

ACCEPTED
 4-1-97
 EPA REG. NO. 8600-6
 MANUFACTURED IN ACCORDANCE WITH THE SAFE HANDLING
 PESTICIDE PROMOTION ACT
 AS AMENDED, FOR THE PESTICIDE
 REGISTERED UNDER

**METHYL BROMIDE
 PRODUCTS**

NO. AM-210

AmeriBrom, Inc.

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**LIST OF AMERIBROM LABELED
METHYL BROMIDE FORMULATIONS**

Product Name	EPA Reg. No. 8622-	Active Ingredients MBR-Chloropicrin		Use
Methyl Bromide Grain Fumigant _a	5	99.5	0	Grain Fumigant
Metabrom 98 _a	6	97.6	1.9 _c	Soil Fumigant
98-2	12	97.6	1.9 _c	Soil Fumigant
67-33	13	66.8	32.8 _d	Soil Fumigant
70-30 _a	14	68.4	1.3 _{b,c}	Soil Fumigant
75-25	15	74.7	24.8 _d	Soil Fumigant
Metabrom 100	16	99.5	0	Grain, Space & Structural Fumigation
Metabrom 99	17	99.3	.5 _c	Soil, Empty Space and Structural Fumigation
50-50	39	49.7	49.5	Soil Fumigant
57-43	40	56.8	42.2	Soil Fumigant
Metapicrin	43	0	99	Soil Fumigant
80-20	44	79	19	Soil Fumigant
90-10 _a	50	89.5	1.8	Soil Fumigant
Methyl Bromide 15298-4-AA		99.7	0	Technical Product for Manufacturing use

a. Not for use in California.
 b. Formulation also contains 30% kerosene.
 c. Chloropicrin added as a warning odorant (tear gas).
 d. Chloropicrin added as a complementary active ingredient.

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**DIRECTIONS FOR THE SAFE
HANDLING AND APPLICATION**

Methyl bromide is marketed as a liquified gas under pressure in cylinders and in 1 and 1 1/2 pound cans. Methyl bromide is a fumigant of wide use because of a high rate of diffusion and penetration into soil, space, sacks and packaged material where its broad spectrum pesticidal activity is fully expressed.

**GENERAL WARNINGS AND LIMITATIONS FOR
AMERIBROM LABELED**

METHYL BROMIDE FORMULATIONS:

METABROM 100 AND

METHYL BROMIDE GRAIN FUMIGANT

METABROM 99, METABROM 98, 98-2 AND 70-30

FOR SOIL, STRUCTURAL AND EMPTY SPACES FUMIGATION
(METHYL BROMIDE WITH UP TO 2% CHLOROPICRIN)

75-25, 67-33, 90-10 AND 80-20

FOR SOIL FUMIGATION

(METHYL BROMIDE AND CHLOROPICRIN
AS ACTIVE INGREDIENTS)

**METAPICRIN (CHLOROPICRIN) IS
ALSO MARKETED FOR SOIL FUMIGATION**

**HAZARDS TO HUMANS & DOMESTIC ANIMALS
DANGER**

HIGH ACUTE TOXICITY

Extremely hazardous liquid and vapor under pressure. Do not breathe vapor. Inhalation may be fatal or cause serious acute illness or delayed lung or nervous system

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injury. Liquid or 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. Methyl bromide may be absorbed through the skin.

If the product is 100% methyl bromide, the vapor is odorless and non-irritating to the skin and eyes during exposure. Exposure to toxic levels may occur without warning or detection by the user.

If the product contains up to 2% chloropicrin as a warning agent, note that 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.

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 overexposure can result in blurred vision, staggering gait and mental imbalance, with probable recovery after a period of no exposure. Blood bromide levels suggest the occurrence, but not the degree of exposure. Treatment is symptomatic. Early symptoms of overexposure, in addition to those noted above, are intense lachrimation and irritation of mucous membranes. There are no known antidotes for methyl bromide.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to wildlife. Do not discharge effluent containing this product into lakes, streams,

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ponds, estuaries, oceans, or public waters unless this product is specifically identified and addressed in an NPDES permit. Do not discharge effluent containing this product in sewer systems without previously notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

PHYSICAL HAZARDS:

Do not use or store near heat, open flames, or sparking electrical equipment.

CHEMICAL HAZARDS:

Do not use application devices incorporating natural rubber or aluminum, magnesium, zinc or their alloys.

NOTE: If the product contains more than 2% chloropicrin as an active ingredient in addition to methyl bromide, note that the vapor of this volatile-liquid tear gas is very irritating to the upper respiratory tract, and even at low levels can cause painful irritation to the nose and throat, and to the eyes, producing tearing. If these symptoms occur, leave the fumigation area immediately. Continued exposure may cause painful irritation to the eyes or temporary blindness, which may cause panic that may in turn lead to further accidents.

STATEMENT OF PRACTICAL TREATMENT:

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

If inhaled — Get exposed person to fresh air. Keep warm. Make sure person can breathe freely.

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If breathing has stopped apply artificial respiration. Do not give anything by mouth to an unconscious person.

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.

SEE THE PRODUCT LABEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS

In case of emergency, call
CHEMTREC (800) 424-9300
OR
AMERIBROM, INC.
52 VANDERBILT AVENUE
NEW YORK, N.Y. 10017
CALL COLLECT: (212) 286-4000

**RESTRICTED USE PESTICIDE
Due To Its Acute Toxicity**

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

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METHYL BROMIDE FUMIGANTS

(Metabrom 98, 98-2, 70-30 Soil Fumigant,
Metabrom 99, 90-10 Preplant Soil Fumigant)

AIR CONCENTRATION LEVEL

The acceptable air concentration level for persons exposed to methyl bromide is 5 ppm (20 mg/M³), except that for entry into residential and commercial structures the acceptable air concentration level is 3 ppm. The air concentration level is measured by a direct reading detection device, such as a Matheson-Kitagawa, Draeger, or Sensidyne.

PERSONAL PROTECTIVE EQUIPMENT

Applicators and other handlers must wear:

Loose fitting or well ventilated long-sleeved shirt and long pants.

Shoes and socks.

Full-face shield or safety glasses with brow and temple shields (Do NOT wear goggles.)

When the acceptable air concentration level is above 5 ppm and a respirator is required, protect the eyes by wearing a full-face respirator.

No respirator is required if the air concentration level of methyl bromide in the working area is measured to be less than 5 ppm.

A respirator is required if the acceptable air concentration level of 5 ppm is exceeded at any time. The respirator must be one of the following types: (a) a supplied-air respirator (MSHA/NIOSH approval number prefix TC-19C) OR (b) a self-contained breathing apparatus (SCBA) (MSHA/NIOSH approval number prefix TC-13F.).

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Under normal soil fumigation conditions, the concentration of methyl bromide in the working area will not generally exceed 5 ppm as a time-weighted average and no respiratory protection is required. However, there is the possibility of a spill or leak during soil fumigation. Therefore, a respirator of a type specified above must be available and will be required for entry into an affected area in the event of a leak or spill.

WORK SAFETY REQUIREMENTS

1. Do not wear jewelry, gloves, goggles, tight clothing, rubber protective clothing, or rubber boots when handling. Methyl bromide and chloropicrin are heavier than air and can be trapped inside clothing and cause skin injury.
2. Immediately after contamination remove outer clothing, shoes, and socks and do not reuse until thoroughly aerated or ventilated. Keep such clothing and shoes outdoors until thoroughly aerated. Then follow the PPE manufacturer's instructions for cleaning/maintaining PPE. If there are no such instructions for washables, use detergent and hot water. Keep and wash PPE and work clothing separately from other laundry.
3. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product. Do not reuse them.
4. Follow PPE manufacturer's instructions for cleaning/maintaining protective eyewear and respirators.

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USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. As soon as possible, wash thoroughly and change into clean clothing.

DIRECTIONS FOR USE

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

USE LIMITATIONS

Extremely hazardous liquid and vapor under pressure. Inhalation may be fatal or cause serious acute illness or delayed lung, nerve or brain injury. Do not breathe vapor. Liquid or vapor can cause serious skin or eye injury which may have delayed onset. Do not get liquid on skin, in eyes or on clothing. Refer to the section Protective Equipment, on page 69 of this manual for use directions for detectors and respiratory equipment.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements in this labeling about personal protective equipment, restricted-entry intervals, and notification to workers. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard (WPS).

No instructions elsewhere on this labeling relieve users from complying with the requirements of the WPS.

ENTRY RESTRICTIONS:

Greenhouse Space Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted by the WPS — is PROHIBITED in the entire greenhouse (entire enclosed structure/building) from the start of application until aeration reduces the air concentration level of methyl bromide in the working area to less than 5 ppm.

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Greenhouse Soil Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted by the WPS — is PROHIBITED in the entire greenhouse (entire enclosed structure/building) from the start of application until 48 hours after application AND until the air concentration level of methyl bromide in the working area is measured to be less than 5 ppm. Until the aeration of the soil is complete (usually 10-14 days), non-handlers are permitted in the greenhouse ONLY while the air concentration level of methyl bromide in their working area remains less than 5 ppm. If tarps are used for the application, non-handler entry is prohibited during tarp removal and until the air level is measured to be less than 5 ppm.

Outdoor Soil Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted on this labeling — is PROHIBITED from the start of application until 48 hours after application. In addition, if tarps are used for the application, non-handler entry is prohibited while tarps are being removed.

NOTIFICATION: Notify workers of the application by warning them orally and by posting fumigant warning signs, as described in the "Placarding of Fumigated Areas" section of this labeling. Post the fumigant warning sign instead of the WPS sign for this application, but follow all WPS requirements pertaining to location, legibility, size, and timing of posting and removal.

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Greenhouses — Soil or Space Fumigation: Post the fumigant warning signs outside all entrances to the entire greenhouse (entire enclosed structure/building).

Outdoor Soil Fumigation: Post the fumigant warning signs at entrances to treated areas.

PPE FOR ENTRY DURING THE ENTRY-RESTRICTED PERIOD: PPE for entry that is permitted by this labeling is listed in the "Hazards to Humans and Domestic Animals" section of this labeling.

PRECAUTIONS FOR USAGE IN ENCLOSED SPACES

When used for fumigation of soil in enclosed spaces (e.g. greenhouses and tarpaulin covered areas) two persons trained in the use of the product must be present during introduction of the fumigant, initiation of aeration, and after aeration when testing for reentry. Two persons do not need to be present if monitoring is conducted remotely (outside the area being fumigated).

Do not fumigate with this product when soil temperature is below approx. 50°F, at 6-8 in.

Aeration and Reentry:

1. After fumigation, fumigated areas must be aerated until the air concentration level of methyl bromide is measured to be less than 5 ppm (3 ppm for residential and commercial structures).

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2. Until the acceptable air concentration level is reached, do not allow any person to enter into the fumigated area unless he/she is wearing the personal protective equipment (including prescribed respirator) specified in the Hazards to Humans section of this labeling. In greenhouses, additional Worker Protection Standard restrictions apply.

SPILL AND LEAK PROCEDURES

Evacuate everyone from the immediate area of the spill or leak. For entry into affected area to correct problem, wear the personal protective equipment (including prescribed respirators) specified in the Hazards to Humans section of this labeling. Move leaking or damaged containers outdoors or to an isolated location.

Observe strict safety precautions. Work upwind, if possible. Allow spilled fumigant to evaporate. Only correctly trained and PPE-equipped handlers are permitted to perform such cleanup. Do not permit entry into the spill or leak area by any other person until the air concentration level of methyl bromide is measured to be less than 5 ppm.

Contaminated soil, water, and other cleanup debris is a toxic hazardous waste. Report spill to the National Response Center (800-424-8802) if the reportable quantity of 1000 lbs. is exceeded.

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METHYL BROMIDE PLUS CHLOROPICRIN FUMIGANTS (67-33, 75-25, 50-50, 57-43 & 80-20 PREPLANT SOIL FUMIGANTS)

AIR CONCENTRATION LEVEL

The acceptable air concentration level for persons exposed to chloropicrin is 0.1 ppm (0.7 mg/M³). The acceptable air concentration for persons exposed to methyl bromide is 5 ppm (20 mg/m³), except that for entry into residential and commercial structures the acceptable air concentration level is 3 ppm. The air concentration level is measured by a direct reading detection device, such as a Matheson-Kitagawa.

PERSONAL PROTECTIVE EQUIPMENT

Applicators and other handlers must wear:

Loose fitting or well ventilated long-sleeved shirt and long pants.

Shoes and socks.

Full-face shield or safety glasses with brow and temple shields (Do NOT wear goggles.)

When the acceptable air concentration level is above 5 ppm and a respirator is required, protect the eyes by wearing a full-face respirator.

No respirator is required if the air concentration level of chloropicrin in the working area is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide in the working area is measured to be less than 5 ppm.

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A respirator is required if the acceptable air concentration level of chloropicrin OR 5 ppm for methyl bromide is exceeded at any time. The respirator must be one of the following types: (a) a supplied-air respirator (MSHA/NIOSH approval number prefix TC-19C) OR (b) a self-contained breathing apparatus (SCBA) (MSHA/NIOSH approval number prefix TC-13F.).

Under normal soil fumigation conditions, the air concentration level of chloropicrin in the working area will not generally exceed 5 ppm. Therefore, no respiratory protection is required. However, there is the possibility of a spill or leak during soil fumigation. Therefore, a respirator of a type specified above must be available and will be required for entry into an affected area in the event of a leak or spill.

WORK SAFETY REQUIREMENTS

1. Do not wear jewelry, gloves, goggles, tight clothing, rubber protective clothing, or rubber boots when handling. Methyl bromide and chloropicrin are heavier than air and can be trapped inside clothing and cause skin injury.
2. Immediately after contamination remove outer clothing, shoes, and socks and do not reuse until thoroughly aerated or ventilated. Keep such clothing and shoes outdoors until thoroughly aerated. Then follow the PPE manufacturer's instructions for cleaning/maintaining PPE. If there are no such instructions for washables, use detergent and hot water. Keep and wash PPE and work clothing separately from other laundry.

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3. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product. Do not reuse them.
4. Follow PPE manufacturer's instructions for cleaning/maintaining protective eyewear and respirators.

USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. As soon as possible, wash thoroughly and change into clean clothing.

DIRECTIONS FOR USE

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

USE LIMITATIONS

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

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For AmeriBrom, Inc., formulations of methyl bromide with chloropicrin, i.e. 75-25, 67-33, 80-20 and 90-10, note that the TLV's of neither methyl bromide (5 ppm or 20 mg/m³) nor chloropicrin (0.1 ppm or 0.7 mg/m³) should be exceeded. Refer to the section Protective Equipment, on page 69 of this manual for use directions for detectors and respiratory equipment.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements in this labeling about personal protective equipment, restricted-entry intervals, and notification to workers. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard (WPS).

No instructions elsewhere on this labeling relieve users from complying with the requirements of the WPS.

ENTRY RESTRICTIONS:

Greenhouse Space Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted by the WPS — is PROHIBITED in the entire greenhouse (entire enclosed structure/building) from the start of application until aeration reduces the air concentration level of chloropicrin in the working area to less than 0.1 ppm AND the air concentration level of methyl bromide in the working area to less than 5 ppm.

Greenhouse Soil Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted by the WPS — is PROHIBITED in the entire greenhouse (entire enclosed structure/building) from the start of application until 48 hours after application AND until the air concentration level of chloropicrin in the working area is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide in the working area is measured to be less than 5 ppm. Until the aeration of the soil is complete (usually 10-14 days), non-handlers are permitted in the greenhouse ONLY while the air concentration level of chloropicrin in their working area remains less than 0.1 ppm AND the air concentration level of methyl bromide in their working area remains less than 5 ppm. If tarps are used for the application, non-handler entry is prohibited during tarp removal and

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until the air level of chloropicrin in the working area is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide in the working area is measured to be less than 5 ppm.

Outdoor Soil Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted on this labeling — is PROHIBITED from the start of application until 48 hours after application. In addition, if tarps are used for the application, non-handler entry is prohibited while tarps are being removed.

NOTIFICATION: Notify workers of the application by warning them orally and by posting fumigant warning signs, as described in the "Placarding of Fumigated Areas" section of this labeling. Post the fumigant warning sign instead of the WPS sign for this application, but follow all WPS requirements pertaining to location, legibility, size, and timing of posting and removal.

Greenhouses — Soil or Space Fumigation: Post the fumigant warning signs outside all entrances to the entire greenhouse (entire enclosed structure/building).

Outdoor Soil Fumigation: Post the fumigant warning signs at entrances to treated areas.

PPE FOR ENTRY DURING THE ENTRY-RESTRICTED PERIOD: PPE for entry that is permitted by this labeling is listed in the "Hazards to Humans and Domestic Animals" section of this labeling

PRECAUTIONS FOR USAGE IN ENCLOSED SPACES

When used for fumigation of soil in enclosed spaces (e.g. greenhouses and tarpaulin covered areas) two persons trained in the use of the product must be present during introduction of the fumigant, initiation of aeration, and after aeration when testing for reentry. Two persons do not need to be present if monitoring is conducted remotely (outside the area being fumigated).

Do not fumigate with this product when soil temperature is below approx. 50°F. at 6-8 in.

Aeration and Reentry:

1. After fumigation, fumigated areas must be aerated until the air concentration level of chloropicrin in the working area is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide is measured to be less than 5 ppm (3 ppm for residential and commercial structures).
2. Until the acceptable air concentration level is reached, do not allow any person to enter into the fumigated area unless he/she is wearing the personal protective equipment (including prescribed respirator) specified in the Hazards to Humans section of this labeling. In greenhouses, additional Worker Protection Standard restrictions apply.

SPILL AND LEAK PROCEDURES

Evacuate everyone from the immediate area of the spill or leak. For entry into affected area to correct problem, wear the personal protective equipment (including

prescribed respirators) specified in the Hazards to Humans section of this labeling. Move leaking or damaged containers outdoors or to an isolated location.

