UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

8622-16 5/11/1988 Page 1 of 32

11 MAY 1988

Mr. Allen S. Tillman
Ameribrom, Inc.
1250 Broadway
New York, NY 10001

Subject: Metabrom 100
EPA Registration No. 8622-16
Your Application of May 19, 1987

Dear Mr. Tillman:

The draft labeling referred to above, submitted in connection with registration under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, is acceptable, and a stamped copy is enclosed for your records. Submit two copies of the finished label when printing is completed.

Sincerely,

Jeff Kempter
Product Manager (32)
Disinfectants Branch
Registration Division (TS-767C)

DIS:TS-767C:WFrancis:wcf:Rm.711:557-6909:5-9-88

	CONCURRENCES							
SYMBOL								
SURNAME								
DATE								

EPA Form 1320-1 (12-70) OFFICIAL FILE COPY

*U.S. GPO : 1985-467-853

2732

TABLE I (Continued)

Commodity	Insects Controlled	Tolerance (ppm)	Dosage (lbs./1000 cu. ft.)	Exposure Time (hrs.)
Muskmelons	pepper maggot, Colorado potato beetle, potato psyllid, squash bug, squash vine borer, earwigs, darkling beetle	20	2.5	2
Okra		30	3.5	2(c)
Onions		20	3	6
Parsnips (roots)		30	3	4
Peas (with pods)		50	3	2
Sweet Corn		50	3	4
Peppers		30	4	2
Pimentos		30	2.5	3
Pineapples		20	2	4
Potatoes		75	3	6
Pumpkins		20	2.5	2
Radishes		30	3	4
Rutabagas		30	3	6
Squash (summer)		30	4	2
Squash (winter)		20	4	2
Squash (zucchini)		20	2.5	3
Sugar Beets (roots)		30	3	4
Sweet Potatoes		75	3.5	4
Tomatoes		20	3	4

24

ACCEPTED
with COMMENTS
in EPA Letter Dated:
8622-16
MAY 11 1988

Under the Federal Insecticide, Fungicide, and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 8622-16

TABLE I (Continued)

Commodity	Insects Controlled	Tolerance (ppm)	Dosage (lbs./1000 cu. ft.)	Exposure Time (hrs.)
Turnips (roots)		30	3	4
Watermelons		20	2.5	2
Yams		30	3.5	4
Cipolini Bulbs	*Exosoma lusitanica*	50	4	4
Cocoa Beans	cocoa moth, cigarette beetle, confused flour beetle, warehouse moth, flat grain beetle, coffee-bean weevil	50	1.5	12(a)
Cotton Seed	*Pectinophora spp.*, Khapra beetle, boll weevil, saw toothed grain beetle	200	8	24(b)(c)
Garlic	*Brachycera spp., dyspessa ulula*, brown wheat mite, onion maggot, onion thrips	50	3	4
Horseradish (roots)	*baris lepidi*	30	3	4

28

PMS-10
5/88 Booklet & Label

TABLE I (Continued)

Commodity	Insects Controlled	Tolerance (ppm)	Dosage (lbs./1000 cu. ft.)	Exposure Time (hrs.)
Salsify Roots	armyworm, flea beetle, leafhoppers, stink bugs, tarnished plant bug	30	3	4
Hay (alfalfa)	Alfalfa weevil, cereal leaf beetle	50	3	24
Grapefruit[a]	anastrepha spp., proedia spp.,	30	3	2
Grapes	leptoglossus spp., megalomelis spp.,	20	4	2
Kumquat	naupactus spp., listroderes spp.,	30	3	2
Lemons	conoderus spp., brevipalpus spp., ants,	30	3	2
Lime	aphids, citrus scale, citrus mites, leaf	30	3	2
Oranges	rollers, white flies, thrips, California	30	3	2
Tangelos	orange clog, mealybugs, orange tortrix	30	3	2
Tangerines		30	3	2

29

[a] Consult APHIS Treatment Manual for additional rates and commodities.
[b] Tolerance of fruit to methyl bromide may vary with different varieties. Check with local authorities or Great Lakes Chemical Corporation before treating.
(a) Chamber fumigation
(b) Khapra beetle quarantine
(c) Pink bollworm quarantine
(d) Must be used in accordance with the plant quarantine program of the USDA

3732

Addition to Metabrom 100 and Metabrom 99 EPA Reg No 8622-16

TABLE I

A , APPLICATION SUMMARY'

Metabrom 100

FOR STORED PRODUCTS PESTS INFESTING RAW AGRICULTURAL COMMODITIES (NOT PROCESSED FOOD)

Commodity	Insects Controlled	Tolerance (ppm)	Dosage (lbs./1000 cu. ft.)	Exposure Time (hrs.)
Almonds	confused flour beetle, saw-toothed grain beetle, dermestids, Indian meal moth, rice weevil, Khapra beetle, drugstore beetle, cigarette beetle, warehouse moth, rusty grain beetle, cadelle, groundnut bruchid	200	3.5	24
Brazil Nuts		200	3.5	24
Bushnuts		200	3.5	24
Butternuts		200	3.5	24
Cashews		200	3.5	24
Chestnuts		200	6	6
Chestnuts		200	3.5	24
Filberts		200	3.5	24
Hickory Nuts		200	3.5	24
Peanuts		200	3.5	24
Pecans		200	3.5	24
Pistachio Nuts		200	3.5	24
Walnuts				

