US EPA ARCHIVE DOCUMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

AUG 30 1991

MEMORANDUM

SUBJECT: 48-Hour D.C.I. for Methyl Bromide

FROM: Douglas Urban, Acting Chief
Ecological Effects Branch
Environmental Fate and Effects Division (H7507C)

TO: Larry Schnaubelt, PM 74
Reregistration Branch
Special Review and Reregistration Division (H7508W)

The 48-hour D.C.I. for methyl bromide has been completed by the Ecological Effects Branch. The following three studies are now required:

- 72-1(c) Acute Fish Toxicity Rainbow Trout
- 72-2(a) Acute Aquatic Invertebrate Toxicity
- 70-1 Special test

The Registration Standard for methyl bromide (published in August, 1986) reserved two studies, a freshwater fish LC_{50} (72-1), and an aquatic invertebrate (72-2) acute toxicity test pending the results of ecological fate ground water contamination data. Groundwater data submitted to EFGWB do not fulfill guideline requirements. However, data on degradation by hydrolysis was found to fulfill EFGWB requirements (review dated August, 1985). These data indicate that Methyl Bromide is relatively persistent in water with reported half-lives of 35, 40, and 50 days for pH 5, 7, and 9, respectively.

Ground water data reviewed by the EFGWB (review dated August 30, 1990) indicate that methyl bromide may persist near the soil surface in quantities above the EEB's level of concern. These data indicate that methyl bromide residue levels found in the first foot of soil 3 days after a single tarpless application of 300 lbs ai/acre (272.4 kg/ha) may typically measure 800 ppm. After 16 days the residue levels measured 100 ppm.

CONCURRENCES

SYMBOL	Ballutt	Craven	H7507C					
SURNAME	H7507C	H7507C	[illegible]					
DATE	8-29-91	8/30/91	8/30/91					

EPA Form 1320-1 (12-70) *U.S.GPO:1989-624-485/10186 OFFICIAL FILE COPY

The fact that methyl bromide is a is highly volatile fumigant with a vapor pressure of 1400 mm Hg at 20° C suggests that exposure to wildlife is unlikely. However, the high rates of application (300 to 800 lbs/acre), high solubility level (17,500 ppm in water), and relatively high persistency (40 day hydrolytic half-life) indicate that an extended duration of exposure to terrestrial wildlife may exist through the ingestion of contaminated food items found in treated soil.

Due to it's persistency and solubility methyl bromide could potentially remain dissolved in soil moisture, or adsorbed to soil particles and organic matter near the surface for an extended period of time thereby increasing the threat of it being carried with runoff water into adjacent surface water sources. These factors suggest that potential risks to aquatic organisms may exist.

In view of this ecological fate data, the following EEB data are now required to support the continued registration of methyl bromide:

- 72-1(c) Acute Fish Toxicity Rainbow Trout
- 72-2(a) Acute Aquatic Invertebrate Toxicity
- 70-1 Special test [1]

For further questions please contact Dan Balluff at 703-557-7725.

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[1] Avian Acute Drinking Water LC50 Study with Mallard Duck: The study methods for this test are similar to the 71-1 Avian Dietary LC50 study except that the test material is provided to birds in drinking water for the five day exposure period. Due to the unusual nature of test material (high vapor pressure), the Ecological Effects Branch should be contacted to discuss test methods before the study is initiated.

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DP Barcode: D167899

PC Code No.: 053201

Date Out: AUG 27 1991

To: Larry Schnaubelt
Product Manager #72
Special Review and Reregistration Division (H7508C)

From: Emil Regelman, Supervisory Chemist
Chemistry Review Section #2
Environmental Fate & Ground Water Branch
Environmental Fate & Effects Division (H7507C)

Thru: Henry Jacoby, Chief
Environmental Fate & Ground Water Branch
Environmental Fate & Effects Division (H7507C)

Attached, please find the EFGWB review of...

Reg./File # :053201

Chemical Name :Methyl Bromide

Type Product :soil fumigant

Product Name :

Company Name :List A 48 Hour DCI Review

Purpose :Identify all applicable data requirements.

Action Code: 627

EFGWB #(s): 91-0882

Date Received: 8/22/91

Total Review Time:

Deferrals to:

__ EEB/EFED __ DEB/HED __ OREB/HED

__ TB1/HED __ TB2/HED __ RSB/RD

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

MEMORANDUM

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

To: Lois Rossi, Chief
Reregistration Branch
Special Review and Reregistration Division (H7508C)

From: Dana Spatz, Chemist
Chemistry Review Section #2
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Thru: Emil Regelman, Supervisory Chemist
Chemistry Review Section #2
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

AUG 23 1991

Henry Jacoby, Chief
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Subject: Current status of the Environmental Fate data base for Methyl Bromide.