Observe strict safety precautions. Work upwind, if possible. Allow spilled fumigant to evaporate. Only correctly trained and PPE-equipped handlers are permitted to perform such cleanup. Do not permit entry into the spill or leak area by any other person until the air concentration level of chloropicrin is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide is measured to be less than 5 ppm.

Contaminated soil, water, and other cleanup debris is a toxic hazardous waste. Report spill to the National Response Center (800-424-8802) if the reportable quantity of 1000 lbs. is exceeded.

FUMIGATION FOR COMMERCIAL STRUCTURES

Aeration and Reentry:

At the end of the exposure period, after all tarpaulins or seals are removed from the structure, open all interior and exterior doors, windows, and vents that are operational. No person shall be allowed to reenter the structure unless wearing protective clothing and a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator until the following criteria are met:

1. If non-mechanical or natural ventilation is used:
 - a. The structure must be aerated for a minimum of seven days from the time the tarpaulins are removed.

- b. After aeration is completed, the level of methyl bromide in the structure must be measured using a gas detector device with a minimum detection limit of 3 ppm for methyl bromide. Measurements must be taken from an interior electrical outlet by inserting the detection device in the ground receptacle, or from other enclosed space within the wall or an interior and a perimeter wall; and
 - c. (i) The level of methyl bromide is less than 3 ppm from each area measured; or
(ii) If the level of methyl bromide is 3 ppm or greater, the structure shall be aerated for an additional 24 hours. At the end of the 24 hour period, the level of methyl bromide must be measured from the areas previously sampled. These procedures must be repeated until the level of methyl bromide is below 3 ppm.
2. If mechanical aeration is used:
 - a. For structures without attics, an aeration fan(s) must be inserted in a window or other exterior opening and sealed so that the air inside the structure is exhausted out of the structure. The aeration fan(s) must be capable of displacing 5,000 cubic feet of air per minute. To facilitate aeration, exterior openings, such as windows, vents, or an access door to the subarea, should be utilized. The structure must be aerated with the fan(s) operating for a minimum of 72 hours;
 - b. After aeration is completed, the level of methyl bromide in the structure must be measured using a gas detector with a minimum detection limit

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of 3 ppm for methyl bromide. Measurements must be taken from an interior electrical outlet by inserting the detection device in the ground receptacle, or from other enclosed space within the wall on an interior and a perimeter wall; and

- c. (i) The level of methyl bromide is less than 3 ppm from each area measured; or
- (ii) If the level of methyl bromide is 3 ppm or greater, the structure must be aerated for an additional 12 hours. At the end of the 12 hour period, the level of methyl bromide must be measured from the areas previously sampled. These procedures must be repeated until the level of methyl bromide is below 3 ppm.

3. For structures with attics:

- a. An aeration fan must be inserted in the attic access door and a window or other exterior opening, and both sealed so that air inside the structure is exhausted outside the structure. The aeration fans must be capable of displacing a minimum of 5,000 cubic feet of air per minute. To facilitate aeration, exterior openings, such as windows, vents, or an access door to the sub-area should be utilized. The structure must be aerated with the fans operating for a minimum of 72 hours;
- b. After aeration is completed, the level of methyl bromide in the structure must be measured using a gas detector device with a minimum detection limit of 3 ppm for methyl bromide residues. Measurements must be taken from within an interior electrical outlet by inserting the detection device in the ground receptacle, or other enclosed space within an interior and a perimeter wall; and

- c. (i) the level of methyl bromide is less than 3 ppm from each area measured; or
- (ii) If the level of methyl bromide is 3 ppm or greater, aeration must continue for an additional 12 hours. At the end of the 12 hour period, the level of methyl bromide must be measured from the areas previously sampled. These procedures must be repeated until the level of methyl bromide is below 3 ppm.

4. For structures with basements:

- a. In addition to the requirements of paragraphs 1, 2, and 3 above, the windows, vents, and interior doors of the basement must open, and
- b. After aeration is completed, the level of methyl bromide in the basement must be measured using a gas detector device with a minimum detection limit of 3 ppm for methyl bromide residues. A measurement must be taken from an interior electrical outlet by inserting the detection device in the ground receptacle, or from other enclosed space within the wall on an interior wall. In the absence of an interior wall, a measurement must be taken of the ambient air in the basement; and
- c. (i) The level of methyl bromide is less than 3 ppm; or
- (ii) If the level of methyl bromide is 3 ppm or greater, the structure must be aerated for an additional 24 hours for natural ventilation or an additional 12 hours for mechanical aeration. At the end of the additional ventilation period, the level of methyl bromide must be measured from the area in the basement

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previously sampled. These procedures must be repeated until the level of methyl bromide is below 3 ppm.

Structural Fumigation Fact Sheet:

The applicator must obtain a structural fumigation fact sheet which has been signed by, and provided to, the following persons:

1. an adult occupant of a single family dwelling prior to the parties entering into a fumigation agreement,
2. a. The owner, manager, or designated agent of the building for multiple-family dwellings, provided he or she acknowledges in writing to the applicator that a copy of the Structural Fumigant Fact Sheet has been provided to an adult occupant of each unit prior to the parties entering into a fumigation agreement; or
b. an adult occupant of each unit in a multiple family dwelling prior to the parties entering into a fumigation agreement, or
3. the owner, manager, or designated agent for all structures or businesses other than family dwellings.

The Structural Fumigation Fact Sheet shall state:

The purpose of this handout is to inform the consumer of possible health hazards associated with the use of the structural fumigant, methyl bromide. To make sure you have been given an opportunity to read this, applicators are required to obtain the signature of the owners and occupants of property to be fumigated with methyl bromide. You will also be given a copy of this fact sheet to keep.

**STRUCTURAL FUMIGANTS:
METHYL BROMIDE**

ATTENTION

Read This Fact Sheet Completely Before Signing

Fumigation involves the introduction of poisonous gases into every part of the structure, including inside the walls. Because overexposure to these gases can be harmful to people, your building will be ventilated before you will be allowed to return.

This fact sheet provides basic information about the structural fumigant, methyl bromide, as well as information about why and how buildings are fumigated, methyl bromide health risks, how to know if you are exposed, ways to minimize your exposure, and several phone numbers to call for more information.

New rules for structural fumigation have substantially increased the time between fumigant use and the time an occupant is allowed back into the building. Post-fumigation ventilation has also been improved significantly. These changes should be adequately protective, but you should know some basic facts about structural fumigants.

Why Buildings Are Fumigated: Houses and other structures are fumigated to kill insect pests living in walls or wood. There are sometimes other ways to deal with these pests, and building owners should investigate them. However, fumigation is sometimes the only method for handling extensive infestations of wood-destroying insects. You can discuss the possibility of alternatives with your pest control company.

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How Buildings Are Fumigated: There are two pesticides used for structural fumigations: methyl bromide and sulfuryl fluoride (known by the trade name, Vikane.) Each has advantages and disadvantages in terms of their effectiveness in killing pests which professional fumigators can discuss with you. Your fumigator should also provide you with a list of items you need to remove from your home before the fumigation starts.

Methyl bromide is a gas. Before fumigation starts, the building to be fumigated is completely sealed and covered with a tarp to keep the gas in the building so it can penetrate wood to kill the pests. The tarp is left on for one to two days. Warning signs are posted around the building notifying people to keep out because the levels of the pesticide in the building during fumigation can kill a person.

After the tarp is removed, a professional fumigator will go into the building wearing a compressed air tank and mask and open the doors and windows. Powerful fans may also be set up to pull fresh air into the building.

It is now required that buildings fumigated with methyl bromide be aired out for a minimum of 72 hours after the tarp is removed. Then, the fumigators are required to measure the levels of methyl bromide inside the walls of buildings to make sure they are below three parts per million before you are allowed to go back in.

The ventilation processes make it unlikely that any remaining fumigant in the living space will be a health hazard after the house is cleared for reoccupancy.

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However, you should be aware of the symptoms of over-exposure to methyl bromide, since it is sensible to be cautious when dealing with a potentially hazardous chemical.

Small pockets of fumigant can remain in dead air space between walls and inside cabinets, and in porous material such as furniture, and may enter into the living space for a few days after fumigation. That's why a mandatory aeration period is required after the tarp is removed. Your building should not be cleared for re-occupancy until it is safe for you to reenter.

How Do You Know Whether You Are Exposed: Methyl bromide is a colorless, odorless gas, so a warning agent is added which causes watery eyes and a scratchy throat. If you experience these symptoms in a building that has been recently fumigated, you should leave immediately and call the pest control company to have your building retested. You should also consult with your physician.

Methyl Bromide Health Risks: Methyl bromide enters your body as a gas when you breathe it. Exposure which may occur from touching treated surfaces is insignificant.

Nervous system, eyes, and respiratory irritations:

Overexposure to methyl bromide can cause blurred vision, headache, and nausea. At higher concentrations, it can cause tremors, sleepiness, convulsions, pneumonia, and excess fluid in the lungs. These symptoms may not appear for 12 to 24 hours. If you experience these symptoms in a recently fumigated building, you should leave immediately and call the

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pest control company to have the building retested. You should also call your personal physician. Physicians are encouraged to report suspected pesticide-related illnesses to EPA.

Birth defects:

Methyl bromide did not affect male reproduction of rats and there was no effect on the fetus of pregnant rabbits when exposed to methyl bromide at levels of human possible exposure.

Other effects:

Life-span studies in rats and mice did not find methyl bromide to have a carcinogenic potential.

Ways To Reduce Your Exposure If You Are Having Your Building Fumigated:

- Carefully evaluate all your pest control alternatives.
- Talk over your treatment program in advance with the pest control company, so you fully understand what will be done, and what you need to do.
- Carefully follow the instructions you are given about items you are to remove from your building.
- Stay out of the treated building for at least three days after the tarp is removed. If you have additional concerns, you may choose to be away for an extra period of time after the building is cleared for reoccupation.
- If you are interested or concerned, you can ask your pest control company to show you the records of the air monitoring it did before your building was cleared for reoccupation.

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- You may wish to increase ventilation by opening doors and windows.
- If you have symptoms of exposure, or you believe that the aeration was not done properly, you should leave the building and contact the pest control company and your physician. You may also wish to call one of the phone numbers listed below.

For information about pesticides, the U.S. Environmental Protection Agency has a toll-free information service, the National Pesticide Telecommunications Network Hotline, which can be reached at 1 (800) 858-7378.

In a medical emergency, call 911, or contact the nearest Poison Control Center. See "Crises Hotlines" listed near the front of the white pages in your phone book.

If you feel uncomfortable entering the structure, or if you do not fully understand the potential hazards, you should call the company that performed the fumigation:

Name: _____

Address: _____

City: _____

Telephone: _____

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I acknowledge receiving a copy of this methyl bromide fact sheet. (You will sign one copy for the company doing the fumigation, and get a second copy to keep for later reference.)

Signature: _____ Date: _____

Please print your name here: _____

Your address: _____

FOR FUMIGATION OF COMMERCIAL STRUCTURES, THESE DIRECTIONS SUPERSEDE ANY OTHER DIRECTIONS ON THE LABEL CONCERNING AERATION AND REENTRY.

LIMITATIONS OF USE ON COMMODITIES

Commodities Unsuitable for Methyl Bromide Fumigations.

The following is a list of materials which should not be exposed to methyl bromide:

1. Foodstuffs
 - a. Iodized salt stabilized with Sodium Hyposulfite.
 - b. Full fat soya flour.
 - c. Certain baking sodas, cattle licks (i.e., salt blocks) or other foodstuff containing reactive sulfur compounds.

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NOTE: Never exceed the recommended dosage or exposure period for food or foodstuff commodities. Prior to repeated fumigation, have the food commodity analyzed for inorganic bromide residues.

2. Some Seeds, Bulbs and Plants
 - a. Seeds and bulbs to be used for planting.*
 - b. Some nursery stock and other living plants.*
- *(For specific information on procedures to prevent commodity injury, contact AmeriBrom, Inc., or the experts of the United States Department of Agriculture.)
3. Pets (All pets, including fish and birds.)
4. Rubber Goods
 - a. Sponge rubber.
 - b. Foam rubber, as in pillows, cushions, mattresses, and some car seats.
 - c. Rubber stamps and other similar forms of reclaimed rubber.
5. Furs
6. Horsehair
7. Feathers (Especially in feather pillows.)
8. Leathergoods (Particularly white or other leather goods tanned with sulfur processes).
9. Woolens (Extreme caution should be used in the fumigation of Angora woolens. Some adverse effects have been noted on woolen socks, sweaters, shawls and yarn.

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- 10. Viscose Rayon
Those rayons processed or manufactured by a process in which carbon bisulfide is used.
- 11. Vinyl
- 12. Paper
 - a. Silver polishing papers
 - b. Certain writing and other papers cured by sulfide processes.
 - c. Photographic prints and blueprints stored in quantity.
 - d. Carbonless carbon paper
 - e. Blueprint papers
- 13. Cellophane*
*(In the event of uncertainty about the possible presence of reactive sulfur compounds, conduct a trial fumigation of a small quantity of the material in question.)
- 14. Photographic Chemicals (Darkroom chemicals, but not camera or film.)
- 15. Rug padding
Foam rubber, felt, etc.
- 16. Cinder Blocks
- 17. Mixed Concrete (Occasionally picks up odors)
- 18. Mixtures of mortar and/or soil used for chinking log cabins.
- 19. Charcoal (Note: Methyl bromide is readily absorbed by charcoal. This may not only contaminate such materials but may reduce the concentration of the gas in the fumigated area to the point of ineffectiveness.)

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GENERAL WARNINGS AND LIMITATIONS FOR PREPLANT SOIL TREATMENT OF FOOD CROPS

When fumigating soil, observe these precautions:

Drivers of application equipment must advise other workers of all precautions and procedures. In addition, drivers must instruct their helpers in the mechanical operation of the tractor and how to safely work with the tractor and driver while fumigating. Handle this fumigant in the open, with the operator upwind from the container where there is good ventilation.

Always have adequate clean water available to wash skin and/or flush eyes. When fumigating soil from a tractor, 5 gallons of water must be carried on the tractor and placed where it is readily accessible. In addition to water available on the tractor, at least 5 gallons of additional water must be available from the service truck. The water must be drinkable but in containers marked "WATER NOT FOR DRINKING."

Check fumigant pressure system for leaks before beginning operation.

Do not lift injection shanks to turn at end of a pass until fumigant has drained from system following closure of shutoff valve.

Trash pulled by the shanks to the end of the field when fumigating must be covered by lifting the shanks.

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In case of a rupture of hose or fitting while applying fumigant, immediately stop tractor and motor. Get off tractor and get to a place where the problem can be observed without exposure to fumes. Approach from upwind with respiratory protection if required, and make necessary repairs.

When changing the cylinders be certain they are turned off and fumigant system is not under pressure. Do not open the system when there are people or structures downwind.

Post all treated areas with warning signs.

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METHYL BROMIDE FUMIGANTS

(Metabrom 98, 98-2, 70-30 Soil Fumigant,
Metabrom 99, 90-10 Preplant Soil Fumigant)

PLACARDING OF FUMIGATED AREAS

The applicator (or supervisor of the application) must placard all entrances to the fumigated area with signs bearing:

- skull and crossbones symbol
- "DANGER/PELIGRO,"
- "Area under fumigation, DO NOT ENTER/NO ENTRE,"
- "Methyl Bromide Fumigant in use,"
- the date and time of fumigation, and
- name, address, and telephone number of the applicator.

Do not allow entry by unprotected persons into the fumigated area until the signs are removed. Such signs must only be removed when the air concentration level of methyl bromide is measured to be less than 5 ppm (3 ppm in residential and commercial structures). Signs must remain legible during entire posting period.

Only a certified applicator (or someone under his/her supervision) may remove warning signs at entrances to fumigated structures.

**Commodity/Product Fumigation with
98-2, 70-30 Soil Fumigant,
Metabrom 99 & 90-10 Preplant Soil Fumigant**

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To determine whether aeration is complete, each fumigated site or vehicle must be monitored and shown to contain less than 5 ppm methyl bromide in the air space around and, when feasible, in the mass of the commodity. If 5 ppm or greater methyl bromide is detected, the placard must be transferred with the commodity to the new site. Workers who transfer or handle incompletely aerated commodity must be informed and appropriate measure must be taken (i.e., ventilation or respiratory protection) to prevent exposures from exceeding 5 ppm of methyl bromide.

**METHYL BROMIDE
PLUS CHLOROPICRIN FUMIGANTS**

(67-33, 75-25, 50-50, 57-43 & 80-20
Preplant Soil Fumigants)

PLACARDING OF FUMIGATED AREAS

The applicator (or supervisor of the application) must placard all entrances to the fumigated area with signs bearing:

- skull and crossbones symbol
- "DANGER/PELIGRO,"
- "Area under fumigation, DO NOT ENTER/NO ENTRE,"
- "Methyl Bromide and Chloropicrin Fumigants in use,"
- the date and time of fumigation, and
- name, address, and telephone number of the applicator.

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Do not allow entry by unprotected persons into the fumigated area until the signs are removed. Such signs must only be removed when the air concentration level of chloropicrin is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide is measured to be less than 5 ppm (3 ppm in residential and commercial structures). Signs must remain legible during the entire posting period.

Only a certified applicator (or someone under his/her supervision) may remove warning signs at entrances to fumigated structures.

Prior to Fumigation: Post all treated areas with warning signs.

Comply with all local regulations and ordinances. Obtain an application permit from Agricultural Regulatory Agencies as required.

After Fumigation: Keep pets, livestock, and other domestic animals out of the treated area during application, during the exposure period as specified for applications in Directions for Use, and during removal of tarpaulin.

Two trained persons must be present during removal of tarpaulins.