24

TABLE I (Continued)

Commodity	Insects Controlled	Tolerance (ppm)	Dosage (lbs./1000 cu. ft.)	Exposure Time (hrs.)
Apples	Oriental fruit moth, coddling moth, apple maggot, apple curculio, twig borer, melon fruit fly, Mediterranean fruit fly, Oriental fruit fly, cherry fruit fly, brown mite, green peach aphid, scales, thrips	5	5	2
Apricots		20	5	2
Cherries		20	5	2
Nectarines		20	5	2
Peaches		20	5	2
Pears		5	5	2
Plums		20	5	2
Quinces		5	5	2
Prunes	coffee bean weevil, Australian spider beetle, saw toothed and merchant grain beetles, dried fruit beetles, Indian meal moth, confused flour beetle, drugstore beetle, warehouse moth, common grain mite	20	5	2
Barley	granary weevil, lesser grain borer, rusty grain beetle, angoumois grain moth, Indian meal moth, confused flour beetle, rice weevil, saw toothed grain beetle,	50	5	12
Corn		50	2	24
Oats		50	3	24
Popcorn		240	1.5	2(a)

25

TABLE I (Continued)

Commodity	Insects Controlled	Tolerance (ppm)	Dosage (lbs./1000 cu. ft.)	Exposure Time (hrs.)
Rice	lesser grain borer, cadelle, Khapra beetle, drugstore beetle, Australian spider beetle, cigarette beetle, warehouse moth, common grain mite, flat grain beetle, Mediterranean flour moth, red flour beetle, common bean weevil, copra beetle	50	6	12(b)
Rice		50	3	24
Rye		50	3	24
Rye		50	6	12(b)
Sorghum (grain)		50	4	24
Dried Peas		125	4	24
Wheat		50	3	24
Copra		100	2.5	24
Beans (all)	armyworms, cabbage looper, European corn borer, Japanese beetle, pod borers, Oriental fruit fly, Mediterranean fruit fly, corn earworm, green stink bug, sawbugs, spider mites, cabbage maggots, lygus bug, melon aphid, pickelworm, carrot rust fly, stink bug, bean leaf beetle, Mexican bean beetle, diabrotica beetle, cucumber beetle, squash bug, false chinch bug, loopers, symphylans, blister beetles, onion maggot, onion thrips, mealybugs,	50	3.5	24
Beets (roots)		30	3	4
Cabbage		50	4	4(d)
Canteloupe		20	2.5	2
Carrots		30	4	4
Citron		30	3	2
Cucumbers		30	2.5	4
Eggplant		20	3	4
Honeydew Melons		20	2.5	2
Jerusalem Artichokes		30	3.5	4

26

4 8 32

TABLE I

B , PROCESSED FOOD - Metabrom 100

Commodity	Insect Controlled	Tolerance (ppm)	Dosage (lbs./1000 cu. ft.)	Exposure Time (hrs.)
Apples (dried)	saw toothed beetle, merchant beetle, dried fruit beetle, Indian meal moth, confused flour beetle, Australian spider beetle, cigarette beetle, warehouse moth, common grain mite, coffee bean weevil	125	1	24
Apricots (dried)		125	1	24
Cherries (dried)		125	1	24
Dates		125	1	24
Figs (dried)		250	1	24
Peaches (dried)		125	1	24
Prunes (dried)		125	1	24
Raisins (dried)		125	1	24
Cheese (parmesan and roquefort)	cheese mites, cheese skipper, cheese maggot	325	1-2	12-24
Eggs (dried)	larder beetle	400	1-2	12-24
Ham Houses	cheese skipper, larder beetle, red legged ham beetle, mites	325	1-2	12-24
Processed Foods	saw toothed beetle, flat grain beetle, flour beetle, cigarette beetle, Indian meal moth	125	1-2	12-24

-30-

TABLE II (Continued)

Commodity	Insect Controlled	Tolerance (ppm)	Dosage (lbs./1000 cu. ft.)	Exposure Time (hrs.)
Processed Grain[a]	confused flour beetle, rice weevil, granary weevil, saw toothed grain beetle, rusty grain beetle, lesser grain borer, cadelle, Khapra beetle, drugstore beetle, Australian spider beetle, cigarette beetle	125	1.5	24
Processed Grain[b]	flour beetle, saw toothed grain beetle, Mediterranean flour moth.	125	1-2	12-24
Processed Grain[c]	flour beetle, grain beetle, mealworms, cigarette beetle, Indian meal moth	125	1.5	24
Spices And Herbs (dried)	saw toothed beetle, flat grain beetle, cigarette beetle, *trogoderma spp.*, Indian meal moth, dried fruit beetle, Australian spider beetle, warehouse moth, confused flour beetle, rusty grain beetle, lesser grain borer, drugstore beetle	400	3	12

[a] Corn grits and cracked rice
[b] Processed grain from equipment fumigation
[c] Processed grain used in production of fermented beverages

-31-

RESTRICTED USE PESTICIDE

For retail sale to and for use only by Certified Applicators or persons under their direct supervision, and only for those uses covered by the Certified Applicator's certification.

DIRECTIONS FOR USE OF THE PRODUCTS

METABROM 100 and METABROM 99

EPA REGISTRATION NUMBERS:

8622-17 AA
8622-16 AA

READ THIS BOOKLET AND ENTIRE LABEL ON CONTAINER CAREFULLY PRIOR TO USE. USE THESE PRODUCTS ONLY ACCORDING TO LABEL INSTRUCTIONS.

