

State of California

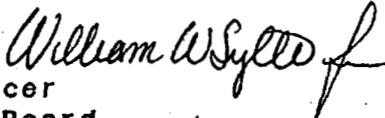
MEMORANDUM

To : Jack Parnell, Director
Department of Food and
Agriculture

Date : September 3, 1987

Subject : ARB Monitoring
of Methyl Bromide

James D. Boyd
Executive Officer



From : Air Resources Board

In response to your request of May 1, 1986 the ARB has conducted air monitoring for pesticidal uses of methyl bromide. This request was made by the Department of Food and Agriculture (DFA) pursuant to Division 7, Chapter 3, Article 1.5, Section 14021. The monitoring results and additional background information are included in the attachments to this memorandum.

The methyl bromide monitoring was conducted in Monterey County and in Stockton. A summary table of the monitoring results is presented in Attachment I. Several actions were taken to select possible sampling sites. These actions included numerous meetings with DFA staff, meetings with representatives of the Agricultural Commissioner's Offices of Monterey and San Joaquin Counties, and aerial and ground surveys of possible monitoring locations. A chronology of these events has been included as Attachment II.

Four locations in Monterey County were selected as sampling sites. A background site was selected at Monterey. Sampling was conducted four days each week from August 26 to September 18, 1986. Sampling was conducted to coincide with methyl bromide applications to strawberry fields for the control of nematodes. Sampling in Stockton was conducted at three locations from October 15 through October 24, 1986, coinciding with the use of methyl bromide as a fumigant at a walnut processing facility. The complete results of the monitoring and analysis are included in Attachment III. Quality assurance reports are contained in Attachment IV.

If you have questions regarding this submittal, please contact me at 5-4383 or have your staff contact Bill Loscutoff at 2-6023.

Attachments

cc: Dr. Michael Lipsett, DHS
Bill Loscutoff

Attachments to the Transmittal Memorandum on
Methyl Bromide Monitoring Data
August 1987

Attachment I:	Summary Table
Attachment II:	Chronology of Events
Attachment III:	UCD Report on Ambient Concentrations of Methyl Bromide
Attachment IV:	Quality Assurance Reports

Attachment I
Summary Table

Summary Table

Summary of Air Concentrations of Methyl Bromide
in Parts Per Billion Volume

(4-hour samples collected in September and October 1986)

Monitoring Site	Maximum Positive ^a	Second Highest Positive ^a	Average All Samples above MDL	Total # of Samples	# Above MDL ^b
Aromas	~MDL	~MDL	<MDL	48	2
Elkhorn	<MDL	<MDL	<MDL	46	0
Flea Market	<MDL	<MDL	<MDL	48	0
M. P. Hospital	<MDL	<MDL	<MDL	42	0
Fennell Farms ^c					
Site A	210	52	76.8	22	8
Site B	900	280	111	38	25
Site C	530	110	59.4	36	20
Stockton	1.6	0.92	1.0	87	3

^aAverage of two replicates, rounded to two significant figures.

^bMDL = minimum detection limit (1.1 ppb; 0.5 ppb for Stockton samples).

^cSites A-C were adjacent to a strawberry field application.

Attachment II
Chronology of Events

Methyl Bromide Monitoring
Chronology of Major Events

<u>Date</u>	<u>Event</u>
May 1, 1986	DFA requests ARB to monitor methyl bromide.
July 10, 1986	ARB staff meets with representatives of UCD, Monterey Bay Unified APCD, and Monterey County Agricultural Commissioner's Office regarding methyl bromide use and sampling locations.
August 13, 1986	UCD submits draft work plan for methyl bromide sampling and analysis.
August 22, 1986	ARB staff discusses Stockton walnut enclosure fumigations with San Joaquin County Agricultural Commissioner's Office.
August 23, 1986	UCD submits modified work plan.
August 26 - September 18, 1986	Sampling is conducted at Monterey County sites.
October 15 - October 24, 1986	Sampling is conducted at Stockton sites.
June 1987	UCD submits draft report to ARB.
August 1987	ARB transmits results of methyl bromide monitoring to DFA.

Attachment III

UCD Report on Ambient Concentrations
of Methyl Bromide

Final Report to the Air Resources Board

Pilot Analysis of Methyl Bromide in Air

Contract # A5-169-43

Date: August 6, 1987

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Contents

Table of Contents	ii
List of Tables	iii
List of Figures	iv
Summary	1
Introduction	4
Experimental	6
Site Selection and Sampling	6
Ambient Sites	6
Sampling	6
Application Site	7
Sample Coding	11
Analysis and Quality Control	12
Analytical Apparatus	12
Sample Preparation	12
Analysis	14
Results	15
Analysis and Quality Control	15
Field Samples	21
Literature Cited	38
Acknowledgments	39
Appendix	40
Meteorological Data at the Flea Market	41
Wind Direction at the Flea Market	42
Air Temperature at the Flea Market	43
Windspeed at the Flea Market	44
Stockton Samples	45

List of Tables

Table 1. Summary of Air Concentrations of Methyl Bromide in Parts Per Billion Volume	3
Table 2. List of Equipment for Field Work	8
Table 3. Recovery of Methyl Bromide From Spiked Air	20
Table 4. Number of 4-hour Sampling Periods for Methyl Bromide . .	23
Table 5. Methyl Bromide Ambient Sites Results	24
Table 6. Fennell Farms Methyl Bromide Results	29
Table 7. Methyl Bromide Results for Collocated Samples at the Fennell Farms Application Site	32
Table 8. Methyl Bromide at Fennell Farms Application Site (Average Values)	34
Table 9. Precision for Collocated Samples at Fennell Farms	36

List of Figures

Figure 1.	Map of the Sampling Locations in Monterey	2
Figure 2.	Charcoal Air Sampling Tube	9
Figure 3.	Map of Fennell Farms Application Site on Rive Road . . .	10
Figure 4.	Configuration of GC for Methyl Bromide Analysis by Headspace Sampling	13
Figure 5.	Headspace Gas Chromatograms of Methyl Bromide on Charcoal	18
Figure 6.	Standard Curve for Methyl Bromide Spiked to Charcoal . .	19

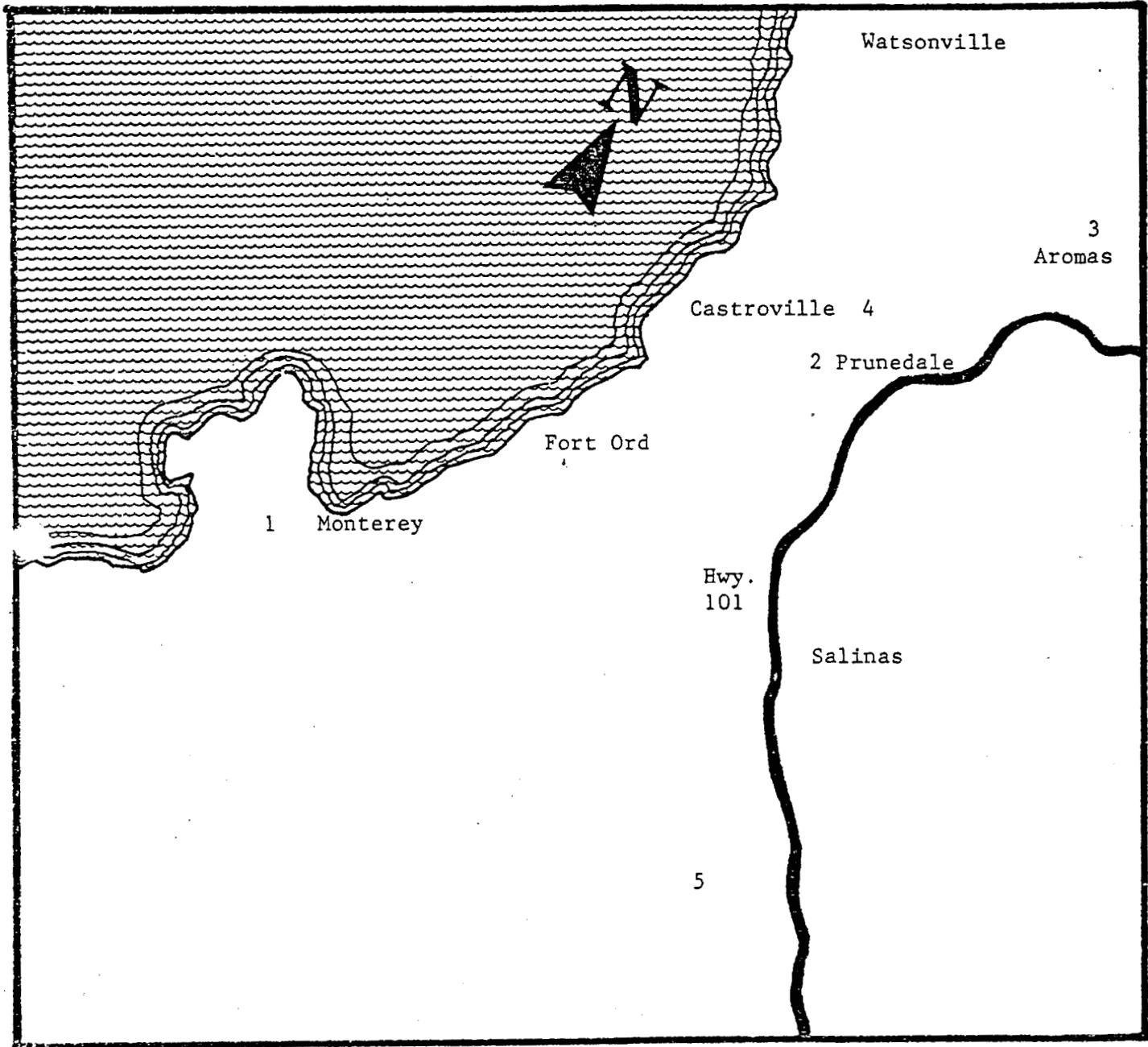
Summary

Air sampling for methyl bromide was conducted during August and September 1986 at three locations in Monterey County (Figure 1), at Aromas, Elkhorn and The Old Corral Flea Market (on Highway 156 between Highway 101 and Castroville). A background site was established at the Monterey Peninsula Hospital in the city of Monterey. Samples were also collected at an application site located at Fennell Farms on River Road south of Salinas prior to, during and four days after the application of methyl bromide to strawberry fields.

Three sites at or near an enclosure fumigation facility in Stockton were utilized to monitor airborne methyl bromide by ARB personnel for a two week period in October 1986. Samples were analyzed by UCD.

The samples were collected in charcoal tubes and analyzed by a head-space gas chromatographic method. Table 1 has the summary of results. The highest concentrations of methyl bromide (900 parts per billion) were found at the Fennell Farms application site; the average of all samples at this site was 90 ppb. There were only a few samples that gave positive responses at or above the minimum detection limit (MDL) of 1.1 ppb ($4.2 \mu\text{g}/\text{m}^3$) at other Monterey County sites or at the Stockton sites.

Figure 1. Map of Sampling Locations in Monterey County.



Scale

← 5 Miles →

Monitoring Sites

- 1 Background
- 2 Old Corral Flea Market
- 3 Aromas School
- 4 Elkhorn School
- 5 Application Sites

**Table 1. Summary of Air Concentrations of Methyl Bromide
in Parts Per Billion Volume**

	Maximum Positive ^a	Second Highest Positive ^a	Average All Samples above MDL	Total # of Samples	# Above MDL ^b
Aromas	~MDL	~MDL	<MDL	48	2
Elkhorn	<MDL	<MDL	<MDL	46	0
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^aAverage of two replicates, rounded to two significant figures.

^bMDL = minimum detection limit (1.1 ppb; 0.5 ppb for Stockton samples).

Introduction

Methyl bromide is extensively used in agriculture (4×10^6 Kg for 1985 in California alone, [1]) as a fumigant to control nematodes, weeds, and fungi in soil and insect pests in harvested grains and nuts. Given its low boiling point (3.8°C) and high vapor pressure ($\sim 1,400$ torr at 20°C), methyl bromide will readily diffuse if not rigorously contained. When used as a soil fumigant, where the material is injected into the soil and immediately covered with a plastic tarp, significant amounts may escape [2,3]; subsequent tarp removal may result in further releases to the atmosphere. The time-weighted average (8 hr/day, 40 hr/wk) threshold limit value for methyl bromide in air is 5 ppm (≈ 20 mg/m³) [4]. A simple and fast, yet accurate, method was needed to determine environmental exposure to methyl bromide at levels well below the TLV. Although several methods of sampling and analysis for methyl bromide are reported in the literature [5-9], none fulfilled the requirements for detection limits and sample throughput of this project.

In this study low volume (0.1 L/min) ambient air samples were collected in Monterey County for methyl bromide analysis at three sites plus a background site. Also, an application site was monitored prior to, during, and four days following completion of the application. Ambient air samples were taken over a four week period from August 26 to September 18, 1986.

Methyl bromide was monitored for a two week period at a fumigation site conducted at an enclosure fumigation facility in Stockton. Air Resources Board personnel monitored at one site on the premises and at two off-site locations. Analysis of samples was performed by UCD personnel using a head-space gas chromatographic method developed for the purpose of this pilot surveillance project.

Chloropicrin samples were also collected at each site and will be the subject of a separate report.

Experimental

Site Selection and Sampling

Ambient Sites

Three sites were selected in Monterey County. Roof tops of the elementary schools in Aromas and Elkhorn were utilized. The roof top of the Old Corral Flea Market located on Highway 156 approximately two miles west of highway 101 was the third site.

Background samples were collected at the Monterey Peninsula Hospital. The criterion for the background site was for it to be the same distance from the ocean as was the nearest sampling site. It was thought that the ocean may have naturally occurring methyl bromide that could interfere with the sampling at sites located near the ocean.

Sampling

Three replicates were collected at the Flea Market site; two replicate samples were taken at the other sites. Replicate samples were taken two meters apart and 1.67 meters above the roof top. One sampler was marked "A" and designated as the primary sample (as per ARB protocol) while the "B" sampler was the replicate. The samplers were connected to high volume sampling pumps via 3/8 inch Tygon tubing and a "T" open to the air. The "T" was needed to step down to the desired flow rate for methyl bromide or chloropicrin. The flow rates were regulated by inline flow meters with valves or by pinch clamps on the open end of the "T". Flow rates were measured by attaching flow meters to the top (open) end of each sampler at the beginning and the end of the sampling period. Each site met the ARB siting criteria and passed the ARB site audit performed on September 3, 1986. Trapping studies,

94.8 lbs
194.3

completed prior to any sampling, showed that the maximum sampling period without breakthrough was 4 hrs with a flow rate of 0.1 LPM for methyl bromide. A listing of sources of equipment and supplies used for field sampling is in Table 2.

Methyl bromide samples consisted of three SKC prepacked charcoal tubes connected in series. Each tube contained about 3 ml of charcoal (Figure 2). The top two tubes were the primary trap while the bottom tube was the backup. The tubes were connected by 3/8 inch Tygon tubing. The entire "sample" was wrapped in aluminum foil to prevent sunlight from striking the tubes and thus heating them or causing photodegradation. After sampling was completed the tubes were frozen (-20°C) until analyzed.

Application Site

Samplers were located upwind and downwind of a field prior to application of methyl bromide (Figure 3). Three sampling sites were set out during and following application. Site A was located ca. 275 m on the northwest side near a migrant trailer housing. Sites B and C were located on the southeast side 67 m and 175 m meters, respectively, from the edge of the field. Battery-powered personnel air samplers were used exclusively at site A (the expected upwind site). Sites B and C were powered by gasoline generators. The prevailing wind was from the northwest.

The wind patterns changed during the day with the wind coming from the southeast during the early to midmorning, then changing direction and becoming very strong out of the northwest during the late afternoon. Thus, site A was the downwind site in the morning and the upwind site during the afternoon.

Application was started at 6:30 a.m. on September 11 but only one third of the field was fumigated due to high wind conditions. The application was

Table 2. List of Equipment for Field Work

1. Wind Profile Register system, Model 104-LED-LM-DC CWT-1791, Thornwaite and Associates, Elmer, NJ
2. Microdatalogger, Model CR-21X, Campbell Scientific, Logan, UT
3. Temperature probe, Model 107, Campbell Scientific, Logan, UT
4. High Volume air samplers, Model U-1/AT, BGI, Inc., Waltham, MA
5. High volume air sampler, Bendix Co., Baltimore, MD
6. Charcoal Tubes, Cat. #226-09, SKC Inc., Eighty Four, PA.
7. Methanol, Acetone, Resi-Grade, Baker Chemical Co.
8. Rotameter, Model VFA 21, Dwyer Instruments, Inc., Michigan City, IN.
9. Battery powered low volume pumps.

