



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: DOCUMENTATION OF EXPOSURE ASSESSMENT FOR METHYL BROMIDE
USED IN STRUCTURAL FUMIGATION

TO: Linda Kutney
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Larry Dorsey

OREB has been requested to provide estimates of the daily exposures of the residents of homes fumigated with methyl bromide (MB). This fumigant is used for control of dry wood termites or powder-post beetles. The structures are covered with a tarp and the fumigant introduced into the structure. After the appropriate fumigation period the tarps are removed and the structures aerated.

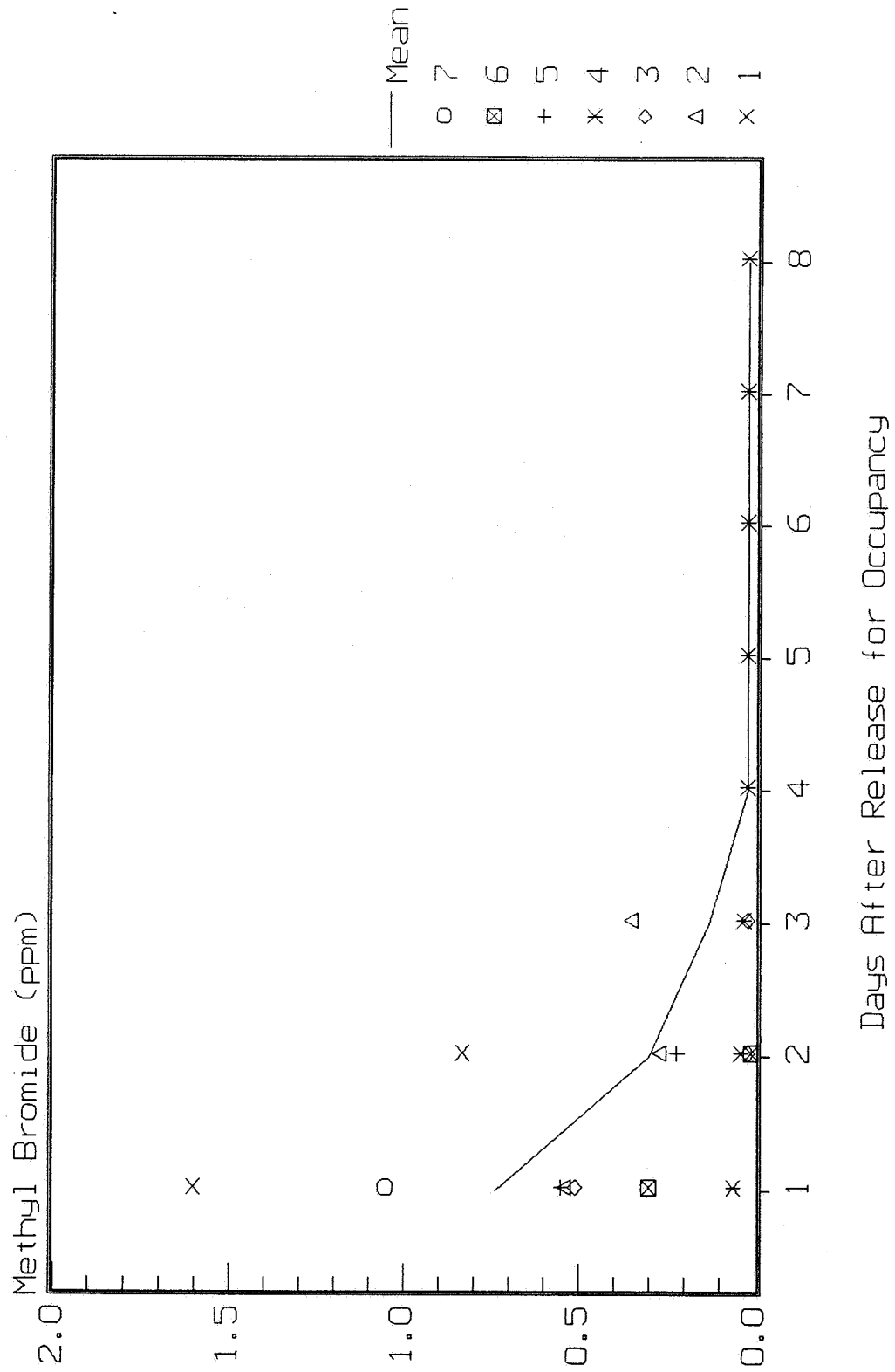
OREB had no data addressing the potential exposures of residents of homes following structural fumigation. California Environmental Protection Agency (CALEPA) provided the results of a preliminary study in which indoor air of seven homes fumigated with MB was monitored using sensitive infrared (IR) equipment. Details of the study, such as recoveries and calibration/QA data were not provided. The data from the seven houses are summarized in Table 1 and presented in graph form in Figure 1. More detailed information, including aeration conditions, are presented in Appendix A.