Ameribrom, Inc.
1250 Broadway
New York, N.Y. 10001

Booklet AM-110 **3/86**

5 of 32

6 8 32

KEEP OUT OF REACH OF CHILDREN

DANGER  **POISON**

PELIGRO

PRECAUSION AL USARIO: Si usted no lee Ingles, no use est producto hasta que la etiqueta le haya sido explicada ampliamente.

STATEMENT OF PRACTICAL TREATMENT

In all cases of overexposure, get medical attention immediately. Take person to a doctor or emergency treatment facility.

If inhaled—Get exposed person to fresh air. Keep warm. Remove from contaminated area. If not breathing start artificial respiration. Give oxygen if needed. Rinse mouth out with water if not conscious. Seek medical attention.

If on skin—Immediately remove contaminated clothing, shoes, jewelry, and any other item on skin. Wash contaminated skin area thoroughly with soap and water.

If in eyes—Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes.

Note to Physician

Early symptoms of overexposure are dizziness, headache, nausea and vomiting, weakness and collapse. Lung edema may develop in 2 to 48 hours after exposure, accompanied by cardiac irregularities; these effects are the usual cause of death. Repeated overex-

7 7 32

posures can result in blurred vision, staggering gait and mental imbalance, with probable recovery after period of no exposure. Blood bromide levels suggest the occurrence, but not the degree of exposure. Treatment is symptomatic.

PRECAUTIONARY STATEMENT
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

DANGER

Extremely hazardous liquid and vapor under pressure. Inhalation may be fatal or cause serious acute illness or delayed lung, or nervous system injury. Do not breathe vapor. Liquid or excessive vapor can cause serious skin or eye injury which may have a delayed onset. Do not get liquid on skin, in eyes or on clothing.

For Metabrom 99

This product contains chloropicrin as a warning odorant. Chloropicrin may be irritating to the upper respiratory tract, and even at low levels can cause painful irritation to the eyes, producing tearing. If these symptoms occur, leave the fumigation area immediately.

Metabrom 100

Methyl Bromide vapor is odorless and non-irritating to skin and eyes during exposure. Exposure to toxic levels may occur without warning or detection by the user.

Liquid and vapor cause burns which may be delayed. Do not breathe vapor, use only with adequate ventilation. Do not use ordinary rubber protective clothing including gloves and boots. Keep away from heat. Wear

8 8 32

a pesticide respirator jointly approved by the Mining Enforcement and Safety Administration (formerly the U.S. Bureau of Mines) and by the National Institute for Occupational Safety and Health under the provision of 30 CFR Part II. Chloropicrin must never be depended upon as a warning agent when a gas mask is worn. Send for a doctor immediately in case of exposure.

Always have an assistant to aid in case of accidents when releasing fumigant from inside of a structure. Wear appropriate respiratory protection: Keep animals, children and unauthorized people away from area under treatment until area is certified free of Methyl Bromide. (See aerations statement.)

ENVIRONMENTAL HAZARDS

This product is toxic to fish, birds and other wildlife. Do not discharge in lakes, streams, ponds or public water unless in accordance with a National Pollution Discharge Elimination System permit. For guidance, contact your regional office of EPA.

PROTECTIVE CLOTHING

Avoid tight clothing, jewelry, gloves, and boots when handling methyl bromide. Methyl bromide may be trapped inside and cause skin irritation or injury. If full-face respiratory protection is not required, wear goggles or full-face shield for eye protection when handling liquid. Do not reuse contaminated clothing and shoes until thoroughly cleaned and aerated.

RESPIRATORY PROTECTION

If the concentration of methyl bromide in the working area, as measured by pump or appropriate detector tube, for example, National Draeger Methyl Bromide 3/

9 8 32

a, 6728211 detector tube, Mine Safety Appliance tube for Methyl Bromide, Tube 462135 and Matheson Gas Products, Kitagawa Kit Model No. 8014 Ka MBr Model 8014-157Sb, does not exceed 5ppm (20 mg/m^3), no respiratory protection is required.

If this concentration is exceeded at any time, all persons in the fumigation area must wear a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air supplied/SCBA respirator.

PLACARDING OF FUMIGATED AREA

The applicator must placard or post all entrances to the fumigated area with signs bearing, in English and Spanish:

1. The signal word DANGER/PELIGRO and the skull and crossbones symbol.
2. The statement, "Area under fumigation, DO NOT ENTER/NO ENTRE"
3. The date of fumigation
4. Name of fumigant used
5. Name, address, and telephone number of the applicator.
6. Any person who transfers a treated commodity to another site without aeration must ensure that the new site is placarded until the commodity is aerated below the threshold concentration.

Only a certified applicator may remove placards, and only when the concentration of Methyl Bromide in the treated site or commodity is below 5 ppm (20 mg/m^3).

AERATION AND REENTRY

After fumigation, treated areas must be aerated until the level of methyl bromide is below 5 ppm. Do not allow

10 & 32

entry into the treated area by any person before this time unless provided with a respiratory protection device (SCBA or combination air-supplied/SCBA).

ENVIRONMENTAL HAZARD

This product is toxic to fish and wildlife. Keep out of lakes, streams and ponds. Do not fumigate with this product when commodity temperature is below 40° F.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

This fumigant is a highly hazardous material and should be used only by individuals trained in its proper use. Before using, read and follow all label precautions and directions.