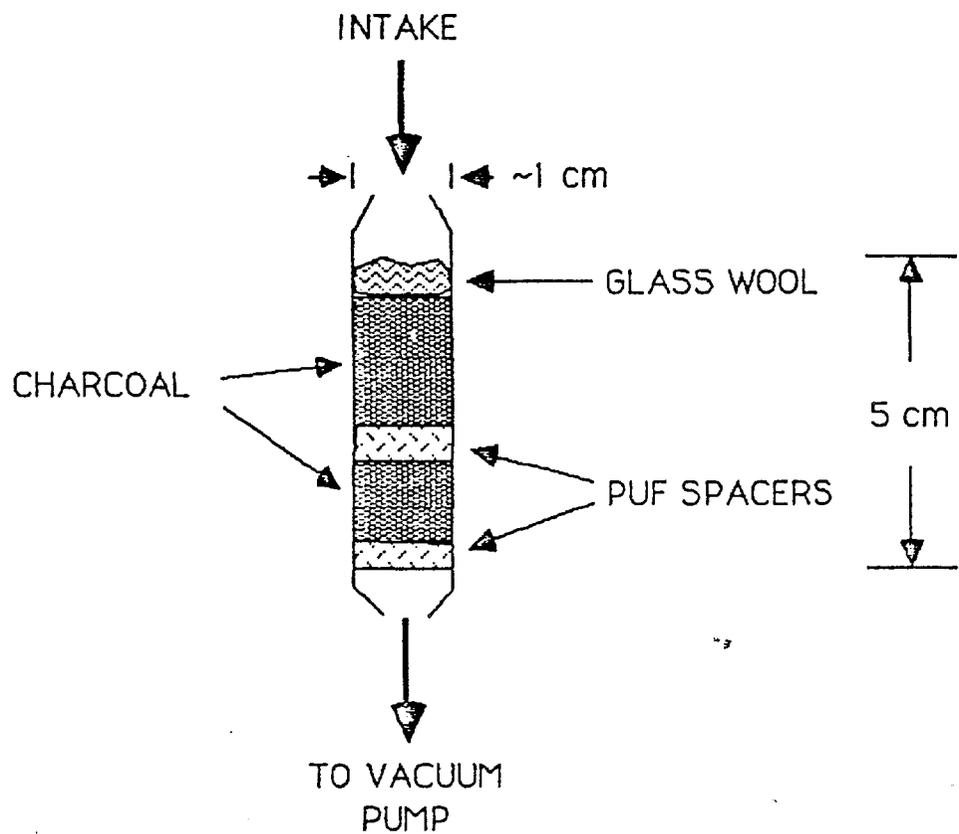
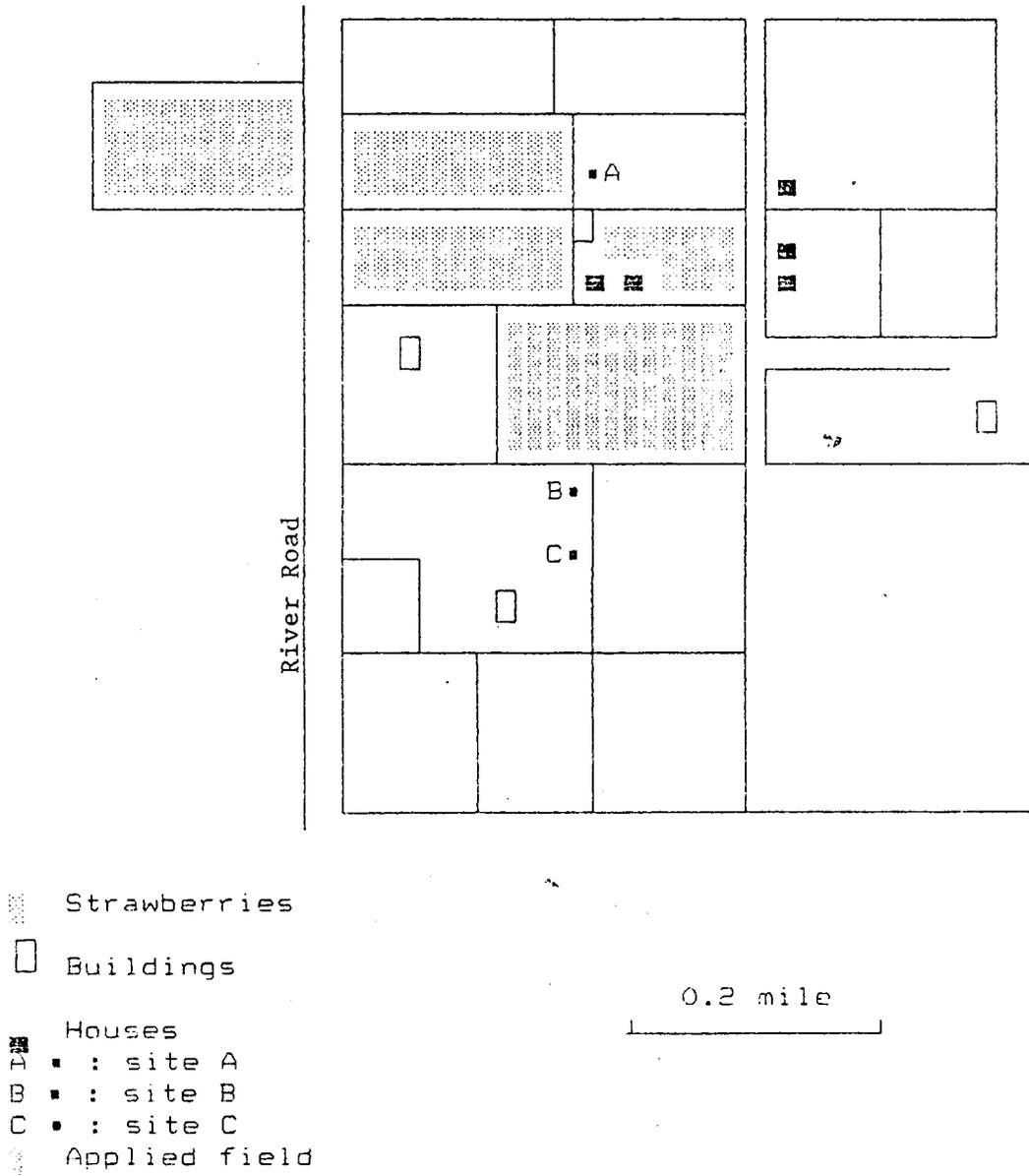


Figure 2 Charcoal Air Sampling Tube.

Figure 3. MAP OF FENNEL FIELDS APPLICATION SITE ON RIVER ROAD



completed on September 12. The field was tarped until the morning of September 15 when the tarp from one-third of the field was removed. The rest of the tarp was removed over the next two days.

Sampling was done on this field the day before the application began and for two 4-hour periods during the first day of application and for three 3-hour periods during the second day of application. Two 4-hour samples were collected while the field was tarped and for four 4-hour periods on the 15th, the first day that one third of the tarps were removed.

Sample Coding

Samples were coded in the following manner: The first number refers to the month of the year and the next one or two, depending on the date, refers to the day of the month. The letter refers to the site where the sample was taken: A, Aromas Elementary School; E, Elkhorn Elementary School; FM, Old Corral Flea Market; M, Monterey Peninsula Hospital. The next number is the period (either 1 or 2) and the letter following indicates whether the sample is from the "A" or "B" sampler. The charcoal tubes also have an additional letter to indicate whether the tube was a primary or a backup (a "p" or a "b"). If the tube was a primary, then there is an "a" or a "b" to indicate the tube location (the "a" tube was at the top while the "b" tube was in the middle above the backup tube). Therefore, 827M2A pb indicates that the sample was taken on August 27 at Monterey Peninsula Hospital and that it was the second sampling period on that day from the "A" sampling site. Also it was the second part of the primary trap.

The application site had the same coding system with the exception that the letter following the sampling period designated the site (A, B or C) then the sample (A or B).

Analysis and Quality Control

Analytical Apparatus

A Perkin-Elmer Model Sigma 2000 gas chromatograph coupled to a Model HS-100 auto sampler was used to analyze the methyl bromide samples. The instrument was modified so that the carrier gas entered the system at the head of the column, with a fraction flowing through the transfer line, in order that flow could be maintained during vial pressurization and headspace sampling (Figure 4). The pressurization and carrier gases had separate sources and pressure controls. In the usual configuration supplied by the manufacturer, carrier gas flows through the transfer line and then through the gas chromatographic column. With this configuration, the carrier gas flow is interrupted during vial pressurization and headspace sampling.

Sample Preparation--Quality Control

To test trapping efficiency, glass tubes filled with about 3 mL charcoal each (Figure 2) were either spiked directly with 0.05-100 µg methyl bromide (Matheson, East Rutherford, NJ) or were used to adsorb the compound from an air stream. In the latter case, two tubes were connected in series to form a sampling train and the intake glass wool was spiked with 3 µg and 10 µg methyl bromide in separate tests to determine trapping efficiency. The sampling train was connected via a manifold to a modified AC-powered high-volume air sampler [10] which pulled air at 0.1 LPM through the charcoal tubes for 4 hrs.

Methyl bromide standards were prepared by spiking the condensed material to pre-weighed, Teflon® septum-sealed vials containing hexane ('Resi-Analyzed'®, J.T. Baker Chemical Co., Phillipsburg, NJ). The pure methyl bromide was contained in a lecture bottle equipped with a needle valve. The

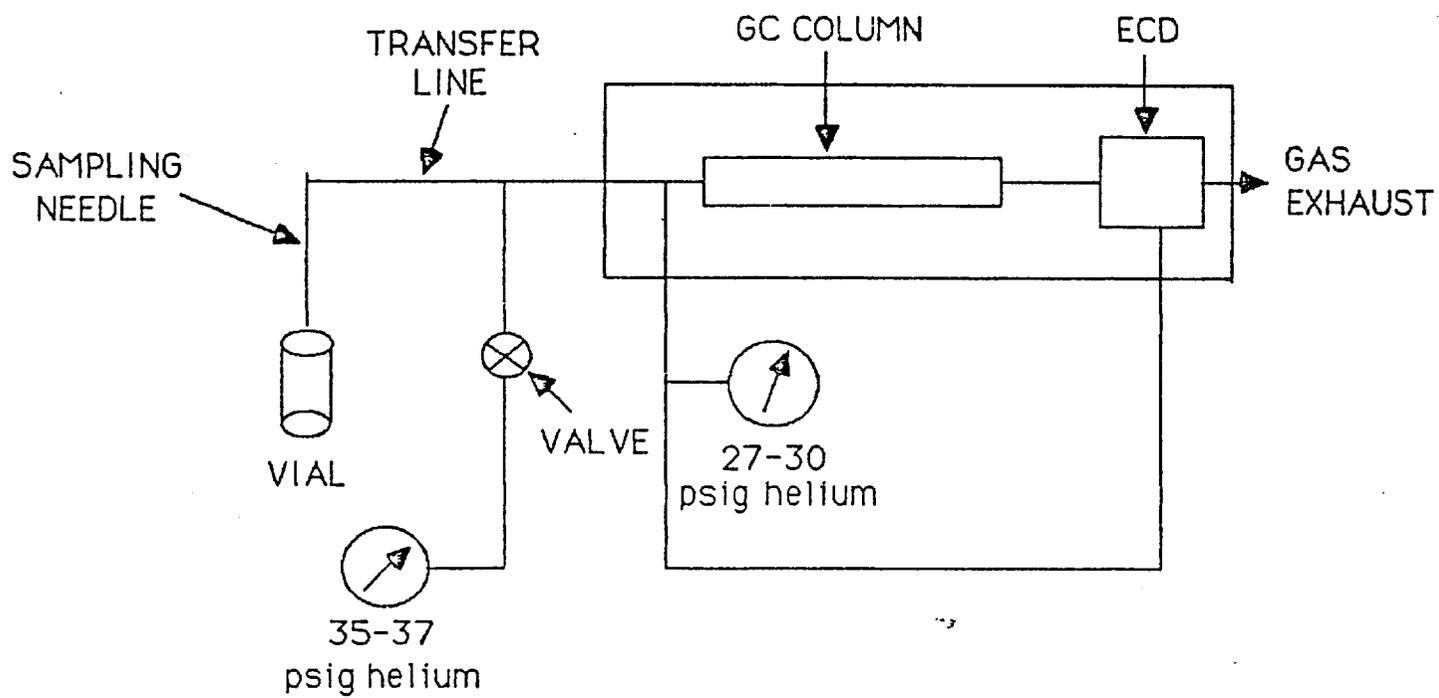


Figure 4 Configuration of GC for Methyl Bromide Analysis by Headspace Sampling

material was recovered by inverting the bottle and opening the valve just enough to allow 1-2 mL of the liquid to empty into a glass vial chilled to dry-ice temperature (-78.5°C). A gas-tight syringe (Hamilton Co., Reno, NV) chilled to the same temperature was used to transfer ~23 µL to the pre-weighed, sealed vial containing 3.5 mL hexane from which about 0.7 mL headspace had been evacuated with a gas-tight syringe. The vial was weighed again and additional hexane was injected into the vial to adjust the methyl bromide concentration to 10 µg/µL. After preparation, the standard was stored in a freezer (-10°C) and replaced with a fresh standard every 1-2 weeks. Aliquots for spiking were removed through the septum using a gas-tight syringe.

Analysis

The contents up to, but not including, the last polyurethane foam (PUF) spacer (Figure 2) of each charcoal-filled air sampling tube were emptied into separate 22 mL glass headspace vials (Perkin-Elmer, Norwalk, CT), which were immediately sealed with Teflon[®]-coated septa. Approximately 2.8 mL of air was evacuated from each vial using a gas-tight syringe and replaced with 2.8 mL benzyl alcohol ('AR' grade; Mallinckrodt Chemical Works, St. Louis, MO, purified by distillation before use). The samples were then thermostatted at 110°C for 15 min in the headspace apparatus, pressurized with nitrogen to 35-37 psig for 0.5 min, and the equilibrated headspace sampled for 0.3 min.

Gas chromatography was accomplished using a 1.8m x 0.32cm (OD) stainless steel column packed with 100/120 mesh Porapak Q (Supelco, Bellefonte, PA) at 140°C and a ⁶³Ni electron-capture detector at 300°C. Carrier and make-up gas (both nitrogen) flows were 20 and 40 mL/min, respectively. The nitrogen source was set at 27-30 psig. Quantitation was done by comparing peak heights

with those of standard injections. Peak heights were measured using a Perkin-Elmer Model LCI-100 computing integrator programmed to integrate peaks valley-to-valley.

Results

Analysis and Quality Control

Sampling of equilibrated headspace is well suited to the determination of volatile analytes in a low volatility matrix. The vapor above the liquid extract should be enriched only in those compounds whose high vapor pressure and low solubility in the extracting solvent would favor the vapor phase. Because of this, a gas chromatogram of the vapor should be relatively "clean" compared to a chromatogram of the liquid extract. Furthermore, careful choice of a high boiling extracting solvent would virtually eliminate the large solvent response common with techniques that include direct liquid solvent injection. We chose benzyl alcohol as the desorbing solvent because of its boiling point ($\sim 205^{\circ}\text{C}$) and its ability to quantitatively remove methyl bromide from charcoal; methyl bromide vapor density was the same for equivalent spikes to charcoal, subsequently desorbed with benzyl alcohol, and benzyl alcohol without charcoal.

The headspace sampler used in this study was a programmable multisampling system composed of a pneumatically operated injection system, a thermostatted sample vial carousel, and an electronically controlled sample magazine. Sampling is based on a pneumatic balanced pressure principle [11] which avoids the disadvantages associated with gas syringes, such as change of partial pressures of the volatiles due to reduced pressure in the syringe. Briefly, the septum of the thermostatted sample is pierced by the hollow sampling needle, the vial is pressurized, and then, through automatic valve switching,

an aliquot of the headspace is injected onto the column using the vial pressure as the driving force. After sampling, the vial pressure is vented and the vial is returned to the sample magazine. The instrument is programmed to allow for the various steps from loading the sample in the carousel to sampling the headspace so that there is no delay time from vial to vial.

Instrument configuration shown in Figure 4 was crucial for the success of the method. The instrument was designed originally to be used primarily with a capillary column, through which carrier gas flow represents only ~2% of the total gas flow through the detector compared to over 30% through the packed column used in this study. A brief disruption (<1 min) of the carrier gas flow through the packed column resulted in an increased base line frequency in the electron-capture detector that required more than ten minutes to recover after carrier gas flow was resumed. This was unacceptable since methyl bromide retention time was only about seven minutes. Maintaining carrier gas flow through the column and detector during vial pressurization and headspace sampling minimally disrupted the detector, which consistently recovered quickly allowing quantitation of the analyte.

Under optimum operating conditions, the detection limit was 50 ng methyl bromide spiked to charcoal (equivalent to 0.5 ppb in air when sampled at 0.1 LPM for 4 hrs). This limit was partly due to the fact that for a desorbed and equilibrated sample, only about 10% of the spiked material was present in the vapor. The volume of headspace (i.e., the amount of analyte) sampled (v , mL) during the injection time (t , min) was estimated from the measured flow (q , mL/min) through the column and a pressure ratio ($[P_v - P_c] / \Delta P_c$) that accounts for the difference in pressure between the vial (P_v) and the column head (P_c) and the column pressure drop (ΔP_c):

$$v = (qt) \left([P_v - P_c] / \Delta P_c \right).$$

Given a column flow of 20 mL/min and the ranges of pressures for the vial and column head noted earlier, volume of headspace injected was typically 1-2 mL. This meant that for the 50 ng methyl bromide spike (0.263 ng/mL vapor in the vial), minimum detection was represented to 263-526 pg reaching the EC detector. The practical MDL for field samples was set at 1.1 ppb.