Table 1. Average Indoor Air Concentrations of Methyl Bromide (MB) from Homes Treated in California - Preliminary Data. All values are in PPM. Air was sampled from various rooms of the homes. Aeration conditions are presented in Appendix A.

House No.	Day After Release for Occupancy								MEAN
	1	2	3	4	5	6	7	8	
1	1.60	0.83							1.22
2	0.54	0.27	0.35						0.39
3	0.51	0.02 ¹	0.02						0.18
4	0.06	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.03
5	0.55	0.22							0.39
6	0.30	0.01							0.15
7	1.05								1.05
MEAN	0.74	0.30	0.13	0.02	0.02	0.02	0.02	0.02	0.36

¹ Level of Detection was 0.04 ppm, values below this level are reported as 0.02 ppm.

Figure 1. Air Levels in California Homes Treated with Methyl Bromide



A number of assumptions were required in order to estimate the respiratory exposures of residents to these fumigants:

- 1) An average male resident has a body weight of 70 kg and a female resident weighs 60 kg.
- 2) The average male resident has respiratory volumes of 0.44 m³ and 1.7 m³ per hour while at rest and while performing light tasks, respectively. Females are assumed to have corresponding respiratory volumes of 0.27 m³ per hour while at rest and 0.96 m³ per hour during light tasks.
- 3) An average resident is assumed to spend 15 hours per day in the home. The daily respiratory volumes are therefore 13 m³ and 7.5 m³ per day for males and females, respectively.

The current label for methyl bromide requires aeration of the fumigated structure until the air concentrations reach 5 ppm. A recent study submitted by DOW Chemical company for another fumigant, sulfuryl fluoride indicates that, upon closing the house **after aeration**, the air levels of both sulfuryl fluoride and methyl bromide increase. DOW has requested label amendments to require further aeration for sulfuryl fluoride. This request has been previously evaluated by OREB in an earlier review (1). The portion of this study addressing MB exposures has not yet been reviewed. Toxicology Branch I has requested OREB to calculate Margins of Exposure (MOEs) for both MB. The toxicological endpoints of concern and relevant physiological parameters were provided by the Toxicology Branch. OREB has provided the MOE calculations for three concentrations of MB. These values are; the label required reentry concentration, 5 ppm for both compounds; the DOW measurement value, 18.6 ppm for MB; and the results of 72 hours of aeration as measured by CALEPA. These MOEs are presented in Table 2.

Table 2. Margins of Exposure (MOE) for Residents of Homes Treated with Methyl Bromide.