All persons working with this fumigant should be knowledgeable about the hazards, and trained in the use of required respirator equipment and detector devices, emergency procedures, and proper use of the fumigant.

When used for fumigation of enclosed spaces (houses and other structures, warehouses, grain bins or elevators, vaults, chambers, trucks, vans, boxcars, ships and other transport vehicles and tarpaulin-covered areas or commodities), two persons trained in the use of this product must be present at all times during introduction and testing of the fumigant. Only a certified applicator may remove placards, and only when the concentration of Methyl Bromide in the treated site or commodity is below 5 ppm (20mg/m^3).

11 8 32

STATEMENT OF WARRANTY AND LIABILITY

Seller warrants that this product complies with the specifications expressed in this label. SELLER MAKES NO OTHER WARRANTIES, AND DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE INTENDED PURPOSE. Seller's liability for default, breach, or failure under this label shall be limited to the amount of the purchase price. Seller shall have no liability for consequential damages.

Many pesticidal chemicals are poisonous and may leave a toxic residue on the plants to which they are applied. The U.S. Food and Drug Administration has established maximum amounts of such pesticidal chemicals that may remain on raw agricultural products at harvest, and it is the user's responsibility to see that there is no residue on such crops at harvest in excess of these amounts. The "Directions for Use" are based on the best available information, and if followed carefully should not leave excessive residues at harvest. However, Ameribrom, Inc., assumes no responsibility as to their accuracy nor for any loss due to excessive residues.

DIRECTIONS

Metabrom 100 ~~and Metabrom 99~~ may be used to control insects infesting various grains and non-food materials. Grains which may be treated and dosage rates are given in Table I. Treatment rates for soil fumigations may be found in Table II. Dosage rates for structural fumigation and other pest sites are found in Table III.

12 8 32

I. METHODS OF SPACE FUMIGATION

A. Chamber Fumigation

Metabrom 100 ~~and Metabrom 99~~ may be used to control stored product pests listed in the treatment tables.

Load the chamber with the material to be fumigated, close exhaust ports, turn on circulating fan and close chamber door. Determine the proper dosage of fumigant from the appropriate table. Vaporize the liquid in the chamber by spraying it into the air stream in front of a blower or fan, passing it through a vaporizer, or allowing it to evaporate from a shallow pan.

NOTE: Before introducing the fumigant, place warning signs and a red warning light on the door. Two people wearing full-faced gas masks with MSHA/NIOSH approved respiratory protection device (SCBA or combination air-supplied/SCBA) should be present when introducing the fumigant. All controls should be outside the chamber.

At the end of the exposure period, aerate by opening the exhaust port, turning on the exhaust fan and opening the chamber door slightly to permit fresh air to enter.

NOTE: Always check completeness of aeration with detection devices before allowing unprotected persons to enter the chamber.

B. Vacuum Chamber Fumigation

1. Place material to be fumigated in the steel chamber and draw the desired vacuum.
2. Release fumigant into the chamber (usually

13 & 32

through a heating unit to insure complete vaporization).

3. Dosage. See Tables I and III for specific commodities and dosage rates.
4. Aeration. Release the vacuum and change the air in the chamber at least two times. A vacuum of 15 in. Hg. should be drawn for this purpose.

C. Truck, Van or Trailer Fumigation

1. Seal the off-side door, ventilators and other openings from the inside.
2. Use a closed-ended, perforated tube to distribute fumigant evenly. Secure the tube to the ceiling so the perforations direct fumigant toward the floor and prevent it from spraying the ceiling. Always apply fumigant from outside the truck, van or trailer.
3. Seal the door and place warning signs on both sides of the truck, van or trailer. Fumigated areas must be placarded on all entrances with signs containing the signal word DANGER and the "Skull and Crossbones" and the words "Area under fumigation, do not enter until completely aerated," the date of fumigation, name of the fumigant used, emergency telephone number for contact and the name and address of the fumigator. Do not remove warning signs until the fumigated area is completely aerated and safe for entry, as indicated by a suitable detector.
4. Do not fumigate while strong winds are blowing.
5. Dosage. Consult Tables I and III for specific commodity treatments and rates.
6. After 12 to 18 hours, open the unit and aerate for 1 to 1½ hours. The truck, van or trailer may then be resealed for shipment.

7. Advise consignee to check the truck, van or trailer for proper aeration on arrival. Do not move trucks, vans or trailers during fumigation. They must be completely aerated before movement is allowed.

D. Railroad Car Fumigation

1. Seal the off-side door, ventilators and other openings from the inside.
2. Use a closed-ended perforated tube to distribute fumigant evenly. Secure the tube to the ceiling so the perforations direct fumigant toward the floor and prevent it from spraying the ceiling. Always apply fumigant from outside the car.
3. Seal the door and place warning signs on both sides of the car. Fumigated areas must be placarded on all entrances with signs containing the signal word DANGER and the "Skull and Crossbones" and the words "Area under fumigation, do not enter until completely aerated," the date of fumigation, name of the fumigant used, emergency telephone number for contact, and the name and address of the fumigator. Do not remove warning signs until the fumigated area is completely aerated and safe for entry, as indicated by a suitable detector.
4. Do not fumigate while strong winds are blowing.
5. Dosage. Consult Tables I and II for specific commodity treatments and rates.
6. Any person who transfers a treated commodity to another site without aeration must ensure that the new site is placarded until the commodity is aerated below the threshold concentration.
7. Only a certified applicator may remove placards, and only when the concentration of Methyl Bro-

15 7 32

mide in the treated site or commodity is below 5ppm (20mg/m^3)

E. Grain Elevator Fumigation

The recirculation method is best for grain elevator fumigations since it allows more time for gas penetration in high resistance areas.