Spill and Leak Procedures for Soil Fumigation:

In case of a rupture of hose or fitting while applying fumigant, immediately stop tractor and motor. Evacuate everyone from the immediate area of the spill or leak. Wear the personal protective equipment (including prescribed respirators) specified in the Hazards to

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Humans section of this labeling for entry into affected area to correct problem. Approach from upwind to make necessary repairs. Do not enter area without the required PPE until the spill has evaporated or the leak has been fixed.

Fumigation with methyl bromide and/or chloropicrin sometimes slows down the rate of nitrification (the conversion to nitrates from ammonia by bacterial action). Certain ammonia-sensitive plants such as tomatoes may suffer growth inhibition or stand reduction when planted in fumigated soils containing high amounts of ammonia nitrogen. Accumulation of ammonium is most likely to occur when maximum rates of fumigant and fertilizer are applied to soils that are acidic, wet, cold or high in organic matter. To lessen this hazard, at least one-half and preferably all the nitrogen fertilizer added immediately before or soon after fumigation should be in the form of nitrate nitrogen. This hazard may also be reduced by delaying planting until several months after fumigation if a nitrate form of nitrogen such as sodium or calcium nitrate is not readily available. Ammonium nitrate used sparingly will supply the nitrogen needed without risk. Phosphorous, potassium and other plant nutrients should be used according to soil needs.

Application should be made several months prior to planting to soils high in organic matter such as muck, compost, and heavily manured soils since they seem more likely to undergo some changes (possible effect on microorganisms) resulting in poor growth.

Do not treat very wet soil, very dry soil or when soil temperature is below 50°F. (10°C).

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Be sure treated plots are free from gas before planting seed or setting out plants. If there is doubt as to complete aeration, working the soil after treatment will aid, particularly when the soil is cool and/or wet.

Do not contaminate fumigated areas by walking from unfumigated soil. Clean your shoes thoroughly if this is necessary. If the treated bed is in a location where flooding or washing is possible after rains, plow a furrow or make a trench around the treated area for proper drainage. Wooden frames around the beds are also satisfactory for preventing this type of contamination.

Do not allow domestic animals to feed on crop residues unless a tolerance exists for such crop.

Do not feed hay or straw treated directly or harvested from treated soils to any animal.

Undesirable concentrations of chloropicrin following soil fumigation with this material may drift to nearby areas. If this occurs, immediately cover treated area with a plastic tarpaulin. The tarpaulins should remain in place overnight and be removed during the daytime. If the escaping vapors reach an undesirable concentration, as indicated by eye irritation, the treated areas should be recovered. Since air movement assists the dilution of the escaping fumes it is most likely that undesirable concentrations will build up during evening or nights when air is static. Application of this material should not be made when there is little or no air movement or when there is an inversion.

SOIL PREPARATION AND TREATMENT

Preplant Soil Preparation

Plow or rip the soil to a depth to which effective treatment is required. The soil should be worked until free of clods or large lumps. Residue from previous crops should be removed and burned prior to fumigation to prevent reinfestation. Soil moisture should be optimum for seed germination. Coarse textured soils can be fumigated with higher moisture content than fine textured soils. For best results, soil should be kept moist for at least 7 days prior to treatment. Do not fumigate if the soil temperature is below 50°F. (10°C). For best results, fumigate when soil temperature is 60°F. to 80°F. (15.6° to 26.7°C) at the depth of 6 to 8 inches.

Soil Fumigation Methods

Use one of the following preplant methods:

1. **Chisel Method** for applying broadcast or row, bed or strip application (suitable for light, non-compacted soils):
 - a. **Overall Field Fumigation**, using a chisel type applicator, inject the product with the chisels spaced no more than 12 inches apart. Inject the fumigant to a depth of 6 to 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 a cultipacker and covered immediately with simultaneous film laying equipment or other suitable cover.

b. Row, Bed or Strip Application:

Row or bed applications may be made at the broadcast rates but the amount used will be proportionately less per acre depending on row spacing and width of treatment in the row or bed. Injection of fumigant should be approximately 4" below surface of the bed but not deeper than the bed itself. Application should be made by a mechanical mulch layer or suitable bed pressing equipment with the mulch layer following immediately afterward. Attention should be given to insuring chisel marks are sealed by pressure to avoid fumigant escape until mulch is laid.

2. 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. Evaporating pans are essential for the volatilization and uniform distribution of fumigant. Shallow pans or basins made of plastic or tinned sheet metal are satisfactory for this purpose.

- a. Use 1 evaporator pan for each 300 to 400 square feet of area.
- b. Anchor one end of each polyethylene tube into an evaporating pan with tape or a suitable weight. This insures that the liquid will be directed into the evaporating pan.
- c. Extend the free ends of the polyethylene tubes outside of the area to be covered.

- d. After the supports and tubing are in place, cover the area to be fumigated with a gasproof cover of polyethylene or coated fabric film.
 - e. Position the cover with its edges in a prepared furrow or trench.
 - f. Seal 6 to 10 inches of the outside edges with dirt. Tamp the dirt down so edges will not pull loose.
 - g. Attach a polyethylene tube to the cylinder valve outlet and open. Use a cylinder dispenser or scale to meter small amounts.
- 3. Tree Site Injector Method** (suitable for light, non-compacted soils):
- Insert injector into soil to a depth of 18 inches or more. Tamp soil lightly around injector. Release entire dose for 100 square feet site. Move away from injector until all fumigant has been released, then remove injector and seal hole with tamped soil.
- 4. Augering Method** (suitable for use in non-compacted or lightly stratified soils):
- Dig hole 3 to 5 feet deep with auger and, if necessary back-fill hole to provide a final depth of 3 feet. Insert applicator tube or probe. Fill hole and release entire dosage for 100 square foot site. When fumigant has been completely released, remove applicator and tamp or compact hole with soil or cover site with polyethylene tarp for 7 days.
- 5. Back-Hoe Method** (especially suitable in highly compacted hard pan soils):
- In stratified soils dig a trench 5 feet deep, 6 feet long

- and as wide as the hoe; in deeply compacted soil, prepare a site the size of the area in which the tree is to be grown. Back-fill with 2 feet of soil, place applicator outlet at the 3-foot level and complete back-fill. Release entire dose for 100 square feet, remove applicator and tamp soil lightly over opening to seal fumigant in the site.
- 6. Hot Gas Method:**
- Apply hot gas after carefully preparing soil. The 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 under a polyethylene cover. This method is especially suitable for treating greenhouses or in general where large amounts of fumigant are required and rapid vaporization is advantageous.
- Exposure and Aeration Periods:**
- In general expose for 24 hours when temperature is above 60°F (15.6°C) and for 48 hours when temperature is between 50°F to 60°F (10.0°C to 15.6°C). After the exposure period, aerate soil for 3-7 days before seeding or 5 to 14 days before setting out vegetative growth. If odor of fumigants persists at the end of aeration period, disc or plough the soil to assist aeration.

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**INSTRUCTIONS FOR CONTROLLING
SPECIAL SOIL PROBLEMS**

**FOR THE CONTROL OF ARMILLARIA ROOT ROT
(ARMILLARIA MELEA) ON DECIDUOUS FRUITS
AND NUTS, CITRUS AND VINEYARDS:**

Pretreatment Soil Preparation:

To obtain the maximum control of Armillaria melea, 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) by naturally allowing 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.

Methods 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. Methods of application are as follows:

1. Non-tarp Chisel Application.

After the soil has been properly prepared, inject dosage by chisel application with chisels spaced 48 to 66 inches apart to a depth of 24 to 30 inches. In the row, bed or strip, treatments may be made by using a single shank. Chisels should have a wing welded on the back 2 to 4 inches above the chemical outlet to partially break the chisel mark. To fill in the chisel mark and seal the surface, disc and ringroll immediately after fumigant injection. Be sure that the disc and ringroller cover an area sufficiently beyond the chisel lines to effect a good seal.

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2. Tarp Chisel Application.

After the soil has been properly prepared, apply dosage by chisels space 48 to 66 inches apart and cover with adequate polyethylene film seal.

3. Deep Injection Auger-Probe Treatment.

Use 1 pound active per injection site in light soils (2 pounds in fine-textured soils) to a depth of 36 inches or more below the soil surface. Use 1 injection site per 100 square feet (on a 10 feet by 10 feet grid pattern) with the injection in the center of the area to be treated.

Exposure and Aeration Period:

To insure the proper time-concentration relationship to control Armillaria root rot, expose for 7 days before removing the polyethylene film cover after chisel applications, and expose for a 1 day interval with deep injection auger-probe treatment. Planting or replanting of trees, vines or other deep-rooted crops may begin 14 days after the period of exposure.

**FOR CONTROL OF NEMATODES ON
DECIDUOUS FRUITS AND NUTS,
CITRUS AND VINEYARDS NON-TARP**

Pretreatment Soil Preparation:

Plow or rip the soil to the depth to which effective treatment is required. The soil should be worked until free of clods or large lumps. Residue from previous crops should be removed and burned prior to fumigation to prevent reinfestation. To insure maximum fumigant

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penetration, the soil at the point of injection should contain 65% moisture of the field capacity. However, to improve sealing, the soil surface may be moistened by means of a sprinkler application of 0.25 to 0.5 inch of water prior to final penetration and application. Avoid treatment of soils that contain more than 30 percent clay or those with high organic content. For best results, fumigate when the soil temperature is 60°F to 80°F (15.6°C to 26.7°C) at the depth of 6 inches. Do not fumigate when soil temperature is below 50°F (10.0°C).

Methods 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.

Use one of the following methods:

1. Chisel Application:

After the soil has been properly prepared, inject fumigant with chisel spaced up to 66 inches apart to a depth of 24 to 30 inches. In the row, band or strip, treatments may be made by using a single shank. Chisels should have a wing welded on the back 2 to 4 inches above the chemical outlet to partially break the chisel mark. To fill in the chisel mark and seal the surface, disc and ringroll immediately after fumigant injection. Be sure that the disc and ringroller cover an area sufficiently beyond the chisel lines to effect a good seal.

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2. Deep Injection Auger-Probe Treatment:

Use 1 pound active per injection site in lighter soils; 2 pounds in fine textured soils. Use 1 injection per 100 square feet (on a 10 feet by 10 feet grid pattern) with the injection in the center of the area to be treated. Tamp or compact the soil at the point of injection.

TREATING COMPOST OR PILES OF SOIL

General Warnings and Limitations:

Fumigation should take place outdoors or in a well ventilated area away from desired plants or occupied buildings. The material to be treated should have a temperature of 60°F (15.6°C) or above, be loose, and moist enough for good seed germination. To insure a good seal, pile the material to a depth of 19 inches on a concrete floor or wet ground. Piles 2-3 feet high can also be treated provided perforations are made in the pile surface at one foot intervals to assist penetration.

Once the pile has been made, install supports to hold the cover a few inches above the pile surface to aid in proper fumigant diffusion. Place the outlet of the applicator tube or tubes in evaporating pans spaced about 30 feet apart on the pile surface. Cover with a polyethylene sheet of 1 mil or greater but not less than 1 mil. Seal the edges by burying, covering with moist sand or soil or by means of sand-filled tubes (sand snakes). Introduce the fumigant into the evaporating pans as a liquid or by means of the hot gas method. Aerate for 24-72 hours before planting.

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FOR GREENHOUSE FOOD CROP

General Warnings and Limitations:

The use of methyl bromide in confined spaces presents a potential hazard to humans and plant life. Special precautions must be made in order that these potential hazards be minimized. It is the responsibility of the individual supervising the fumigation operation to see that all safety precautions below are strictly observed.

1. Before the fumigation operation commences, the supervisor of the fumigation job shall have conducted proper training of all personnel involved in the fumigation (includes use of safety equipment) removed all persons from the area not directly involved in the fumigation, and inspected the equipment to insure proper aeration.
2. If a wind is blowing, all injection should be made up-wind from a previous injection site. Immediately after injection of the fumigant and tarping, a qualified person wearing protective equipment, should monitor the area to detect leaks. If leaks are found, the source of the leak should be resealed immediately.
3. During this operation, all windows and doors should be open and fans operating to maximize ventilation. Exposure time should be 24 to 48 hours.

On-Site Protective Equipment: Although this fumigant contains chloropicrin, the absence of chloropicrin does not always indicate the absence of methyl bromide. Do not allow any person to enter the fumigated structure without the appropriate protective

equipment from the time of injection of the fumigant until acceptable air concentration level readings are obtained using an approved detector. To maintain adequate safety standards, the following equipment must be present and accessible on the site during the entire fumigation operation: (1) one or more self-contained breathing apparatus; (2) one or more replacement air bottles per breathing apparatus; and (3) one or more halide leak detectors.

After Fumigation: At the end of the exposure period, remove all seals and open all doors and windows that are operational. Allow for complete ventilation. Use ventilation fans whenever possible to remove fumigant from dead air pockets. Follow exactly the instructions in the entry restriction section of the Agricultural-Use Requirements box.

Please Refer To General warnings and limitations for preplant soil treatment of food crop. Page 33.

GENERAL WARNINGS AND LIMITATIONS FOR INDOOR/STRUCTURAL FUMIGATION

At temperatures below 60°F (15.6°C) increase the dosage by 0.5 pound per 1000 cubic feet for every 10°F (5.6°C) drop in temperature or use an approved procedure to heat the fumigant. Do not fumigate when temperature is below 50°F (10°C).

Claims for control of stored product pests and structural pests will also control rats and mice. When rodenticide claim is solely the object of fumigation, dosages are usually lower.

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Overdosing, overexposure or repeated fumigation of food or feedstuff commodity should be avoided. When the prior history is not known, or in those instances where a repeated fumigation is necessary, the commodity should be analyzed for inorganic bromide residues before fumigation to make certain the proposed treatment will not result in residues that will exceed the tolerances established. Special care must be exercised to determine that methyl bromide fumigation of commodities such as animal feeds, flour, dried eggs, dried figs, dried milk, nuts, meats and meat products will not result in residues in excess of established tolerances. When used for fumigation of enclosed spaces, 2 persons trained in the use of methyl bromide must be present at all times during introduction of the fumigant, testing, and aeration periods.

Stored Commodity/Product Fumigation Methods:

Unless otherwise specified in the use paragraph, use one of the following methods.

1. Chamber Fumigation:

Load the chamber with the material to be fumigated, close exhaust ports, turn on circulating fan and close chamber door. Determine the proper rate of application and exposure time. 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. Before introducing the fumigant, place warning signs and a red warning light on the door. Two people wearing full-faced masks with an approved NIOSH/MSHA self-contained breathing apparatus

(SCBA or combination air-supplied) are required when introducing the fumigant and opening the door after fumigation. 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.

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

2. Vacuum Chamber Fumigation:

- a. Place material to be fumigated in the steel chamber and draw the desired vacuum.
- b. Release fumigant into the chamber (usually through a heating unit to insure complete vaporization).
- c. At the end of the exposure time, release the vacuum and change the air in the chamber at least 2 times. A vacuum of 15 inch mercury should be drawn for this purpose.

3. Truck, Van or Trailer Fumigation—Closed Top Conveyances:

- a. Seal the off-side door, ventilators and other openings from the inside.
- b. 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.

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- c. 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 at least 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. See directions for placarding or posting given previously. Page 35.
 - d. Do not fumigate while strong winds are blowing.
 - e. After 12 to 18 hours, open the unit and aerate 1 to 1.5 hours. The truck, van or trailer may then be resealed for shipment.
 - f. 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.
4. Truck, Van or Trailer Fumigation — Top Conveyances:
- a. Park trailer or van out of traffic area — if possible on the lee side of a building to protect from winds.
 - b. Roll back the protective tarpaulin to expose the bulk grain or other commodity.
 - c. Prepare a gas expansion dome by placing several cardboard boxes, empty 5-gallon pails

- or other propping materials on the top of the load down the center line. These props should be high enough to support the tarpaulin 12 to 18 inches at the center line above the grain or commodity surface after replacement.
- d. Place 2 shallow, plastic or non aluminum metal, containers on the center line grain surface of the load at points 0.3 and 0.6 the distance from the front of the conveyance. Direct into and firmly attach with tape one end of a 0.25 inch I.D. polyethylene applicator hose into each evaporating container to prevent liquid methyl bromide from contacting the commodity. Hand the other end of each hose over the side of the conveyance down to approximate waist height from the ground. The ends of the hose should have a brass fitting for attaching to the applicator.
- e. Pull the tarpaulin back over the load, covering the props thereby creating the gas expansion dome. Do not tie down the tarpaulin but leave sufficient room to tape the gasproof cover to the conveyance sides below the edges of the tarpaulin.
- f. With the 4 or 6 mil polyethylene or other gasproof cover, completely over-cover the protective tarpaulin to extend down the sides of the container. Clean the containers of dirt and grease. With two-inch masking tape, seal the entire edge of the gasproof cover to the sides and ends of the container, below the tarpaulin, leaving the ends of the 2 applicator hoses exposed for attaching the applicator.

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- g. Do not occupy truck cabs, van cabs or trailer attached tractor cabs during exposure and aeration periods. Lock the cab doors during the exposure and aeration periods.
- h. CLEAR THE IMMEDIATE WORKING AREA OF ALL UNAUTHORIZED PERSONNEL. Release one-half of the recommended dosage through each of the applicator tubes, from the applicator. Methyl bromide boils at 39°F (3.8°C).
- i. Following release of the methyl bromide and disconnection from the applicator, tape the open end of the applicator hose with masking tape and fasten the hose to the side of the conveyance.
- j. Using a Draeger detector, check for fumigant leaks at all taped margins and at the floor of the conveyance. Seal any point where methyl bromide is leaking.
- k. Securely attach the proper methyl bromide fumigation warning placards to each side and to the ends of the conveyance during the fumigation and aeration period.
- l. Containerized commodities may be transferred or moved on and off ships during the fumigation exposure period of 12 to 24 hours. At the end of the exposure period, working in a well-ventilated area and from ground level only, unseat the taped edges and remove the gasproof cover. Also working from ground level only, starting with the downwind end first, peel back the protective tarpaulin cover toward the center of the container to expose the commodity load surface at each end. Do not remove warning placards until aeration has been completed.