Typical chromatograms of standard injections are shown in Figure 5. The early off-scale detector response was partly due to vial pressurization and sample injection and partly to the presence of oxygen and other volatiles in the injected vapor sample. It must be emphasized at this point that the instrument was operated at the detection limit sensitivity. This was done to accommodate environmental samples that could have any amount of methyl bromide above the detection limit; an electronic integrator was used so that off-scale responses could be easily quantitated. The two peaks mid-way through the chromatogram were derived from the septum; these peaks appeared for empty vials as well and reduced thermostating time led to decreased peak size. Because of these peaks and an occasional later eluting peak, chromatograms were allowed to develop for 30 min, with 32 min representing the total time elapsed from one injection to the next. This meant that it was possible to analyze 45 samples in a 24 hr period. Detector linearity was at least three orders of magnitude (0.1 to 100 μ g on charcoal, Figure 6) allowing quantitation of widely varying sample concentrations with a minimum number of standard injections. Furthermore, standards run at the beginning and end of a sample set were the same, indicating that desorbed samples in the presence of charcoal and benzyl alcohol were stable over at least a 24 hr period.

Results for the spiked air sampling tests are summarized in Table 3. Air temperature varied between 21°C and 29°C for the 10 μ g spike and remained at 30°C for the 3 μ g spike. While overall recovery was satisfactory (average of

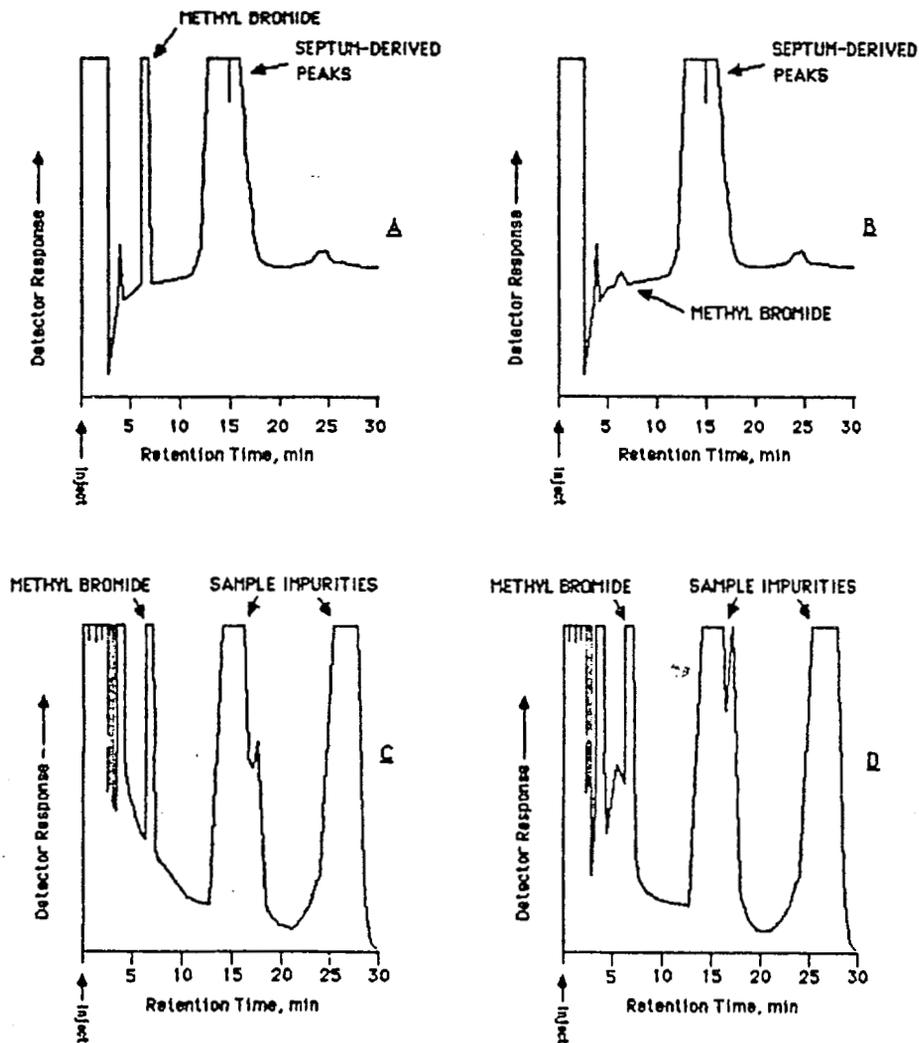


Figure 5 Headspace Gas Chromatograms of Methyl Bromide on Charcoal (A=10 µg, B=0.05 µg spikes; C=4.2 µg, 175m, tarp in place; D=4.7 µg, 64m, tarp removal) (Attn: 2x).

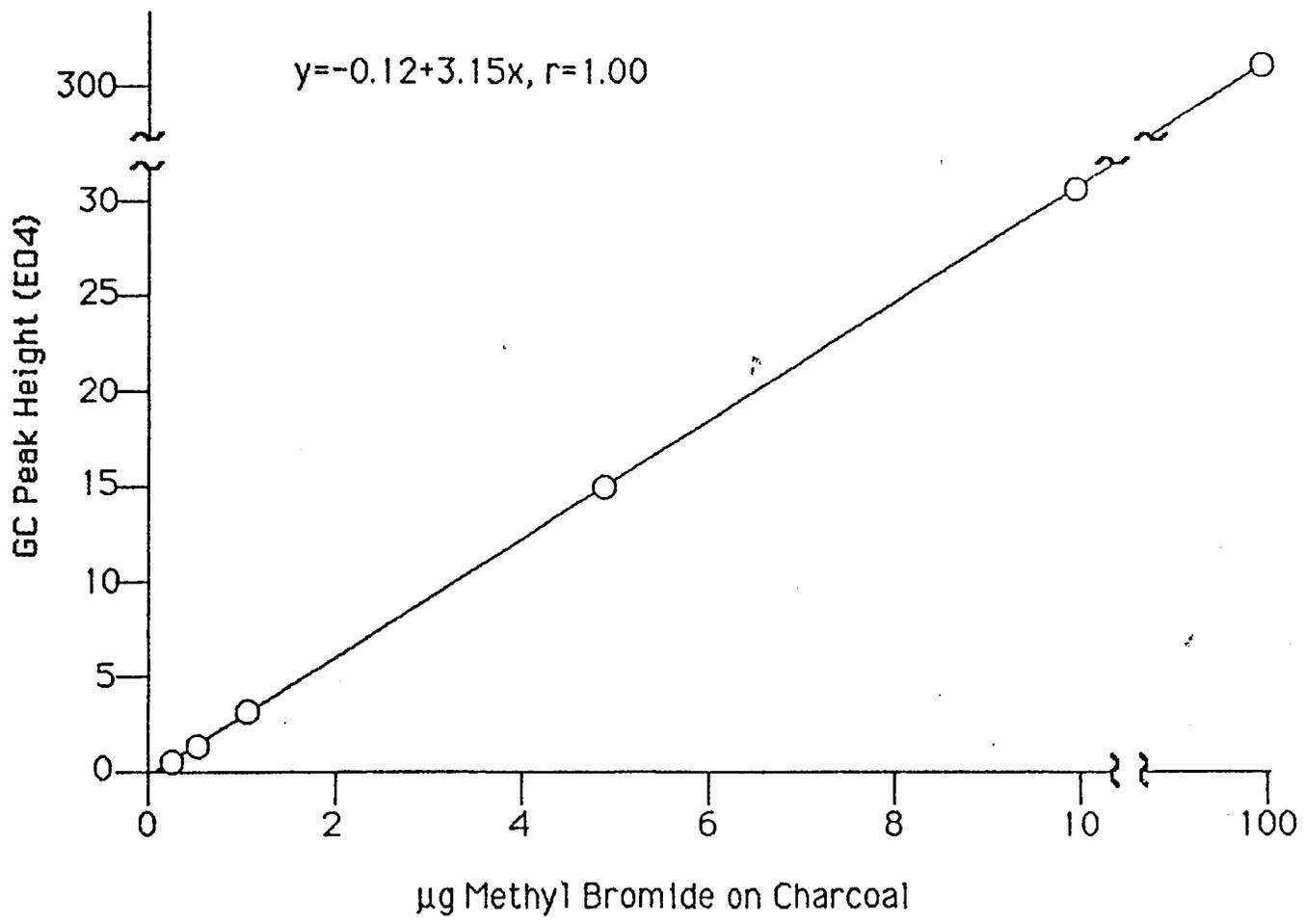


Figure 6 Standard Curve for Methyl Bromide Spiked to Charcoal

Table 3. Recovery of Methyl Bromide from Spiked Air

Tube	Percent Recovered by Charcoal ^a	
	3 g ^b	10 g ^b
Front	37/39	31/33
Back	37/34	63/58
Total	74/73	94/91

^aResults for duplicate tests (0.1 LPM for 4 hrs).

^bAmount spiked to glass wool.

92.2%, 10 µg; 73.5%, 3 µg), significant breakthrough to the second tube occurred in both cases (average of 60.4%, 10 µg; 35.5%, 3 µg). Recovery was quantitative (>95%) for tubes spiked directly with 10 µg and 3 µg standard and analyzed immediately.

A flow rate of 0.1 LPM and a sampling time of 4 hrs (24 L total air), used in the above recovery tests, were conditions adopted as part of the sampling protocol for monitoring outdoor air concentrations of methyl bromide. As a result of the outcome of the spiked air sampling tests, which showed significant breakthrough to the second charcoal tube, the sampling train used in the field study consisted of three charcoal-filled tubes in series. The first two tubes were used to determine the amount of methyl bromide in air. The third tube was a back-up to determine whether breakthrough occurred. If at least 25% of the total trapped material appeared in the back-up tube, then the concentration in air would be reported as a "greater than" number.

Essentially all of the methyl bromide was trapped, in the first tube. The good recovery was partly due to a relatively low field air temperature (~16°C) compared to the spiked recovery studies (21-30°C). Chromatograms comparing air samples with standards (Figure 5) indicated that they were qualitatively the same and that potential interfering peaks were not present in the vapor of the desorbed air sample.

Field Samples

Table 4 summarizes the field samples collected. Table 5 contains the air flow, period and micrograms of methyl bromide found at the ambient sites. Only two samples, both from the Aromas site on August 26 and 27, showed positive responses near the MDL (1.1 ppb or 4.2 µg/m³) at the ambient sites. It should be noted that an estimated 30 acres of strawberries, located

approximately 0.25 mile upwind from the Aromas sampling site, were tarped during the first week of sampling.

The concentrations of methyl bromide were highest at the application site (Table 6). Site A, the station where the battery driven personal samplers were employed, had a greater variance between replicates when compared to site B and C (Table 6-8). This could be explained by the error in total air flow. The total air flow was low in some samples. Air flows were measured at the beginning and the end of each period. The flows were adjusted to 100 ml/min at the beginning of each period. However, the flow rates, in some cases, dropped to less than 50 ml/min when the final flows were read. Thus, site "A" total volume was probably greater than was recorded. The total volume should be approximately 15 liters. However, some volumes at site A were as low as 3 liters, which could be close to a factor of five in error. The highest average concentration (900 ppb) occurred at site B during the second day of application. The concentration at site C reached 530 ppb while site A, the site northwest of the treated area, yielded a concentration of 210 $\mu\text{g}/\text{m}^3$ on the second day of application. Within 15 days after application air concentrations of methyl bromide were negligible.

Table 9 contains the calculated data precision of the collocated samplers. The precision was calculated from the following equation:

$$P = [Y - (Y + X)/2]/X \times 100$$

where P is the calculated data precision; Y is the concentration from duplicate sampler of collocated pair; X is the concentration from primary sampler of collocated pair. Precision for the entire data set ranged from -48.1% to 68.3%.

Table 4. NUMBER OF 4-HOUR SAMPLING PERIODS FOR METHYL BROMIDE

DATE	<u>STATIONARY SITES</u>				<u>FENNELL FARMS</u>		
	A	E	FM	M	a	b	c
8/26	1	1	-	-	-	-	-
8/27	1	1	1	2	-	-	-
8/28	2	2	2	2	-	-	-
8/29	2	2	2	2	-	-	-
9/2	2	2	2	2	-	-	-
9/3	2	2	2	1	-	-	-
9/4	2	2	2	2	-	-	-
9/5	2	2	2	2	-	-	-
9/8	2	2	2	2	-	-	-
9/9	2	2	2	2	-	-	-
9/10	2	2	2	2	-	1	-
9/11	1	1	1	1	1	2	1
9/12	-	-	-	-	2	3	3
9/13	-	-	-	-	-	2	2
9/14	-	-	-	-	1	2	2
9/15	1	1	1	1	2	4	4
9/16	-	1	1	-	2	3	3
9/17	1	-	1	-	1	2	2
9/18	1	-	1	-	1	1	1

A: Aromas E: Elkhorn FM: flea market M: Monterey

a: Fennell Farms site A b: Fennell Farms site B
c: Fennell Farms site C

Table 5.

METHYL BROMIDE AMBIENT SITES RESULTS

SAMPLE ID	DATE	TIME ON	TIME OFF	AIR FLOW (lpm)	PERIOD (min)	MeBr PRIMARY Hg	
						A	B
826E1A	8/26/86	10:10	14:25	0.07	255.00	<0.05	<0.05
826E1B	8/26/86	10:10	14:25	0.08	255.00	<0.05	<0.05
826A1A	8/26/86	12:24	16:10	0.07	226.00	<0.05	<0.05
826A1B	8/26/86	12:24	16:10	0.07	226.00	0.06	<0.05
827M1A	8/27/86	9:04	13:03	0.08	239.00	<0.05	<0.05
827M1B	8/27/86	9:04	13:03	0.07	239.00	<0.05	<0.05
827E1A	8/27/86	9:57	14:13	0.08	256.00	<0.05	<0.05
827E1B	8/27/86	9:57	14:13	0.08	256.00	<0.05	<0.05
827A1A	8/27/86	10:37	14:54	0.08	257.00	<0.05	0.09
827A1B	8/27/86	10:37	14:54	0.08	257.00	<0.05	<0.05
827FM1A	8/27/86	11:45	16:17	0.05	272.00	<0.05	<0.05
827FM1B	8/27/86	11:45	16:17	0.05	272.00	<0.05	<0.05
827FM1C	8/27/86	11:45	16:17	0.05	272.00	<0.05	<0.05
827M2A	8/27/86	13:28	16:54	0.07	206.00	<0.05	<0.05
827M2B	8/27/86	13:28	16:54	0.08	206.00	<0.05	<0.05
828A1A	8/28/86	6:49	10:35	0.08	226.00	<0.05	<0.05
828A1B	8/28/86	6:49	10:35	0.08	226.00	<0.05	<0.05
828E1A	8/28/86	7:47	11:56	0.08	249.00	<0.05	<0.05
828E1B	8/28/86	7:47	11:56	0.08	249.00	<0.05	<0.05
828FM1A	8/28/86	7:25	11:18	0.07	233.00	<0.05	<0.05
828FM1B	8/28/86	7:25	11:18	0.07	233.00	<0.05	<0.05
828FM1C	8/28/86	7:25	11:18	0.07	233.00	<0.05	<0.05
828M1A	8/28/86	8:41	12:48	0.08	247.00	<0.05	<0.05
828M1E	8/28/86	8:41	12:48	0.08	247.00	<0.05	<0.05
828A2A	8/28/86	10:46	15:01	0.07	255.00	<0.05	<0.05
828A2B	8/28/86	10:46	15:01	0.07	255.00	<0.05	<0.05
828E2A	8/28/86	12:08	15:43	0.08	215.00	<0.05	<0.05
828E2B	8/28/86	12:08	15:43	0.08	215.00	<0.05	<0.05
828FM2A	8/28/86	11:37	16:23	0.08	286.00	<0.05	<0.05
828FM2B	8/28/86	11:37	16:23	0.08	286.00	<0.05	<0.05
828FM2C	8/28/86	11:37	16:23	0.07	286.00	<0.05	<0.05
828M2A	8/28/86	13:01	17:29	0.08	268.00	<0.05	<0.05
828M2B	8/28/86	13:01	17:29	0.07	268.00	<0.05	<0.05
829A1A	8/29/86	6:37	10:32	0.07	235.00	<0.05	<0.05
829A1B	8/29/86	6:37	10:32	0.07	235.00	<0.05	<0.05
829FM1A	8/29/86	7:12	11:12	0.07	240.00	<0.05	<0.05
829FM1B	8/29/86	7:12	11:12	0.08	240.00	<0.05	<0.05
829FM1C	8/29/86	7:12	11:12	0.08	240.00	<0.05	<0.05
829E1A	8/29/86	7:38	11:48	0.09	250.00	<0.05	<0.05
829E1B	8/29/86	7:38	11:48	0.08	250.00	<0.05	<0.05
829M1A	8/29/86	8:22	12:40	0.08	258.00	<0.05	<0.05
829M1B	8/29/86	8:22	12:40	0.08	258.00	<0.05	<0.05
829A2A	8/29/86	10:45	14:45	0.05	240.00	<0.05	<0.05
829A2B	8/29/86	10:45	14:55	0.07	250.00	<0.05	<0.05
829FM2A	8/29/86	11:30	15:26	0.07	236.00	<0.05	<0.05
829FM2B	8/29/86	11:30	15:26	0.07	236.00	<0.05	<0.05
829FM2C	8/29/86	11:30	15:26	0.07	236.00	<0.05	<0.05
829E2A	8/29/86	12:01	16:07	0.06	246.00	<0.05	<0.05

Table 5 (con't).

