

PM 32 5785-55

1 of 37

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

JUL 1 1992

Great Lakes Chemical Corporation
P.O. Box 220
West Lafayette, IN 47906

Attn: R. Franklin Handy, Ph.D.

Subject: Revised Labeling for Aeration and Reentry Statements
Brom-O-Gas 0.25%
EPA Registration No. 5785-55

Your product labeling package, revised in accordance with your company's May 18, 1992 letter of commitment, has been reviewed and the following comments apply.

Product Labeling

The labeling referred to above, submitted in connection with registration under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, is acceptable subject to the comments listed below. A stamped copy is enclosed for your records. All products distributed or sold after August 1, 1992 must bear labeling which contains the revisions detailed in this letter. Two copies of the finished printed labeling must be submitted to EPA before you distribute or sell the product.

1. In the table of contents of the product booklet, please provide a reference to the Methyl Bromide Structural Fumigation Fact Sheet.

2. All products distributed or sold by the registrant after August 1, 1992 and distributed or sold by any other person after September 1, 1992 must bear the approved labeling revised in accordance with EPA's comments. Distribution or sale of methyl bromide pesticide products for commercial or residential structural fumigation after these dates without the revised labeling will be a violation of FIFRA §12(a)(1)(E).

CONCURRENCES

SYMBOL							
SURNAME							
DATE							

Additionally, the following conditions, as set forth in your May 18, 1992 letter of commitment, have been added to the above referenced registration:

1. Great Lakes Chemical Corporation will notify all its customers by certified mail that distribution or sale of methyl bromide pesticide products bearing EPA Registration No. 5785-55, for residential or commercial structural fumigation, will be prohibited after September 1, 1992 unless the product's labeling includes the July 1992 revised use directions. Such notification will include a copy of the approved revised labeling. Great Lakes Chemical Corporation will keep a copy of each notification and return receipt for two years.

2. Great Lakes Chemical Corporation will offer to relabel methyl bromide pesticide products for its distributors, and if the distributors accept the offer, Great Lakes Chemical Corporation will relabel such products.

3. All products bearing EPA Registration No. 5785-55, distributed or sold by Registrant after August 1, 1992 will bear the July 1992 revisions concerning aeration and reentry and bear the fact sheet for commercial and structural fumigation.

If you should have any questions concerning this letter, you may call Robert Travaglini on (703) 305-6909.

Sincerely,



Ruth G. Douglas
Product Manager (32)
Antimicrobial Program Branch
Registration Division (H7504C)

3 0437

**RESTRICTED USE PESTICIDE
DUE TO ACUTE TOXICITY**

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

BROM-O-GAS® 0.25%

**SOIL AND SPACE FUMIGANT
Contains .25% Chloropicrin**

ACTIVE INGREDIENTS:		By Wt.
Methyl bromide		99.75%
INERT INGREDIENTS:		
Chloropicrin25%
TOTAL		100%

This product weighs 14.4 pounds per gallon.

**ACCEPTED
with COMMENTS
in EPA Letter Docket**

DANGER

PELIGRO

KEEP OUT OF REACH OF CHILDREN

POISON

JUL 9 1992
Under the Federal Insecticide, Fungicide, and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 5785-55

PRECAUTION AL USUARIO: Si usted no le Ingles, no use este producto hasta que la etiqueta le haya sido explicado ampliamente.

STATEMENT OF PRACTICAL TREATMENT.

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

- IF INHALED:** Remove exposed person from contaminated area. Keep warm. Make sure person can breathe freely. If breathing has stopped, give artificial respiration. If not unconscious, rinse mouth out with water. Do not give anything by mouth to an unconscious person.
- IF ON SKIN:** Immediately remove contaminated clothing, shoes, 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 SIDE PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS

NET WEIGHT _____ LBS. EPA REG. NO. 5785-55-AA
LOT NUMBER _____ EPA EST. NO. 5785-AR-01
July 1992

BOG2583

**GREAT LAKES CHEMICAL CORPORATION
WEST LAFAYETTE, INDIANA 47906**

10-1-1

**PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS
DANGER**

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.

This product contains chloropicrin as a warning agent. Chloropicrin may be irritating to the upper respiratory tract, and even at low levels can cause painful irritation to the eyes, producing watering. 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 overexposures 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.

PROTECTIVE CLOTHING. Methyl bromide may be trapped inside clothing and cause skin injury. Wear loose shirts, long trousers and socks that are cleaned after each wearing. Do not wear jewelry, gloves or other gas confining apparel. If full-face respiratory protection is not required, wear full face shield for eye protection when handling liquid. After exposure, immediately remove clothing, shoes and socks. Do not reuse contaminated clothing until thoroughly decontaminated. Drenched shoes cannot be adequately decontaminated.

