.

	Number of Samples	Average Concentration (ng/ml)	Standard Deviation (ng/ml)	Method Detection Limit (ng/ml)	Estimated Quantitation Limit (ng/ml)
alachlor	8	32.9	4.70	14.1	70.5
chlorothalonil	8	33.9	2.99	8.95	44.7
chlorpyrifos	8	24.3	1.62	4.87	24.3
diazinon	8	19.5	1.81	5.44	27.2
dimethoate	8	21.4	1.72	5.16	25.8
disulfoton	8	26.8	1.63	4.89	24.5
fenamiphos	8	31.9	1.44	4.32	21.6
fonofos	8	16.3	1.68	5.03	25.1
oxydemeton-methyl	8	48.3	1.74	5.21	26.1
permethrin	8	32.0	3.07	9.21	46.1

Table 8. Summary of laboratory spike samples.

Chemical	Number of Samples	Average Recovery (%)	Standard Deviation (%)
alachlor	12	108	7
chlorothalonil	12	93	4
chlorpyrifos	12	123	16
diazinon	12	105	10
dimethoate	12	111	12
disulfoton	12	104	17
fenamiphos	12	125	18
fonofos	12	97	7
oxydemeton-methyl	12	143	29
permethrin	12	97	10

Table 9. Results of trapping efficiency tests.

Chemical	Number of Samples	Parent Spike Level (ng)	Average Parent Recovery (%)	Average Oxygen Analog Recovery (%)	Average Total Recovery (%)	Sta Dev of Rec
alachlor	3	500	121	na	121	
chlorothalonil	3	500	78	na	78	
chlorpyrifos	3	500	---	---	105[a]	
diazinon	3	500	98	19	117	
dimethoate	3	500	104	29	133	
disulfoton	3	500	84	na	84	
fenamiphos	3	500	96	na	96	
fonofos	3	500	73	29	102	
oxydemeton-methyl	3	500	110	na	109	
permethrin	3	500	110	na	110	

[a] chlorpyrifos and chlorpyrifos oxygen analog detected in the control sample, cannot determine relative proporti

Table 10. Results of field spikes. These samples contained a known amount of parent compou laboratory. Samples were taken to the field and handled identically to other samples.

Chemical	Number of Samples	Range of Parent Spike Level (ng)	Range of Parent Recovery (%)	Range of Oxygen Analog Recovery (%)	Range of Total Recovery (%)	Av T Rec (
alachlor	12	560 - 1130	78 - 124	na[a]	78 - 124	1
chlorothalonil	12	360 - 720	68 - 95	na	68 - 95	
chlorpyrifos	12	190 - 390	101 - 196	nd[b] - 63	90 - 259	1
diazinon	12	220 - 440	86 - 117	nd - 42	97 - 158	1
dimethoate	12	210 - 410	97 - 118	nd - 37	97 - 155	1
disulfoton	12	200 - 390	16 - 105	14 - 60	76 - 122	1
fenamiphos	12	170 - 340	98 - 132	na	98 - 132	1
fonofos	12	200 - 400	65 - 93	nd - 27	76 - 100	
oxydemeton-methyl	12	210 -420	106 - 151	na	106 - 151	1
permethrin	12	370 - 740	74 - 112	na	74 - 112	

[a] not applicable
[b] none detected, detection limit approximately 15%

Table 11. Results of storage stability tests. These samples contain a known amount of chemical and analyzed after storage under the same conditions as field samples.

Chemical	Number of Samples	Recovery After 0 Days of Storage (%)	Recovery After 15 Days of Storage (%)	Recovery After 30 Days of Storage (%)
alachlor	6	116	116	113
chlorothalonil	6	107	101	100
chlorpyrifos	6	105	126	93
diazinon	6	102	108	92
dimethoate	6	105	114	95
disulfoton	6	107	99	56
fenamiphos	6	114	108	90
fonofos	6	97	95	89
oxydemeton-methyl	6	112	108	99
permethrin	6	107	99	98

Table 12. Results of duplicate field samples. Twenty duplicate sets of samples were collected for each pesticide. Only duplicates for which at least one sample contained a quantifiable concentration are shown. The relative percent difference is a measure of the range of the concentration, expressed as a percentage of the mean concentration.

Chemical	Sample 1 (ng/m^3)	Sample 2 (ng/m^3)	Relative Percent Difference
chlorpyrifos	nd* (1 - 4)[a]	5.1	---
	4.8	nd* (1 - 4)	---
	31.2	35.8	6.8
	4.6	nd* (1 - 4)	---
	8.1	7.9	1.3
	6.9	6.7	1.5
	7.5	7.0	3.4
	28.5	26.0	4.6
chlorpyrifos OA	4.8	5.5	6.8
	nd (<4)[b]	4.1	---
cycloate	760	739	1.4

[a] nd* = possible detection with the possible concentration shown in parentheses

[b] nd = none detected with the possible concentration shown in parentheses