METHYL BROMIDE AMBIENT SITES RESULTS

SAMPLE ID	DATE	TIME ON	TIME OFF	AIR FLOW (lpm)	PERIOD (min)	MeBr PRIMARY Hg	
						A	B
829E2B	8/29/86	12:01	16:07	0.07	246.00	<0.05	<0.05
829M2A	8/29/86	12:54	17:09	0.07	255.00	<0.05	<0.05
829M2B	8/29/86	12:54	17:09	0.07	255.00	<0.05	<0.05
92A1A	9/2/86	7:28	11:27	0.07	239.00	<0.05	<0.05
92A1B	9/2/86	7:28	11:27	0.07	239.00	<0.05	<0.05
92FM1A	9/2/86	8:13	12:26	0.07	253.00	<0.05	<0.05
92FM1B	9/2/86	8:13	12:26	0.08	253.00	<0.05	<0.05
92FM1C	9/2/86	8:13	12:26	0.07	253.00	<0.05	<0.05
92E1A	9/2/86	9:00	13:24	0.07	264.00	<0.05	<0.05
92E1B	9/2/86	9:00	13:24	0.07	264.00	<0.05	<0.05
92M1A	9/2/86	10:02	14:41	0.07	279.00	<0.05	<0.05
92M1B	9/2/86	10:02	14:41	0.07	279.00	<0.05	<0.05
92A2A	9/2/86	11:53	15:08	0.06	195.00	<0.05	<0.05
92A2A	9/2/86	11:53	15:08	0.07	195.00	<0.05	<0.05
92FM2A	9/2/86	12:58	16:58	0.07	240.00	<0.05	<0.05
92FM2B	9/2/86	12:58	16:58	0.07	240.00	<0.05	<0.05
92FM2C	9/2/86	12:58	16:58	0.07	240.00	<0.05	<0.05
92E2A	9/2/86	13:43	17:40	0.07	237.00	<0.05	<0.05
92E2B	9/2/86	13:43	17:40	0.07	237.00	<0.05	<0.05
92M2A	9/2/86	15:17	19:20	0.08	243.00	<0.05	<0.05
92M2B	9/2/86	15:17	19:20	0.07	243.00	<0.05	<0.05
93A1A	9/3/86	7:53	12:50	0.07	297.00	<0.05	<0.05
93A1B	9/3/86	7:53	12:50	0.07	297.00	<0.05	<0.05
93FM1A	9/3/86	8:48	13:49	0.08	301.00	<0.05	<0.05
93FM1B	9/3/86	8:48	13:49	0.08	301.00	<0.05	<0.05
93FM1C	9/3/86	8:48	13:49	0.08	301.00	<0.05	<0.05
93E1A	9/3/86	10:06	14:56	0.08	290.00	<0.05	<0.05
93E1B	9/3/86	10:06	14:56	0.08	290.00	<0.05	<0.05
93M1A	9/3/86	11:18	16:18	0.07	300.00	<0.05	<0.05
93M1B	9/3/86	11:18	16:18	0.07	300.00	<0.05	<0.05
93A2A	9/3/86	13:05	17:17	0.08	252.00	<0.05	<0.05
93A2B	9/3/86	13:05	17:17	0.08	252.00	<0.05	<0.05
93FM2A	9/3/86	14:32	18:31	0.08	239.00	<0.05	<0.05
93FM2B	9/3/86	14:32	18:31	0.07	239.00	<0.05	<0.05
93FM2C	9/3/86	14:32	18:31	0.07	239.00	<0.05	<0.05
93E2A	9/3/86	15:37	19:37	0.08	240.00	<0.05	<0.05
93E2B	9/3/86	15:37	19:37	0.07	240.00	<0.05	<0.05
94A1A	9/4/86	8:09	12:09	0.08	240.00	<0.05	<0.05
94A1B	9/4/86	8:09	12:09	0.07	240.00	<0.05	<0.05
94FM1A	9/4/86	8:53	12:59	0.07	246.00	<0.05	<0.05
94FM1B	9/4/86	8:53	12:59	0.07	246.00	<0.05	<0.05
94FM1C	9/4/86	8:53	12:59	0.07	246.00	<0.05	<0.05
94E1A	9/4/86	9:24	13:51	0.07	267.00	<0.05	<0.05
94E1B	9/4/86	9:24	13:51	0.07	267.00	<0.05	<0.05
94M1A	9/4/86	10:14	15:00	0.07	286.00	<0.05	<0.05
94M1B	9/4/86	10:14	15:00	0.07	286.00	<0.05	<0.05
94A2A	9/4/86	12:28	16:28	0.07	240.00	<0.05	<0.05
94A2B	9/4/86	12:28	16:28	0.07	240.00	<0.05	<0.05

Table 5 (con't).

METHYL BROMIDE AMBIENT SITES RESULTS

SAMPLE ID	DATE	TIME ON	TIME OFF	AIR FLOW (lpm)	PERIOD (min)	MeBr PRIMARY Hg	
						A	B
94FM2A	9/4/86	13:32	17:32	0.07	240.00	<0.05	<0.05
94FM2B	9/4/86	13:32	17:32	0.07	240.00	<0.05	<0.05
94FM2C	9/4/86	13:32	17:32	0.07	240.00	<0.05	<0.05
94E2A	9/4/86	14:19	18:22	0.07	243.00	<0.05	<0.05
94E2B	9/4/86	14:19	18:22	0.08	243.00	<0.05	<0.05
94M2A	9/4/86	15:28	19:23	0.08	235.00	<0.05	<0.05
94M2B	9/4/86	15:28	19:23	0.07	235.00	<0.05	<0.05
95A1A	9/5/86	6:58	10:59	0.07	241.00	<0.05	<0.05
95A1B	9/5/86	6:58	10:59	0.07	241.00	<0.05	<0.05
95E1A	9/5/86	8:07	12:07	0.07	240.00	<0.05	<0.05
95E1B	9/5/86	8:07	12:07	0.07	240.00	<0.05	<0.05
95FM1A	9/5/86	8:35	12:49	0.07	254.00	<0.05	<0.05
95FM1B	9/5/86	8:35	12:49	0.07	254.00	<0.05	<0.05
95FM1C	9/5/86	8:35	12:49	0.07	254.00	<0.05	<0.05
95M1A	9/5/86	9:19	14:29	0.07	310.00	<0.05	<0.05
95M1B	9/5/86	9:19	14:29	0.07	310.00	<0.05	<0.05
95A2A	9/5/86	11:26	16:00	0.07	274.00	<0.05	<0.05
95A2B	9/5/86	11:26	16:00	0.07	274.00	<0.05	<0.05
95E2A	9/5/86	12:33	16:50	0.07	257.00	<0.05	<0.05
95E2B	9/5/86	12:33	16:50	0.07	257.00	<0.05	<0.05
95FM2A	9/5/86	13:40	17:40	0.07	240.00	<0.05	<0.05
95FM2B	9/5/86	13:40	17:40	0.07	240.00	<0.05	<0.05
95FM2C	9/5/86	13:40	17:40	0.08	240.00	<0.05	<0.05
95M2A	9/5/86	14:57	18:01	0.08	184.00	<0.05	<0.05
95M2B	9/5/86	14:57	18:01	0.07	184.00	<0.05	<0.05
98A1A	9/8/86	7:17	11:17	0.07	240.00	<0.05	<0.05
98A1B	9/8/86	7:17	11:17	0.08	240.00	<0.05	<0.05
98FM1A	9/8/86	8:00	12:00	0.08	240.00	<0.05	<0.05
98FM1B	9/8/86	8:00	12:00	0.08	240.00	<0.05	<0.05
98FM1C	9/8/86	8:00	12:00	0.08	240.00	<0.05	<0.05
98E1A	9/8/86	8:47	12:49	0.07	242.00	<0.05	<0.05
98E1B	9/8/86	8:47	12:49	0.07	242.00	<0.05	<0.05
98M1A	9/8/86	9:44	13:47	0.07	243.00	<0.05	<0.05
98M1B	9/8/86	9:44	13:47	0.07	243.00	<0.05	<0.05
98A2A	9/8/86	11:35	15:35	0.07	240.00	<0.05	<0.05
98A2B	9/8/86	11:35	15:35	0.07	240.00	<0.05	<0.05
98FM2A	9/8/86	12:26	16:19	0.07	233.00	<0.05	<0.05
98FM2B	9/8/86	12:26	16:19	0.07	233.00	<0.05	<0.05
98FM2C	9/8/86	12:26	16:19	0.07	233.00	<0.05	<0.05
98E2A	9/8/86	13:00	16:56	0.07	236.00	<0.05	<0.05
98E2B	9/8/86	13:00	16:56	0.07	236.00	<0.05	<0.05
98M2A	9/8/86	14:06	17:58	0.08	232.00	<0.05	<0.05
98M2B	9/8/86	14:06	17:58	0.08	232.00	<0.05	<0.05
99A1A	9/9/86	7:44	11:46	0.07	242.00	<0.05	<0.05
99A1B	9/9/86	7:44	11:46	0.07	242.00	<0.05	<0.05
99FM1A	9/9/86	8:23	12:31	0.05	248.00	<0.05	<0.05
99FM1B	9/9/86	8:23	12:31	0.05	248.00	<0.05	<0.05
99FM1C	9/9/86	8:23	12:31	0.05	248.00	<0.05	<0.05

Table 5 (con't).

METHYL BROMIDE AMBIENT SITES RESULTS

SAMPLE ID	DATE	TIME ON	TIME OFF	AIR FLOW (lpm)	PERIOD (min)	MeBr PRIMARY Hg	
						A	B
99E1A	9/9/86	8:57	13:20	0.07	263.00	<0.05	<0.05
99E1B	9/9/86	8:57	13:20	0.07	263.00	<0.05	<0.05
99M1A	9/9/86	9:46	14:30	0.07	284.00	<0.05	<0.05
99M1B	9/9/86	9:46	14:30	0.07	284.00	<0.05	<0.05
99A2A	9/9/86	12:01	16:12	0.07	251.00	<0.05	<0.05
99A2B	9/9/86	12:01	16:12	0.08	251.00	<0.05	<0.05
99FM2A	9/9/86	13:02	17:00	0.07	238.00	<0.05	<0.05
99FM2B	9/9/86	13:02	17:00	0.07	238.00	<0.05	<0.05
99FM2C	9/9/86	13:02	17:00	0.07	238.00	<0.05	<0.05
99E2A	9/9/86	13:45	17:47	0.07	242.00	<0.05	<0.05
99E2B	9/9/86	13:45	17:47	0.07	242.00	<0.05	<0.05
99M2A	9/9/86	14:52	18:43	0.07	231.00	<0.05	<0.05
99M2B	9/9/86	14:52	18:43	0.07	231.00	<0.05	<0.05
910A1A	9/10/86	6:55	10:58	0.07	243.00	<0.05	<0.05
910A1B	9/10/86	6:55	10:58	0.07	243.00	<0.05	<0.05
910FM1A	9/10/86	7:33	11:39	0.07	246.00	<0.05	<0.05
910FM1B	9/10/86	7:33	11:39	0.08	246.00	<0.05	<0.05
910FM1C	9/10/86	7:33	11:39	0.08	246.00	<0.05	<0.05
910E1A	9/10/86	8:05	12:23	0.07	258.00	<0.05	<0.05
910E1B	9/10/86	8:05	12:23	0.07	258.00	<0.05	<0.05
910M1A	9/10/86	8:48	13:26	0.07	278.00	<0.05	<0.05
910M1B	9/10/86	8:48	13:26	0.07	278.00	<0.05	<0.05
910A2A	9/10/86	11:09	15:09	0.07	240.00	<0.05	<0.05
910A2B	9/10/86	11:09	15:09	0.07	240.00	<0.05	<0.05
910FM2A	9/10/86	12:03	15:52	0.07	229.00	<0.05	<0.05
910FM2B	9/10/86	12:03	15:52	0.07	229.00	<0.05	<0.05
910FM2C	9/10/86	12:03	15:52	0.07	229.00	<0.05	<0.05
910E2A	9/10/86	12:43	16:34	0.07	231.00	<0.05	<0.05
910E2B	9/10/86	12:43	16:34	0.07	231.00	<0.05	<0.05
910M2A	9/10/86	13:51	17:58	0.07	247.00	<0.05	<0.05
910M2B	9/10/86	13:51	17:58	0.07	247.00	<0.05	<0.05
911A1A	9/11/86	8:38	12:49	0.07	251.00	<0.05	<0.05
911A1B	9/11/86	8:38	12:49	0.07	251.00	<0.05	<0.05
911FM1A	9/11/86	9:20	13:34	0.07	254.00	<0.05	<0.05
911FM1B	9/11/86	9:20	13:34	0.07	254.00	<0.05	<0.05
911FM1C	9/11/86	9:20	13:34	0.07	254.00	<0.05	<0.05
911E1A	9/11/86	9:47	14:10	0.07	263.00	<0.05	<0.05
911E1B	9/11/86	9:47	14:10	0.07	263.00	<0.05	<0.05
915M1A	9/15/86	10:00	18:52	0.07	532.00	<0.05	<0.05
915M1B	9/15/86	10:00	18:52	0.07	532.00	<0.05	<0.05
915A1A	9/15/86	13:04	17:03	0.07	239.00	<0.05	<0.05
915A1B	9/15/86	13:04	17:03	0.07	239.00	<0.05	<0.05
915FM1A	9/15/86	13:51	17:42	0.07	231.00	<0.05	<0.05
915FM1B	9/15/86	13:51	17:42	0.07	231.00	<0.05	<0.05
915FM1C	9/15/86	13:51	17:42	0.07	231.00	<0.05	<0.05
915E1A	9/15/86	14:25	18:10	0.07	225.00	<0.05	<0.05
915E1B	9/15/86	14:25	18:10	0.07	225.00	<0.05	<0.05
916E1A	9/16/86	9:35	13:57	0.07	262.00	<0.05	<0.05

Table 5 (con't).