1. Seal structure carefully, using masking tape for small openings and polyethylene sheeting secured with masking tape for large openings.
2. Fumigated areas must be placarded on all entrances with signs containing the signal word DANGER and the "Skull and Crossbones" and the words "Area under fumigation, do not enter until completely aerated," the date of fumigation, name of the fumigant used, emergency telephone number for contact, and the name and address of the fumigator. Do not remove warning signs until the fumigated area is completely aerated and safe for entry, as indicated by a suitable detector.
3. Dosage. Use the rate and exposure time shown in Table I for specific grains to be treated.
4. Fumigate by using a fan or blower to recirculate the methyl bromide through perforated pipes or ducts at the bottom of the bin, up through the return duct. Or discharge the fumigant through polyethylene tubing in the head space at intervals of 100 ft. or less.
5. Check periodically for leaks with a gas detector.
6. To aerate after fumigation, disconnect return air at the fan and discharge into outside air. Continue aeration until suitable detector shows the fumigant is below the threshold level of 5ppm (20mg/m^3). Use same detector to check the el-

16 8 32

evator head space for possible pockets of Methyl Bromide.

F. Tarpaulin Fumigation

The stacked material should be placed on a concrete floor or other air-tight surface. If the floor is not air tight, it may be made so by laying Sisal Kraft paper, tar paper or additional tarpaulin or polyethylene sheeting on it. Center 4 or 5 sacks on top of the stack to provide space for gas expansion. Place an evaporating pan with an anchored applicator tube in the center of the expansion dome. Cover and seal the stack with a gas tight tarpaulin of polyethylene sheeting of 4 mil. or greater thickness. Connect the tube to the gas cylinder. Release the fumigant. Dosage. Use rate and exposure time shown in Table I or III. When fumigation is complete, partially remove the tarpaulin and leave it for 30 minutes. This allows partial aeration before the cover is completely removed.

G. Warehouse, Structual and Food Plant Fumigation

Check with appropriate municipal and county authorites before fumigating to be completely familiar with local regulations. Ordinances may require watchmen, padlocks, or warning posters during and after fumigation and/or notification of the nearest fire station. Notify anyone who would normally be in the area before fumigating.

1. Remove food and feed commodities before fumigation.
2. Dosage. See Table III for dosages and pests controlled. (Use only methyl bromide products

17 8 32

containing .25%, .5%, and 1% chloropicrin, and 100% methyl bromide.)

3. Seal the building by closing all external openings, including roof ventilators, chimneys, drain pipes, tunnels, etc. Fumigated areas must be placarded on all entrances with signs containing the signal word DANGER and the "Skull and Crossbones" and the words "Area under fumigation, do not enter until completely aerated," the date of fumigation, name of the fumigant used, emergency telephone number for contact, and the name and address of the fumigator. Do not remove warning signs until the fumigated area is completely aerated and safe for entry, as indicated by a suitable detector.
4. Seal all floor and roof cracks and around the eaves.
5. Take special care to seal partitions to adjacent storage or work areas in the building. When using tarps, the soil surface should be sealed by using sand or water snakes or by trenching and burying the edge of the tarp in the trench and covering with soil or sand followed by the application of water. When using sand snakes, the soil surface should be premoistened if necessary.
6. Doors and hatches on milling machinery should be opened prior to fumigation. These include elevator boots, conveyor lids, settling chamber doors, dust trunks, and any other openings that will allow fumigant into the equipment.
7. If possible, clear adjoining buildings sharing a common wall. If they cannot be cleared, check frequently with an approved detector to insure the safety of the occupants.

18 7 32

H. Shipboard, In Transit Ship Or Shiphold Fumigation

IMPORTANT: Shipboard, in transit ship or shiphold fumigation is also governed by U.S. Coast Guard Regulations. Refer to and comply with these regulations prior to fumigation.

Prefumigation Procedures

1. Prior to fumigating a vessel for in transit cargo fumigation, the master of the vessel or his representative, and the fumigator must determine whether the vessel is suitably designed and configured so as to allow for safe occupancy by the ship's crew throughout the duration of the fumigation. If it is determined that the design and configuration of the vessel does not allow for safe occupancy by the ship's crew throughout the duration of the fumigation, then the vessel will not be fumigated unless all crew members are removed from the vessel. The crew members will not be allowed to reoccupy the vessel until the vessel has been properly aerated and a determination has been made by the master of the vessel and the fumigator that the vessel is safe for occupancy.
2. The person responsible for the fumigation must notify the master of the vessel, or his representative, of the requirements relating to personal protection equipment*, detection equipment and that a person qualified in the use of this equipment must accompany the vessel with cargo under fumigation. Emergency procedures, cargo ventilation, periodic monitoring and inspections, and first aid measures must be discussed with and understood by the master of the vessel or his representative.

*Personal protection equipment means a gas mask or respirator for the fumigant approved jointly by the National Institute of Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA).