Methyl bromide is a fumigant with acaricidal, fungicidal, herbicidal, insecticidal, nematicidal, and rodenticidal properties registered for use on a variety of **Terrestrial Food Crop** (postharvest or preplant fumigant for field and vegetable crops, preplant or replant soil fumigant for orchard crops), **Terrestrial Nonfood Crop** (preplant soil fumigant for tobacco, ornamental plants, and turf; general soil fumigant for bulk soil, compost, and manure; soil fumigant for general indoor/outdoor treatments including recreational areas), **Residential Outdoor, Indoor Food** (postharvest and store commodity fumigant), and **Greenhouse Food and Nonfood** crop sites. Of the total amount of methyl bromide applied in the United States prior to 1985, 70% was used on sites for tomatoes, strawberries, and other vegetables, and 20-25% was used on commodity/structural and governmental sites. Application rates range from 19 to 872 lb ai/A or 0.5 to 1 lb ai/yd^3 for soil fumigation, and from 0.25 to 11 lb ai/1000 ft^3 for postharvest and stored commodity fumigation. Methyl bromide may be formulated with chloropicrin. Single active ingredient formulations consist of 33-100% PrGs. Methyl bromide may be applied as a soil fumigant using augering, back-hoe, chisel, hot gas, raised tarp, and injection methods; stored commodity/product fumigation methods include injection and recirculation. Applicators must be certified or under the direct supervision of applicators certified to apply methyl bromide.

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Methyl bromide exists as a gas under normal environmental conditions. It is probable that, under actual use conditions, it will be very mobile but will dissipate rapidly unless the soil has been sealed to prevent volatilization. For maximum effectiveness, the label recommends that the soil be covered with tarps after treatment or that the methyl bromide be injected deep below the soil surface.

Valid experimental data that have been submitted to EFGWB on the fate of methyl bromide and its degradates are limited to a hydrolysis study and several supplemental field studies that addressed only the parent compound. Methyl bromide hydrolyzes to primarily methanol and inorganic bromide in pH 5, 7, and 9 buffered solutions held in the dark at 25°C. Hydrolysis is, however, slow with half-lives of approximately 35, 50 and 40 days at pH 5, 7, and 9 respectively. An average degradation rate of 1.4 mg CH_3Br/liter of H_2O/day at 25°C was calculated. In a Soil Field Dissipation study it was found that after injection of methyl bromide at a depth of 2 feet, parent was detected at depths of up to 8 feet (maximum depth at which samples were collected). Concentrations at the 4- to 8-foot depths generally increased so long as soil covers remained in place. However, in unsealed soil, methyl bromide at the 1-foot sampling depth dissipated with a half-life of <4 days. Dissipation was slowed if the soil surfaces were covered with tarps or polyethylene covers.

Unfortunately, the mobility and persistence of methyl bromide in soil have not been conclusively established by experimental data submitted to EFGWB. However, judging from the chemical properties of methyl bromide and general information about its behavior, methyl bromide should be very mobile in soil; the rates of mobility and dissipation under field conditions will depend on whether the soil surface has been sealed to prevent volatilization or if the void space in the soil is nearly filled with water to prevent diffusion. Also, methyl bromide is fairly soluble in water; if the water table is close to the soil surface, there is the potential for ground water contamination.

It must be noted, however, that this assessment is based upon a very small data base. The majority of studies submitted to EFGWB to date on the behavior of methyl bromide have been found unacceptable. Methyl bromide's high vapor pressure has apparently caused the registrant some problems in conducting acceptable environmental fate studies. However, EFGWB maintains that the studies were not designed properly to account for the significant volatilization.

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STATUS OF DATA REQUIREMENTS FOR THE REGISTRATION OF METHYL BROMIDE AS PER THE 1986 REGISTRATION STANDARD

SATISFIED

161-1 Hydrolysis

NOT SATISFIED

161-2 Photodegradation in Water
162-1 Aerobic Soil Metabolism
162-2 Anaerobic Soil Metabolism
163-1 Leaching-Adsorption/Desorption
164-1 Soil Field Dissipation

RESERVED

164-5 Long-term Soil Field Dissipation
165-1 Confined Accumulation in Rotational Crops
165-2 Field Accumulation in Rotational Crops
166-1 Prospective Ground Water Monitoring Study*

*According to EPA's "Pesticides in Ground Water Data Base- 1988 Interim Report", Methyl Bromide was not detected in the 2896 wells that were surveyed for CH_3Br across the country. However, the monitoring requirements are being held in reserve until more is learned about the behavior of methyl bromide from the required environmental fate studies listed above.

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Justification for EEB 70-1 Special test

Methyl bromide is a gas at room temperature, therefore standard test procedures can not be employed. The Avian Acute Drinking Water LC50 Study with Mallard Duck is required in place of the three normally required avian acute/subacute studies (71-1a, 71-2a, and 71-2b). This study will enable a risk assessment to be performed by comparing the residues in the water that produced an LC50 with the residues that are estimated to be in avian food items.