METHYL BROMIDE AMBIENT SITES RESULTS

SAMPLE ID	DATE	TIME ON	TIME OFF	AIR FLOW (lpm)	PERIOD (min)	MeBr PRIMARY Hg	
						A	B
916E1B	9/16/86	9:35	13:57	0.07	262.00	<0.05	<0.05
916FM1A	9/16/86	10:15	14:43	0.07	268.00	<0.05	<0.05
916FM1B	9/16/86	10:15	14:43	0.07	268.00	<0.05	<0.05
916FM1C	9/16/86	10:15	14:43	0.07	808.00	<0.05	<0.05
917FM1A	9/17/86	7:41	11:47	0.08	246.00	<0.05	<0.05
917FM1B	9/17/86	7:41	11:47	0.08	246.00	<0.05	<0.05
917FM1C	9/17/86	7:41	11:47	0.08	246.00	<0.05	<0.05
917A1A	9/17/86	13:05	16:58	0.07	233.00	<0.05	<0.05
917A1B	9/17/86	13:05	16:58	0.08	233.00	<0.05	<0.05
918FM1A	9/18/86	12:00	16:22	0.07	262.00	<0.05	<0.05
918FM1B	9/18/86	12:00	16:22	0.07	262.00	<0.05	<0.05
918FM1C	9/18/86	12:00	16:22	0.07	262.00	<0.05	<0.05
918A1A	9/18/86	12:53	16:58	0.07	245.00	<0.05	<0.05
918A1B	9/18/86	12:53	16:58	0.07	245.00	<0.05	<0.05
918M1A	9/18/86	19:15	23:19	0.07	244.00	<0.05	<0.05
918M1B	9/18/86	19:15	23:19	0.07	244.00	<0.05	<0.05

Table 6. FENNEL FIELDS METHYL BROMIDE RESULTS

SAMPLE ID	DATE	TIME		PERIOD (min)	FLOW RATE (lpm)	AIR VOLUME (Cu m)	METHYL BROMIDE			P.P.B.	MeBr average $\mu\text{g}/\text{Cu m}$	MeBr average P.P.B.	
		ON	OFF				TUBE (micrograms)	$\mu\text{g}/\text{Cu m}$	BACKUP				
911FF1AA	9/11/86	8:54	13:00	246	0.011	0.0027	1.04	0.42		385	99	200	52
911FF1AB	9/11/86	8:54	13:00	246	0.066	0.0157	0.12	0.12	<0.05	15	4		
911FF1BA	9/11/86	7:10	11:10	240	0.066	0.0157	2.82	<0.05	<0.05	180	46	197	51
911FF1BB	9/11/86	7:10	11:10	240	0.055	0.0131	2.81	<0.05	<0.05	215	55		
911FF2AA	9/11/86	13:30	17:30	240	0.011	0.0026	<0.05	<0.05		< 4.2	< 1.1		
911FF2AB	9/11/86	13:30	17:30	240	0.066	0.0158	<0.05	<0.05		< 4.2	< 1.1		
911FF2BA	9/11/86	11:25	15:25	240	0.066	0.0157	4.33	0.23	<0.1	276	71	284	73
911FF2BB	9/11/86	11:25	15:25	240	0.066	0.0157	4.59	<0.1	<0.1	292	75		
911FF1CA	9/11/86	11:37	15:47	250	0.060	0.0150	5.28	<0.1	N.A.	352	91	422	109
911FF1CB	9/11/86	11:37	15:47	250	0.055	0.0137	6.73	<0.1	N.A.	491	127		
912FF10A	9/12/86	7:00	10:30	210	0.011	0.0024	3.32	<0.1	N.A.	1380	357	800	207
912FF1AB	9/12/86	7:00	10:30	210	0.060	0.0126	2.74	<0.1	N.A.	217	56		
912FF10A	9/12/86	6:20	9:30	190	0.066	0.0125	<0.1	<0.1		< 4.2	< 1.1		
912FF1BB	9/12/86	6:20	9:30	190	0.071	0.0135	<0.1	<0.1		< 4.2	< 1.1		
912FF1CA	9/12/86	6:23	10:03	220	0.060	0.0132	<0.1	<0.1		< 4.2	< 1.1		
912FF1CB	9/12/86	6:23	10:03	220	0.066	0.0144	<0.1	<0.1		< 4.2	< 1.1		
912FF2AA	9/12/86	10:57	13:47	170	0.082	0.0139	<	<0.1	<0.1	< 4.2	< 1.1		
912FF2AB	9/12/86	10:57	13:47	170	0.055	0.0093	<	<0.1	<0.1	< 4.2	< 1.1		
912FF2BA	9/12/86	9:45	12:45	180	0.066	0.0118	7.73	<0.1	<0.1	655	169	1100	284
912FF2BB	9/12/86	9:45	12:45	180	0.060	0.0108	16.70	<0.1	<0.1	1546	399		
912FF2CA	9/12/86	10:15	13:15	180	0.066	0.0118	3.30	<0.1	<0.1	280	72	325	84
912FF2CB	9/12/86	10:15	13:15	180	0.066	0.0118	4.36	0.15	<0.1	369	95		
912FF30A	9/12/86	13:02	16:22	200	0.066	0.0131	38.70	<0.1	<0.1	2954	762	3500	904
912FF30B	9/12/86	13:02	16:22	200	0.066	0.0131	53.10	<0.1	<0.1	4053	1046		
912FF3CA	9/12/86	13:30	16:40	190	0.071	0.0135	24.90	<0.1	N.A.	1844	476	2060	532
912FF3CB	9/12/86	13:30	16:40	190	0.066	0.0125	28.50	<0.1	N.A.	2280	588		
913FF1BA	9/13/86	10:15	13:15	180	0.066	0.0118	8.95	<0.1	N.A.	758	196	668	172
913FF1BB	9/13/86	10:15	13:15	180	0.066	0.0118	6.81	<0.1	N.A.	577	149		
913FF1CA	9/13/86	10:45	13:53	188	0.071	0.0134	5.79		N.A.	432	111	400	103
913FF1CB	9/13/86	10:45	13:53	188	0.066	0.0123	4.52	<0.1	N.A.	367	95		
913FF2BA	9/13/86	13:45	17:45	240	0.066	0.0157	6.13	<0.1	N.A.	390	101	409	106
913FF2BB	9/13/86	13:45	17:45	240	0.066	0.0157	6.71	<0.1	N.A.	427	110		
913FF2CA	9/13/86	14:18	18:18	240	0.055	0.0131	3.63	N.A.	N.A.	277	72	273	70
913FF2CB	9/13/86	14:18	18:18	240	0.066	0.0157	4.21	N.A.	N.A.	268	69		
914FF1AA	9/14/86	9:18	13:47	269	0.060	0.0162	<	<0.1	N.A.	< 4.2	< 1.1		
914FF1AB	9/14/86	9:18	13:47	269	0.060	0.0162	<	<0.1	N.A.	< 4.2	< 1.1		
914FF1BA	9/14/86	8:45	12:30	225	0.066	0.0148	1.39		N.A.	94	24	89	23
914FF1BB	9/14/86	8:45	12:30	225	0.066	0.0148	1.23	<0.1	N.A.	83	21		
914FF1CA	9/14/86	8:50	13:00	250	0.071	0.0178	<	<0.1	N.A.	< 4.2	< 1.1		
914FF1CB	9/14/86	8:50	13:00	250	0.071	0.0178	0.51	<0.1	N.A.	29	7		
914FF2BA	9/14/86	12:50	16:50	240	0.011	0.0027	2.31	<0.1	N.A.	856	221	621	160

Table 6. FENNEL FIELDS METHYL BROMIDE RESULTS (con't)

SAMPLE ID	DATE	TIME		PERIOD (min)	FLOW RATE (lpm)	AIR VOLUME (Cu m)	METHYL BROMIDE			P.P.B.	MeBr average $\mu\text{g}/\text{Cu m}$	MeBr average P.P.B.	
		ON	OFF				TUBE (micrograms)		$\mu\text{g}/\text{Cu m}$				
							A	B	BACKUP				
914FF2BB	9/14/86	12:50	16:50	240	0.066	0.0157	6.08	<0.1	N.A.	337	100		
914FF2CA	9/14/86	13:30	17:30	240	0.055	0.0131	3.40	<0.1	<0.1	260	67	212	55
914FF2CB	9/14/86	13:30	17:30	240	0.066	0.0157	2.58	<0.1	N.A.	164	42		
915FF1AA	9/15/86	7:55	11:47	232	0.055	0.0127	2.79	0.81	N.A.	220	57	157	41
915FF1AB	9/15/86	7:55	11:47	232	0.002	0.0190	1.80	N.A.	N.A.	95	24		
915FF1BA	9/15/86	7:00	11:03	243	0.066	0.0159	<0.1	N.A.	N.A.	< 4.2	< 1.1		
915FF1BB	9/15/86	7:00	11:03	243	0.066	0.0159	<0.1	N.A.	N.A.	< 4.2	< 1.1		
915FF1CA	9/15/86	7:25	11:24	239	0.071	0.0170	<0.1	N.A.	N.A.	< 4.2	< 1.1		
915FF1CB	9/15/86	7:25	11:24	239	0.060	0.0144	<0.1	N.A.	N.A.	< 4.2	< 1.1		
915FF2AA	9/15/86	11:59	14:30	151	0.017	0.0025	<0.1	<0.1	N.A.	< 4.2	< 1.1		
915FF2AB	9/15/86	11:59	14:30	151	0.011	0.0017	<0.1	<0.1	N.A.	< 4.2	< 1.1		
915FF2BA	9/15/86	11:18	15:07	229	0.060	0.0138	2.33	<0.1	N.A.	169	44	230	59
915FF2BB	9/15/86	11:18	15:07	229	0.055	0.0125	3.64	<0.1	N.A.	291	75		
915FF2CA	9/15/86	11:38	15:33	235	0.066	0.0154	0.92	<0.1	N.A.	60	15	62	16
915FF2CB	9/15/86	11:38	15:33	235	0.066	0.0154	0.98	<0.1	N.A.	64	16		
915FF3BA	9/15/86	15:25	19:35	250	0.066	0.0164	5.62	<0.1	N.A.	343	88	315	81
915FF3BB	9/15/86	15:25	19:35	250	0.066	0.0164	4.70	<0.1	N.A.	287	74		
915FF3CA	9/15/86	15:45	19:52	247	0.060	0.0149	3.11	<0.1	N.A.	209	54	215	55
915FF3CB	9/15/86	15:45	19:52	247	0.060	0.0148	3.27	<0.1	N.A.	221	57		
915FF4BA	9/15/86	19:46	23:22	216	0.066	0.0142	6.18	<0.1	N.A.	435	112	449	116
915FF4BB	9/15/86	19:46	23:22	216	0.071	0.0153	7.07	<0.1	N.A.	462	119		
915FF4CA	9/15/86	20:02	23:46	224	0.066	0.0147	2.18	<0.1	N.A.	148	38	163	42
915FF4CB	9/15/86	20:02	23:46	224	0.066	0.0147	2.61	<0.1	N.A.	178	46		
916FF1AA	9/16/86	8:16	11:29	193	0.066	0.0127	0.17	<0.1		13	3	17	4
916FF1AB	9/16/86	8:16	11:29	193	0.049	0.0095	0.19	<0.1		20	5		
916FF1BA	9/16/86	7:22	11:04	222	0.066	0.0146	<0.1			< 4.2	< 1.1		
916FF1BB	9/16/86	7:22	11:04	222	0.071	0.0153	<0.1			< 4.2	< 1.1		
916FF1CA	9/16/86	7:52	12:02	250	0.066	0.0164	<0.1			< 4.2	< 1.1		
916FF1CB	9/16/86	7:52	12:02	250	0.060	0.0150	<0.1			< 4.2	< 1.1		
916FF2AA	9/16/86	12:55	15:55	180	0.071	0.0128	<0.1			< 4.2	< 1.1		
916FF2AB	9/16/86	12:55	15:55	180	0.066	0.0118	<0.1			< 4.2	< 1.1		
916FF2BA	9/16/86	11:19	16:37	318	0.066	0.0209	<0.1			< 4.2	< 1.1		
916FF2BB	9/16/86	11:19	16:36	317	0.066	0.0208	<0.1			< 4.2	< 1.1		
916FF2CA	9/16/86	12:29	17:09	280	0.066	0.0184	<0.1			< 4.2	< 1.1		
916FF2CB	9/16/86	12:29	17:09	280	0.060	0.0168	<0.1			< 4.2	< 1.1		
916FF3BA	9/16/86	17:05	20:42	217	0.066	0.0142	0.93			65	17	50	13
916FF3BB	9/16/86	17:05	20:42	217	0.060	0.0131	0.45			34	9		
916FF3CA	9/16/86	17:26	21:00	214	0.066	0.0140	<0.1			< 4.2	< 1.1		
916FF3CB	9/16/86	17:26	21:00	214	0.066	0.0140	0.08			6	1		
917FF1AA	9/17/86	10:36	15:35	299	0.011	0.0034	<0.1			< 4.2	< 1.1		
917FF1AB	9/17/86	10:36	15:35	299	0.060	0.0180	<0.1			< 4.2	< 1.1		

Table 6. FENNEL FIELDS METHYL BROMIDE RESULTS (con't)

SAMPLE ID	DATE	TIME		PERIOD (min)	FLOW RATE (lpm)	AIR VOLUME (Cu m)	METHYL BROMIDE			P.P.B.	MeBr average $\mu\text{g}/\text{Cu m}$	MeBr average P.P.B.
		ON	OFF				(micrograms)	TUBE B	BACKUP			
917FF1BA	9/17/86	10:11	14:53	282	0.055	0.0154	<0.1			< 4.2	< 1.1	
917FF1BB	9/17/86	10:11	14:53	282	0.049	0.0139	<0.1			< 4.2	< 1.1	
917FF1CA	9/17/86	9:47	13:43	236	0.055	0.0129	<0.1			< 4.2	< 1.1	
917FF1CB	9/17/86	9:47	13:43	236	0.060	0.0142	<0.1			< 4.2	< 1.1	
917FF2BA	9/17/86	15:22	18:05	163	0.066	0.0107	<0.1			< 4.2	< 1.1	
917FF2BB	9/17/86	15:22	18:05	163	0.066	0.0107	< 0.41			33	10	33
917FF2CA	9/17/86	14:18	18:20	242	0.049	0.0119	<0.1			< 4.2	< 1.1	
917FF2CB	9/17/86	14:18	18:20	242	0.066	0.0159	<0.1			< 4.2	< 1.1	
918FF1AA	9/18/86	8:56	13:15	259	0.011	0.0029	<0.1			< 4.2	< 1.1	
918FF1AB	9/18/86	8:56	13:15	259	0.044	0.0114	<0.1			< 4.2	< 1.1	
918FF1BA	9/18/86	9:33	14:05	272	0.066	0.0178	<0.1			< 4.2	< 1.1	
918FF1BB	9/18/86	9:33	14:05	272	0.066	0.0178	<0.1			< 4.2	< 1.1	
918FF1CA	9/18/86	9:59	14:40	281	0.060	0.0169	<0.1			< 4.2	< 1.1	
918FF1CB	9/18/86	9:59	14:40	281	0.044	0.0123	<0.1			< 4.2	< 1.1	

Table 7. METHYL BROMIDE RESULTS FOR COLLOCATED SAMPLES
AT THE FENNELL FARMS APPLICATION SITE

($\mu\text{g}/\text{Cu m}$)

SITE		A		B		C	
DATE	START TIME	A	B	A	B	A	B
9/11/86	7:10			180	215		
	8:54	385	15				
	11:25			276	292		
	11:37					352	491
	13:30	< 4.2	< 4.2				
9/12/86	6:20			< 4.2	< 4.2		
	6:23					< 4.2	< 4.2
	7:00	1383	217				
	9:45			655	1550		
	10:15					280	369
	10:57	< 4.2	< 4.2				
	13:02			2950	4050		
	13:30					1840	2280
9/13/86	10:15			758	577		
	10:45					432	367
	13:45			390	427		
	14:18					277	268
9/14/86	8:45			94	83		
	8:50					< 4.2	30
	9:18	< 4.2	< 4.2				
	12:50			656	387		
	13:30					260	164
9/15/86	7:00			< 4.2	< 4.2		
	7:25					< 4.2	< 4.2
	7:55	220	95				
	11:18			169	291		
	11:38					60	64
	11:59	< 4.2	< 4.2				
	15:25			343	287		
	15:45					209	221
	19:46			435	462		
	20:02					148	178
9/16/86	7:22			< 4.2	< 4.2		
	7:52					< 4.2	< 4.2
	8:16	13	20				
	11:19			< 4.2	< 4.2		
	12:29					< 4.2	< 4.2
	12:55	< 4.2	< 4.2				
	17:05			65	64		

Table 7 (con't). METHYL BROMIDE RESULTS FOR COLLOCATED SAMPLES
AT THE FENNELLS FARMS APPLICATION SITE.

(µg/Cu m)

SITE		A		B		C	
DATE	START TIME	A	B	A	B	A	B
9/17/86	17:26					< 4.2	6.0
	9:47						
	10:11			< 4.2	< 4.2		
	10:36	< 4.2	< 4.2				
	14:18					< 4.2	< 4.2
9/18/86	15:22			< 4.2	38		
	8:56	< 4.2	< 4.2				
	9:33			< 4.2	< 4.2		
	9:59					< 4.2	< 4.2

Table 8. METHYL BROMIDE AT FENNELLS FARMS APPLICATION SITE
(average values)

DATE	START TIME	(µg/Cu m)			:	(P.P.B.)		
		A	B	C		A	B	C
9/11/86								
	7:10		197				51	
	8:54	200				52		
	11:25		284				73	
	11:37			422				110
	13:30	< 4.2				< 1.1		
9/12/86								
	6:20		< 4.2				< 1.1	
	6:23			< 4.2				< 1.1
	7:00	800				210		
	9:45		1100				280	
	10:15			325				84
	10:57	< 4.2				< 1.1		
	13:02		3500				900	
	13:30			2060				530
9/13/86								
	10:15		668				170	
	10:45			400				100
	13:45		409				110	
	14:18			273				70
9/14/86								
	8:45		89				23	
	8:50			29				7.0
	9:18	< 4.2				< 1.1		
	12:50		621				160	
	13:30			212				55
9/15/86								
	7:00		< 4.2				< 1.1	
	7:25			< 4.2				< 1.1
	7:55	157				41		
	11:18		230				59	
	11:38			62				16
	11:59	< 4.2				< 1.1		
	15:25		315				81	
	15:45			215				55
	19:46		449				116	
	20:02			152				42
9/16/86								
	7:22		< 4.2				< 1.1	
	7:52			< 4.2				< 1.1
	8:16	17				4.0		
	11:19		< 4.2				< 1.1	
	12:29			< 4.2				< 1.1
	12:55	< 4.2				< 1.1		
	17:05		50				13	
	17:26			< 4.2				< 1.1
9/17/86								

Table 8 (con't). METHYL BROMIDE AT FENNELLS FARMS APPLICATION SITE
(average values)

DATE	START TIME	(Hg/Cu m)			:	(P.P.B.)		
		A	B	C		A	B	C
	9:47			< 4.2	:			< 1.1
	10:11		< 4.2		:		< 1.1	
	10:36	< 4.2			:	< 1.1		
	14:18			< 4.2	:			< 1.1
	15:22		38		:		10	
9/18/86	8:56	< 4.2			:	< 1.1		
	9:33		< 4.2		:		< 1.1	
	9:59			< 4.2	:			< 1.1

Table 9. Precision for Collocated Samplers at Fennell Farms in Percents

DATE	START TIME	SITE		
		A	B	C
9/11/86	7:10		9.7	
	8:54	-48.1		
	11:25		2.9	
	11:37			19.7
	13:30	-42.2		
9/12/86	9:45		68.3	
	10:15			15.9
	13:02		18.6	
	13:30			12.0
9/13/86	10:15		-11.9	
	10:45			-7.5
	13:45		4.7	
	14:18			-1.6
9/14/86	8:45		-5.9	
	8:50			
	9:18			
	12:50		-27.4	
	13:30			-18.5
9/15/86	7:55	-28.4		
	11:18		36.1	
	11:38			3.3
	15:25		-8.2	
	15:45			2.9
	19:46		3.1	
	20:02			10.1
9/16/86	8:16	26.9		
	12:29			
	17:05		-23.8	

Data completeness for the entire data set was greater than 95% for the ambient samples, based on the number of valid samples analyzed divided by the total number of samples taken.