RESPIRATORY PROTECTION. Respiratory protection equipment is required when using Brom-O-Gas for certain applications. Refer to GLK 160G, Section I, Space Fumigation and Section II, Soil Fumigation for complete instructions on the requirements for respiratory protective equipment.

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 this product into sewer systems without previously notifying the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

SPILL AND LEAK PROCEDURES. Evacuate immediate area of spill or leak. Use a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator for entry into affected area to correct problem. Allow spill to evaporate. Do not permit entry into spill area by persons without appropriate respiratory protection, until concentration of methyl bromide is determined to be less than 5 ppm. Remove leaking containers to an isolated area and discharge contents under a polyethylene sheeting of 4 mil or greater thickness onto the soil surface in accordance with instructions for Soil Fumigation located in GLK 160G.

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 pounds is exceeded.

PHYSICAL AND CHEMICAL HAZARDS

Contents under pressure. Do not use or store near heat or open flame. In fires fueled by other materials, Brom-O-Gas may liberate hazardous gases. The use of Brom-O-Gas with aluminum, magnesium, zinc and alkali metals will result in the liberation of toxic gases, and possible fire and explosion. In addition, severe corrosion of containers and equipment made of these metals will occur.

DIRECTIONS FOR USE

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

STORAGE, HANDLING, AND DISPOSAL

Storage and Handling. ~~Store in a locked, dry, cool, well-ventilated area.~~ Store in a secure manner either outdoors under ambient conditions or indoors in a well ventilated area. Post as a pesticide storage area. Do not contaminate water, food, or feed by storage. Store cylinders upright, secured to a rack or wall to prevent tipping. Containers should not be subjected to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use rope slings, hooks, tongs or similar devices to unload cylinders. Transport cylinders using hand truck, fork truck or other device to which the cylinder can be firmly secured. Do not remove valve protection bonnet and safety cap until immediately before reuse. Replace safety cap and valve protection bonnet when cylinder is not in use. When cylinder is empty, close valve, screw safety cap on to valve outlet, and replace protection bonnet before returning to shipper. Only the registrant, or his designee, is authorized to refill cylinders. Do not use cylinders for any other purpose.

BEST AVAILABLE COPY

Disposal. Pesticide wastes are toxic. Improper disposal of excess pesticide is a violation of Federal law. If these wastes can not be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office of guidance. Return empty cylinders freight collect to the Great Lakes Chemical Corporation location from which shipment was made. Return partial cylinders only after consulting Great Lakes Chemical Corporation for proper shipping instructions. In either case, use delivering carrier when possible.

Brom-O-Gas may be used for Space and Soil Fumigation. This fumigant is a highly hazardous material and must be used only by individuals trained in its proper use. You must carefully read and understand GLK 160G in order to use Brom-O-Gas. Observe all safety and precautionary instructions as set forth in GLK 160G. All fumigation directions, including dosage rates, exposure times and aeration periods, are given in GLK 160G.

STATEMENT OF WARRANTY AND LIABILITY

Seller warrants that this product complies with the specifications expressed in this label and GLK 160G. SELLER MAKES NO OTHER WARRANTIES; AND DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE INTENDED PURPOSE. Seller's liability for default, breach, or failure under this label shall be limited to the amount of the purchase price. Seller shall have no liability for consequential damages.

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

July 1992

RESTRICTED USE PESTICIDE
DUE TO ACUTE TOXICITY

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

DIRECTIONS FOR USE OF THE PRODUCTS

BROM-O-GAS®

EPA REGISTRATION NUMBERS

5785-4
5785-7 5785-8
5785-42 5785-55

ACCEPTED
with COMMENTS
by EPA Letter # 1002

JUL 9 1992

Under the Federal Insecticide,
Fungicide, and Rodenticide Act as
amended, for the pesticide
registered under EPA Reg. No.
5785-55

PRECAUCION AL USUARIO: Si usted no lee ingles, no use este producto hasta que la etiqueta le haya sido explicado ampliamente.

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

GREAT LAKES CHEMICAL CORPORATION
P.O. BOX 2200
WEST LAFAYETTE, INDIANA 47906

- Registered trademark of Great Lakes Chemical Corporation.
- 1992 Great Lakes Chemical Corporation

GLK160G

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

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS

DANGER

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.

These products contain chloropicrin as a warning agent. Chloropicrin may be irritating to the upper respiratory tract, and even at low levels can cause painful irritation to the eyes, producing watering. If these symptoms occur, leave the fumigation area immediately.

STATEMENT OF PRACTICAL TREATMENT

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

IF INHALED: Remove exposed person from contaminated area. Keep warm. Make sure person can breathe freely. If breathing has stopped, apply artificial respiration. If not unconscious, rinse mouth out with water. Do not give anything by mouth to an unconscious person.