3. During the fumigation or until a manned vessel leaves port or the cargo is aerated, the person in charge of the fumigation shall insure that a qualified person using gas or vapor detection equipment tests spaces adjacent to spaces containing fumigated cargo and all regularly occupied spaces for fumigation leakage. If leakage of the fumigant is detected, the person in charge of the fumigation shall take action to correct the leakage, or shall inform the master of the vessel, or his representative of the leakage so that corrective action can be taken.
4. If the fumigation is not completed and the vessel aerated before the manned vessel leaves port, the person in charge of the vessel shall insure that at lest two units of personal protection equipment* and one gas or vapor detection device, and a person qualified in their operation be on board the vessel during the voyage.
5. Dosage. See Table I or III for specific rates.

Precautions and Procedures During Voyage

Using appropriate gas detection equipment, monitor spaces adjacent to areas containing fumigated cargo and all regularly occupied areas for fumigant leakage. If leakage is detected, the area should be evacuated of all personnel, ventilated, and action taken to correct the leakage, before allowing the area to be occupied. Do not enter fumigated areas except under emergency conditions. If necessary to enter a fumigated area, ap-

propriate personal protection equipment* must be used. Never enter fumigated areas alone. At least one other person, wearing personal protection equipment*, should be available to assist in case of an emergency.

Precautions and Procedures During Discharge

If necessary to enter holds prior to discharge, test spaces directly above cargo surface for fumigant concentration, using appropriate gas detection and personal protection equipment*. Do not allow entry to fumigated areas without personal protection equipment*, unless fumigant concentrations are at safe levels, as indicated by a suitable detector.

II. SOIL FUMIGATION

Pests controlled are: Nematodes, including root-knot spp., Tylenchulus, Pratylenchus, Xiphinema, Criconemoides, and Paratylenchus on almonds, apples, apricots, cherries, citrus, grape vinyards, peaches, pecans, pistachios, plums, prunes, strawberries, tomatoes and walnuts.

Soil-borne fungi, including: Pythium, Rhizoctonia, Phytophthora, Pyrenochaeta, Sclerotinia, Sclerotium, Armillaria, and the clubroot organism, Plasmodiophora.

Weeds and weed seed: seeds, roots, stolons, and bulbs of broadleaf weeds and grasses including quackgrass, annual bluegrass, broomrape, common lambsquarters, torpedograss and bermudagrass. Not effective against mallow, dodder, and some species of clover.

Insects in the soil at the time of treatment including: wireworms, June beetle larvae, white grubs, and garden symphylan.

Pretreatment Soil Preparation

Plow or rip the soil to the depth of which effective treatment is required. The soil should be worked until free of clods or large lumps. Residue from previous crops should be worked into the soil to allow for decomposition prior to fumigation. Soil moisture should be optimum for seed germination. For best results soil should be kept moist for at least four days prior to treatment. Do not fumigate if the soil temperature is below 50°F. For best results, fumigate when soil temperature is 60°F. to 90°F. at the depth of 6 inches. Use the higher labelled rates for muck and heavy clay soils.

Field Fumigation

For overall application of Metabrom 100 and Metabrom 99 inject the product with a chisel type applicator having the chisels spaced no more than 12 inches apart and injecting the fumigant to a depth of 6-8 inches below the soil surface. The soil surface must be covered immediately after treatment with simultaneous film laying equipment or by sealing with a roller or cultipacker and covered within 20 minutes with polyethylene film or other suitable cover. Consult Table II for proper dosage. For row applications use the same dosage rates per acre as suggested in Table II. The actual amount used per acre, however, will be proportional to the actual area treated.

Raised Tarp Fumigation Method

Support the center of the cover to provide a small gas dome. Inflated plastic bags, crumpled fertilizer bags, burlap bags stuffed lightly with hay or straw, inverted baskets, flowerpots or bottles placed in the soil may be used for support.

22 8 32

Evaporating pans are essential for the volatilization and uniform dispersion of fumigant. Shallow pans or basins made of plastic or tin are satisfactory for this purpose.

1. Use one evaporator pan for each 300 to 400 square feet of area.
2. Anchor one end of each polyethylene tube into an evaporating pan with tape or a suitable weight. This ensures that the liquid will be directed into the evaporating pan.
3. Extend the free ends of the polyethylene tubes outside of the area to be covered.
4. After the supports and tubing are in place, cover the area to be fumigated with a gasproof cover of polyethylene or coated fabric film.
5. Position the cover with its edges in a prepared furrow or trench.
6. Seal six to ten inches of the outside edges with dirt. Tamp the dirt down so edges will not pull loose.
7. Attach a polyethylene tube to the cylinder and open the fumigant. Use a cylinder dispenser or scale to meter small amounts.

Hot Gas Method

The "hot gas method" consists of using a commercially manufactured heat exchanger, or a copper coil immersed in a vessel containing hot water, to vaporize the fumigant before introduction.

This method may be useful where large amounts of fumigant are required and rapid vaporization is advantageous.

Dosage

Use one to two pounds of Metabrom 100 or Metabrom 99 per 100 square feet for an exposure period of 24

hours when soil temperature is 60°F. or higher. Methyl bromide penetrates the soil to the depth it has been plowed or ripped. When soil temperature is between 50°F. and 60°F. extend the exposure period to 48 hours. Do not treat when soil temperature is below 50°F.