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Acknowledgment

We wish to acknowledge the technical assistance of Vince Schmidt, John Sagebiel and Clayton Reece (University of California) and helpful discussions with Mike Poore (benzyl alcohol desorption), Lynn Baker and Tom Parker, all with the California Air Resources Board, and Tom Dufala with TriCal Chemical Co. for providing standards and assistance with the application site. This study was supported by contract funds from the California Air Resources Board. Mention of proprietary products is made for identification purposes only and does not imply endorsement by ARB.

Appendix

Meteorological Data at the Flea Market for Aug. 28 through Sept. 18^A

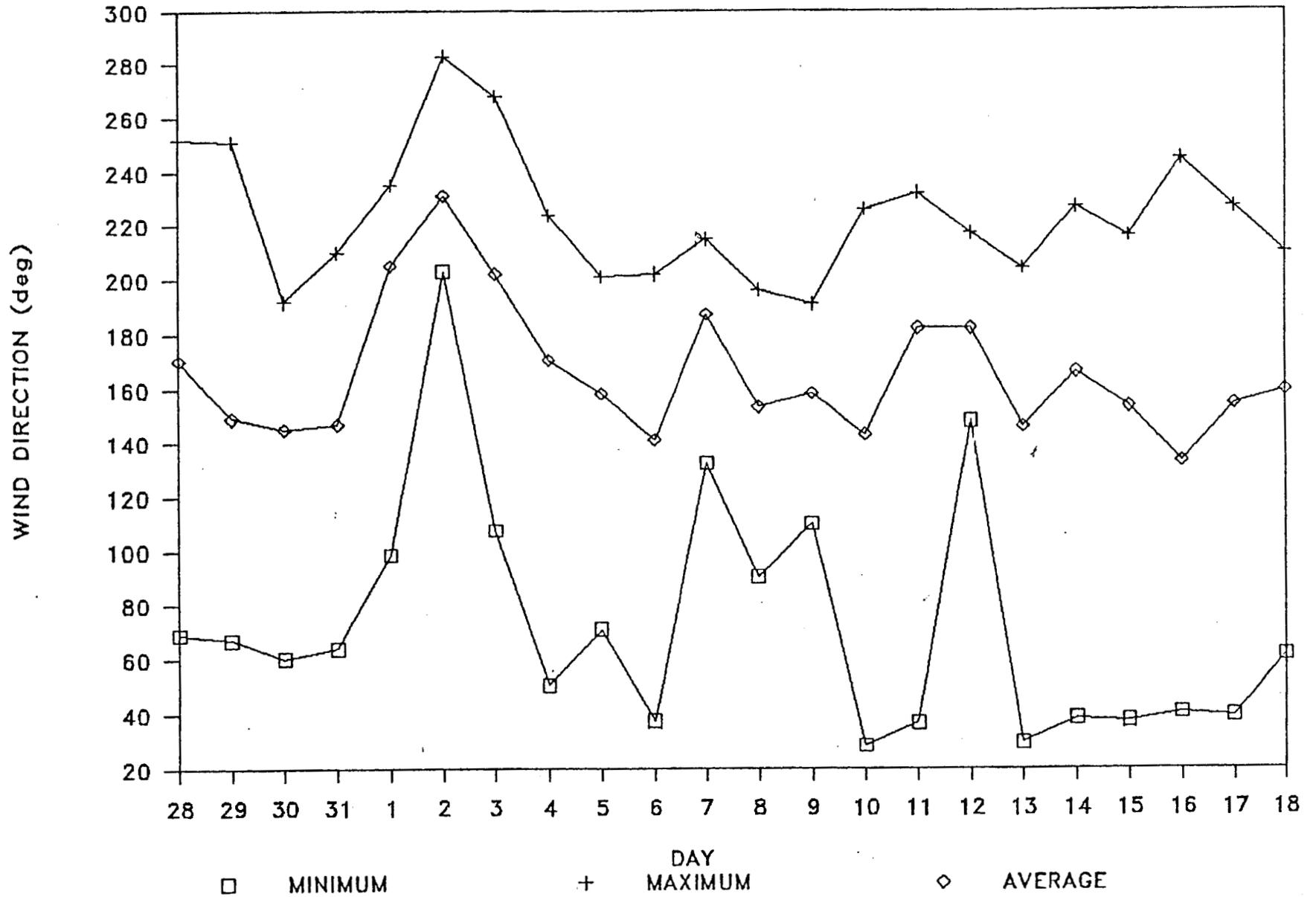
DAY	WINDSPEED (cm/sec)			WIND ^B (deg)	TEMPERATURE (°C)		
	MIN	MAX	AVG	DIRC.	MIN	MAX	AVG.
28	58.7	441	234	170	14.0	22.0	18.5
29	82.0	395	233	149	12.6	20.8	17.2
30	68.8	310	190	145	12.4	19.4	14.7
31	63.4	374	195	147	11.8	19.4	14.7
1	59.3	504	275	205	11.4	17.2	14.1
2	120.0	449	307	231	11.7	16.3	13.9
3	39.4	420	225	202	12.7	18.8	15.2
4	56.7	406	214	170	13.0	19.4	15.4
5	41.4	456	200	158	11.6	19.2	15.0
6	61.7	387	207	141	12.3	16.8	14.5
7	59.1	421	225	187	12.8	17.9	15.1
8	82.2	591	286	153	12.8	18.7	16.1
9	94.5	398	234	158	12.8	18.8	16.0
10	57.7	510	238	143	9.1	25.3	18.4
11	128.0	592	412	182	11.0	16.8	15.1
12	94.0	525	297	182	12.7	17.6	15.1
13	83.0	503	262	146	11.1	20.0	16.5
14	54.0	531	283	166	12.5	21.3	17.3
15	69.8	520	277	153	10.2	22.3	17.8
16	81.6	592	351	133	13.5	24.9	18.8
17	35.7	502	224	154	13.6	21.8	17.2
18	26.7	592	295	159	10.8	19.8	16.1

A: Observations between 0600 and 2000

B: 0° = East, 90° = South, 180° = West, 270° = North

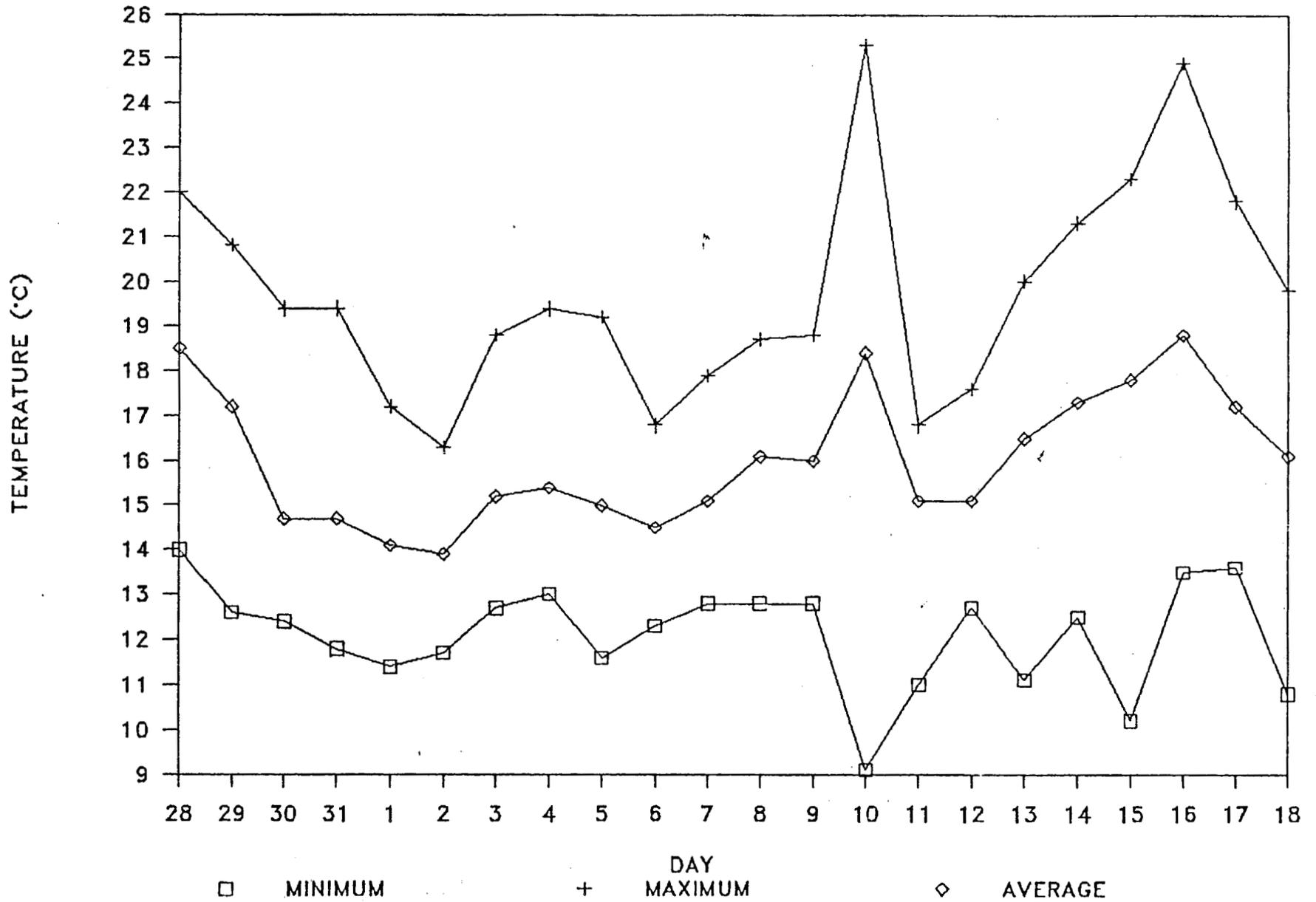
WIND DIRECTION AT FLEA MARKET

FROM 0600 TO 1800



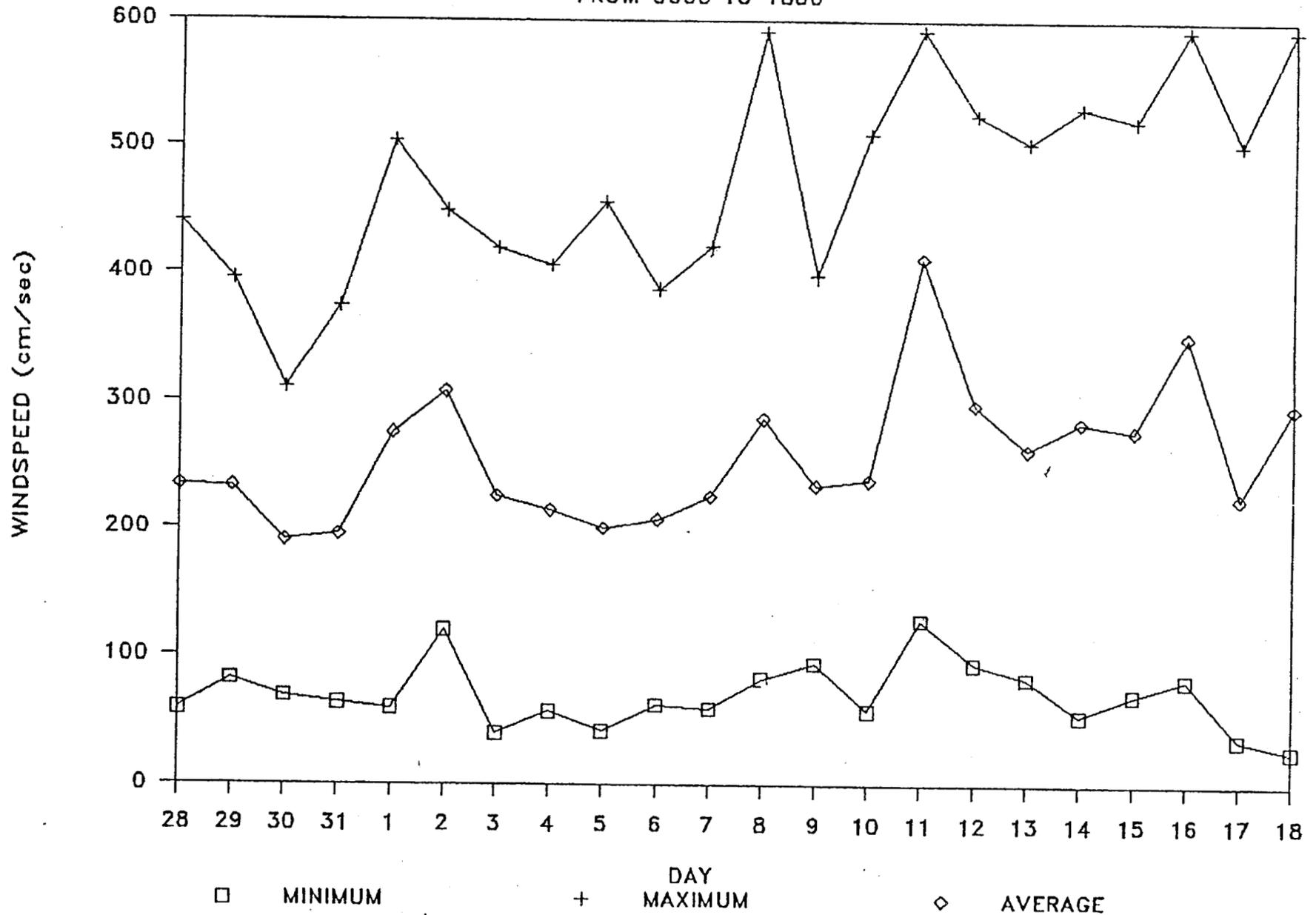
AIR TEMPERATURE AT FLEA MARKET

FROM 0600 TO 1800



WINDSPEED AT FLEA MARKET

FROM 0600 TO 1800



MeBr-Stockton

Sample Designation	Date Taken	Total Methyl Bromide, μg	Air Conc., $\mu\text{g}/\text{m}^3$	Air Conc., ppb
S1, 12:00 AM ?	10/15/86	<0.05	<3.47	<0.89
S1, 12:00 AM ?	"	"	"	"
S1, 1200	"	"	"	"
S1-1, 1700	"	"	<3.09	<0.79
S1-2, 1700	"	"	"	"
S1-3, 1700	"	--	--	--
S2N-1, 1300	"	<0.05	<3.47	<0.89
S2N-2, 1300	"	"	"	"
S2N-3, 1300	"	"	"	"
S2N-2, 1700	"	"	"	"
S2N-3, 1700	"	"	"	"
S2S-1, 1300	"	"	<1.74	<0.45
S2S-1, 1700	"	"	"	"
S2S-2, 1700	"	"	"	"
S2S-3, 1700	"	"	"	"
S3-2, 1300	"	"	<1.89	<0.49
S3-2, 1645	"	"	<1.78	<0.46
S3-3, 1300	"	"	<1.89	<0.49
S3-1, 1645	"	"	<1.78	<0.46
S3-3, 1645	"	"	"	"
S1-1, 1130	10/22/86	"	<1.19	<0.31
S1-2, 1130	"	"	"	"
S1-3, 1130	"	--	--	--
S1-1, 1630	"	<0.05	<1.85	<0.48
S1-2, 1630	"	"	"	"
S1-3, 1630	"	"	"	"
S3-1, 1145	"	"	<1.19	<0.31
S3-2, 1145	"	<0.05	<1.19	<0.31
S3-3, 1145	"	<0.05	<1.19	<0.31
S3-1, 1615	"	0.08	2.42	0.62
S3-2, 1615	"	<0.05	<1.52	<0.39
S3-3, 1615	"	"	"	"
S2N-1, 1200	"	"	<1.19	<0.31
S2N-2, 1200	"	"	"	"
S2N-3, 1200	"	"	"	"
S2N-1, 1600	"	"	<1.60	<0.41
S2N-2, 1600	"	"	"	"
S2N-3, 1600	"	"	"	"
S2S-1, 1200	"	"	<1.19	<0.31
S2S-2, 1200	"	"	"	"
S2S-3, 1200	"	"	"	"
S2S-1, 1600	"	"	<1.41	<0.36
S2S-2, 1600	"	"	"	"
S2S-3, 1600	"	"	"	"
S2S-2, 1200	10/23/86	"	<1.77	<0.46
S2S-1, 1600	"	"	<1.36	<0.35
S2S-2, 1600	"	"	"	"

Attachment IV

Quality Assurance Reports

Memorandum

To : Peter Venturini, Chief
Stationary Source Division

PETER

Date : October 30, 1986

Subject: Addendum to
September 29, 1986 Audit
Report, Monterey County
Pesticide Study

From : Spencer Duckworth, Chief
Aerometric Data Division
Air Resources Board



Attached you will find an addendum to the chloropicrin-methylbromide field audit report sent to you on October 21, 1986. The addendum includes the results of rover site audits and a study to determine the source of methylbromide sampler flow variability.