Chemical	Scenario	ppm		mg/cu m		Daily Dose (ng/kg/day)		Effect	Species	NOEL ppm	NOEL mg/kg/day	MOE Males	MOE Females
		Males	Females	Males	Females	Males	Females						
Methyl Bromide	TLV	5	19.40	3.6	2.4	2.4	Developmental	Rabbit	40	37	15.3		
	DOW Measurement	18.6	72.17	13.4	9.0	9.0			40	37	4.1		
	72 Hr Aeration	0.142	0.55	0.1	0.1	0.1			40	37	540.1		
	TLV	5	19.40	3.6	2.4	2.4	Developmental	Rat	20	19	7.8		
	DOW Measurement	18.6	72.17	13.4	9.0	9.0			20	19	2.1		
	72 Hr Aeration	0.142	0.55	0.1	0.1	0.1			20	19	275.9		
	TLV	5	19.40	3.6	2.4	2.4	Chronic	Rat	30	28	11.5		
	DOW Measurement	18.6	72.17	13.4	9.0	9.0			30	28	2.1		
	72 Hr Aeration	0.142	0.55	0.1	0.1	0.1			30	28	273.6		
	TLV	5	19.40	3.6	2.4	2.4			3	2.8	0.8	1.2	
	DOW Measurement	18.6	72.17	13.4	9.0	9.0			3	2.8	0.2	0.3	
	72 Hr Aeration	0.142	0.55	0.1	0.1	0.1			3	2.8	27.4	40.7	
	TLV	5	19.40	3.6	2.4	2.4	Acute LC50		2700	N/A	N/A		
	DOW Measurement	18.6	72.17	13.4	9.0	9.0	(30 min.)		2700	N/A	N/A		
	72 Hr Aeration	0.142	0.55	0.1	0.1	0.1			2700	N/A	N/A		
	Human Effects (unknown duration)	35	135.80	25.2	17.0	17.0			35.0		N/A	N/A	

REFERENCES

- 1) Memorandum from J. Tice (OREB) to E. Saito (SACB) titled "Product Amendment Action for Sulfuryl Fluoride Fumigant (Vikane), dated November 26, 1991.

cc: Correspondence File
D. Jaquith/OREB (H7509C)
L. Chitlik/SACB (H7509C)
Chemical file

Appendix A. Summary of California Air Monitoring Data from Homes Fumigated with Methyl Bromide.

House No.	Day After Release	Location	ppm	Aeration Status
1	1	Bathroom	0.1	Aeration status: House continually actively aerated with windows open and four fans from fumigation company distributed in house plus existing overhead operating in dining room.
	1	Kitchen	2	Aeration status: House continually actively aerated with windows open and four fans from fumigation company distributed in house plus existing overhead operating in dining room.
	1	Living room	2.7	Aeration status: House continually actively aerated with windows open and four fans from fumigation company distributed in house plus existing overhead operating in dining room.
2	2	Bathroom	1.4	Aeration status: house open most of the time but passive aeration for second day (fans removed - some windows closed). Carpenter replacing old windows.
	2	Kitchen	0.6	Aeration status: house open most of the time but passive aeration for second day (fans removed - some windows closed). Carpenter replacing old windows.
	2	Living room	0.5	Aeration status: house open most of the time but passive aeration for second day (fans removed - some windows closed). Carpenter replacing old windows.
	1	Bedroom	1.4	Aeration status: house considered open most of the time with active aeration.
	1	Dining	0.02	Aeration status: house considered open most of the time with active aeration.
	1	Hall Closet	0.2	Aeration status: house considered open most of the time with active aeration.
3	2	Bedroom	0.7	Aeration status: house considered open most of the time with active aeration.
	2	Dining	0.02	Aeration status: house considered open most of the time with active aeration.
	2	Hall Closet	0.08	Aeration status: house considered open most of the time with active aeration.
	3	Bedroom	0.2	Aeration status: house considered open most of the time with active aeration.
	3	Dining	0.5	Aeration status: house considered open most of the time with active aeration.

Appendix A (Continued). Summary of California Air Monitoring Data from Homes Fumigated with Methyl Bromide.

