

Memorandum

To : Kean Goh, Sr. Env. Res. Scientist  
Environmental Hazards Assessment Program

Date : May 21, 1993

Place : Sacramento

Phone: 4-0536

from : Department of Pesticide Regulation

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Environmental Hazards Assessment Program

Subject : Results of Off-Site Air Monitoring During a Methyl Bromide Warehouse Fumigation

SUMMARY

The concentrations of methyl bromide in the air surrounding a metal warehouse during a fumigation were determined. Several samples of twenty-four hour duration were taken at a distance of 30 feet from the warehouse in which the fumigation was applied. Concentrations ranged from none detected to 550 ppb,

INTRODUCTION

The Department is reviewing methyl bromide regulations to ensure an adequate margin of safety during fumigation. As part of that review, the Department is investigating methyl bromide concentrations at a distance of 30 feet from fumigation structures. The methyl bromide concentration in air is be partially caused by the diffusion of the gas out of the fumigation structure. Corrugated metal warehouses are a common type of structure used for commodity storage and fumigations. The non-airtight construction of the warehouses is expected to allow diffusion of methyl bromide out of the building. The objective of this study was to determine air concentration at a 30 foot "controlled access area" during the first 24 hours during fumigation.

SITE AND FUMIGATION DESCRIPTION

A raisin packing plant in Madera County was selected as a monitoring site, The location has processing and packing areas, and several warehouses that are used for storage and fumigation. The monitored building, situated in the southwest end of the location, consists of two warehouses, each 90 feet x 80 feet x 20 feet. Only one of the warehouses was fumigated (Figure 1). The warehouse is constructed of metal frame and corrugated metal sheeting on a concrete pad. Each separate warehouse has two 12-foot roll-up doors with a 3-foot personnel door next to it. None of the doors were sealed during the fumigation. The fumigated warehouse was approximately 75% filled with bins of raisins.



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Fumigation procedures were typical. Methyl bromide was heated, injected into a port at the side of the warehouse, and piped up to the center of the ceiling. At the application rate of 0.75 lb./1,000 cu. ft., a total of 108 lbs. of methyl bromide was applied to the 144,000 cu. ft. warehouse over a period of 20 minutes. Typically, the fumigation is then held for 2-3 weeks, at which time the doors are opened and the warehouse is passively aerated,

#### MATERIAL AND METHODS

Ten samplers were placed 30 feet away (sampling tubes located 4 feet above ground level) around the entire building (Figure 1). Two of the samplers were placed 30 feet away from the center of the two 12-foot doors of the fumigated warehouse.

Methyl bromide concentrations in air were measured using a train of four petroleum-based charcoal tubes connected end to end (primary and backups) attached to an air pump. Methyl bromide was trapped on the charcoal as air flowed through it. Air sampling was initiated at approximately 2:35 p.m., on April 6, 1993, just prior to the start of methyl bromide injection and the 24-hour sample was collected at approximately 2:45 p.m. the next day. Air pump rates were approximately 15 ml/min. The tubes were collected and placed on dry ice for delivery to the laboratory.

Samples were analyzed by Paul Lee of the California Department of Food and Agriculture's Chemistry Laboratory Services. The charcoal from the primary and backup tubes was extracted separately with carbon disulfide. The resulting extract was then analyzed with a gas chromatograph equipped with an electron capture detector. Background air samples were taken to determine if any level of methyl bromide was present in the air before the start of the fumigation. The detection limit was 0.2 ug/sample, equivalent to approximately 2 ppb.

#### RESULTS

Air concentrations of methyl bromide ranged from none detected to 550 ppb (Table 1). The highest concentration was found at a sampler located 30 feet away from the east-side doorway (Figure 1). The sample located just south, in a more downwind direction, had the next highest concentration of 300 ppb. The results suggested that methyl bromide outgassed through the doors, since high concentrations were grouped at the downwind door sites. The sample result from the northwest corner of the building should be discarded, because no methyl bromide was detected in the first two tubes. **The third tube** broke at the time of collection, and the only methyl bromide detected at the sampler was from the fourth tube.

cc: Randy Segawa  
Dennis Gibbons

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Figure 1. Concentration of Methyl Bromide (ppb) at Sampling Sites for **24-hour** Period.

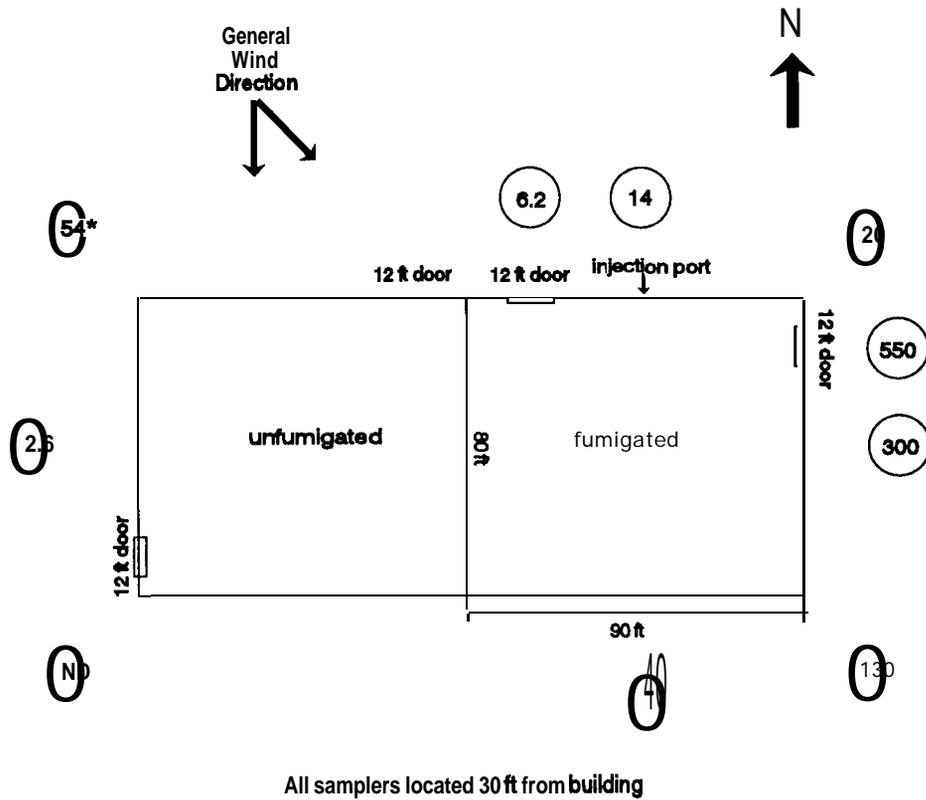


Table 1. Results of Methyl Bromide Air Monitoring at Warehouse Fumigation.

Sampling Location	Sampling Run Time (min)	Sampler Air Flow (ml/min)	Methyl Bromide		Detection Limit (ppb)
			(ug/sample)	ppb	
Northwest	1447	14.6	4.39"	54"	2.40
West	1446	14.9	0.22	2.6	2.40
Southwest	1446	14.9	none detected	none detected	2.40
South	1444	14.5	3.98	49	2.50
Southeast	1444	15.5	11.48	130	2.30
East	1444	15.3	25.70	300	2.30
Northeast	1440	14.7	1.68	20	2.40
North	1440	14.6	1.14	14	2.50
North door	1439	15.3	0.53	6.2	2.30
East door	1443	14.8	45.68	550	2.40
Background south	136	93.6	none detected	none detected	4.10
Background north	136	93.6	none detected	none detected	4.10

\* suspect data