If you have any questions or comments regarding this evaluation, please contact Peggy Vanicek of the Quality Assurance Section at 3-8373.

Attachment

cc: Bob Effa
Bob Barham

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Stationary Source
Division
Air Resources Board

Memorandum

To : Spencer Duckworth, Chief
Aerometric Data Division

Thru: Bob Effa, Manager
Quality Assurance Section *RCE*

Kevin Kalthoff *JK*
Associate Air Pollution Specialist

From : Air Resources Board

Date : October 29, 1986

Subject: Addendum to
September 29, 1986 Audit
Report, Monterey County
Pesticide Study

Summary

On September 17, 1986, the Quality Assurance Section performed additional field audits at three rover sites of the Chloropicrin and Methylbromide air monitoring program conducted by the University of California, Davis (UCD). This memo reports the results of these audits and the sample train testing performed at the Quality Assurance laboratory the week of September 29, 1986. Present at the audit were: Lynn Baker and Tom Parker of Stationary Source Division (SSD), Mike McChesney and Vince Schmidt of UCD, and myself.

The sampling system at two of the three rover sites was the same as the four sites previously reported. At the third site, battery operated personal sampling pumps were used and power was not available to operate the audit mass flow meter. The sites were located at ground level in fields surrounding a treated field west of Salinas. The Chloropicrin sampling flows were all within $\pm 15\%$ of the true flows. The Methylbromide could not be accurately checked due to the effect of the pressure drop across the mass flow meter on the flows of the sampling system. The field audit data sheets for the two sites are enclosed.

Field Operations

The rover sites were located on upwind and downwind sites of a treated field. No siting problems or changes in methods from the previous audits were noted.

Flow Audits

As before, the flow audits were performed using a Matheson Mass Flow Meter, Model 8143, according to the procedure described in Attachment 1 of the September 29, 1986 report. The results of the Chloropicrin audit are summarized in Table I.

Table 1

Flow Accuracy Audit Results
Chloropicrin and Methylbromide Air Monitoring Study

<u>Site</u>	<u>Side</u>	<u>Compound</u>	<u>Percent Difference*</u>
Rover B	A	Chloropicrin	-6.1
	B	Chloropicrin	+0.6
Rover C	A	Chloropicrin	+4.2
	B	Chloropicrin	+12.3

* Percent Difference = $\frac{\text{Measured Flow} - \text{True Flow}}{\text{True Flow}} \times 100\%$

Sampler Evaluation

In order to better determine the effect of pressure drops caused by the audit mass flow meter and rotameters used to set the sample flow rates, the sample system from Rover Site C was set up in the QA lab during the week of September 29, 1986. The results of the tests indicated that any restriction to the sample flow would change the sample flow. The cause of this effect was the low pressure high flow rate pump (HiVol blower) used. Relatively large amounts of air were required to be bled into the system to keep the pump from overheating. Any small restriction in the sample line would cause the flow balance to shift to the bleed air. The previous audits of Methylbromide therefore do not reflect the sampling flow conditions. In addition, the use of a rotameter on the sample tube(s) inlet would affect the flow rate, so that the actual flow rate during sampling is unknown. Since calibrated rotameters were used to set the sample flows, these set flows would be the minimum sample flows. The data should therefore be calculated based on these minimum flow rates and the concentration of Methylbromide reported at less than or equal to the calculated value since higher actual flow rates would cause the concentrations to be lower than calculated.

Enclosure

cc: Peggy Vanicek

	<u>Yes</u>	<u>No</u>
Is the site clean and well maintained?	—	—
Are field measurements recorded in a log book or on data forms?	✓	—
Are they up-to-date?	✓	—
Operator's initials?	✓	—
Initial and Final Flows?	✓	—
Are records maintained regarding maintenance, site visits, problems, etc.	✓	—
Are the inlet and outlet ports of the sampler capped when not in use?	✓	—

Field Audit

Mass Flow Meter ARB # 6853

Date Last Certified: 9-2-86

Certification Equation: Position 1-100cc : Std Airflow = 1.0875 x Display + 0.26
Position 4-3L : Std Airflow = 0.03035 x Display + 0.01

Sampler ID # _____ Collocated ()

Audit Point	Mass Flowmeter Flow, L/min			Indicated Flow			Measured Flow	True Flow	Percent Difference
	Run			Run					
	1	2	3	1	2	3			
I A	30.8						85	-	
MB-B	32.4						80	-	

Sampler ID # _____ Collocated ()

Audit Point	Mass Flowmeter Flow, L/min			Indicated Flow			Measured Flow	True Flow	Percent Difference
	Run			Run					
	1	2	3	1	2	3			
CP-A	26.0						0.75	0.799	-6.1%
CP-B	27.5						0.85	0.845	+0.6%

Comments _____

	<u>Yes</u>	<u>No</u>
'Is the site clean and well maintained?	✓	—
Are field measurements recorded in a log book or on data forms?	✓	—
Are they up-to-date?	✓	—
Operator's initials?	✓	—
Initial and Final Flows?	✓	—
Are records maintained regarding maintenance, site visits, problems, etc.	✓	—
Are the inlet and outlet ports of the sampler capped when not in use?	✓	—

Field Audit

Mass Flow Meter ARB # 6853

Date Last Certified: 9-2-86

Certification Equation: Position 1 (100cc) : Std. Airflow = 1.0875 x Display +0.26
Position 4 (3L) : Std. Airflow = 0.03035x Display +0.01

Sampler ID # _____ Collocated () _____

Audit Point	Mass Flowmeter Flow, L/min			Indicated Flow			Measured Flow	True Flow	Percent Difference
	Run			Run					
	1	2	3	1	2	3			
-A	111.1 *			100cc/min				--	
MB-B									

* With Rotameter and MFM in series, an adjusted flow was ~10cc/min

Sampler ID # _____ Collocated () _____

Audit Point	Mass Flowmeter Flow, L/min			Indicated Flow			Measured Flow	True Flow	Percent Difference
	Run			Run					
	1	2	3	1	2	3			
CP-A	31.3			1L/min.			1L/min	.960	+4.2
CP-B	29.0			1L/min			1L/min.	.890	+12.3

Comments _____

Memorandum

PETER

To : Peter Venturini, Chief
Stationary Source Division

Date : November 12, 1986

Subject: Audit Report of the
Stockton, CA
Methylbromide Monitoring
Project - October 1986

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NOV 18 1986

Stationary Source
Division
Air Resources Board

Spencer
Spencer Duckworth, Chief
Aerometric Data Division

From : Air Resources Board

Attached you will find a report summarizing the results of the field audit conducted by my staff at SSD's request for the methylbromide monitoring project at Stockton, CA.

If you have any questions regarding this evaluation, please call Peggy Vanicek of the Quality Assurance Section at 3-8373.

Attachment

cc: Bob Effa
Bob Barham

Field Audit Report
Methylbromide Air Monitoring Project
Stockton, California

Summary

On October 15, 1986, the Quality Assurance Section (QA), at the request of the Stationary Source Division (SSD), conducted a field audit of a methylbromide monitoring site in Stockton, California. Peggy Vanicek of the QA Section performed the audit and present from SSD were Angus MacPherson and Tom Parker.

Three sites were operating to monitor for methylbromide emissions from local walnut fumigation processes. Due to the unavailability of 110 VAC power at two of the sites, only one site was audited. Site #1 (Corporation Yard) was the audited site and was considered to be representative of all three sites in view of the fact that siting criteria and sampling apparatus were the same at each location. Since the monitoring network consisted of only three sites in operation, the audit of Site #1 provided an adequate assessment.

Site #1 conformed with siting criteria listed in the June 1986 SSD "Quality Assurance Plan for Pesticide Monitoring." Documentation of site activities and sampling conditions was adequate for the project. Three minor potential problems were noted and are discussed in detail below.

A flow accuracy audit was conducted using a Matheson Mass Flow Meter Model 8143. The audit results indicated the sampler flow accuracy was -12.6%.

Following is a detailed description of the audit activities along with a copy of the field audit data sheet (Attachment I).

Field Operations

The sampling apparatus consisted of a portable battery operated Brailsford TD-1AS reciprocating pump with an in-line valve to control sample flow. A SXC charcoal tube was mounted vertically and connected to the rotameter with tygon tubing, the inlet side of the tube was down and open to the atmosphere. The flow was measured and adjusted by attaching a calibrated 0.1-0.5 L Dwyer top valve rotameter to the sample tube inlet and adjusting the in-line valve for proper flow. The rotameter was calibrated under atmospheric conditions by the QA Standards Laboratory on October 8, 1986, and the calibration data was available for review at the site. Records were kept as to sampling conditions, date and time, and sample flows were measured and recorded on data sheets (Attachment II) before and after the sampling period. Two minor problems were noted with regards to data recording and sample set-up. First, the operator's initials were not included on the data sheets. To ensure the ability to trace records, it is important to include the initials of the person recording the information.

The second potential problem was that the charcoal tube was not protected from sunlight. On the day of the audit, however, plans were made to cover the tubes with aluminum foil. Since methylbromide undergoes removal primarily by reaction with the hydroxyl radical and not by photodissociation, the analysis data from tubes not protected from sunlight may not have been adversely affected.

The sampling apparatus was sited correctly in accordance with the criteria listed in "Quality Assurance Plan for Pesticide Monitoring." One potential problem was noted with the observation of a gasoline pump located approximately 25 meters west by southwest from the sampler. Methylbromide is a minor constituent of gasoline, and it is possible, given the proper wind conditions, for sample contamination to occur when gasoline is dispensed. In addition, other components of gasoline might interfere with the analytical method.

Flow Audits

The flow accuracy audit was conducted with a Matheson Mass Flow Meter Model 8141 according to the procedures described in Attachment III. The mass flow meter is certified against ARB's primary standard Brooks flow calibrator. The results of the flow audit are summarized in Table I.

Table I

Flow Accuracy Audit Results

Methylbromide Monitoring Study - Stockton, California

<u>Site</u>	<u>Percent Difference*</u>
Site #1 - Corporation Yard	-12.6%

* Percent Difference = $\frac{\text{Measured Flow} - \text{True Flow}}{\text{True Flow}} \times 100$

Yes No

Is the site clean and well maintained?

✓ —

Are field measurements recorded in a log book or on data forms?

✓ —

Are they up-to-date?

✓ —

Operator's initials?

— ✓

Initial and Final Flows?

✓ —

Are records maintained regarding maintenance, site visits, problems, etc.

✓ —

Are the inlet and outlet ports of the sampler capped when not in use?

N/A —

Field Audit

Mass Flow Meter ARB # 6853 (100 cc)

Date Last Certified: 9-2-86

Certification Equation: Std. Airflow = 1.0875 x Display + 0.26

Sampler ID # Collocated ()

Audit Point	Mass Flowmeter Flow, L/min			Indicated Flow			Measured Flow	True Flow	Percent Difference
	Run			Run					
	1	2	3	1	2	3			
1	131.1			.11			.12 ⁵ L	.143L	-12.6%

Sampler ID # Collocated ()

Audit Point	Mass Flowmeter Flow, L/min			Indicated Flow			Measured Flow	True Flow	Percent Difference
	Run			Run					
	1	2	3	1	2	3			

Comments

C-86-101 : STOCKTON AMBIENT MEBR

Attachment 11

	SITE	TIME START	Q _{START} (LPH)	CLIMATE	TIME FINISH	Q _{FINISH} (LPH)	CLIMATE
186	S-1	0730	0.175	T ~ 50°F	1130	0.175	T ~ 70°F
	S-2N	0800	0.175	WINDS:	1200	0.175	WINDS:
	S-2S	0800	0.175	~ 0-3 mph	1200	0.175	~ 0-5 mph
	S-3	0745	0.175	NW	1145	0.175	N.W
	S-1	1230	0.175	T ~ 70°F	1630	0.05	T ~ 80°F
	S-2N	1200	0.175	WINDS:	1600	0.085	WINDS:
	S-2S	1200	0.175	0-5 mph	1600	0.12	~ 0-5 mph
	S-3	1215	0.175	NW	1615	0.10	N.W.

186	S-1	0730	0.175	T ~ 50°F	1130	0.08	T ~ 60°F
	S-2N	0800	0.175	WINDS:	1200	0.06	WINDS:
	S-2S	0800	0.175	~ 0-1 mph	1200	0.06	~ 0-3 mph
	S-3	0745	0.175	N.W	1145	0.775	N.W
	S-1*	1230	0.175	T ~ 60°F	1600	0.175	T ~ 65°F
	S-2N*	1200	0.175	WINDS:	1600 1530	0.175	WINDS:
	S-2S*	1200	0.175	~ 0-3 mph	1600 1530	0.175	~ 0-5 mph
	S-3*	1215	0.175	N.W	1545	0.175	N.W

1186	S-1	0800	0.175	T ~ 55°F	1215	0.12	T ~ 70°F
	S-2N*	0815	0.175	WINDS:	1230	0.12	WINDS:
	S-2S*	0815	0.175	0-5 mph	1230	0.12	0-5 mph
	S-3*	0745	0.175	N.W	1150	0.175	N.W

E	Site	TIME START	Q _{START} (LPH)	TIME FINISH	Q _{FINISH} (LPH)	NOTES
186	S-3	0800	0.12	1200	0.10	Temp ~ 60°F WINDS: ~ 0-2 FROM NW
	S-1	0815	0.12	1215	0	
	S-2N	0845	0.12	1245	0	
	S-2S	0845	0.12	1245	0.12	
	S-1	1200	0.12	1630	0	Temp ~ 75°F WINDS: ~ 5-10 FROM NW
	S-3	1230	0.12	1645	0.10	
	S-2N	1300	0.12	1700	0	
	S-2S	1300	0.12	1700	0.12	

1/8'	S-3	0800	0.12	1200	0.09	Temp ~ 57°F WINDS: ~ 0-2 mph FROM: W
	S-2N	08 00 ¹⁵	0.12	1230	0.09	
	S-2S	0815	0.12	1230	0.12	
1	S-1	0835	0.12	1245	0.22	
1	S-3 a/c	1300	0.12	1630	0.12	Temp ~ 65°F WINDS: ~ 10-15 mph FROM W
1	S-2N a/b	1330	0.12	1615	0.12	
1	S-2S a/b	1330	0.12	1615	0.08	
1	S-1 a/b	1345	0.18	1645	0.18	

KEY:

S-1 : Ag. Corporate yard

S-2N : Rover, 2426 Learned Ave., North Sample

S-2S : " " " " South "

S-3 : Diamond Walnut

a/ : Blank Sample taken during this sample period

b/ : ~~From~~ one-tube sample train

Flow Audit Procedure for Pesticide Samplers

Introduction: The pesticide sampler is audited using a Matheson Mass Flow Meter, Model 8143, that is standardized against a NBS traceable Brooks flow calibrator corrected to 25°C and 760 mm Hg.

The mass flow meter (MFM) is placed in series with the sample probe and the flows checked while the sampler is operating at the normal sampling flow rate. The standard (true) flow rates are obtained from the calibrative curve of the MFM and the indicated flow rates are applied to the sampler's calibration curve to determine the reported flow rates which are then compared to true flow rates.

Equipment: The basic equipment required for the pesticide sampler flow audit is listed below. Additional equipment may be required depending on the particular configuration and type of sampler.

1. Matheson Mass Flow Meter, Model 8143, Transfer Standard with a 10 SLPM transducer.
2. Tygon tubing, 1/8" and 1/4" I.D., for connections to sampler.
3. Teflon tubing, 1/4" I.D.
4. Stainless steel Swagelok fittings, cleaned with methanol and heated overnight at 100°C.
5. Plastic caps to cover flow meter ports.
6. Audit log book and data sheets.