A. TREE SITE FUMIGATION DIRECTIONS (FOR USE IN FLORIDA ONLY)

Preplant or replant fumigation of citrus soil for control of Phytophthora and citrus nematodes in Florida sandy soils. Trees which are planted in this treated soil will not bear harvestable fruit for a period of at least 24 months. Apply with chisels spaced 12 inches apart to a depth of 6 to 8 inches. Seal fumigant with a drag or cultipacker following immediately behind chisels. Apply Metabrom 100 or Metabrom 99 at the rate of 1 pound per 100 square feet. Immediately cover with a 4 mil. tarp and expose to fumigation for 96 hours. This treatment will control disease to a depth of 4 feet. Remove cover and aerate 2 weeks before setting transplants in treated area.

B. SPECIAL INSTRUCTIONS FOR THE CONTROL OF ARMILLARIA MELLEA (OAK ROOT FUNGUS) ON DECIDUOUS FRUITS AND NUTS, CITRUS AND VINEYARDS

Preparation for Application

To obtain the maximum control of Armillaria mellea with Metabrom 100 and Metabrom 99, soil must be dry to a depth requiring treatment. This can be accomplished by: a) planting sudangrass in the spring, irrigating until the grass has established itself, then withholding further irrigation; b) naturally, by allow-

ing plants to grow without irrigation. When soil is dry, cut and remove grass, plants and debris. Rip soil to a depth of 36 inches and disc to smoothness.

Dosage and Method of Application

This is a preplant or replant treatment. Crops which are planted in this treated soil will not bear harvestable fruit for a period of at least 24 months. Methods and dosage of application are as follows. See Table II.

1. Non-Tarp Chisel Application. After the soil has been properly prepared inject 400-870 pounds of Metabrom 100 or Metabrom 99 per acre by chisel applications with 2 chisels spaced 66 inches apart to a depth of 24-30 inches. For non-tarp applications be sure to properly seal the chisel line which may be accomplished by the following equipment modifications.
   Weld a wing behind the chisel 2 to 4 inches above the chemical outlet to break the chisel mark. Place a shovel behind the chisel at the soil surface to push dirt into the upper chisel mark. Follow with a cone-shaped press wheel with a shovel to pull additional soil into the chisel line. This is followed by a flat roller to press the soil even with the adjacent soil surface. This treatment will treat a strip 96 inches wide.
2. Tarp Chisel Application. After the soil has been properly prepared, apply 400-870 pounds of fumigant per acre by chisels spaced 48-66 inches apart and cover with adequate polyethylene film seal.
3. Deep Injection Auger-Probe Treatment. Use one pound of Metabrom 100 or Metabrom 99 in light soils (two pounds in fine-textured soils) to a depth of 36 inches or more below the soil surface. Assume one injection site per 100 square feet (on a 10 ft. x 10 ft.

25 & 32

grid pattern) with the injection in the center of the area to be treated.

Exposure and Aeration Period

1. To insure the proper time-concentration relationship to control oak root fungus for chisel applications, we recommend a seven day exposure period before removing the polyethylene film cover, and a one day interval with Deep Injection Auger-Probe Treatment after which planting or replanting of trees, vines or other deep-rooted crops may begin 14 days later.
2. Metabrom 100 or Metabrom 99 will not usually control weed seeds under very dry conditions. However, some control may be observed on deep-rooted perennials such as morningglory (bindweed) and rhizomes of Johnsongrass.

C. NON-TARP NEMATODE CONTROL

For control of nematodes (including Meloidogyne spp., Xiphinema spp., Criconemoides, Pratylenchus, and Paratylenchus) on almonds, apples, apricots, cherries, citrus, grape vineyards, peaches, pecans, pistachios, plums, prunes, strawberries, tomatoes and walnuts.

Pretreatment Soil Preparation

Plow or rip the soil to a depth of which effective treatment is required. The soil should be worked until free of clods or large lumps. Residue from previous crops should be worked into the soil to allow for decomposition prior to fumigation. Soil moisture should be optimum for seed germination. For best results soil should be kept moist for at least four days prior to treatment. Do not fumigate if the soil temperature is below 50°F.

For best results, fumigate when soil temperature is 60°F. to 90°F. at the depth of 6 inches. Use the higher labelled rates for muck and heavy clay soils.

Dosage and Method of Application

This is a preplant or replant treatment. Do not apply to soil where trees or vines will bear harvestable fruit within 24 months. A waiting period of at least 14 days should be observed between application and planting. Methods and dosage of application are as follows:

1. Chisel Application. After the soil has been properly prepared, inject 400-872 pounds of Metabrom 100 or Metabrom 99 per acre by chisel application with 2 chisels spaced 66 inches apart to a depth of 24-30 inches. For non-tarp applications be sure to properly seal the chisel line which may be accomplished by the following equipment modifications. Weld a wing behind the chisel 2 to 4 inches above the chemical outlet to break the chisel mark. Place a shovel behind the chisel at the soil surface to push dirt into the upper chisel mark. Follow with a cone-shaped press wheel with a shovel to pull additional soil into the chisel line. This is followed by a flat roller to press the soil even with the adjacent soil surface. This treatment will treat a strip 96 inches wide.
2. Deep Injection Auger-Probe Treatment. Use one pound of Metabrom 100 or Metabrom 99 per injection site in lighter soils; two pounds of Metabrom 100 or Metabrom 99 in fine textured soils. Use one injection site per 100 square feet (on a 10 ft. x 10 ft. grid pattern) with the injection in the center of the area to be treated. Tamp or compact the soil at the point of injection.