UPON COMPLETION OF THE AERATION PROCEDURE, THE PROFESSIONAL FUMIGATOR IS RESPONSIBLE FOR THE RELEASE OF THE CONVEYANCE AND COMMODITY.

5. Railroad Car Fumigation:

- a. Car should be placed on seldom used trackage or siding so that it will not have to be moved while under fumigation.
- b. Methyl bromide must *always be applied from outside* the railroad car by means of a 0.25 inch copper or plastic tubing attached to a special puncturer can or to a methyl bromide cylinder. The tube may be introduced into the car through a hole drilled in the floor near the center of the car or through some other convenient hole such as a crack in the door or some roof opening. The discharge end of the tube should be secured near the ceiling at the center of the car. This may be accomplished by fastening the tube to a pole, stick or some other support that may be propped up to hold the end of the tube near the ceiling. The discharge end of the tube is plugged and a hole drilled through the opposite walls of the tube about 1 to 2 inches below the tip to permit escape of the methyl bromide mist above the commodity load and toward the opposite ends of the car.
- c. All car openings should be carefully sealed. Particular attention should be given to the space around doors, the eaves, and the floor. During application and fumigation, all openings used to introduce the gas tube should be tightly sealed

around the tube. Any holes bored through the car structure should be of a minimum size and carefully sealed following fumigation. Masking tape, caulking compound or greased paper may be used as sealing materials.

- d. Post warning signs conforming to Department of Transportation or as described on page 35 on both doors before applying methyl bromide.
- e. Methyl bromide may be applied by using special measuring devices that can be attached to the cylinders. Always wear safety glasses when working with methyl bromide.
- f. After application of the proper dosage, withdraw the tubing and seal the hose used for application. Keep the car sealed for 12 to 18 hours. A Draeger detector may be used to check sealed areas for leaks. The fumigated car should not be moved during the exposure period.
- g. At the end of the fumigation period, open all doors and vents to allow as much air circulation as possible. It will usually require about 30 minutes to aerate a car after fumigation but this must be determined by the use of a Draeger detector. Keep all persons out of the car during fumigation and aeration and until such time as a suitable detector shows no methyl bromide present. Only then is it safe to enter the car without respiratory protection.

6. Grain Elevator Fumigation:

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

- a. Seal structure carefully, using masking tape for small openings and polyethylene sheeting secured with masking tape for large openings.
- b. Fumigated areas must be placarded on all entrances with signs containing at least 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 fumigant used, emergency telephone number for contact, and the name and address of fumigator. Do not remove warning signs until the fumigated area is completely aerated and safe for entry, as indicated by a suitable detector.
- c. Use the rate and exposure time shown in site entries for specific grains to be treated.
- d. Fumigate by using a fan or blower to recirculate the methyl bromide through the 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 feet or less.
- e. Check periodically for leaks with a Draeger detector.
- f. To aerate after fumigation, disconnect return air at the fan and discharge into outside air. Continue aeration until suitable detector shows the fumigant has dissipated. Use Draeger detector to check the elevator head space for possible pockets of methyl bromide.

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7. Tarpaulin Fumigation:

- a. Arrange the stacks, gas expansion dome, tubing and evaporating pans and tarpaulin. Follow these directions:

The stack: Stacks of stored commodities usually can be fumigated where they stand as long as the tarpaulin is large enough to cover the stack completely. Be sure to allow for a tarpaulin margin of at least 2 feet around the stack when the cover is laid over it. The stack should be on a concrete floor or other airtight surface. Where floors are not airtight (such as on a loading dock) cracks should be caulked or otherwise sealed to prevent escape of the fumigant. Sisal kraft paper, tar paper, or additional tarpaulin laid on the floor under the material to be fumigated will provide a satisfactory seal.

The gas expansion dome: Center 4 or more sacks upright on top of the stacked material to form a gas expansion dome. This facilitates gas distribution.

The tubing and evaporating pans: Copper, polyethylene, or saran tubing is used to inject the gas near the center of the expansion dome. The outlet of this tubing should be fastened to an evaporating pan to prevent liquid methyl bromide from dripping on the commodity being fumigated, or splashing on the tarpaulin.

The tarpaulin: Water-proofed canvas tarpaulins are not satisfactory. Before spreading the tarpaulin, sweep around the stack to provide a

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clean surface for sealing. Unroll or unfold the tarpaulin over the stack, providing a margin on the floor of 2 or 3 feet. Run the applicator tubing out from under the tarpaulin at a corner which should be folded. Seal the tarpaulin by weighting it down with a row of bagged material or sand-filled tubes. (Canvas or plastic tubing about 4 inches in diameter may be used for these sandsnakes).

- b. Once the above preparations are completed, fumigation can be done. Attach the applicator tubing to the cylinder of methyl bromide. Place warning placards on tarpaulins under fumigation. These placards must be present during aeration. Leave the stack undisturbed for 24 hours after releasing the fumigant.

8. Shipboard, In Transit or Shiphold Fumigation:

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

Pre-fumigation Procedures:

- a. 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.

b. 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 self contained breathing apparatus (SCBA) or combined air-supplied/SCBA respirator approved jointly by the National Institute of Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA).

c. Fumigated areas must be placarded on all entrances with signs containing at least the signal word DANGER and the "Skull and Crossbones", and the words "Area under 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.

d. 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.

e. 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 least 2 units of personal protection equipment and 1 gas or vapor detection device, and a person qualified in their operation be on board the vessel during the voyage.

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, appropriate personal protection equipment must be used. Never enter fumigated areas alone. At least 1 other person, wearing personal protection equipment, should be available to assist in case of an emergency.

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Precautions and Procedures During Discharge:

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

9. Warehouse, Structural* and Food Plant Fumigation:

Check with appropriate municipal and county authorities 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. Several types of buildings can be fumigated with methyl bromide. Frame, metal and concrete buildings used for storage of agricultural products can be fumigated if they are in good repair and tight, or can be made tight by sealing or tarping. The buildings include packing plants, grain elevators, milling and baking plants, port warehouses, grain storage buildings and coffee warehouses. Cement blocks pose a special problem because of their porous nature, but can be fumigated if an increased dosage and exposure time is allowed to compensate for the diffusion loss. There is no rule of thumb allowing for leakage. The applicator will have to exercise judgement from his observation of the building's condition.

*See page 20 for directions.

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- a. The most important part of the entire fumigation job lies in the preparation and sealing of the structure. The properties of penetration and diffusion that make methyl bromide an ideal fumigant also make it difficult to confine—and for that reason, a good sealing job is necessary. High winds, for example, increase fumigant loss and cause fumigant to drift to the leeward side of the building.

Sealing of the building begins with the closing of all external openings to the building. Seal roof ventilators and chimneys by wrapping them with tarpaulin, or plastic sheet, or by stripping the screened openings with a wide commercial masking tape. Stairwells and interior doors should be closed. Any broken panes should be replaced, then exterior doors and windows should be wedged tight, locked, and cracks caulked or taped. Check for cracks in the floor, roof, and around eaves and seal them. Special care should be taken to seal partitions to adjacent storage or work areas in a building. Adjoining buildings sharing a common wall must be cleared of personnel, animals, and items that will react to methyl bromide or commodities which might be damaged by exceeding the established tolerances for inorganic bromide before fumigation. If this is not feasible, spread a glossy type building paper, Sisal draft or asphalt laminated paper, plastic film or a heavy oiled kraft or wrapping paper to prevent spread of the fumigant into undesired areas. In all such cases where the adjoining building is occupied, it should be checked frequently with an appropriate detector during fumigation to insure the

safety of the occupants. Check local regulations for specific requirements. Appearance, economy and ease of cleanup will probably determine your choice of sealing materials.

Where time and neatness are factors, masking tapes and commercial caulking compounds will probably justify their extra cost. It is possible, however, to make your own paste by combining lubricating oil and a low grade of flour.

Because methyl bromide gas can penetrate accumulations of trash and sweepings, necessary cleanups may be postponed until after the fumigation has been completed. It is recommended that all doors and hatches on milling machinery be opened. These include elevator boots and repair openings, conveyor lids, settling chamber doors and dust trunks. This also applied to reels, purifiers, sifters, shorts and bran dusters, feeder gates on rolls and purifiers as well as other openings that will facilitate the entrance of gas to the equipment. Dead spouts are particularly difficult to penetrate and should be opened before the fumigation.

- b. Dosage recommendations are made on the basis of cubic content. In square or rectangular buildings simply multiply the interior length by width and height. In irregular shaped buildings, find the cubic content of each unit, then add them together to find the total. In case of peaked roofs the average height between the sidewall and the top of the roof may be used as the third multiple in calculating the cubic content. In taking measurements, no deductions should be made for space occupied by machinery,

commodities or furnishings. Exceptions to this rule apply to fresh fruits and vegetables.

- c. Cylinders should be placed by a two-man team, using a clipboard to map the location of each cylinder in the building. The cylinders should be arranged so that the fumigator will start releasing the gas on the top floor and continue walking away from the released gas in the direction of the exit as he opens each subsequent cylinder.

As methyl bromide is heavier than air, it is advisable to overdose the top floor slightly. In all cases, the size of cylinder can quite naturally follow the needed dosage for that particular cubic space. Cylinders should be located within a room so as to do the best job of diffusion into all areas. Cylinders should be set in an upright position and the shipping caps removed. Again, since methyl bromide is heavier than air, in order to prevent stratification at the lower levels, it is sometimes advisable to attach standpipes (or curved pipes directed upward) to the cylinder valves. If standpipes are used, they should be equipped with T fittings to direct the gas laterally and prevent direct contact.

- d. At this point, a practice session should be undertaken to familiarize the operators with the location of each cylinder and the sequence in which it is to be discharged. With SCBA equipment at ready position, quickly open and close the cylinder valves to make certain they are in working order and thus avoid delay during the actual release.

If fans are to be used, they should be sparkproof and strategically located and made ready to switch on or

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off from outside the building. One 16 inch fan for every 50,000 cubic feet of space will be sufficient. Quite often, however, it is possible to use heating fans or other installations already in the building.

Extinguish all open flames and turn off all high temperature electrical equipment including laboratory ovens, pilot lights, gas refrigerators, oil burners, etc. Presence of intense heat from such sources may change methyl bromide to hydrobromic acid which may be injurious to commodities and equipment. Place warning signs on all entrances to the building. Have lights to illuminate warning signs plainly. Inform police, fire and health officials that a fumigation process is about to begin. Observe location of nearest telephone for use in case of emergency. Make sure fumigators can recognize early symptoms of methyl bromide intoxication and that the appropriate physicians and hospitals have been provided a copy of "First Aid & Treatment for Methyl Bromide Exposure". Arrangements should be made to seal and bar the building entrances as soon as the job is complete. Watchmen should take up their stations to prevent any admittance during the fumigation.

- e. At this point, SCBA equipment should be donned, carefully checked, and the cylinders opened. Under no circumstances should the operators be in the building longer than 30 minutes in releasing the gas. If it is impossible for one crew to do it within this time period, additional experienced crews should be used. Two persons trained in the use of methyl bromide must be present at all times during introduction of the fumigant, testing and aeration periods.

Thus, in case one should become incapacitated for any reason, such as an accidental fall that would result in an injury or unconsciousness, the other man could move him to fresh air. These men should always remain close to each other from the time they open the first cylinder until the time they leave the building together. While the first 2 are in the building, it is advisable to have 2 additional men, with SCBA equipment ready and waiting at the exit to aid if needed. When releasing fumigant, start on the top floor and work toward exits. Where there is a basement, the gas should be released there immediately prior to releasing the gas on the ground floor. One man should check off locations of each cylinder so none are missed.

All fans should be running while the gas is being released and left running until uniform distribution has been accomplished, which should not require more than 30 minutes to 1 hour. After this the fans should be turned off.

- f. Once the exposure period is complete, aeration should be started by opening the previously prepared doors and windows on the ground floor. Where ventilators are accessible from the outside, they should also be opened at this time. The ground floor should be allowed to aerate until a Draeger detector shows that the methyl bromide concentration has diminished to 5 ppm or less. At this point, at least 2 men, wearing SCBA equipment should begin opening windows, starting at the bottom and working upward. These men should not try to open all windows on any single floor the first time through

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but should open only those windows that are necessary for thorough ventilation and return to the outside as soon as possible. They should not remain inside the building for prolonged periods (not more than 15 minutes). The fans should be turned on once again and allowed to run until aeration is complete. After the building has been partially aerated, the men again wearing masks, should open as many of the remaining windows as needed to complete the aeration. No one should be allowed inside the building without a suitable mask until all parts of the building have been checked with a Draeger detector for methyl bromide concentration. Once the aeration has been completed, usually 2 or 3 hours, the building can be returned to normal condition for operation. Where possible, it is advisable to leave in place such sealing as will not hinder operation and operations so that this sealing does not have to be replaced for future fumigations.

10. Recirculation Method:

With recirculation, dosages can be reduced as much as 50 percent to 70 percent below those recommended because of more efficient use of the fumigant. Bulletins are available for dose and use recommendations.

Exposure Period for Stored Commodity Fumigation:

Unless otherwise specified, expose the treated commodities for a period of 12 to 24 hours.

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Fumigation of stored grain with moisture content above 14 percent may injure germination. Do not fumigate if grain moisture is high or if grain temperature is below 60°F (15.6°C) or if there is excessive dockage.

NOTE: All data, including the procedures discussed herein are believed to be accurate and reliable, but are presented without guarantee or responsibility on the part of the seller.

As use conditions are not within its control, seller does not guarantee results from use of its products or other information described herein. In as much as any assistance furnished by the seller with reference to the safe use and disposal of its products is provided without charge. Seller assumes no obligation or liability therefore, except to the extent that any such assistance shall be given in good faith.

Protective Equipment:

Equipment to measure leaks and residue vapor during and following fumigation.

Follow manufacturers recommendation for type of detector and directions for use.

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Draeger Tube Methyl Bromide 3/a No. 6728211

Manufactured by:
National Draeger, Inc.
101 Technology Drive
P.O. Box 120
Pittsburgh, PA 15230
Tel. (412) 787-8383

**Matheson-Kitagawa Detector Tubes
8014-157 Sb**

Distributed by:
Matheson Gas Products
932 Paterson Plank Rd.
East Rutherford, N.J. 07073
Branches through United States
Tel. (201) 933-2400

Halide Detector

This detector has been used by the methyl bromide fumigation industry for years. The use of the halide detector is limited today as the threshold detection limit is only 15 ppm.

Respiratory Protection:

The following are names of several respiratory protection devices which can be purchased. The manufacturers should be contacted to determine the adequacy of the equipment. Follow the manufacturers recommendation for use, cleaning, storage, fitting, maintenance, etc.

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Survivair Mark 2 SCBA

30 minute LP series 9842
Manufactured by:
Survivair
A Division of U.S.D. Corp.
3323 West Warner Ave.
P.O. Box 25018
Santa Ana, CA 92799-5018

Distributed by:
SCC Products
Soil Chemicals Corp.
P.O. Box 782
Hallister, CA 95024
Tel. (408) 637-1992

Scott Air Pak II or 2.2 or 4.5

SCBA Equipment
Manufactured by:
Scott Aeration
225 Erie Street
Lancaster, NY 14086
Tel. (716) 683-5100

**Custom 4500 or Netralite Air Mask with
FHR harness**

Manufactured by:
MSA
600 Perm Center Boulevard
Pittsburgh, PA 15235
Tel. 1 (800) 672-2222

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METHYL BROMIDE TECHNICAL:

Common name: Methyl Bromide
Chemical name: Bromomethane.
Empirical Formula: CH_3Br .

Physical Characteristics:

Color: Colorless to light yellow.
Physical State: Gas
Odor: Odorless.
Melting Point: -94°C .
Boiling Point: $3.5-4^\circ\text{C}$.
Specific Gravity: 1.73 (liquid)
Solubility: Practically insoluble in water:
<0.1 g/100 g at 25°C (open system); 1.34 g/100 g at 25°C (closed system).
Readily soluble in most organic solvents, alcohols, ethers, chloroform, carbon disulfide, benzene & carbon tetrachloride.
1400 mm Hg at 20°C .

Vapor Pressure:

Octanol/Water

Partition

Coefficient:

Stability:

1.19 \pm 0.04

Methyl bromide undergoes hydrolysis in water. The average hydrolysis rate at 25°C was 1.4 mg MBr/liter of water/day. The hydrolysis rate increases with light and heat.

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Flammability: Flash point: none.
Flammable (explosive) limits:
lower 8.6%
upper 20%

Storage Stability: Methyl bromide is stable at ambient temperature and in sealed containers for at least 36 months.

Corrosiveness: Pure, dry methyl bromide is not corrosive to metals except aluminum. In the presence of moisture or alcohol, surface reactions occur on zinc, tin and iron.

The liquid is corrosive to aluminum, magnesium and zinc metals and their alloys. Methyl bromide may also attack rubber and some forms of plastics and coatings.

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Use Profile:

Type of Pesticide: Acaricide; Fungicide; Herbicide;
Insecticide; Nematicide;
Rodenticide.

Pests Controlled: Insects; mites; rodents; plant
pathogens; nematodes;
termites; weeds.

Registered Uses: Preplant soil fumigation; stored
commodities (both raw agricul-
tural commodities and
processed foods/feeds);
greenhouses; termite control;
grain elevators; mills, ships and
transportation vehicles.

Predominant Uses: Vegetables; tobacco;
strawberries; commodity/
structural; government
quarantine; ornamentals; fruits.

Mode of Activity: Fumigations.

Formulation

Types Registered: Gaseous and Liquid Under
Pressure.