ON SKIN: Immediately remove contaminated clothing, shoes 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.

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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 overexposures 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.

STORAGE, HANDLING AND DISPOSAL

Storage. ~~Store in a locked, dry, cool, well-ventilated area. Post as a pesticide storage area.~~
~~Store in a secure manner either outdoors under ambient conditions or indoors in a well ventilated area. Post as a pesticide storage area.~~ Do not contaminate water, food or feed by storage. Store cylinders upright, secured to a rack or wall to prevent tipping.

Cylinders. Cylinders should not be subjected to rough handling or mechanical shock such as dropping, bumping, dragging or sliding. Do not use rope slings, hooks, tongs or similar devices to unload cylinders. Transport cylinders using hand truck, fork truck or other device to which the cylinder can be firmly secured. Do not remove valve protection bonnet and safety cap until immediately before use. Replace safety cap and valve protection bonnet when cylinder is not in use.

When cylinder is empty, close valve, screw safety cap on to valve outlet, and replace protection bonnet before returning to shipper. Only the registrant, or his designee, is authorized to refill cylinders. Do not use cylinders for any other purpose.

Cans. Store 1 and 1 1/2 pound cans in same manner as cylinders.

Disposal. Pesticide wastes are toxic. Improper disposal of excess pesticide is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Return empty cylinders freight collect to the Great Lakes Chemical Corporation location from which shipment was made. Return partial cylinders only after consulting Great Lakes Chemical Corporation for proper shipping instructions. In either case, use delivering carrier when possible. Dispose of empty cans in a sanitary landfill, or by other procedures approved by state and local authorities.

ENVIRONMENTAL HAZARDS

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

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previously notifying the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

SPILL AND LEAK PROCEDURES.

Evacuate immediate area of spill or leak. Use a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator for entry into affected area to correct problem. Allow spill to evaporate. Do not permit entry into spill area by persons without appropriate respiratory protection until concentration of methyl bromide is determined to be less than 5 ppm. Remove leaking containers to an isolated area and discharge contents under a polyethylene sheeting of 4 mil or greater thickness onto the soil surface in accordance with instructions for soil fumigation.

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 pounds is exceeded.

DIRECTIONS FOR USE

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

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

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

Directions for structural fumigation and other pest sites are found in SECTION I. Directions for soil fumigation may be found in SECTION II.

I. SPACE FUMIGATION DIRECTIONS.

THE FOLLOWING PRECAUTIONARY PROCEDURES MUST BE FOLLOWED FOR ALL USES ADDRESSED IN THIS SECTION.

When used for fumigation of enclosed spaces (e.g., dwellings and other structures, warehouses, empty grain bins or elevators, vaults, chambers, greenhouses, trucks, vans, railroad cars, ships, and other transport vehicles, and tarpaulin-covered areas), two persons trained in the use of this 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).

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Do not fumigate with this product when the space or structure to be fumigated is below 40°F. Fumigation at different temperatures may be allowed or required under APHIS quarantine treatment schedules.

When using methyl bromide as a space fumigant, the applicator must placard or post all entrances to the fumigated area with signs bearing, in English and Spanish:

1. The signal word DANGER/PELIGRO and the skull and crossbones symbol.
2. The statement, "Area under fumigation, DO NOT ENTER/NO ENTRE".
3. The date of fumigation.
4. Name of fumigant used.
5. Name, address and telephone number of the applicator.

Do not remove a placard until the treated space is completely aerated. To determine whether aeration is complete, each fumigated site must be monitored and shown to contain less than 5 ppm methyl bromide. If less than 5 ppm methyl bromide is detected, the placard may be removed.

PROTECTIVE CLOTHING.

Methyl bromide may be trapped inside clothing and cause skin injury. Wear loose shirts, long trousers and socks that are cleaned after each wearing. Do not wear jewelry, gloves or other gas confining apparel. If full-face respiratory protection is not required, wear full-face shield for eye protection when handling liquid. After exposure, immediately remove clothing, shoes and socks. Do not reuse contaminated clothing until thoroughly decontaminated. Drenched shoes cannot be adequately decontaminated.

RESPIRATORY PROTECTION.

If the concentration of methyl bromide in the worker area, as measured by a pump and appropriate detector tubes (for example, Draeger, Kitagawa, MSA, and Sensidyne), does not exceed 5 ppm, no respiratory protection is required. If this concentration is exceeded at any time, all persons in the fumigation area must wear a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator or evacuate the area.

AERATION AND REENTRY.

After fumigation, treated areas must be aerated until the level of methyl bromide is below 5 ppm. Do not allow entry into the treated area by any person before this time, unless protective clothing and a respiratory protection device (NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator) is worn.