House No.	Day After Release	Location	ppm	Aeration Status
3	1	Kitchen	1	Aeration status: House open most of the time with active aeration (fans and windows open).
	1	Living room	0.02	Aeration status: House open most of the time with active aeration (fans and windows open).
	2	Kitchen	0.02	Aeration status: House open most of the time with active aeration (fans and windows open).
	2	Living Room	0.02	Aeration status: House open most of the time with active aeration (fans and windows open).
4	3	Kitchen	0.02	Aeration status: House open most of the time with active aeration (fans and windows open).
	3	Living room	0.02	Aeration status: House open most of the time with active aeration (fans and windows open).
	1	Bath	0.02	Aeration status: House open most of the time with active aeration (fans and windows open).
	1	Fireplace	0.09	Aeration status: House open most of the time with active aeration (fans and windows open).
3	2	Bath	0.03	Aeration status: House closed and fans removed. Raining, overhead fan operating in room with fireplace, exhaust fan over range in kitchen operating and forced-air furnace blower operating circulating air.
	2	Fireplace	0.05	Aeration status: House closed and fans removed. Raining, overhead fan operating in room with fireplace, exhaust fan over range in kitchen operating and forced-air furnace blower operating circulating air.
	3	Bath	0.02	Aeration status: House closed and fans removed. Overhead fan operating in room with fireplace, exhaust fan over range in kitchen operating and forced-air furnace blower operating circulating air.
	3	Fireplace	0.03	Aeration status: House closed and fans removed. Overhead fan operating in room with fireplace, exhaust fan over range in kitchen operating and forced-air furnace blower operating circulating air.
4	4	Bath	0.02	Aeration status: House closed and fans removed. Overhead fan operating in room with fireplace, exhaust fan over range in kitchen operating and forced-air furnace blower operating circulating air.

Appendix A (Continued). Summary of California Air Monitoring Data from Homes Fumigated with Methyl Bromide.

House No.	Day After Release	Location	ppm	Aeration Status
4		Fireplace	0.02	Aeration status: House closed and fans removed. Overhead fan operating in room with fireplace, exhaust fan over range in kitchen operating and forced-air furnace blower operating circulating air.
5		Bath	0.02	Aeration status: House closed and fans removed. Overhead fan operating in room with fireplace, exhaust fan over range in kitchen operating and forced-air furnace blower operating circulating air.
5		Fireplace	0.02	Aeration status: House closed and fans removed. Overhead fan operating in room with fireplace, exhaust fan over range in kitchen operating and forced-air furnace blower operating circulating air.
6		Bath	0.02	Aeration status: House closed and fans removed. Overhead fan operating in room with fireplace, exhaust fan over range in kitchen operating and forced-air furnace blower operating circulating air.
6		Fireplace	0.02	Aeration status: House closed and fans removed. Overhead fan operating in room with fireplace, exhaust fan over range in kitchen operating and forced-air furnace blower operating circulating air.
7		Bath	0.02	Aeration status: House open - owner working at site. Overhead fan operating in room with fireplace; other fans and furnace off.
7		Fireplace	0.02	Aeration status: House open - owner working at site. Overhead fan operating in room with fireplace, other fans and furnace off.
8		Bath	0.02	Aeration status: House closed. Overhead fan operating in room with fireplace.
8		Fireplace	0.02	Aeration status: House closed. Overhead fan operating in room with fireplace.

Appendix A (Continued). Summary of California Air Monitoring Data from Homes Fumigated with Methyl Bromide.

House No.	Day After Release	Location	ppm	Aeration Status
5	1	Bedroom	0.46	Not available
	1	Living room	0.64	Not available
	2	Bedroom	0.3	Not available
	2	Living room	0.14	Not available
6	1	Bedroom	0.3	Not available
	1	Kitchen		Air pump did not run or quit
	2	Bedroom	0.01	Not available
7	1	Den	1.17	Not available
	1	Kitchen	0.93	Not available