Audit Procedures:

1. Plug the Matheson MFM into a 110 VAC outlet. Allow 10 minutes for the MFM to warm up.
2. Connect the MFM to the sample tube using the 1/4" teflon tubing and tygon tubing. If it is desired not to use the sample tube a dummy tube may be used in its place.
3. Allow the flow to stabilize for 1-2 minutes and record the indicated flows on the data sheet.
4. Apply the indicated flows to the calibration curve of the Matheson MFM standard to obtain the true flow and record in the blanks provided on the field data sheet. Obtain the sampler measured flow from the field operator. Calculate the difference between the true flow and measured flow and report as percent difference on the field data sheet.

Memorandum

PETER
To : Peter Venturini, Chief
Stationary Source Division

Date : April 27, 1987

Subject : UCD Department of
Toxicology, Environmental
Laboratory Toxicology
Laboratory Audit -
Methyl Bromide Air
Monitoring Project

Spencer
Spencer Duckworth, Chief
Aerometric Data Division

From : Air Resources Board

Attached you will find a summary report of the laboratory audit conducted by my staff at SSD's request for the methyl bromide monitoring project. The laboratory audit consisted of both an analytical performance check and a procedural review.

A more detailed audit report is on file in the Aerometric Data Division - Quality Assurance Section. If you have further questions on this audit or wish to see a copy of the full report, please contact Bob Effa at 2-3726.

Attachment

cc: Bob Barham
Bob Effa

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MAY 5 1987

Stationary Source
Division
Air Resources Board

MAY 08 1987

Laboratory Audit Report Summary

Environmental Toxicology Laboratory
University of California, Davis
Methyl Bromide Air Monitoring Project
Monterey County, California

Report Date: April 27, 1987

Summary

On Thursday, November 6, 1986, the Quality Assurance Section completed an audit of the Environmental Toxicology Laboratory which provided the analytical support for the methyl bromide air monitoring project conducted by the University of California, Davis (UCD) in Monterey County, California, for the ARB Stationary Source Division. The audit was conducted at the request of the Stationary Source Division (SSD) to fulfill requirements of SSD's pesticide monitoring plan and consisted of both an analytical performance and a system audit.

Eight SKC charcoal adsorbant tubes were spiked with methyl bromide by QA staff and submitted to the UCD laboratory for analysis as an analytical performance audit. The reported results from the laboratory were all within 50 percent of the assigned value with an average bias of -45 percent. Results of the performance audit are summarized in Table I.

Table I

Methyl Bromide Performance Audit Results Environmental Toxicology Laboratory University of California, Davis

<u>Sample Identification</u>	<u>Assigned Concentration, µg</u>	<u>Laboratory Measured Concentration, µg</u>	<u>Percent Bias*</u>
A	3.6	2.0	-44
B	5.4	2.9	-46
C	7.2	4.0	-44
D	Blank	< 0.1	--
E	3.6	1.9	-47
F	9.0	5.0	-44
G	2.9	1.8	-38
H	4.3	2.2	-49

* Percent Bias = $\frac{\text{Measured Concentration} - \text{Assigned Concentration}}{\text{Assigned Concentration}} \times 100$

The system audit reviewed the laboratory operations pertaining to sample handling and analysis, and data documentation. Laboratory facilities were also evaluated for safety features and for chemical handling and storage equipment. The laboratory, though pressed for space, had several safety features and chemical handling equipment items available, and had modern analytical instrumentation for use on this project. During the review of the laboratory quality control measures, deficiencies were found in procedures which are an integral component of good laboratory practices, and in documentation necessary for evaluating the uncertainties associated with the analytical process. These deficiencies are discussed in detail along with comments in the full audit report kept on file at the Aerometric Data Division. Before UCD completes the final report on methyl bromide the laboratory should provide as much information as possible regarding the documentation that was unavailable for review at the time of the audit to provide a more complete assessment of the uncertainties associated with the data set.

Memorandum

William Loscutoff, Chief
Toxic Pollutants Branch
Air Resources Board
1102 Q Street
Sacramento, CA 95814

Date : May 1, 1986

Place : Sacramento

From : Department of Food and Agriculture - 1220 N Street
Sacramento, CA 95814

Subject: ARB Monitoring for Methyl Bromide (Reference 2323)

In order to fulfill requirements of the AB 1807 (Tanner) process (Food and Agriculture Code, Division 7, Chapter 3, Article 1.5), the California Department of Food and Agriculture (CDFA) requests that the ARB document the airborne emission level of methyl bromide (MeBr). This memorandum provides some background information on MeBr, identifies how it is used, and provides some recent use information. It was prepared by A.W. Fabre, L. Ross, and T. Mischke of my staff.

Methyl bromide is a gaseous fumigant used both in soil and on commodities. It is odorless at low concentrations but may have a musty or slightly sweet odor at high concentrations. It has a vapor pressure of 1420 mmHg at standard temperature and pressure, a boiling point of 3.6°C and a molecular weight of 94.9 g/mole. These physical attributes contribute to MeBr's ability to penetrate quickly and deeply into sorptive materials at normal atmospheric pressures and then, at the end of treatment, dissipate rapidly without appreciably altering the treated material. Methyl bromide is marketed almost exclusively in pressurized steel cylinders although twenty milliliter glass ampules are available for some types of vertebrate control.

Methyl bromide is regulated as a restricted material under §6400, Article 1, Title 3 of the California Administrative Code. Additional use requirements in Article 4, §6450, 6452, and 6454, also govern pest control operations and the activities of MeBr users. The following three sections in this memo address specific categories of MeBr use: soil (field) fumigation, nursery and commodity fumigation and structural fumigation.

Soil Fumigation

Pesticide use data indicates that the majority of MeBr is utilized in field fumigation of soils. Specialized tractors which are equipped with steel shank rippers and continuous polyethylene tarping devices are used to apply MeBr fumigants. These applications are made to control nematodes, soil fungi, insects and weed seeds; typically, the cost of application is over \$1,000 per acre. Because field fumigation is expensive and application difficult, treatment is restricted to soils in which high value crops such as grapes, strawberries, nursery stock and long lived perennials will be planted and application is generally made by large contract fumigators.

When used in the field, MeBr fumigant products usually contain substantial amounts of chloropicrin. In some mixtures chloropicrin serves as a warning agent

SURNAME

SO-106

Sanders

William Loscutoff
Page 2
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Because MeBr is mixed with chloropicrin for field fumigation and because of differences in crop rooting area, there is considerable latitude in the rate of MeBr application. Most field applications utilize from 150 to 200 pound of MeBr per acre.

Nursery and Commodity Fumigation

Section 6452 of the California Administrative Code describes the circumstances under which fumigations of MeBr are to occur: treatment "shall be done in a properly sealed fumigation chamber, railroad car, or truck trailer, or under a gas confining tarp approved by the [agricultural] commissioner or director." Typically, MeBr products with little or no chloropicrin are used in these treatments and the dosage varies from 1.5 to 3 pounds per thousand cubic feet of enclosure. Granaries, dried fruit processors, and nut processors are the major MeBr users within this category. According to the 1984 Pesticide Use Report, nursery and commodity fumigation accounted for less than 5% of the total MeBr use that year.

Structural Fumigation

Structural fumigation is performed by structural pest control operators who are licensed by the Department of Food and Agriculture and required to file pesticide use reports monthly. Typically, structures are enclosed in gas-tight tarps and between 1 and 3 pounds of MeBr per 1,000 cubic feet is injected. This tarp remains in place for a period of 1 to 3 days. Section 6454, Article 4, Title 3 of the California Administrative Code requires MeBr structural fumigation products to contain a chloropicrin warning agent. According to the 1984 Pesticide Use Report, 1,489,504 pounds of MeBr were used for structural fumigation that year.

Monitoring Recommendation

We recommend that the ARB monitor in the Watsonville area to document the level of airborne emissions which result from strawberry field treatments which are staggered from June to October. Since MeBr is a restricted material and users are required to file a Notice of Intent, this notice can provide a means of determining when fumigation will occur and thus aid in specific monitoring site identification. To characterize the emissions that may result from the fumigation of agricultural commodities in enclosures (chambers, etc.) we recommend that the ARB monitor in Stockton during September and October when several million pounds of in-shell walnuts are treated at a walnut processing facility. We also recommend concurrent MeBr/chloropicrin monitoring since these two pesticides are almost exclusively used together and because chloropicrin is the next candidate toxic air contaminant we plan to submit to the ARB for monitoring under AB 1807.

William Loscutoff

Page 3

May 1, 1986

Monitoring Considerations

1. It is very difficult to monitor gas phase MeBr when using adsorbant devices. Such devices work fairly well at moderate (1 ppm) to high concentrations, but extreme precautions must be taken to ensure recoveries from the adsorption medium are not highly variable. At low to very low concentrations, recovery variability prohibits the use of gas-phase trapping methods.
2. Real time gas-phase monitoring by long path infrared detection is the only way to reliably monitor MeBr at concentrations below 1 ppm.
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John S. Sanders for

Ronald J. Oshima
Branch Chief
Environmental Monitoring and
Pest Management, Room A-149
(916) 324-8921

cc: Peter Venturini
Bob Barham
Ralph Proper
Lynn Baker
Lori Johnston

Memorandum

: William Loscutoff, Chief
Toxic Pollutants Branch
Air Resources Board
1102 Q Street
Sacramento, CA 95814

Date : May 1, 1986

Place : Sacramento

From : Department of Food and Agriculture - 1220 N Street
Sacramento, CA 95814

Subject: ARB Monitoring for Methyl Bromide (Reference 2323)

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SURNAME

SO-106

Sanders

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Page 2

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John S. Sanders for

Ronald J. Oshima
Branch Chief
Environmental Monitoring and
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(916) 324-8921

cc: Peter Venturini
Bob Barham
Ralph Proper
Lynn Baker
Lori Johnston

Memorandum

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1102 Q Street
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Date : May 1, 1986

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SO-106

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John S. Sanders for

Ronald J. Oshima
Branch Chief
Environmental Monitoring and
Pest Management, Room A-149
(916) 324-8921

cc: Peter Venturini
Bob Barham
Ralph Proper
Lynn Baker
Lori Johnston

Memorandum

To : Genevieve A. Shiroma, Chief
Toxic Air Contaminant
Identification Branch
Air Resources Board
P.O. Box 2815
1102 Q Street
Sacramento, CA 95814

Date : September 16, 1991

Place :

From : Department of Pesticide Regulation 1220 N Street, P.O. Box 942871
Sacramento, California 94271-0001

Subject : ARB Monitoring for Carbofuran

In order to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5), the California Department of Pesticide Regulation (CDPR) requests that the Air Resources Board document the airborne levels of carbofuran.

Carbofuran (2,3-Dihydro-2,2-Dimethyl-7-Benzofuranyl Methyl Carbonate) is an insecticide/nematocide and is an active ingredient in 5 currently registered pesticide products. Carbofuran-containing products are formulated as granules (3 products) and liquids (2 products). Carbofuran-containing products are used to control a wide range of insect and soil pests and are registered for use on several crops including alfalfa, rice, and grapes.

Acute toxicity studies show carbofuran to be highly toxic by oral ingestion and inhalation, and moderately toxic by dermal exposure. Acute LD₅₀'s of 13.3, 5.6, and 2.0 mg/kg have been reported in male rats, female rats, and mice respectively. Acute inhalation (4 hr.) LC₅₀ values in the rat range from 17 to 47 µg/l and the dermal LD₅₀ in rabbits has been measured at 14.7 mg/kg.

Because of acute toxic effects, the federal Environmental Protection Agency has classified carbofuran in Toxicity Category I and has designated it a restricted use pesticide. Carbofuran entered the risk assessment process at CDPR under SB950 (Birth Defects Prevention Act of 1984) because of the identification of potential chronic, reproductive and mutagenic effects. Additionally, concern over acute toxicity has been a primary consideration in selecting carbofuran as a candidate toxic air contaminant for AB1807 review.

Carbofuran is listed as a restricted use material under Title 3, California Code of Regulations, section 6400, and a permit is required to purchase or use carbofuran-containing products which contain greater than ten percent active ingredient by weight. Several changes in the registered uses of carbofuran-containing products have occurred since 1988 as well as changes in the way pesticide use is reported. These changes limit the usefulness of historic use data in predicting future use. Therefore, currently available Pesticide Use Report data

characterizes but does not account for the actual use of carbofuran-containing products. Sales data indicate that 177,944 pounds of carbofuran were sold in 1988, but reported use was 267,794 pounds.

The following table summarizes 1987 and 1988 Pesticide Use Report data for carbofuran:

Carbofuran Use by Crop (pounds of active ingredient)

<u>Crop</u>	<u>1987</u>	<u>1988</u>
Alfalfa	103,982	116,446
Grapes	79,812	73,335
Rice	57,476	58,895
Sugarbeet	12,240	9,105
Other	16,568	10,013
TOTAL REPORTED USE	270,078	267,794

Pesticide Use Report data summarized in this table show the largest reported use of carbofuran-containing products occurs on alfalfa. Carbofuran use on rice is limited to granular formulations and use on grapes may include soil-applied, granular formulations as well as liquid formulations applied through drip irrigation systems.

Carbofuran is used on alfalfa to control alfalfa weevils. Adult alfalfa weevils over-winter in field trash or other secluded hiding places and emerge in late winter and early spring. Weevils migrate to alfalfa fields and begin laying eggs inside alfalfa stems. The larvae emerge and begin feeding on upper leaves and new shoots. The larvae damage early season growth and in heavy infestations weaken fields and cause significant economic loss. Typically, applications of carbofuran are made when larvae numbers reach damaging levels. In Imperial County, alfalfa weevil treatments often peak during February and March. Treatments are timed according to pest numbers and vary every season. Monitoring activities must be timed and correspond to periods of significant use. Applications are typically made using aircraft which apply from 0.25 to 0.50 pound of active ingredient per acre in a minimum of 5 gallons of water.

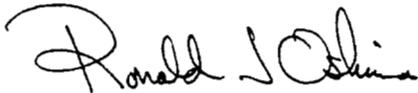
Recommendation

The use pattern for carbofuran suggests that monitoring should take place in Imperial County for a 30-day sampling period during February and March. Three sampling sites should be selected in relatively high-population areas or areas frequented by people. Sampling sites should be in alfalfa growing areas, but not immediately adjacent to

Genevieve Shiroma
September 16, 1991
Page 3

fields. At each site, nineteen discrete 24-hour samples should be taken during the 30-day sampling period. The specific dates for 24-hour sampling should be chosen by random method, during the 30 day sampling period.

Replicate (co-located) samples are needed for three dates at each site. Two co-located air samplers (in addition to the primary sampler) should be run on those days. The date chosen for collecting the replicate samples should be distributed over the 30 day period. They may, but need not be, the same dates at every site.



Ronald J. Oshima
Branch Chief
Environmental Monitoring and Pest
Management, Room A-149
(916) 654-1144

cc: Jim Wells
Tobi Jones
Regional Coordinator
Stephen L Birdsall
Keith Pfeifer
Lynn Baker
Peter Venturini

Dave Duncan
Bill Fabre
Kevin Kelley
Robert Krieger
Douglas Okumura
Larry Nelson
Ruby Reed

Memorandum

To : Ron Oshima, Chief
Environmental Monitoring and Pest
Management

Date : March 14, 1991

Place : Sacramento

From : Department of Food and Agriculture

Robert I. Krieger, Chief/Supervising
Toxicologist
John H. Ross, Senior Toxicologist
Worker Health and Safety Branch

Subject: ARB Monitoring Program

Three memoranda were recently attached together concerning the requirements of AB/1807. My question concerns the nomination process again and just where scientific judgement seems to be entering into this issue. The memoranda indicate that monitoring will be conducted for technical triadimefon, oxydemeton-methyl and methidathion. The document includes information concerning the physical properties, classification, use and other information.

I am sure that the recommendation which follows in each case has been developed after substantial thought, but I have substantial reservations. The vapor pressure of the various agents triadimefon, oxydemeton-methyl and methidathion range from 3.8×10^{-5} to 4.5×10^{-7} millimeters of Hg at 25°C. The acute toxicities of these materials are registered in milligrams per kilogram (mg/kg).

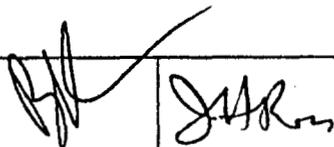
Have we identified some means by which general population exposures to these materials may be of any significance outside of an ill conceived regulatory structure? Is it our recommendation that three sampling sites should be selected in relatively high population areas (or areas frequented by people)? That implies to me that the results will be considered to have some relevance to the general population. The presumption is quite clear, but unstated. It gives the results remarkable power in any subsequent risk assessment. I am uncertain and unconvinced that this strategy is relevant in these cases or any other ones in which materials of such low vapor pressure are being evaluated as community/basin air pollutants.

It is be clear that in areas adjacent to or downwind from application sites that residues may be measurable in air, although this strategy for monitoring other low vapor pressure pesticides has not been very successful. Levels may be quantified and even projected into some model of movement of chemical from a treated area (virtually a point source) to a non-treated one.

Where are we in the Department of Food and Agriculture (CDFA) headed with respect to issues related to air and pesticides? Are we better to find insignificant levels of non volatiles (e.g. paraquat) or to conclude based on physical properties that they will not be present in air in an inhalable form?

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