A. Chamber and Vault Fumigation.

All precautionary procedures as outlined immediately under SECTION I, SPACE FUMIGATION DIRECTIONS, must be followed.

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 from Table I. Introduce the fumigant into the chamber by releasing it into the air stream in front of

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a blower or fan, passing it through a vaporizer, or allowing it to evaporate from a shallow pan. 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 or an inlet port to permit fresh air to enter. At the end of the aeration period, check fumigant concentration with a detection device before allowing unprotected persons to enter the chamber.

B. Vacuum Chamber Fumigation.

All precautionary procedures as outlined immediately under SECTION I, SPACE FUMIGATION DIRECTIONS, must be followed.

1. Place articles to be fumigated in the steel chamber and draw the vacuum (25 to 27 inches Hg).
2. Release fumigant into the chamber (usually through a heating unit to insure complete vaporization).
3. See Table I for specific articles, rates of application and exposure times, as indicated by footnote "b".
4. At the end of the exposure time, release the vacuum and change the air in the chamber at least two times. A vacuum of 15 in. Hg should be drawn for this purpose. After purging chamber, check fumigant concentration with a detection device before allowing unprotected person(s) to enter.

C. Railroad Car, Truck, Van or Trailer Fumigation.

All precautionary procedures as outlined immediately under SECTION I, SPACE FUMIGATION DIRECTIONS, must be followed.

1. Railroad car should be placed on seldom used trackage or siding so that it will not have to be moved while under fumigation. Park trailer or van out of traffic area; if possible on the lee side of a building to protect from winds. Do not fumigate while strong winds are blowing.
2. Seal the off-side door, ventilators and other openings. Seal from the inside, if possible.
3. Secure a perforated tube with the end closed to the ceiling to distribute fumigant evenly of use evaporating pan(s). Always apply fumigant from outside the vehicle.
4. Seal the door and placard vehicle.
5. Consult Table I for specific articles, rates of application and exposure times.

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6. After the appropriate exposure period, open the unit and aerate 1 to 1 1/2 hours. The vehicle must be aerated to below 5 ppm before movement is allowed. The vehicle may then be resealed for shipment. **DO NOT MOVE VEHICLES DURING FUMIGATION. FOR USED TIRES A PERIOD OF AERATION OF 2 TO 3 DAYS IS REQUIRED FOR THE GAS LEVELS TO FALL TO 5 PPM.**

D. Tarpaulin Fumigation.

All precautionary procedures as outlined immediately under SECTION I, SPACE FUMIGATION DIRECTIONS, must be followed.

The article or stacked articles should be placed on a concrete floor or other air-tight surface. If the floor is not air-tight, it may be made so by covering it with sisal kraft paper, tar paper or additional tarpaulin or polyethylene sheeting. Provide a space on top of the stack for a gas expansion dome to facilitate distribution. Evaporating pans are essential for the volatilization and uniform dispersion of fumigant except where a vaporizer is used. Shallow pans or basins made of plastic or metal (except aluminum) are satisfactory for this purpose. Use one evaporator pan for each 1000 cubic feet contained under the tarp. For delivery of Brom-O-Gas from outside the tarpaulin, polyethylene tubing is required. Anchor one end of each polyethylene tube into an evaporating pan with tape or a suitable weight. This ensures that the liquid will be directed into the evaporating pan. Place evaporating pan(s) with anchored applicator tubing in the center of the expansion dome. Extend the free ends of the polyethylene tubes outside the area to be covered. Cover and seal the stack with a gas tight tarpaulin or polyethylene sheeting of 4 mil or greater thickness. Allow a margin of at least two feet at the base of the stack for sealing. Sweep around the stack to provide a clean surface for sealing the tarpaulin. Seal tarpaulin to floor by sand and/or water snakes, by taping or by means of moist soil or sand. Attach each polyethylene tube to a can applicator or cylinder valve outlet and release fumigant. Use a cylinder dispenser or scale to meter small amounts from cylinders. Special units are available for use of 1 and 1 1/2 pound cans that combine opener and evaporating pan functions, and are designed to be used with all parts under the tarpaulin. Use rates and exposure times shown in Table I. At the end of the exposure period, unseal opposite ends of the tarpaulin and allow to aerate for at least 30 minutes before completely removing the tarp. Check fumigant concentration with a detection device before allowing unprotected persons to enter the area.

E. Structural Fumigation.

For the fumigation of buildings to kill wood-infesting insects and other pests.

All precautionary procedures as outlined immediately under SECTION I, SPACE FUMIGATION DIRECTIONS, must be followed.

Check with appropriate municipal and county authorities before fumigating to be completely familiar with local regulations. Ordinances may require watchmen or locks during fumigation, and/or notification of the nearest fire station.