Metabrom 100 or Metabrom 99 used with a tarp will not usually control most weed seeds. However, some control may be observed on deep-rooted perennials such as morningglory (bindweed) and rhizomes of Johnsongrass.

28 8 32

TABLE I

A. Application Summary
Metabrom 100
For Stored Products....

See attached sheets

			Exposure Time (hrs.)
Barley	50	2	12
Corn (including popcorn)	50	3	24
Oats	50	1.5	24
Popcorn[b]	240	3	2
Rice	50	3	24
Rye	50	4	24
Sorghum (grain)	50	3	24
Wheat	50		24

[a]granary weevil, lesser grain borer, rusty grain beetle, angoumois grain moth, Indian meal moth, confused flour beetle, rice weevil, saw toothed grain beetle, cadelle, Khapra beetle, drugstore beetle, Australian spider beetle, cigarette beetle, warehouse moth, common grain mite, flat grain beetle, Mediterranean flour moth, red flour beetle, common bean weevil, copra beetle.

[b]chamber fumigation

TABLE II

METABROM 100 AND METABROM 99 SOIL FUMIGATION USES

Treatment Site	Rate (lbs/A)	Exposure Time
Field Soils to be Planted to:		
Tomato	180-240	24-48 hrs.
Strawberry	180-240	24-48 hrs.
Citrus & Deciduous fruits	400-870[1]	24-48 hrs.
& Nuts (non-food)	435-870[2]	24-48 hrs.
Nursery Soils:		
Turf	180-435	24-48 hrs.
Ornamentals	180-435	24-48 hrs.
Forest Tree Seedlings	180-435	24-48 hrs.
Strawberry (non-food)	180-435	24-48 hrs.
Greenhouse Soil (non-food crops, for Tomatoes, see rate above)	180-435	24-48 hrs.
Seed or Transplant Beds (non-food)	180-435	24-48 hrs.
Tobacco	872	24-48 hrs.
Potting Mix	1#/Cu. Yd.	24-48 hrs.

[1]*Deep injection application.*
[2]Topical application.

TABLE III

APPLICATION SUMMARY FOR STRUCTURAL PEST CONTROL AND OTHER SITES[1]

Treatment Site	Pests	Rate (#/1000 cu. ft.) Volume	Dosage	Exposure
Dwellings[2], Garages and Barns	termites (drywood & dampwood), bedbugs, cockroaches, silverfish, powder post beetle, death watch beetle, carpenter ants, rats, mice	Less than 100,000 cu. ft.	¼-3#	24 hrs.
		100,000-500,000 cu. ft.	1¼-1½#	24 hrs.
		500,000-1,000,000 cu. ft.	1-1¼#	24 hrs.
		Over 1,000,000 cu. ft.	1#	24 hrs.
Warehouses (empty)	cockroaches, rats, mice, confused flour beetle, rice weevil, granary weevil, saw toothed grain beetle, rusty grain beetle, lesser grain borer, cadelle, Khapra beetle, drugstore beetle, larder beetle, carpet beetle, copra beetle, coffee bean weevil, groundnut bruchid, common bean weevil, dried fruit beetle, golden spider beetle, Australian spider beetle, cigarette beetle, angoumois grain moth, Mediterranean flour moth, warehouse moth, Indian meal moth, common grain mite		4-5 oz.	12-18 hrs.
Feed Rooms (empty)			3#	24 hrs.
Grain Bins			3#	24 hrs.
Bags, Boxes and Crates (empty)			1½-3#(a)	
			2-3#(b)	2 hrs.

TABLE III (Continued)

APPLICATION SUMMARY FOR STRUCTURAL PEST CONTROL AND OTHER SITES[1]

Treatment Site	Pests	Rate (#/1000 cu. ft.) Volume	Dosage	Exposure
Furniture	termites (drywood & dampwood), bedbugs, cockroaches, silverfish, powder post beetle, death watch beetle, carpenter ants, clothes moth, cigarette beetle, drugstore beetle, carpet beetle		1-3# 2-3#	24 hrs. 2 hrs.
Lumber and Wood Products	termites (drywood & dampwood), powder post beetle, round and flat headed borers, carpenter ants and bark beetles		1-3#(a,b) 2-3#(a,b)	24 hrs. 2 hrs.
Greenhouses (empty)	mealybugs, scale insects and mites		3#	4 hrs.
Mushroom houses (empty)	mushroom flies		2#	24 hrs.

31 & 32

TABLE III (Continued)

APPLICATION SUMMARY FOR STRUCTURAL PEST CONTROL AND OTHER SITES[1]

Treatment Site	Pests	Rate (#/1000 cu. ft.) Volume	Dosage	Exposure
Poultry houses (empty)	poultry mites, bedbugs		2#	24 hrs.
Baled Tobacco	drugstore beetle, cigarette beetle, tobacco beetle, tobacco moth		2-3#(a) 4#(b)	48-72 hrs. 4 hrs.
Baled Cotton	pink bollworm, boll weevil		3#(a) 4#(b)	24 hrs. 2 hrs.

[1] At temperatures below 60°F., increase the dosage by ½ pound per 1,000 cu. ft. for every 10°F., drop in temperature or use an approved procedure to heat the fumigant. Do not fumigate when temperature is below 50°F.
[2] For dwellings do not use methyl bromide formulations containing 2% or more chloropicrin.
(a) Atmospheric
(b) Vacuum Chamber (25-27)
NOTE: Remove food and feed commodities before fumigating dwellings.

32 & 32