The cost of the study is approximately $8,000. This cost is less than the cost for the normal battery for the three above listed tests that this test will replace.

Betsy Grim SACS, EFED 9/9/91.

1.Composition: TGAI=Technical grade of the active ingredient; PAIRA=Pure active ingredient, radiolabeled; TEP=Typical end-use product

2.Use Patterns: A=Terrestrial Food Crop; B=Terrestrial Feed Crop; C=Terrestrial Non-Food Crop; D=Aquatic Food Crop; E=Aquatic Non-Food Outdoor; F=Aquatic Non-Food Industrial; G=Aquatic Non-Food Residential; H=Greenhouse Food Crop; I=Greenhouse Non-Food Crop; J=Forestry; K=Outdoor Residential; L=Indoor Food; M=Indoor Non-Food; N=Indoor Medical; O=Indoor Residential; Z=Use Group for Site 00000

3. The following study is now required because ecological fate data indicates that birds may be exposed to methyl bromide residue levels above the EEB's level of concern:

70-1 Special test: Avian Acute Drinking Water LC50 Study with Mallard Duck:

The study methods for this test are similar to those for the 71-1 Avian Dietary LC50 study except that the test material is provided to birds in drinking water for the five day exposure period instead of in the bird test diet. Due to the unusual nature of the test material (high vapor pressure), the Ecological Effects Branch should be contacted to discuss test methods before the study is initiated.

4. This study was reserved pending ecological fate data and is now required.

* In Bibliographic Citation column indicates study may be upgradeable

Date: 8-29-91
Case No: 0335
Chemical No: Methyl Bromide 053201

PHASE IV
DATA REQUIREMENTS FOR
ECOLOGICAL EFFECTS BRANCH

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Data Requirements	Composition[1]	Use Pattern[2]	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Bibliographic Citation	Must Additional Data Be Submitted under FIFRA3(c)(2)(B)?
6 Basic Studies in Bold					
70-1 Special Test [3]			No		Yes
71-1(a) Acute Avian Oral, Quail/Duck					
71-1(b) Acute Avian Oral, Quail/Duck	(TEP)				
71-2(a) Acute Avian Diet, Quail					
71-2(b) Acute Avian Diet, Duck					
71-3 Wild Mammal Toxicity					
71-4(a) Avian Reproduction Quail					
71-4(b) Avian Reproduction Duck					
71-5(a) Simulated Terrestrial Field Study					
71-5(b) Actual Terrestrial Field Study					
72-1(a) Acute Fish Toxicity Bluegill					
72-1(b) Acute Fish Toxicity Bluegill	(TEP)				
72-1(c) Acute Fish Toxicity Rainbow Trout[4]			No		Yes
72-1(d) Acute Fish Toxicity Rainbow Trout	(TEP)				
72-2(a) Acute Aquatic Invertebrate Toxicity[4]			No		Yes
72-2(b) Acute Aquatic Invertebrate Toxicity	(TEP)				
72-3(a) Acute Estu/Mari Tox Fish					
72-3(b) Acute Estu/Mari Tox Mollusk					
72-3(c) Acute Estu.Mari Tox Shrimp					

* In Bibliographic Citation column indicates study may be upgradeable

Date: 8-29-91
Case No: 0335
Chemical No: Methyl Bromide 053201

PHASE IV
DATA REQUIREMENTS FOR
ECOLOGICAL EFFECTS BRANCH

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Data Requirements	Composition[1]	Use Pattern[2]	Does EPA Have Data To Satisfy This Requirement? (Yes, No)	Bibliographic Citation	Must Additional Data Be Submitted under FIFRA3(c)(2)(B)?
72-3(d) Acute Estu/Mari Tox Fish	(TEP)				
72-3(e) Acute Estu/Mari Tox Mollusk	(TEP)				
72-3(f) Acute Estu/Mari Tox Shrimp	(TEP)				
72-4(a) Early Life-Stage Fish					
72-4(b) Live-Cycle Aquatic Invertebrate					
72-5 Life-Cycle Fish					
72-6 Aquatic Org. Accumulation					
72-7(a) Simulated Aquatic Field Study					
72-7(b) Actual Aquatic Field Study					
122-1(a) Seed Germ./Seedling Emerg.					
122-1(b) Vegetative Vigor					
122-2 Aquatic Plant Growth					
123-1(a) Seed Germ./Seedling Emerg.					
123-1(b) Vegetative Vigor					
123-2 Aquatic Plant Growth					
124-1 Terrestrial Field Study					
124-2 Aquatic Field Study					
141-1 Honey Bee Acute Contact					
141-2 Honey Bee Residue on Foliage					
141-5 Field Test for Pollinators					

* In Bibliographic Citation column indicates study may be upgradeable