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Preparation for Fumigation. Remove the following items from the structure to be fumigated: 1) all food, animal feed and medicinals not sealed in metal or glass; 2) seeds, bulbs and live plants; 3) pets (including fish and birds); 4) furs; 5) horsehair articles; 6) rubber goods (natural latex); 7) carbonless carbon forms and blueprints; 8) automobiles; 9) cinder blocks; 10) articles containing sulfur.

Extinguish all open flames including pilot lights. Turn off electric heating elements. Open all interior doors, openings into attics and crawl spaces. Open cabinet doors and drawers. Windows should be open when tarpaulins are used.

For masonry or metal structures, seal all cracks and other air leaks with caulking material or tape, and seal cracks around doors, windows, vents and other openings. Wooden structures and others that cannot be readily sealed may be completely enveloped with an impervious tarpaulin. Seal securely all seams between tarps and seal the lower edges of the tarp to the ground with moist soil or with sand or water snakes. To prevent escape of gas through the ground and avoid injury to nearby plants, wet the soil to a depth of six inches for a distance of one foot outward from the edge of the tarp.

Consult Table I for dosage and exposure times.

Release the fumigant from outside the structure. The shooting hose must be made of chemically resistant material. For dwellings, release the fumigant in a non-carpeted area such as the attic, porch or carport. The shooting hose must be directed into a chemically resistant bucket or tub and attached firmly so it will not come loose. The airstream of a fan must be directed toward the receptacle end of hose to circulate the vaporized fumigant. Introduce the fumigant through a heat exchanger to the shooting hose. Maintain the temperature of the vaporized fumigant at 130°F. or higher. In addition to the shooting fan, use at least one fan for each 10,000 cubic feet of space. The fans should be directed up and positioned for maximum circulation. For an average size structure, the entire amount of fumigant may be released in one place. For a larger or more complex structure, release fumigant at two or more locations chosen to aid in the even distribution of the gas.

~~At the end of the exposure period, remove all seals and open all doors. Unseal tarpaulins from the roof and drop sides to the ground. Use fans to aid in aeration and removal of the fumigant. Do not remove placards until the concentration is below 5 ppm.~~

FUMIGATION FOR RESIDENTIAL OR 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:

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1. A) If non-mechanical or natural ventilation is used, 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 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 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 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 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. A) For structures with attics, 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 subarea should be utilized. The structure must be aerated with the fans operating for a minimum of 72 hours;

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detection device in the ground receptacle, or other enclosed space within an interior and 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, in addition to the requirements of paragraphs 1, 2, and 3 above, the windows, vents, and interior doors of the basement must be open, and

A) 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

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

Structural Fumigation Fact Sheet

A. 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,

(3) the owner, manager, or designated agent for all structures or businesses other than family dwellings,

B. 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.

Why 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 procedures make it unlikely that any remaining fumigant in the living space will be a health hazard after the house is cleared for reoccupancy. However, you should be aware of the symptoms of overexposure 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 reoccupancy 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 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 the EPA.

Birth defects: In recent animal studies, methyl bromide caused birth defects when pregnant animals were exposed under experimental conditions. There is no evidence that methyl bromide affects human reproduction, although some chemicals which cause birth defects in animals may also cause birth defects in humans. Any person, including pregnant women, should avoid unnecessary exposure.

Other effects: It is not known whether long-term exposure to methyl bromide causes cancer. Experiments in animals are underway to study this, although tests so far are negative. However, even if methyl bromide were shown to cause cancer over a lifetime of exposure in animals, it is unlikely that your exposure from the one-time fumigation of your building would be high enough to cause a significant risk of cancer.

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

- o Carefully evaluate all your pest control alternatives.
- o 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.
- o Carefully follow the instructions you are given about items you are to remove from your building.
- o 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.
- o 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.
- o You may wish to increase ventilation by opening doors and windows.
- o 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 services, the National Pesticide Telecommunications Network Hotline, which can be reached a 1 (800) 858-7378.

In a medical emergency, call 911, or contact the nearest Poison Control Center. See "Crisis 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 RESIDENTIAL AND COMMERCIAL STRUCTURES, THESE DIRECTIONS SUPERSEDE ANY OTHER DIRECTIONS ON THE LABEL CONCERNING AERATION AND REENTRY.

F. Warehouse, Grain Elevator, Food Processing Plant, Restaurants, and Other Empty Building Fumigation.

All precautionary procedures as outlined immediately under SECTION I, SPACE FUMIGATION DIRECTIONS, must be followed.

Check with appropriate municipal and county authorities before fumigating to be completely familiar with local regulations. Ordinances may require watchmen or locks during fumigation and/or notification of the nearest fire station.