PM 21

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ACCEPTED
 4-1-97
 EPA REG. NO. 8600-6
 MANUFACTURED IN ACCORDANCE WITH THE SAFE HANDLING
 INSTRUCTIONS OF THE FEDERAL INSECTICIDE ACT,
 AS AMENDED, FOR THE PESTICIDE
 REGISTERED UNDER
 F.P. 227-07

METHYL BROMIDE PRODUCTS

NO. AM-210

AmeriBrom, Inc.

52 VANDERBILT AVENUE, NEW YORK, NY 10017
 TELEPHONE: (212) 286-4000
 FAX: (212) 286-4475

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 Methyl Bromide Technical Data 72

**LIST OF AMERIBROM LABELED
METHYL BROMIDE FORMULATIONS**

Product Name	EPA Reg. No. 8622-	Active Ingredients		Use
		MBR—Chloropicrin		
Methyl Bromide Grain Fumigant _a	5	99.5	0	Grain Fumigant
Metabrom 98 _a	6	97.6	1.9 _c	Soil Fumigant
98-2	12	97.6	1.9 _c	Soil Fumigant
67-33	13	66.8	32.8 _d	Soil Fumigant
70-30 _a	14	68.4	1.3 _{b,c}	Soil Fumigant
75-25	15	74.7	24.8 _d	Soil Fumigant
Metabrom 100	16	99.5	0	Grain, Space & Structural Fumigation
Metabrom 99	17	99.3	.5 _c	Soil, Empty Space and Structural Fumigation
50-50	39	49.7	49.5	Soil Fumigant
57-43	40	56.8	42.2	Soil Fumigant
Metapicrin	43	0	99	Soil Fumigant
80-20	44	79	19	Soil Fumigant
90-10 _a	50	89.5	1.8	Soil Fumigant
Methyl Bromide 15298-4-AA		99.7	0	Technical Product for Manufacturing use

- a. Not for use in California.
- b. Formulation also contains 30% kerosene.
- c. Chloropicrin added as a warning odorant (tear gas).
- d. Chloropicrin added as a complementary active ingredient.

**DIRECTIONS FOR THE SAFE
HANDLING AND APPLICATION**

Methyl bromide is marketed as a liquified gas under pressure in cylinders and in 1 and 1 1/2 pound cans. Methyl bromide is a fumigant of wide use because of a high rate of diffusion and penetration into soil, space, sacks and packaged material where its broad spectrum pesticidal activity is fully expressed.

**GENERAL WARNINGS AND LIMITATIONS FOR
AMERIBROM LABELED
METHYL BROMIDE FORMULATIONS:**

METABROM 100 AND

METHYL BROMIDE GRAIN FUMIGANT

**METABROM 99, METABROM 98, 98-2 AND 70-30
FOR SOIL, STRUCTURAL AND EMPTY SPACES FUMIGATION
(METHYL BROMIDE WITH UP TO 2% CHLOROPICRIN)**

75-25, 67-33, 90-10 AND 80-20

FOR SOIL FUMIGATION

**(METHYL BROMIDE AND CHLOROPICRIN
AS ACTIVE INGREDIENTS)**

**METAPICRIN (CHLOROPICRIN) IS
ALSO MARKETED FOR SOIL FUMIGATION**

**HAZARDS TO HUMANS & DOMESTIC ANIMALS
DANGER**

HIGH ACUTE TOXICITY

Extremely hazardous liquid and vapor under pressure. Do not breathe vapor. Inhalation may be fatal or cause serious acute illness or delayed lung or nervous system

injury. Liquid or 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. Methyl bromide may be absorbed through the skin.

If the product is 100% methyl bromide, the vapor is odorless and non-irritating to the skin and eyes during exposure. Exposure to toxic levels may occur without warning or detection by the user.

If the product contains up to 2% chloropicrin as a warning agent, note that 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.

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 overexposure can result in blurred vision, staggering gait and mental imbalance, with probable recovery after a period of no exposure. Blood bromide levels suggest the occurrence, but not the degree of exposure. Treatment is symptomatic. Early symptoms of overexposure, in addition to those noted above, are intense lachrimation and irritation of mucous membranes. There are no known antidotes for methyl bromide.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to wildlife. Do not discharge effluent containing this product into lakes, streams,

ponds, estuaries, oceans, or public waters unless this product is specifically identified and addressed in an NPDES permit. Do not discharge effluent containing this product in sewer systems without previously notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

PHYSICAL HAZARDS:

Do not use or store near heat, open flames, or sparking electrical equipment.

CHEMICAL HAZARDS:

Do not use application devices incorporating natural rubber or aluminum, magnesium, zinc or their alloys.

NOTE: If the product contains more than 2% chloropicrin as an active ingredient in addition to methyl bromide, note that the vapor of this volatile-liquid tear gas is very irritating to the upper respiratory tract, and even at low levels can cause painful irritation to the nose and throat, and to the eyes, producing tearing. If these symptoms occur, leave the fumigation area immediately. Continued exposure may cause painful irritation to the eyes or temporary blindness, which may cause panic that may in turn lead to further accidents.

STATEMENT OF PRACTICAL TREATMENT:

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

If inhaled — Get exposed person to fresh air. Keep warm. Make sure person can breathe freely.

If breathing has stopped apply artificial respiration. Do not give anything by mouth to an unconscious person.

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.

SEE THE PRODUCT LABEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS

In case of emergency, call
CHEMTREC (800) 424-9300
OR
AMERIBROM, INC.
52 VANDERBILT AVENUE
NEW YORK, N.Y. 10017
CALL COLLECT: (212) 286-4000

**RESTRICTED USE PESTICIDE
Due To Its Acute Toxicity**

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

METHYL BROMIDE FUMIGANTS

(Metabrom 98, 98-2, 70-30 Soil Fumigant,
Metabrom 99, 90-10 Preplant Soil Fumigant)

AIR CONCENTRATION LEVEL

The acceptable air concentration level for persons exposed to methyl bromide is 5 ppm (20 mg/M³), except that for entry into residential and commercial structures the acceptable air concentration level is 3 ppm. The air concentration level is measured by a direct reading detection device, such as a Matheson-Kitagawa, Draeger, or Sensidyne.

PERSONAL PROTECTIVE EQUIPMENT

Applicators and other handlers must wear:

Loose fitting or well ventilated long-sleeved shirt and long pants.

Shoes and socks.

Full-face shield or safety glasses with brow and temple shields (Do NOT wear goggles.)

When the acceptable air concentration level is above 5 ppm and a respirator is required, protect the eyes by wearing a full-face respirator.

No respirator is required if the air concentration level of methyl bromide in the working area is measured to be less than 5 ppm.

A respirator is required if the acceptable air concentration level of 5 ppm is exceeded at any time. The respirator must be one of the following types: (a) a supplied-air respirator (MSHA/NIOSH approval number prefix TC-19C) OR (b) a self-contained breathing apparatus (SCBA) (MSHA/NIOSH approval number prefix TC-13F.).

Under normal soil fumigation conditions, the concentration of methyl bromide in the working area will not generally exceed 5 ppm as a time-weighted average and no respiratory protection is required. However, there is the possibility of a spill or leak during soil fumigation. Therefore, a respirator of a type specified above must be available and will be required for entry into an affected area in the event of a leak or spill.

WORK SAFETY REQUIREMENTS

1. Do not wear jewelry, gloves, goggles, tight clothing, rubber protective clothing, or rubber boots when handling. Methyl bromide and chloropicrin are heavier than air and can be trapped inside clothing and cause skin injury.
2. Immediately after contamination remove outer clothing, shoes, and socks and do not reuse until thoroughly aerated or ventilated. Keep such clothing and shoes outdoors until thoroughly aerated. Then follow the PPE manufacturer's instructions for cleaning/maintaining PPE. If there are no such instructions for washables, use detergent and hot water. Keep and wash PPE and work clothing separately from other laundry.
3. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product. Do not reuse them.
4. Follow PPE manufacturer's instructions for cleaning/maintaining protective eyewear and respirators.

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Greenhouse Soil Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted by the WPS — is PROHIBITED in the entire greenhouse (entire enclosed structure/building) from the start of application until 48 hours after application AND until the air concentration level of methyl bromide in the working area is measured to be less than 5 ppm. Until the aeration of the soil is complete (usually 10-14 days), non-handlers are permitted in the greenhouse ONLY while the air concentration level of methyl bromide in their working area remains less than 5 ppm. If tarps are used for the application, non-handler entry is prohibited during tarp removal and until the air level is measured to be less than 5 ppm.

Outdoor Soil Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted on this labeling — is PROHIBITED from the start of application until 48 hours after application. In addition, if tarps are used for the application, non-handler entry is prohibited while tarps are being removed.

NOTIFICATION: Notify workers of the application by warning them orally and by posting fumigant warning signs, as described in the "Placarding of Fumigated Areas" section of this labeling. Post the fumigant warning sign instead of the WPS sign for this application, but follow all WPS requirements pertaining to location, legibility, size, and timing of posting and removal.

Greenhouses — Soil or Space Fumigation: Post the fumigant warning signs outside all entrances to the entire greenhouse (entire enclosed structure/building).

Outdoor Soil Fumigation: Post the fumigant warning signs at entrances to treated areas.

PPE FOR ENTRY DURING THE ENTRY-RESTRICTED PERIOD: PPE for entry that is permitted by this labeling is listed in the "Hazards to Humans and Domestic Animals" section of this labeling.

PRECAUTIONS FOR USAGE IN ENCLOSED SPACES

When used for fumigation of soil in enclosed spaces (e.g. greenhouses and tarpaulin covered areas) two persons trained in the use of the product must be present during introduction of the fumigant, initiation of aeration, and after aeration when testing for reentry. Two persons do not need to be present if monitoring is conducted remotely (outside the area being fumigated).

Do not fumigate with this product when soil temperature is below approx. 50°F. at 6-8 in.

Aeration and Reentry:

1. After fumigation, fumigated areas must be aerated until the air concentration level of methyl bromide is measured to be less than 5 ppm (3 ppm for residential and commercial structures).

USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. As soon as possible, wash thoroughly and change into clean clothing.

DIRECTIONS FOR USE

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

USE LIMITATIONS

Extremely hazardous liquid and vapor under pressure. Inhalation may be fatal or cause serious acute illness or delayed lung, nerve or brain injury. Do not breathe vapor. Liquid or vapor can cause serious skin or eye injury which may have delayed onset. Do not get liquid on skin, in eyes or on clothing. Refer to the section Protective Equipment, on page 69 of this manual for use directions for detectors and respiratory equipment.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements in this labeling about personal protective equipment, restricted-entry intervals, and notification to workers. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard (WPS).

No instructions elsewhere on this labeling relieve users from complying with the requirements of the WPS.

ENTRY RESTRICTIONS:

Greenhouse Space Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted by the WPS — is PROHIBITED in the entire greenhouse (entire enclosed structure/building) from the start of application until aeration reduces the air concentration level of methyl bromide in the working area to less than 5 ppm.

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A respirator is required if the acceptable air concentration level of 0.1 ppm for chloropicrin OR 5 ppm for methyl bromide is exceeded at any time. The respirator must be one of the following types: (a) a supplied-air respirator (MSHA/NIOSH approval number prefix TC-19C) OR (b) a self-contained breathing apparatus (SCBA) (MSHA/NIOSH approval number prefix TC-13F.).

Under normal soil fumigation conditions, the air concentration level of chloropicrin in the working area will not generally exceed 5 ppm. Therefore, no respiratory protection is required. However, there is the possibility of a spill or leak during soil fumigation. Therefore, a respirator of a type specified above must be available and will be required for entry into an affected area in the event of a leak or spill.

WORK SAFETY REQUIREMENTS

1. Do not wear jewelry, gloves, goggles, tight clothing, rubber protective clothing, or rubber boots when handling. Methyl bromide and chloropicrin are heavier than air and can be trapped inside clothing and cause skin injury.
2. Immediately after contamination remove outer clothing, shoes, and socks and do not reuse until thoroughly aerated or ventilated. Keep such clothing and shoes outdoors until thoroughly aerated. Then follow the PPE manufacturer's instructions for cleaning/maintaining PPE. If there are no such instructions for washables, use detergent and hot water. Keep and wash PPE and work clothing separately from other laundry.

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2. Until the acceptable air concentration level is reached, do not allow any person to enter into the fumigated area unless he/she is wearing the personal protective equipment (including prescribed respirator) specified in the Hazards to Humans section of this labeling. In greenhouses, additional Worker Protection Standard restrictions apply.

SPILL AND LEAK PROCEDURES

Evacuate everyone from the immediate area of the spill or leak. For entry into affected area to correct problem, wear the personal protective equipment (including prescribed respirators), specified in the Hazards to Humans section of this labeling. Move leaking or damaged containers outdoors or to an isolated location.

Observe strict safety precautions. Work upwind, if possible. Allow spilled fumigant to evaporate. Only correctly trained and PPE-equipped handlers are permitted to perform such cleanup. Do not permit entry into the spill or leak area by any other person until the air concentration level of methyl bromide is measured to be less than 5 ppm.

Contaminated soil, water, and other cleanup debris is a toxic hazardous waste. Report spill to the National Response Center (800-424-8802) if the reportable quantity of 1000 lbs. is exceeded.

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3. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product. Do not reuse them.
4. Follow PPE manufacturer's instructions for cleaning/maintaining protective eyewear and respirators.

USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. As soon as possible, wash thoroughly and change into clean clothing.

DIRECTIONS FOR USE

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

USE LIMITATIONS

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

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METHYL BROMIDE PLUS CHLOROPICRIN FUMIGANTS (67-33, 75-25, 50-50, 57-43 & 80-20 PREPLANT SOIL FUMIGANTS)

AIR CONCENTRATION LEVEL

The acceptable air concentration level for persons exposed to chloropicrin is 0.1 ppm (0.7 mg/M³). The acceptable air concentration for persons exposed to methyl bromide is 5 ppm (20 mg/m³), except that for entry into residential and commercial structures the acceptable air concentration level is 3 ppm. The air concentration level is measured by a direct reading detection device, such as a Matheson-Kitagawa.

PERSONAL PROTECTIVE EQUIPMENT

Applicators and other handlers must wear:

Loose fitting or well ventilated long-sleeved shirt and long pants.

Shoes and socks.

Full-face shield or safety glasses with brow and temple shields (Do NOT wear goggles.)

When the acceptable air concentration level is above 5 ppm and a respirator is required, protect the eyes by wearing a full-face respirator.

No respirator is required if the air concentration level of chloropicrin in the working area is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide in the working area is measured to be less than 5 ppm.

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until the air level of chloropicrin in the working area is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide in the working area is measured to be less than 5 ppm.

Outdoor Soil Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted on this labeling — is PROHIBITED from the start of application until 48 hours after application. In addition, if tarps are used for the application, non-handler entry is prohibited while tarps are being removed.

NOTIFICATION: Notify workers of the application by warning them orally and by posting fumigant warning signs, as described in the "Placarding of Fumigated Areas" section of this labeling. Post the fumigant warning sign instead of the WPS sign for this application, but follow all WPS requirements pertaining to location, legibility, size, and timing of posting and removal.

Greenhouses — Soil or Space Fumigation: Post the fumigant warning signs outside all entrances to the entire greenhouse (entire enclosed structure/building).

Outdoor Soil Fumigation: Post the fumigant warning signs at entrances to treated areas.

PPE FOR ENTRY DURING THE ENTRY-RESTRICTED PERIOD: PPE for entry that is permitted by this labeling is listed in the "Hazards to Humans and Domestic Animals" section of this labeling

For AmeriBrom, Inc., formulations of methyl bromide with chloropicrin, i.e. 75-25, 67-33, 80-20 and 90-10, note that the TLV's of neither methyl bromide (5 ppm or 20 mg/m³) nor chloropicrin (0.1 ppm or 0.7 mg/m³) should be exceeded. Refer to the section Protective Equipment, on page 69 of this manual for use directions for detectors and respiratory equipment.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements in this labeling about personal protective equipment, restricted-entry intervals, and notification to workers. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard (WPS).

No instructions elsewhere on this labeling relieve users from complying with the requirements of the WPS.

PRECAUTIONS FOR USAGE IN ENCLOSED SPACES

When used for fumigation of soil in enclosed spaces (e.g. greenhouses and tarpaulin covered areas) two persons trained in the use of the product must be present during introduction of the fumigant, initiation of aeration, and after aeration when testing for reentry. Two persons do not need to be present if monitoring is conducted remotely (outside the area being fumigated).

Do not fumigate with this product when soil temperature is below approx. 50°F. at 6-8 in.

Aeration and Reentry:

1. After fumigation, fumigated areas must be aerated until the air concentration level of chloropicrin in the working area is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide is measured to be less than 5 ppm (3 ppm for residential and commercial structures).
2. Until the acceptable air concentration level is reached, do not allow any person to enter into the fumigated area unless he/she is wearing the personal protective equipment (including prescribed respirator) specified in the Hazards to Humans section of this labeling. In greenhouses, additional Worker Protection Standard restrictions apply.

SPILL AND LEAK PROCEDURES

Evacuate everyone from the immediate area of the spill or leak. For entry into affected area to correct problem, wear the personal protective equipment (including

ENTRY RESTRICTIONS:

Greenhouse Space Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted by the WPS — is PROHIBITED in the entire greenhouse (entire enclosed structure/building) from the start of application until aeration reduces the air concentration level of chloropicrin in the working area to less than 0.1 ppm AND the air concentration level of methyl bromide in the working area to less than 5 ppm.