Preparation for Fumigation. Remove the following items from the structure to be fumigated: 1) all food, animal feed and medicinals not sealed in metal or glass; 2) seeds, bulbs and live plants; 3) pets (including fish and birds); 4) furs; 5) horsehair articles; 6) rubber goods (natural latex); 7) carbonless carbon forms and blueprints; 8) automobiles; 9) cinder blocks; 10) articles containing sulfur.

Extinguish all open flames including pilot lights. Turn off electric heating elements. Open all interior doors, openings into attics and crawl spaces. Open cabinet doors and drawers. Windows should be open when tarpaulins are used.

1. See Table I for rates of application and pests controlled.
2. **Sealing the Building.** The most important part of the fumigation is the preparation and sealing of the structure. A thorough sealing job is necessary. Avoid fumigating under windy conditions.

Sealing of the building begins with the closing of all external openings to the building. Wrap roof ventilators, chimneys and other large openings with a tarpaulin or plastic sheet

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and seal with duct or other appropriate tape. Screened openings may also be sealed with a wide, commercial masking or duct tape. Cleaning of the surfaces to be taped and the use of commercial spray-on adhesives will improve sealing.

For masonry or metal structures, seal all cracks and other air leaks with caulking material or tape, and seal cracks around doors, windows, vents and other openings. Wooden structures and others that cannot be readily sealed may be completely enveloped with an impervious tarpaulin. Seal securely all seams between tarps and seal the lower edges of the tarp to the ground with moist soil or with sand or water snakes. To prevent escape of gas through the ground and avoid injury to nearby plants, wet the soil to a depth of six inches for a distance of one foot outward from the edge of the tarp.

Exterior doors and windows should be wedged tight, locked, and sealed. Large exterior doors may require additional efforts to seal properly. Broken window panes should be replaced. Check for cracks around the eaves, in the floor and roof, and seal them.

Special care should be taken to seal off adjacent storage or work areas in a building that are not to be fumigated. Adjoining buildings sharing a common wall should be cleared of occupants before fumigation. If this is not feasible, spread a glossy-type building paper along the adjoining wall to prevent spread of the fumigant into undesired areas. Sisal kraft and asphalt-laminated paper, plastic film, and heavily oiled kraft or wrapping paper are appropriate. In all such cases where the adjoining building is occupied, it should be checked frequently with a suitable gas detector during fumigation to ensure the safety of the occupants. Check local regulations for specific requirements.

Doors or hatches on milling machinery should be opened prior to fumigation. These include elevator boots, conveyor lids, settling chamber doors, dust trunks and any other openings that will allow fumigant into the equipment. Inside doors, cabinets, lockers, and drawers should also be opened to facilitate treatment and aeration. "Dead" spouts are particularly difficult to penetrate and should be opened before the fumigation.

4. **Fumigating the Structure. Inside Release.** Cylinders should be placed by a team of two people and the location of each cylinder in the building should be mapped. The cylinders should be arranged so that the fumigators can walk away from the released gas as they open each subsequent cylinder.

Because *Brom-O-Gas* is heavier than air, it is advisable to increase slightly the amount of fumigant released on the top floor. Cylinders should be placed within a room for best distribution into all areas. Cylinders should be placed in an upright position and the shipping caps removed. Because *Brom-O-Gas* is heavier than air, it is sometimes advisable to attach standpipes (or curved pipes directed slightly upward) to the cylinder valves in order to reduce stratification at lower levels. If standpipes are used, they should be equipped with "T" fittings to direct the gas laterally and to prevent direct contact with the ceiling.

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Fans are recommended to distribute the fumigant more quickly and to aid in aeration of the structure after the exposure period. The choice of fan for a given situation may depend upon experience or research data. Generally, one 16 inch fan for every 50,000 cubic feet of space will be sufficient. It is often possible to use heating system fans or other installations already in the building for improved circulation or distribution of the fumigant.

All fans should be running while the gas is being released, and left running until uniform distribution has been accomplished. They may be turned off from outside the building or by using timers.

Prior to fumigation, extinguish all open flames and turn off all high temperature electrical equipment including laboratory ovens, pilot lights, gas refrigerators, oil burners, etc. Brom-O-Gas in the presence of intense heat from such sources may generate some hydrobromic acid which may be injurious to commodities and equipment.

Place warning signs or placards on all entrances to the building. Signs and placards should conform to all local, state, and federal regulations. It is best to inform police, fire and health officials that a fumigation process is about to begin. Observe the location of the nearest outside telephone for use in case of an emergency.

Practice or review the shooting procedure so that the operation will be done efficiently and safely. Respiratory protection equipment should be checked for leaks and other problems before the "practice session". While wearing respiratory protection, quickly open and close the cylinder valves to make certain they are in working order and, thus, avoid delay during the actual release.

Operators should not be in the building longer than 30 minutes while releasing the gas. If it is impossible for one crew to do it within this time period, additional experienced crews should be used. Two people should work together while the gas is being released and when clearing the structure.

Fumigators should always remain in sight of each other from the time they open the first cylinder until the time they leave the building together. While the fumigant is being released, it is advisable to have additional people, with respiratory protection equipment ready, waiting outside to assist if necessary. One member of the team should record the release of the fumigant from each cylinder so that none are missed. Lock and seal the last exit. If guards are used, they should remain on duty during release, exposure, and aeration periods to prevent unauthorized entry.

- 5. Fumigating the Structure. Outside Release.** Releasing the fumigant from outside the space to be fumigated is possible in some situations and will probably minimize applicator exposure to the fumigant. Prepare the building as outlined previously.

Secure the ends of each "shooting" line or hose to each point where the fumigant is to be released, using evaporating pans or plastic sheeting to prevent possible damage to some

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surfaces. Run each line to the cylinder(s) located outside the area to be treated. Connect each line to the cylinder(s) or manifold.

Lock and seal the last exit. If guards are used, they should remain on duty during release, exposure, and aeration periods to prevent unauthorized entry.

Open the valves to release the fumigant. Respiratory protection equipment must be available in the event of a major leak or equipment failure.

- 6. Aerating the Building.** When the exposure period is complete, aeration generally should be started by opening previously sealed doors and windows on the ground floor. Ventilators accessible from the outside should be opened at this time.

After partial aeration, a team of at least two trained people with appropriate respiratory protection should begin opening windows, starting at the lower floors, and working upward. Fans should be on to assist aeration. Aeration is usually complete in four hours depending upon weather conditions and cross ventilation. No one should be allowed inside the building without respiratory protection until the methyl bromide concentration is below 5 ppm in the worker area.

Contact the police, fire and health officials previously notified of the fumigation and inform them that it has been completed.

G. Shipboard, In Transit Ship or Shiphold Fumigation.

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

All precautionary procedures as outlined immediately under SECTION I, SPACE FUMIGATION DIRECTIONS, must be followed.

Prefumigation Procedures.

1. Prior to fumigating a vessel for in transit cargo fumigation, the master of the vessel or his representative, and the fumigator must determine whether the vessel is suitably designed and configured so as to allow for safe occupancy by the ship's crew throughout the duration of the fumigation. If it is determined that the design and configuration of the vessel does not allow for safe occupancy by the ship's crew throughout the duration of the fumigation, then the vessel must not be fumigated unless all crew members are removed from the vessel. The crew members must 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 (5 ppm or below).
2. The person responsible for the fumigation must notify the master of the vessel, or his representative of the requirements: 1) relating to the use of respiratory protection equipment; 2) relating to the use of detection equipment; and 3) that a person qualified in the use of this

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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.

3. During fumigation, or until a manned vessel leaves port or the cargo is aerated, the person in charge of the fumigation shall ensure that a qualified person using gas detection equipment tests spaces for fumigant leakage. If leakage of the fumigant is detected, the person in charge of the fumigation shall take action to correct the leakage, or inform the master of the vessel, or his representative, of the leakage so that corrective action can be taken.

Using appropriate gas detection equipment, monitor spaces adjacent to areas containing fumigated cargo and all regularly occupied areas for fumigant leakage. If methyl bromide concentration above 5 ppm is detected, the area should be evacuated of all personnel, ventilated, and action taken to correct the leakage, before allowing the area to be reoccupied. Do not enter fumigated areas except under emergency conditions. If necessary to enter a fumigated area, wear a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator (personal protection equipment). Never enter fumigated area alone.

At least one other person, wearing personal protection equipment, should be available to assist in case of an emergency. If necessary to enter holds prior to discharge, test spaces directly above cargo surface for fumigant concentration, using an appropriate gas detector and while wearing personal protection equipment. Do not enter without respiratory protection, unless fumigation concentration is at or below 5 ppm, as indicated by a suitable detector.

4. If the fumigation is not completed and the vessel aerated before the manned vessel leaves port, the person in charge of the vessel shall ensure that there be on board the vessel during the voyage: 1) at least two NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirators; 2) one gas detection device; and 3) a person qualified in their operation.

5. See Table I for specific commodities, rates of application and exposure times.

II. SOIL FUMIGATION DIRECTIONS

THE FOLLOWING PRECAUTIONARY PROCEDURES MUST BE FOLLOWED FOR ALL USES ADDRESSED IN THIS SECTION.

PROTECTIVE CLOTHING.

Methyl bromide may be trapped inside clothing and cause skin injury. Wear loose, long-sleeved shirts, long trousers and socks that are cleaned after each wearing. Do not wear jewelry, gloves or other gas confining apparel. If full-face respiratory protection is not required, wear full-face shield for eye protection when handling liquid. After exposure, immediately remove clothing, shoes

and socks. Do not reuse contaminated clothing until thoroughly decontaminated. Drenched shoes cannot be adequately decontaminated.