Greenhouse Soil Fumigation: Entry (including early entry that would otherwise be permitted under the WPS) by any person — other than a correctly trained and equipped handler who is performing a handling task permitted by the WPS — is PROHIBITED in the entire greenhouse (entire enclosed structure/building) from the start of application until 48 hours after application AND until the air concentration level of chloropicrin in the working area is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide in the working area is measured to be less than 5 ppm. Until the aeration of the soil is complete (usually 10-14 days), non-handlers are permitted in the greenhouse ONLY while the air concentration level of chloropicrin in their working area remains less than 0.1 ppm AND the air concentration level of methyl bromide in their working area remains less than 5 ppm. If tarps are used for the application, non-handler entry is prohibited during tarp removal and

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of 3 ppm for methyl bromide. Measurements must be taken from an interior electrical outlet by inserting the detection device in the ground receptacle, or from other enclosed space within the wall on an interior and a perimeter wall; and

- c. (i) The level of methyl bromide is less than 3 ppm from each area measured; or
- (ii) If the level of methyl bromide is 3 ppm or greater, the structure must be aerated for an additional 12 hours. At the end of the 12 hour period, the level of methyl bromide must be measured from the areas previously sampled. These procedures must be repeated until the level of methyl bromide is below 3 ppm.

3. For structures with attics:

- a. An aeration fan must be inserted in the attic access door and a window or other exterior opening, and both sealed so that air inside the structure is exhausted outside the structure. The aeration fans must be capable of displacing a minimum of 5,000 cubic feet of air per minute. To facilitate aeration, exterior openings, such as windows, vents, or an access door to the sub-area should be utilized. The structure must be aerated with the fans operating for a minimum of 72 hours;
- b. After aeration is completed, the level of methyl bromide in the structure must be measured using a gas detector device with a minimum detection limit of 3 ppm for methyl bromide residues. Measurements must be taken from within an interior electrical outlet by inserting the detection device in the ground receptacle, or other enclosed space within an interior and a perimeter wall; and

prescribed respirators) specified in the Hazards to Humans section of this labeling. Move leaking or damaged containers outdoors or to an isolated location.

Observe strict safety precautions. Work upwind, if possible. Allow spilled fumigant to evaporate. Only correctly trained and PPE-equipped handlers are permitted to perform such cleanup. Do not permit entry into the spill or leak area by any other person until the air concentration level of chloropicrin is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide is measured to be less than 5 ppm.

Contaminated soil, water, and other cleanup debris is a toxic hazardous waste. Report spill to the National Response Center (800-424-8802) if the reportable quantity of 1000 lbs. is exceeded.

FUMIGATION FOR COMMERCIAL STRUCTURES

Aeration and Reentry:

At the end of the exposure period, after all tarpaulins or seals are removed from the structure, open all interior and exterior doors, windows, and vents that are operational. No person shall be allowed to reenter the structure unless wearing protective clothing and a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator until the following criteria are met:

- 1. If non-mechanical or natural ventilation is used:
 - a. The structure must be aerated for a minimum of seven days from the time the tarpaulins are removed.

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- c. (i) the level of methyl bromide is less than 3 ppm from each area measured; or
- (ii) If the level of methyl bromide is 3 ppm or greater, aeration must continue for an additional 12 hours. At the end of the 12 hour period, the level of methyl bromide must be measured from the areas previously sampled. These procedures must be repeated until the level of methyl bromide is below 3 ppm.

4. For structures with basements:

- a. In addition to the requirements of paragraphs 1, 2, and 3 above, the windows, vents, and interior doors of the basement must open, and
- b. After aeration is completed, the level of methyl bromide in the basement must be measured using a gas detector device with a minimum detection limit of 3 ppm for methyl bromide residues. A measurement must be taken from an interior electrical outlet by inserting the detection device in the ground receptacle, or from other enclosed space within the wall on an interior wall. In the absence of an interior wall, a measurement must be taken of the ambient air in the basement; and
- c. (i) The level of methyl bromide is less than 3 ppm; or
- (ii) If the level of methyl bromide is 3 ppm or greater, the structure must be aerated for an additional 24 hours for natural ventilation or an additional 12 hours for mechanical aeration. At the end of the additional ventilation period, the level of methyl bromide must be measured from the area in the basement

- b. After aeration is completed, the level of methyl bromide in the structure must be measured using a gas detector device with a minimum detection limit of 3 ppm for methyl bromide. Measurements must be taken from an interior electrical outlet by inserting the detection device in the ground receptacle, or from other enclosed space within the wall or an interior and a perimeter wall; and
- c. (i) The level of methyl bromide is less than 3 ppm from each area measured; or
- (ii) If the level of methyl bromide is 3 ppm or greater, the structure shall be aerated for an additional 24 hours. At the end of the 24 hour period, the level of methyl bromide must be measured from the areas previously sampled. These procedures must be repeated until the level of methyl bromide is below 3 ppm.

2. If mechanical aeration is used:

- a. For structures without attics, an aeration fan(s) must be inserted in a window or other exterior opening and sealed so that the air inside the structure is exhausted out of the structure. The aeration fan(s) must be capable of displacing 5,000 cubic feet of air per minute. To facilitate aeration, exterior openings, such as windows, vents, or an access door to the subarea, should be utilized. The structure must be aerated with the fan(s) operating for a minimum of 72 hours;
- b. After aeration is completed, the level of methyl bromide in the structure must be measured using a gas detector with a minimum detection limit

How Buildings Are Fumigated: There are two pesticides used for structural fumigations: methyl bromide and sulfuryl fluoride (known by the trade name, Vikane.) Each has advantages and disadvantages in terms of their effectiveness in killing pests which professional fumigators can discuss with you. Your fumigator should also provide you with a list of items you need to remove from your home before the fumigation starts.

Methyl bromide is a gas. Before fumigation starts, the building to be fumigated is completely sealed and covered with a tarp to keep the gas in the building so it can penetrate wood to kill the pests. The tarp is left on for one to two days. Warning signs are posted around the building notifying people to keep out because the levels of the pesticide in the building during fumigation can kill a person.

After the tarp is removed, a professional fumigator will go into the building wearing a compressed air tank and mask and open the doors and windows. Powerful fans may also be set up to pull fresh air into the building.

It is now required that buildings fumigated with methyl bromide be aired out for a minimum of 72 hours after the tarp is removed. Then, the fumigators are required to measure the levels of methyl bromide inside the walls of buildings to make sure they are below three parts per million before you are allowed to go back in.

The ventilation processes make it unlikely that any remaining fumigant in the living space will be a health hazard after the house is cleared for reoccupancy.

previously sampled. These procedures must be repeated until the level of methyl bromide is below 3 ppm.

Structural Fumigation Fact Sheet:

The applicator must obtain a structural fumigation fact sheet which has been signed by, and provided to, the following persons:

1. an adult occupant of a single family dwelling prior to the parties entering into a fumigation agreement.
2. a. The owner, manager, or designated agent of the building for multiple-family dwellings, provided he or she acknowledges in writing to the applicator that a copy of the Structural Fumigant Fact Sheet has been provided to an adult occupant of each unit prior to the parties entering into a fumigation agreement; or
b. an adult occupant of each unit in a multiple family dwelling prior to the parties entering into a fumigation agreement, or
3. the owner, manager, or designated agent for all structures or businesses other than family dwellings.

The Structural Fumigation Fact Sheet shall state:

The purpose of this handout is to inform the consumer of possible health hazards associated with the use of the structural fumigant, methyl bromide. To make sure you have been given an opportunity to read this, applicators are required to obtain the signature of the owners and occupants of property to be fumigated with methyl bromide. You will also be given a copy of this fact sheet to keep.

However, you should be aware of the symptoms of over-exposure to methyl bromide, since it is sensible to be cautious when dealing with a potentially hazardous chemical.

Small pockets of fumigant can remain in dead air space between walls and inside cabinets, and in porous material such as furniture, and may enter into the living space for a few days after fumigation. That's why a mandatory aeration period is required after the tarp is removed. Your building should not be cleared for re-occupancy until it is safe for you to reenter.

How Do You Know Whether You Are Exposed: Methyl bromide is a colorless, odorless gas, so a warning agent is added which causes watery eyes and a scratchy throat. If you experience these symptoms in a building that has been recently fumigated, you should leave immediately and call the pest control company to have your building retested. You should also consult with your physician.

Methyl Bromide Health Risks: Methyl bromide enters your body as a gas when you breathe it. Exposure which may occur from touching treated surfaces is insignificant.

Nervous system, eyes, and respiratory irritations:

Overexposure to methyl bromide can cause blurred vision, headache, and nausea. At higher concentrations, it can cause tremors, sleepiness, convulsions, pneumonia, and excess fluid in the lungs. These symptoms may not appear for 12 to 24 hours. If you experience these symptoms in a recently fumigated building, you should leave immediately and call the

STRUCTURAL FUMIGANTS: METHYL BROMIDE

ATTENTION

Read This Fact Sheet Completely Before Signing

Fumigation involves the introduction of poisonous gases into every part of the structure, including inside the walls. Because overexposure to these gases can be harmful to people, your building will be ventilated before you will be allowed to return.

This fact sheet provides basic information about the structural fumigant, methyl bromide, as well as information about why and how buildings are fumigated, methyl bromide health risks, how to know if you are exposed, ways to minimize your exposure, and several phone numbers to call for more information.

New rules for structural fumigation have substantially increased the time between fumigant use and the time an occupant is allowed back into the building. Post-fumigation ventilation has also been improved significantly. These changes should be adequately protective, but you should know some basic facts about structural fumigants.

Why Buildings Are Fumigated: Houses and other structures are fumigated to kill insect pests living in walls or wood. There are sometimes other ways to deal with these pests, and building owners should investigate them. However, fumigation is sometimes the only method for handling extensive infestations of wood-destroying insects. You can discuss the possibility of alternatives with your pest control company.

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pest control company to have the building retested. You should also call your personal physician. Physicians are encouraged to report suspected pesticide-related illnesses to EPA.

Birth defects:

Methyl bromide did not affect male reproduction of rats and there was no effect on the fetus of pregnant rabbits when exposed to methyl bromide at levels of human possible exposure.

Other effects:

Life-span studies in rats and mice did not find methyl bromide to have a carcinogenic potential.

Ways To Reduce Your Exposure If You Are Having Your Building Fumigated:

- Carefully evaluate all your pest control alternatives.
- Talk over your treatment program in advance with the pest control company, so you fully understand what will be done, and what you need to do.
- Carefully follow the instructions you are given about items you are to remove from your building.
- Stay out of the treated building for at least three days after the tarp is removed. If you have additional concerns, you may choose to be away for an extra period of time after the building is cleared for reoccupation.
- If you are interested or concerned, you can ask your pest control company to show you the records of the air monitoring it did before your building was cleared for reoccupation.

- You may wish to increase ventilation by opening doors and windows.
- If you have symptoms of exposure, or you believe that the aeration was not done properly, you should leave the building and contact the pest control company and your physician. You may also wish to call one of the phone numbers listed below.

For information about pesticides, the U.S. Environmental Protection Agency has a toll-free information service, the National Pesticide Telecommunications Network Hotline, which can be reached at 1 (800) 858-7378.

In a medical emergency, call 911, or contact the nearest Poison Control Center. See "Crises Hotlines" listed near the front of the white pages in your phone book.

If you feel uncomfortable entering the structure, or if you do not fully understand the potential hazards, you should call the company that performed the fumigation:

Name: _____

Address: _____

City: _____

Telephone: _____

I acknowledge receiving a copy of this methyl bromide fact sheet. (You will sign one copy for the company doing the fumigation, and get a second copy to keep for later reference.)

Signature: _____ Date: _____

Please print your name here: _____

Your address: _____

FOR FUMIGATION OF COMMERCIAL STRUCTURES, THESE DIRECTIONS SUPERSEDE ANY OTHER DIRECTIONS ON THE LABEL CONCERNING AERATION AND REENTRY.

LIMITATIONS OF USE ON COMMODITIES

Commodities Unsited for Methyl Bromide Fumigations.

The following is a list of materials which should not be exposed to methyl bromide:

1. Foodstuffs
 - a. Iodized salt stabilized with Sodium Hyposulfite.
 - b. Full fat soya flour.
 - c. Certain baking sodas, cattle licks (i.e., salt blocks) or other foodstuff containing reactive sulfur compounds.

NOTE: Never exceed the recommended dosage or exposure period for food or foodstuff commodities. Prior to repeated fumigation, have the food commodity analyzed for inorganic bromide residues:

2. Some Seeds, Bulbs and Plants
 - a. Seeds and bulbs to be used for planting.*
 - b. Some nursery stock and other living plants.*
- * (For specific information on procedures to prevent commodity injury, contact AmeriBrom, Inc., or the experts of the United States Department of Agriculture.)
3. Pets (All pets, including fish and birds.)
4. Rubber Goods
 - a. Sponge rubber.
 - b. Foam rubber, as in pillows, cushions, mattresses, and some car seats.
 - c. Rubber stamps and other similar forms of reclaimed rubber.
5. Furs
6. Horsehair
7. Feathers (Especially in feather pillows.)
8. Leathergoods (Particularly white or other leather goods tanned with sulfur processes).
9. Woolens (Extreme caution should be used in the fumigation of Angora woolens. Some adverse effects have been noted on woolen socks, sweaters, shawls and yarn.)

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GENERAL WARNINGS AND LIMITATIONS FOR PREPLANT SOIL TREATMENT OF FOOD CROPS

10. Viscose Rayon

Those rayons processed or manufactured by a process in which carbon bisulfide is used.

11. Vinyl

12. Paper

- a. Silver polishing papers
- b. Certain writing and other papers cured by sulfide processes.
- c. Photographic prints and blueprints stored in quantity.
- d. Carbonless carbon paper
- e. Blueprint papers

13. Cellophane*

*(In the event of uncertainty about the possible presence of reactive sulfur compounds, conduct a trial fumigation of a small quantity of the material in question.)

14. Photographic Chemicals (Darkroom chemicals, but not camera or film.)

15. Rug padding
Foam rubber, felt, etc.

16. Cinder Blocks

17. Mixed Concrete (Occasionally picks up odors)

18. Mixtures of mortar and/or soil used for chinking log cabins.

19. Charcoal (Note: Methyl bromide is readily absorbed by charcoal. This may not only contaminate such materials but may reduce the concentration of the gas in the fumigated area to the point of ineffectiveness.)

When fumigating soil, observe these precautions:

Drivers of application equipment must advise other workers of all precautions and procedures. In addition, drivers must instruct their helpers in the mechanical operation of the tractor and how to safely work with the tractor and driver while fumigating. Handle this fumigant in the open, with the operator upwind from the container where there is good ventilation.

Always have adequate clean water available to wash skin and/or flush eyes. When fumigating soil from a tractor, 5 gallons of water must be carried on the tractor and placed where it is readily accessible. In addition to water available on the tractor, at least 5 gallons of additional water must be available on the service truck. The water must be drinkable but in containers marked "WATER NOT FOR DRINKING."

Check fumigant pressure system for leaks before beginning operation.

Do not lift injection shanks to turn at end of a pass until fumigant has drained from system following closure of shutoff valve.

Trash pulled by the shanks to the end of the field when fumigating must be covered by lifting the shanks.

In case of a rupture of hose or fitting while applying fumigant, immediately stop tractor and motor. Get off tractor and get to a place where the problem can be observed without exposure to fumes. Approach from upwind with respiratory protection if required, and make necessary repairs.

When changing the cylinders be certain they are turned off and fumigant system is not under pressure. Do not open the system when there are people or structures downwind.

Post all treated areas with warning signs.

METHYL BROMIDE FUMIGANTS

(Metabrom 98, 98-2, 70-30 Soil Fumigant, Metabrom 99, 90-10 Preplant Soil Fumigant)

PLACARDING OF FUMIGATED AREAS

The applicator (or supervisor of the application) must placard all entrances to the fumigated area with signs bearing:

- skull and crossbones symbol
- "DANGER/PELIGRO,"
- "Area under fumigation, DO NOT ENTER/NO ENTREE,"
- "Methyl Bromide Fumigant in use,"
- the date and time of fumigation, and
- name, address, and telephone number of the applicator.

Do not allow entry by unprotected persons into the fumigated area until the signs are removed. Such signs must only be removed when the air concentration level of methyl bromide is measured to be less than 5 ppm (3 ppm in residential and commercial structures). Signs must remain legible during entire posting period.

Only a certified applicator (or someone under his/her supervision) may remove warning signs at entrances to fumigated structures.

Commodity/Product Fumigation with
98-2, 70-30 Soil Fumigant,
Metabrom 99 & 90-10 Preplant Soil Fumigant

To determine whether aeration is complete, each fumigated site or vehicle must be monitored and shown to contain less than 5 ppm methyl bromide in the air space around and, when feasible, in the mass of the commodity. If 5 ppm or greater methyl bromide is detected, the placard must be transferred with the commodity to the new site. Workers who transfer or handle incompletely aerated commodity must be informed and appropriate measure must be taken (i.e., ventilation or respiratory protection) to prevent exposures from exceeding 5 ppm of methyl bromide.

**METHYL BROMIDE
PLUS CHLOROPICRIN FUMIGANTS**

(67-33, 75-25, 50-50, 57-43 & 80-20
Preplant Soil Fumigants)

PLACARDING OF FUMIGATED AREAS

The applicator (or supervisor of the application) must placard all entrances to the fumigated area with signs bearing:

- skull and crossbones symbol
- "DANGER/PELIGRO,"
- "Area under fumigation, DO NOT ENTER/NO ENTRE,"
- "Methyl Bromide and Chloropicrin Fumigants in use,"
- the date and time of fumigation, and
- name, address, and telephone number of the applicator.

Humans section of this labeling for entry into affected area to correct problem. Approach from upwind to make necessary repairs. Do not enter area without the required PPE until the spill has evaporated or the leak has been fixed.

Fumigation with methyl bromide and/or chloropicrin sometimes slows down the rate of nitrification (the conversion to nitrates from ammonia by bacterial action). Certain ammonia-sensitive plants such as tomatoes may suffer growth inhibition or stand reduction when planted in fumigated soils containing high amounts of ammonia nitrogen. Accumulation of ammonium is most likely to occur when maximum rates of fumigant and fertilizer are applied to soils that are acidic, wet, cold or high in organic matter. To lessen this hazard, at least one-half and preferably all the nitrogen fertilizer added immediately before or soon after fumigation should be in the form of nitrate nitrogen. This hazard may also be reduced by delaying planting until several months after fumigation if a nitrate form of nitrogen such as sodium or calcium nitrate is not readily available. Ammonium nitrate used sparingly will supply the nitrogen needed without risk. Phosphorous, potassium and other plant nutrients should be used according to soil needs.

Application should be made several months prior to planting to soils high in organic matter such as muck, compost, and heavily manured soils since they seem more likely to undergo some changes (possible effect on microorganisms) resulting in poor growth.

Do not treat very wet soil, very dry soil or when soil temperature is below 50°F. (10°C).

Do not allow entry by unprotected persons into the fumigated area until the signs are removed. Such signs must only be removed when the air concentration level of chloropicrin is measured to be less than 0.1 ppm AND the air concentration level of methyl bromide is measured to be less than 5 ppm (3 ppm in residential and commercial structures). Signs must remain legible during the entire posting period.

Only a certified applicator (or someone under his/her supervision) may remove warning signs at entrances to fumigated structures.

Prior to Fumigation: Post all treated areas with warning signs.

Comply with all local regulations and ordinances. Obtain an application permit from Agricultural Regulatory Agencies as required.

After Fumigation: Keep pets, livestock, and other domestic animals out of the treated area during application, during the exposure period as specified for applications in Directions for Use, and during removal of tarpaulin.

Two trained persons must be present during removal of tarpaulins.

Spill and Leak Procedures for Soil Fumigation:

In case of a rupture of hose or fitting while applying fumigant, immediately stop tractor and motor. Evacuate everyone from the immediate area of the spill or leak. Wear the personal protective equipment (including prescribed respirators) specified in the Hazards to

Be sure treated plots are free from gas before planting seed or setting out plants. If there is doubt as to complete aeration, working the soil after treatment will aid, particularly when the soil is cool and/or wet.

Do not contaminate fumigated areas by walking from unfumigated soil. Clean your shoes thoroughly if this is necessary. If the treated bed is in a location where flooding or washing is possible after rains, plow a furrow or make a trench around the treated area for proper drainage. Wooden frames around the beds are also satisfactory for preventing this type of contamination.

Do not allow domestic animals to feed on crop residues unless a tolerance exists for such crop.

Do not feed hay or straw treated directly or harvested from treated soils to any animal.

Undesirable concentrations of chloropicrin following soil fumigation with this material may drift to nearby areas. If this occurs, immediately cover treated area with a plastic tarpaulin. The tarpaulins should remain in place overnight and be removed during the daytime. If the escaping vapors reach an undesirable concentration, as indicated by eye irritation, the treated areas should be recovered. Since air movement assists the dilution of the escaping fumes it is most likely that undesirable concentrations will build up during evening or nights when air is static. Application of this material should not be made when there is little or no air movement or when there is an inversion.

SOIL PREPARATION AND TREATMENT

Preplant Soil Preparation

Plow or rip the soil to a depth to which effective treatment is required. The soil should be worked until free of clods or large lumps. Residue from previous crops should be removed and burned prior to fumigation to prevent reinfestation. Soil moisture should be optimum for seed germination. Coarse textured soils can be fumigated with higher moisture content than fine textured soils. For best results, soil should be kept moist for at least 7 days prior to treatment. Do not fumigate if the soil temperature is below 50°F. (10°C). For best results, fumigate when soil temperature is 60°F. to 80°F. (15.6° to 26.7°C) at the depth of 6 to 8 inches.

Soil Fumigation Methods

Use one of the following preplant methods:

1. **Chisel Method** for applying broadcast or row, bed or strip application (suitable for light, non-compacted soils):

- a. **Overall Field Fumigation**, using a chisel type applicator, inject the product with the chisels spaced no more than 12 inches apart. Inject the fumigant to a depth of 6 to 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 a cultipacker and covered immediately with simultaneous film laying equipment or other suitable cover.

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- d. After the supports and tubing are in place, cover the area to be fumigated with a gasproof cover of polyethylene or coated fabric film.

- e. Position the cover with its edges in a prepared furrow or trench.

- f. Seal 6 to 10 inches of the outside edges with dirt. Tamp the dirt down so edges will not pull loose.

- g. Attach a polyethylene tube to the cylinder valve outlet and open. Use a cylinder dispenser or scale to meter small amounts.

3. **Tree Site Injector Method** (suitable for light, non-compacted soils):

Insert injector into soil to a depth of 18 inches or more. Tamp soil lightly around injector. Release entire dose for 100 square feet site. Move away from injector until all fumigant has been released, then remove injector and seal hole with tamped soil.

4. **Augering Method** (suitable for use in non-compacted or lightly stratified soils):

Dig hole 3 to 5 feet deep with auger and, if necessary back-fill hole to provide a final depth of 3 feet. Insert applicator tube or probe. Fill hole and release entire dosage for 100 square foot site. When fumigant has been completely released, remove applicator and tamp or compact hole with soil or cover site with polyethylene tarp for 7 days.

5. **Back-Hoe Method** (especially suitable in highly compacted hard pan soils):

In stratified soils dig a trench 5 feet deep, 6 feet long

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b. Row, Bed or Strip Application:

Row or bed applications may be made at the broadcast rates but the amount used will be proportionately less per acre depending on row spacing and width of treatment in the row or bed. Injection of fumigant should be approximately 4" below surface of the bed but not deeper than the bed itself. Application should be made by a mechanical mulch layer or suitable bed pressing equipment with the mulch layer following immediately afterward. Attention should be given to insuring chisel marks are sealed by pressure to avoid fumigant escape until mulch is laid.

2. 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. Evaporating pans are essential for the volatilization and uniform distribution of fumigant. Shallow pans or basins made of plastic or tinned sheet metal are satisfactory for this purpose.

- a. Use 1 evaporator pan for each 300 to 400 square feet of area.

- b. Anchor one end of each polyethylene tube into an evaporating pan with tape or a suitable weight. This insures that the liquid will be directed into the evaporating pan.

- c. Extend the free ends of the polyethylene tubes outside of the area to be covered.

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and as wide as the hoe; in deeply compacted soil, prepare a site the size of the area in which the tree is to be grown. Back-fill with 2 feet of soil, place applicator outlet at the 3-foot level and complete back-fill. Release entire dose for 100 square feet, remove applicator and tamp soil lightly over opening to seal fumigant in the site.

6. Hot Gas Method:

Apply hot gas after carefully preparing soil. The 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 under a polyethylene cover. This method is especially suitable for treating greenhouses or in general where large amounts of fumigant are required and rapid vaporization is advantageous.

Exposure and Aeration Periods:

In general expose for 24 hours when temperature is above 60°F (15.6°C) and for 48 hours when temperature is between 50°F to 60°F (10.0°C to 15.6°C). After the exposure period, aerate soil for 3-7 days before seeding or 5 to 14 days before setting out vegetative growth. If odor of fumigants persists at the end of aeration period, disc or plough the soil to assist aeration.

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INSTRUCTIONS FOR CONTROLLING SPECIAL SOIL PROBLEMS

FOR THE CONTROL OF ARMILLARIA ROOT ROT (ARMILLARIA MELEA) ON DECIDUOUS FRUITS AND NUTS, CITRUS AND VINEYARDS:

Pretreatment Soil Preparation:

To obtain the maximum control of *Armillaria melea*, 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) by naturally allowing 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.

Methods 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. Methods of application are as follows:

1. Non-tarp Chisel Application.

After the soil has been properly prepared, inject dosage by chisel application with chisels spaced 48 to 66 inches apart to a depth of 24 to 30 inches. In the row, bed or strip, treatments may be made by using a single shank. Chisels should have a wing welded on the back 2 to 4 inches above the chemical outlet to partially break the chisel mark. To fill in the chisel mark and seal the surface, disc and ringroll immediately after fumigant injection. Be sure that the disc and ringroller cover an area sufficiently beyond the chisel lines to effect a good seal.

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penetration, the soil at the point of injection should contain 65% moisture of the field capacity. However, to improve sealing, the soil surface may be moistened by means of a sprinkler application of 0.25 to 0.5 inch of water prior to final penetration and application. Avoid treatment of soils that contain more than 30 percent clay or those with high organic content. For best results, fumigate when the soil temperature is 60°F to 80°F (15.6°C to 26.7°C) at the depth of 6 inches. Do not fumigate when soil temperature is below 50°F (10.0°C).

Methods 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.

Use one of the following methods:

1. Chisel Application:

After the soil has been properly prepared, inject fumigant with chisel spaced up to 66 inches apart to a depth of 24 to 30 inches. In the row, band or strip, treatments may be made by using a single shank. Chisels should have a wing welded on the back 2 to 4 inches above the chemical outlet to partially break the chisel mark. To fill in the chisel mark and seal the surface, disc and ringroll immediately after fumigant injection. Be sure that the disc and ringroller cover an area sufficiently beyond the chisel lines to effect a good seal.

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2. Tarp Chisel Application.

After the soil has been properly prepared, apply dosage by chisels space 48 to 66 inches apart and cover with adequate polyethylene film seal.

3. Deep Injection Auger-Probe Treatment.

Use 1 pound active per injection site in light soils (2 pounds in fine-textured soils) to a depth of 36 inches or more below the soil surface. Use 1 injection site per 100 square feet (on a 10 feet by 10 feet grid pattern) with the injection in the center of the area to be treated.

Exposure and Aeration Period:

To insure the proper time-concentration relationship to control *Armillaria* root rot, expose for 7 days before removing the polyethylene film cover after chisel applications, and expose for a 1 day interval with deep injection auger-probe treatment. Planting or replanting of trees, vines or other deep-rooted crops may begin 14 days after the period of exposure.

FOR CONTROL OF NEMATODES ON DECIDUOUS FRUITS AND NUTS, CITRUS AND VINEYARDS NON-TARP

Pretreatment Soil Preparation:

Plow or rip the soil to the depth to which effective treatment is required. The soil should be worked until free of clods or large lumps. Residue from previous crops should be removed and burned prior to fumigation to prevent reinfestation. To insure maximum fumigant

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2. Deep Injection Auger-Probe Treatment:

Use 1 pound active per injection site in lighter soils; 2 pounds in fine textured soils. Use 1 injection per 100 square feet (on a 10 feet by 10 feet grid pattern) with the injection in the center of the area to be treated. Tamp or compact the soil at the point of injection.

TREATING COMPOST OR PILES OF SOIL

General Warnings and Limitations:

Fumigation should take place outdoors or in a well ventilated area away from desired plants or occupied buildings. The material to be treated should have a temperature of 60°F (15.6°C) or above, be loose, and moist enough for good seed germination. To insure a good seal, pile the material to a depth of 19 inches on a concrete floor or wet ground. Piles 2-3 feet high can also be treated provided perforations are made in the pile surface at one foot intervals to assist penetration.

Once the pile has been made, install supports to hold the cover a few inches above the pile surface to aid in proper fumigant diffusion. Place the outlet of the applicator tube or tubes in evaporating pans spaced about 30 feet apart on the pile surface. Cover with a polyethylene sheet of 1 mil or greater but not less than 1 mil. Seal the edges by burying, covering with moist sand or soil or by means of sand-filled tubes (sand snakes). Introduce the fumigant into the evaporating pans as a liquid or by means of the hot gas method. Aerate for 24-72 hours before planting.

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FOR GREENHOUSE FOOD CROP

General Warnings and Limitations:

The use of methyl bromide in confined spaces presents a potential hazard to humans and plant life. Special precautions must be made in order that these potential hazards be minimized. It is the responsibility of the individual supervising the fumigation operation to see that all safety precautions below are strictly observed.

1. Before the fumigation operation commences, the supervisor of the fumigation job shall have conducted proper training of all personnel involved in the fumigation (includes use of safety equipment) removed all persons from the area not directly involved in the fumigation, and inspected the equipment to insure proper aeration.
2. If a wind is blowing, all injection should be made up-wind from a previous injection site. Immediately after injection of the fumigant and tarping, a qualified person wearing protective equipment, should monitor the area to detect leaks. If leaks are found, the source of the leak should be resealed immediately.
3. During this operation, all windows and doors should be open and fans operating to maximize ventilation. Exposure time should be 24 to 48 hours.

On-Site Protective Equipment: Although this fumigant contains chloropicrin, the absence of chloropicrin does not always indicate the absence of methyl bromide. Do not allow any person to enter the fumigated structure without the appropriate protective

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Overdosing, overexposure or repeated fumigation of food or feedstuff commodity should be avoided. When the prior history is not known, or in those instances where a repeated fumigation is necessary, the commodity should be analyzed for inorganic bromide residues before fumigation to make certain the proposed treatment will not result in residues that will exceed the tolerances established. Special care must be exercised to determine that methyl bromide fumigation of commodities such as animal feeds, flour, dried eggs, dried figs, dried milk, nuts, meats and meat products will not result in residues in excess of established tolerances. When used for fumigation of enclosed spaces, 2 persons trained in the use of methyl bromide must be present at all times during introduction of the fumigant, testing, and aeration periods.

Stored Commodity/Product Fumigation Methods:

Unless otherwise specified in the use paragraph, use one of the following methods.

1. Chamber Fumigation:

Load the chamber with the material to be fumigated, close exhaust ports, turn on circulating fan and close chamber door. Determine the proper rate of application and exposure time. 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. Before introducing the fumigant, place warning signs and a red warning light on the door. Two people wearing full-faced masks with an approved NIOSH/MSHA self-contained breathing apparatus

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equipment from the time of injection of the fumigant until acceptable air concentration level readings are obtained using an approved detector. To maintain adequate safety standards, the following equipment must be present and accessible on the site during the entire fumigation operation: (1) one or more self-contained breathing apparatus; (2) one or more replacement air bottles per breathing apparatus; and (3) one or more halide leak detectors.

After Fumigation: At the end of the exposure period, remove all seals and open all doors and windows that are operational. Allow for complete ventilation. Use ventilation fans whenever possible to remove fumigant from dead air pockets. Follow exactly the instructions in the entry restriction section of the Agricultural-Use Requirements box.

Please Refer To General warnings and limitations for preplant soil treatment of food crop. Page 33.

GENERAL WARNINGS AND LIMITATIONS FOR INDOOR/STRUCTURAL FUMIGATION

At temperatures below 60°F (15.6°C) increase the dosage by 0.5 pound per 1000 cubic feet for every 10°F (5.6°C) drop in temperature or use an approved procedure to heat the fumigant. Do not fumigate when temperature is below 50°F (10°C).

Claims for control of stored product pests and structural pests will also control rats and mice. When rodenticide claim is solely the object of fumigation, dosages are usually lower.

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(SCBA or combination air-supplied) are required when introducing the fumigant and opening the door after fumigation. 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.

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

2. Vacuum Chamber Fumigation:

- a. Place material to be fumigated in the steel chamber and draw the desired vacuum.
- b. Release fumigant into the chamber (usually through a heating unit to insure complete vaporization).
- c. At the end of the exposure time, release the vacuum and change the air in the chamber at least 2 times. A vacuum of 15 inch mercury should be drawn for this purpose.

3. Truck, Van or Trailer Fumigation—Closed Top Conveyances:

- a. Seal the off-side door, ventilators and other openings from the inside.
- b. 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.

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- c. 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 at least 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. See directions for placarding or posting given previously. Page 35.
 - d. Do not fumigate while strong winds are blowing.
 - e. After 12 to 18 hours, open the unit and aerate 1 to 1.5 hours. The truck, van or trailer may then be resealed for shipment.
 - f. 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.
- 4. Truck, Van or Trailer Fumigation—Top Conveyances:**
- a. Park trailer or van out of traffic area—if possible on the lee side of a building to protect from winds.
 - b. Roll back the protective tarpaulin to expose the bulk grain or other commodity.
 - c. Prepare a gas expansion dome by placing several cardboard boxes, empty 5-gallon pails

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- g. Do not occupy truck cabs, van cabs or trailer attached tractor cabs during exposure and aeration periods. Lock the cab doors during the exposure and aeration periods.
- h. CLEAR THE IMMEDIATE WORKING AREA OF ALL UNAUTHORIZED PERSONNEL. Release one-half of the recommended dosage through each of the applicator tubes, from the applicator. Methyl bromide boils at 39°F (3.8°C).
- i. Following release of the methyl bromide and disconnection from the applicator, tape the open end of the applicator hose with masking tape and fasten the hose to the side of the conveyance.
- j. Using a Draeger detector, check for fumigant leaks at all taped margins and at the floor of the conveyance. Seal any point where methyl bromide is leaking.
- k. Securely attach the proper methyl bromide fumigation warning placards to each side and to the ends of the conveyance during the fumigation and aeration period.
- l. Containerized commodities may be transferred or moved on and off ships during the fumigation exposure period of 12 to 24 hours. At the end of the exposure period, working in a well-ventilated area and from ground level only, unseal the taped edges and remove the gasproof cover. Also working from ground level only, starting with the downwind end first, peel back the protective tarpaulin cover toward the center of the container to expose the commodity load surface at each end. Do not remove warning placards until aeration has been completed.

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- or other propping materials on the top of the load down the center line. These props should be high enough to support the tarpaulin 12 to 18 inches at the center line above the grain or commodity surface after replacement.
- d. Place 2 shallow, plastic or non aluminum metal, containers on the center line grain surface of the load at points 0.3 and 0.6 the distance from the front of the conveyance. Direct into and firmly attach with tape one end of a 0.25 inch I.D. polyethylene applicator hose into each evaporating container to prevent liquid methyl bromide from contacting the commodity. Hand the other end of each hose over the side of the conveyance down to approximate waist height from the ground. The ends of the hose should have a brass fitting for attaching to the applicator.
- e. Pull the tarpaulin back over the load, covering the props thereby creating the gas expansion dome. Do not tie down the tarpaulin but leave sufficient room to tape the gasproof cover to the conveyance sides below the edges of the tarpaulin.
- f. With the 4 or 6 mil polyethylene or other gasproof cover, completely over-cover the protective tarpaulin to extend down the sides of the container. Clean the containers of dirt and grease. With two-inch masking tape, seal the entire edge of the gasproof cover to the sides and ends of the container, below the tarpaulin, leaving the ends of the 2 applicator hoses exposed for attaching the applicator.

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UPON COMPLETION OF THE AERATION PROCEDURE, THE PROFESSIONAL FUMIGATOR IS RESPONSIBLE FOR THE RELEASE OF THE CONVEYANCE AND COMMODITY.

5. Railroad Car Fumigation:

- a. Car should be placed on seldom used trackage or siding so that it will not have to be moved while under fumigation.
- b. Methyl bromide must *always be applied from outside* the railroad car by means of a 0.25 inch copper or plastic tubing attached to a special puncturer can or to a methyl bromide cylinder. The tube may be introduced into the car through a hole drilled in the floor near the center of the car or through some other convenient hole such as a crack in the door or some roof opening. The discharge end of the tube should be secured near the ceiling at the center of the car. This may be accomplished by fastening the tube to a pole, stick or some other support that may be propped up to hold the end of the tube near the ceiling. The discharge end of the tube is plugged and a hole drilled through the opposite walls of the tube about 1 to 2 inches below the tip to permit escape of the methyl bromide mist above the commodity load and toward the opposite ends of the car.
- c. All car openings should be carefully sealed. Particular attention should be given to the space around doors, the eaves, and the floor. During application and fumigation, all openings used to introduce the gas tube should be tightly sealed

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around the tube. Any holes bored through the car structure should be of a minimum size and carefully sealed following fumigation. Masking tape, caulking compound or greased paper may be used as sealing materials.

- d. Post warning signs conforming to Department of Transportation or as described on page 35 on both doors before applying methyl bromide.
- e. Methyl bromide may be applied by using special measuring devices that can be attached to the cylinders. Always wear safety glasses when working with methyl bromide.
- f. After application of the proper dosage, withdraw the tubing and seal the hose used for application. Keep the car sealed for 12 to 18 hours. A Draeger detector may be used to check sealed areas for leaks. The fumigated car should not be moved during the exposure period.
- g. At the end of the fumigation period, open all doors and vents to allow as much air circulation as possible. It will usually require about 30 minutes to aerate a car after fumigation but this must be determined by the use of a Draeger detector. Keep all persons out of the car during fumigation and aeration and until such time as a suitable detector shows no methyl bromide present. Only then is it safe to enter the car without respiratory protection.

6. Grain Elevator Fumigation:

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

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7. Tarpaulin Fumigation:

- a. Arrange the stacks, gas expansion dome, tubing and evaporating pans and tarpaulin. Follow these directions:

The stack: Stacks of stored commodities usually can be fumigated where they stand as long as the tarpaulin is large enough to cover the stack completely. Be sure to allow for a tarpaulin margin of at least 2 feet around the stack when the cover is laid over it. The stack should be on a concrete floor or other airtight surface. Where floors are not airtight (such as on a loading dock) cracks should be caulked or otherwise sealed to prevent escape of the fumigant. Sisal kraft paper, tar paper, or additional tarpaulin laid on the floor under the material to be fumigated will provide a satisfactory seal.

The gas expansion dome: Center 4 or more sacks upright on top of the stacked material to form a gas expansion dome. This facilitates gas distribution.

The tubing and evaporating pans: Copper, polyethylene, or saran tubing is used to inject the gas near the center of the expansion dome. The outlet of this tubing should be fastened to an evaporating pan to prevent liquid methyl bromide from dripping on the commodity being fumigated, or splashing on the tarpaulin.

The tarpaulin: Water-proofed canvas tarpaulins are not satisfactory. Before spreading the tarpaulin, sweep around the stack to provide a

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- a. Seal structure carefully, using masking tape for small openings and polyethylene sheeting secured with masking tape for large openings.
- b. Fumigated areas must be placarded on all entrances with signs containing at least 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 fumigant used, emergency telephone number for contact, and the name and address of fumigator. Do not remove warning signs until the fumigated area is completely aerated and safe for entry, as indicated by a suitable detector.
- c. Use the rate and exposure time shown in site entries for specific grains to be treated.
- d. Fumigate by using a fan or blower to recirculate the methyl bromide through the 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 feet or less.
- e. Check periodically for leaks with a Draeger detector.
- f. To aerate after fumigation, disconnect return air at the fan and discharge into outside air. Continue aeration until suitable detector shows the fumigant has dissipated. Use Draeger detector to check the elevator head space for possible pockets of methyl bromide.

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clean surface for sealing. Unroll or unfold the tarpaulin over the stack, providing a margin on the floor of 2 or 3 feet. Run the applicator tubing out from under the tarpaulin at a corner which should be folded. Seal the tarpaulin by weighting it down with a row of bagged material or sand-filled tubes. (Canvas or plastic tubing about 4 inches in diameter may be used for these sand snakes).

- b. Once the above preparations are completed, fumigation can be done. Attach the applicator tubing to the cylinder of methyl bromide. Place warning placards on tarpaulins under fumigation. These placards must be present during aeration. Leave the stack undisturbed for 24 hours after releasing the fumigant.
- #### 8. Shipboard, In Transit or Shiphold Fumigation:
- Shipboard, in transit ship or shiphold fumigation is also governed by United States Coast Guard Regulations. Refer to and comply with these regulations prior to fumigation.

Pre-fumigation Procedures:

- a. 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

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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.

- b. 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 self contained breathing apparatus (SCBA) or combined air-supplied/SCBA respirator approved jointly by the National Institute of Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA).
- c. Fumigated areas must be placarded on all entrances with signs containing at least the signal word DANGER and the "Skull and Crossbones", and the words "Area under 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.

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Precautions and Procedures During Discharge:

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

9. Warehouse, Structural* and Food Plant Fumigation:

Check with appropriate municipal and county authorities 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. Several types of buildings can be fumigated with methyl bromide. Frame, metal and concrete buildings used for storage of agricultural products can be fumigated if they are in good repair and tight, or can be made tight by sealing or tarping. The buildings include packing plants, grain elevators, milling and baking plants, port warehouses, grain storage buildings and coffee warehouses. Cement blocks pose a special problem because of their porous nature, but can be fumigated if an increased dosage and exposure time is allowed to compensate for the diffusion loss. There is no rule of thumb allowing for leakage. The applicator will have to exercise judgement from his observation of the building's condition.

*See page 20 for directions.

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- d. 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.
- e. 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 least 2 units of personal protection equipment and 1 gas or vapor detection device, and a person qualified in their operation be on board the vessel during the voyage.

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, appropriate personal protection equipment must be used. Never enter fumigated areas alone. At least 1 other person, wearing personal protection equipment, should be available to assist in case of an emergency.

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- a. The most important part of the entire fumigation job lies in the preparation and sealing of the structure. The properties of penetration and diffusion that make methyl bromide an ideal fumigant also make it difficult to confine—and for that reason, a good sealing job is necessary. High winds, for example, increase fumigant loss and cause fumigant to drift to the leeward side of the building.

Sealing of the building begins with the closing of all external openings to the building. Seal roof ventilators and chimneys by wrapping them with tarpaulin, or plastic sheet, or by stripping the screened openings with a wide commercial masking tape. Stairwells and interior doors should be closed. Any broken panes should be replaced, then exterior doors and windows should be wedged tight, locked, and cracks caulked or taped. Check for cracks in the floor, roof, and around eaves and seal them. Special care should be taken to seal partitions to adjacent storage or work areas in a building. Adjoining buildings sharing a common wall must be cleared of personnel, animals, and items that will react to methyl bromide or commodities which might be damaged by exceeding the established tolerances for inorganic bromide before fumigation. If this is not feasible, spread a glossy type building paper, Sisal draft or asphalt laminated paper, plastic film or a heavy oiled kraft or wrapping paper to prevent spread of the fumigant into undesired areas. In all such cases where the adjoining building is occupied, it should be checked frequently with an appropriate detector during fumigation to insure the

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safety of the occupants. Check local regulations for specific requirements. Appearance, economy and ease of cleanup will probably determine your choice of sealing materials.

Where time and neatness are factors, masking tapes and commercial caulking compounds will probably justify their extra cost. It is possible, however, to make your own paste by combining lubricating oil and a low grade of flour.

Because methyl bromide gas can penetrate accumulations of trash and sweepings, necessary cleanups may be postponed until after the fumigation has been completed. It is recommended that all doors and hatches on milling machinery be opened. These include elevator boots and repair openings, conveyor lids, settling chamber doors and dust trunks. This also applied to reels, purifiers, sifters, shorts and bran dusters, feeder gates on rolls and purifiers as well as other openings that will facilitate the entrance of gas to the equipment. Dead spouts are particularly difficult to penetrate and should be opened before the fumigation.

- b. Dosage recommendations are made on the basis of cubic content. In square or rectangular buildings simply multiply the interior length by width and height. In irregular shaped buildings, find the cubic content of each unit, then add them together to find the total. In case of peaked roofs the average height between the sidewall and the top of the roof may be used as the third multiple in calculating the cubic content. In taking measurements, no deductions should be made for space occupied by machinery,

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off from outside the building. One 16 inch fan for every 50,000 cubic feet of space will be sufficient. Quite often, however, it is possible to use heating fans or other installations already in the building.

Extinguish all open flames and turn off all high temperature electrical equipment including laboratory ovens, pilot lights, gas refrigerators, oil burners, etc. Presence of intense heat from such sources may change methyl bromide to hydrobromic acid which may be injurious to commodities and equipment. Place warning signs on all entrances to the building. Have lights to illuminate warning signs plainly. Inform police, fire and health officials that a fumigation process is about to begin. Observe location of nearest telephone for use in case of emergency. Make sure fumigators can recognize early symptoms of methyl bromide intoxication and that the appropriate physicians and hospitals have been provided a copy of "First Aid & Treatment for Methyl Bromide Exposure". Arrangements should be made to seal and bar the building entrances as soon as the job is complete. Watchmen should take up their stations to prevent any admittance during the fumigation.

- e. At this point, SCBA equipment should be donned, carefully checked, and the cylinders opened. Under no circumstances should the operators be in the building longer than 30 minutes in releasing the gas. If it is impossible for one crew to do it within this time period, additional experienced crews should be used. Two persons trained in the use of methyl bromide must be present at all times during introduction of the fumigant, testing and aeration periods.

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commodities or furnishings. Exceptions to this rule apply to fresh fruits and vegetables.

- c. Cylinders should be placed by a two-man team, using a clipboard to map the location of each cylinder in the building. The cylinders should be arranged so that the fumigator will start releasing the gas on the top floor and continue walking away from the released gas in the direction of the exit as he opens each subsequent cylinder.

As methyl bromide is heavier than air, it is advisable to overdose the top floor slightly. In all cases, the size of cylinder can quite naturally follow the needed dosage for that particular cubic space. Cylinders should be located within a room so as to do the best job of diffusion into all areas. Cylinders should be set in an upright position and the shipping caps removed. Again, since methyl bromide is heavier than air, in order to prevent stratification at the lower levels, it is sometimes advisable to attach standpipes (or curved pipes directed upward) to the cylinder valves. If standpipes are used, they should be equipped with T fittings to direct the gas laterally and prevent direct contact.

- d. At this point, a practice session should be undertaken to familiarize the operators with the location of each cylinder and the sequence in which it is to be discharged. With SCBA equipment at ready position, quickly open and close the cylinder valves to make certain they are in working order and thus avoid delay during the actual release.

If fans are to be used, they should be sparkproof and strategically located and made ready to switch on or

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Thus, in case one should become incapacitated for any reason, such as an accidental fall that would result in an injury or unconsciousness, the other man could move him to fresh air. These men should always remain close to each other from the time they open the first cylinder until the time they leave the building together. While the first 2 are in the building, it is advisable to have 2 additional men, with SCBA equipment ready and waiting at the exit to aid if needed. When releasing fumigant, start on the top floor and work toward exits. Where there is a basement, the gas should be released there immediately prior to releasing the gas on the ground floor. One man should check off locations of each cylinder so none are missed.

All fans should be running while the gas is being released and left running until uniform distribution has been accomplished, which should not require more than 30 minutes to 1 hour. After this the fans should be turned off.

- f. Once the exposure period is complete, aeration should be started by opening the previously prepared doors and windows on the ground floor. Where ventilators are accessible from the outside, they should also be opened at this time. The ground floor should be allowed to aerate until a Draeger detector shows that the methyl bromide concentration has diminished to 5 ppm or less. At this point, at least 2 men, wearing SCBA equipment should begin opening windows, starting at the bottom and working upward. These men should not try to open all windows on any single floor the first time through

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but should open only those windows that are necessary for thorough ventilation and return to the outside as soon as possible. They should not remain inside the building for prolonged periods (not more than 15 minutes). The fans should be turned on once again and allowed to run until aeration is complete. After the building has been partially aerated, the men again wearing masks, should open as many of the remaining windows as needed to complete the aeration. No one should be allowed inside the building without a suitable mask until all parts of the building have been checked with a Draeger detector for methyl bromide concentration. Once the aeration has been completed, usually 2 or 3 hours, the building can be returned to normal condition for operation. Where possible, it is advisable to leave in place such sealing as will not hinder operation and operations so that this sealing does not have to be replaced for future fumigations.

10. Recirculation Method:

With recirculation, dosages can be reduced as much as 50 percent to 70 percent below those recommended because of more efficient use of the fumigant. Bulletins are available for dose and use recommendations.

Exposure Period for Stored Commodity Fumigation:

Unless otherwise specified, expose the treated commodities for a period of 12 to 24 hours.

Draeger Tube Methyl Bromide 3/a No. 6728211

Manufactured by:
National Draeger, Inc.
101 Technology Drive
P.O. Box 120
Pittsburgh, PA 15230
Tel. (412) 787-8383

**Matheson-Kitagawa Detector Tubes
8014-157 Sb**

Distributed by:
Matheson Gas Products
932 Paterson Plank Rd.
East Rutherford, N.J. 07073
Branches through United States
Tel. (201) 933-2400

Halide Detector

This detector has been used by the methyl bromide fumigation industry for years. The use of the halide detector is limited today as the threshold detection limit is only 15 ppm.

Respiratory Protection:

The following are names of several respiratory protection devices which can be purchased. The manufacturers should be contacted to determine the adequacy of the equipment. Follow the manufacturers recommendation for use, cleaning, storage, fitting, maintenance, etc.

Fumigation of stored grain with moisture content above 14 percent may injure germination. Do not fumigate if grain moisture is high or if grain temperature is below 60°F (15.6°C) or if there is excessive dockage.

NOTE: All data, including the procedures discussed herein are believed to be accurate and reliable, but are presented without guarantee or responsibility on the part of the seller.

As use conditions are not within its control, seller does not guarantee results from use of its products or other information described herein. In as much as any assistance furnished by the seller with reference to the safe use and disposal of its products is provided without charge. Seller assumes no obligation or liability therefore, except to the extent that any such assistance shall be given in good faith.

Protective Equipment:

Equipment to measure leaks and residue vapor during and following fumigation.

Follow manufacturers recommendation for type of detector and directions for use.

Survivair Mark 2 SCBA

30 minute LP series 9842
Manufactured by:
Survivair
A Division of U.S.D. Corp.
3823 West Warner Ave.
P.O. Box 25018
Santa Ana, CA 92799-5018

Distributed by:
SCC Products
Soil Chemicals Corp.
P.O. Box 782
Hallister, CA 95024
Tel. (408) 637-1992

Scott Air Pak II or 2.2 or 4.5

SCBA Equipment
Manufactured by:
Scott Aeration
225 Erie Street
Lancaster, NY 14086
Tel. (716) 683-5100

**Custom 4500 or Netralite Air Mask with
FHR harness**

Manufactured by:
MSA
600 Perm Center Boulevard
Pittsburgh, PA 15235
Tel. 1 (800) 672-2222

METHYL BROMIDE TECHNICAL:

Common name: Methyl Bromide
Chemical name: Bromomethane.
Empirical Formula: CH₃Br.

Physical Characteristics:

Color: Colorless to light yellow.
Physical State: Gas
Odor: Odorless.
Melting Point: -94°C.
Boiling Point: 3.5-4°C.
Specific Gravity: 1.73 (liquid)
Solubility: Practically insoluble in water:
<0.1 g/100 g at 25°C (open system); 1.34 g/100 g at 25°C (closed system).
Readily soluble in most organic solvents, alcohols, ethers, chloroform, carbon disulfide, benzene & carbon tetrachloride.
Vapor Pressure: 1400 mm Hg at 20°C.
Octanol/Water Partition Coefficient: 1.19 ± 0.04
Stability: Methyl bromide undergoes hydrolysis in water. The average hydrolysis rate at 25°C was 1.4 mg MBr/liter of water/day. The hydrolysis rate increases with light and heat.

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Use Profile:

Type of Pesticide: Acaricide; Fungicide; Herbicide; Insecticide; Nematicide; Rodenticide.
Pests Controlled: Insects; mites; rodents; plant pathogens; nematodes; termites; weeds.
Registered Uses: Preplant soil fumigation; stored commodities (both raw agricultural commodities and processed foods/feeds); greenhouses; termite control; grain elevators; mills, ships and transportation vehicles.
Predominant Uses: Vegetables; tobacco; strawberries; commodity/structural; government quarantine; ornamentals; fruits.
Mode of Activity: Fumigations.
Formulation
Types Registered: Gaseous and Liquid Under Pressure.

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Flammability: Flash point: none.
Flammable (explosive) limits:
lower 8.6%
upper 20%

Storage Stability: Methyl bromide is stable at ambient temperature and in sealed containers for at least 36 months.

Corrosiveness: Pure, dry methyl bromide is not corrosive to metals except aluminum. In the presence of moisture or alcohol, surface reactions occur on zinc, tin and iron.
The liquid is corrosive to aluminum, magnesium and zinc metals and their alloys. Methyl bromide may also attack rubber and some forms of plastics and coatings.

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