Under normal conditions of use, no respiratory protection will be required. Because there is a possibility of a spill or leak, the following spill and leak procedures must be understood and followed.

SPILL AND LEAK PROCEDURES

(Equipment Malfunction).

In case of a rupture of hose or fitting while applying fumigant, immediately stop tractor and motor. Immediately evacuate area of spill or leak. Use a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator for entry into affected area to correct problem. Approach from upwind to make necessary repairs. Do not reenter area without respiratory protection until a spill has evaporated or a leak has been repaired, and the methyl bromide concentration is determined to be less than 5 ppm.

NOTE: Fumigation may temporarily reduce nitrification in the soil, thus increasing levels of ammonium nitrogen and soluble ammonium salts to potentially phytotoxic levels. 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. Apply only fertilizer containing at least 30% nitrate until the crop is well established and soil temperature is above 65°F., then fertilize as indicated by soil test. Acid soils should be limed before fumigation to stimulate nitrification and to reduce possible ammonium toxicity.

PRECAUTIONARY STATEMENTS

The following precautions must be followed **PRIOR** to soil fumigation.

- A) Comply with all local regulations and ordinances. Obtain an application permit from agricultural regulatory agencies as required.
- B) **Never** fumigate alone. It is imperative to always have an assistant present and proper protective equipment available in case of accidents.
- C) Persons in charge of all operations must advise other workers of all safety precautions and procedures. In addition, they must instruct their helpers in the mechanical operation of the equipment.
- D) Handle this fumigant in the open, with operator "upwind" from the container where there is good ventilation.
- E) Check fumigant delivery system for leaks before beginning operation. Two trained persons must be present during introduction of the fumigant.

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- F) During soil fumigation, at least 10 gallons of water must be readily accessible at the site of application. This water must be potable and in containers marked "Decontamination water not to be used for drinking".
 - G) All trash should be cleaned from the field before starting fumigation.

The following precautions must be followed DURING the soil fumigation operation.

- A) Two trained persons must be present during introduction of the fumigant.
- B) Do not make application of this fumigant when there is little or no air movement or there is an atmospheric inversion.
- C) Do not lift injection shanks to turn at the end of a pass until fumigant has been purged or drained from system following closure of shutoff valve.
- D) If trash is inadvertently pulled up by the shanks when fumigating, it must be covered with polyethylene film.
- E) When changing the cylinders, be certain they are turned off and fumigant system is not under pressure.

The following precautions must be followed AFTER soil fumigation.

- A) Post all treated areas with warning signs until aeration is complete.
- B) Two trained persons must be present during removal of the tarpaulin, if used.
- C) Keep all animals and unauthorized people away from area during removal of tarpaulin, if used.

APPLICATION METHODS. Brom-O-Gas is to be used only as a preplant treatment when used for soil fumigation.

A. Tarpaulin Methods for Field, Nursery, Greenhouse and Seed or Transplanted Bed Soils.

Pests controlled when present in soil at time of treatment:

Plant-parasitic nematodes, including root-knot, root lesion (meadow), cyst, citrus, burrowing, false root-knot, lance, spiral, ring, sting, stubby root, dagger, awl, sheath and stunt (stylet).

Soil-borne disease causing organisms, including the fungi *Pythium*, *Rhizoctonia*, *Phytophthora*, *Pyrenochaeta*, *Sclerotinia*, *Sclerotium* and *Fusarium* and the clubroot organism *Plasmodiophora*.

Weeds, including broadleaf weeds such as broomrape and lambsquarters and grasses such as bermudagrass, annual bluegrass, torpedograss and quackgrass. Not effective against hard seed weeds, such as mallow, dodder, morningglory, and certain leguminous weeds.

Insects, including wireworms, cutworms, grubs, rootworms, ants and garden symphylans.

Pretreatment Soil Preparation.

Plow or rip or otherwise till 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 worked into the soil to allow for decomposition prior to fumigation. Soil moisture should be adequate 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 four days prior to treatment. Do not fumigate if the soil temperature is below 50°F. For best results, fumigate when soil temperature is 60°F. to 80°F. at the depth of 6 inches.

1. Overall Application.

Inject *Brom-O-Gas* with a chisel type applicator having the chisels spaced no more than 12 inches apart and injecting the fumigant to a depth of 6-8 inches below the soil surface. The soil surface must be covered with polyethylene film immediately after treatment with simultaneous film laying equipment or by sealing with a roller or cultipacker and covered within 20 minutes with polyethylene film or other suitable cover. Consult Table II for proper rates of application and exposure periods. At the end of exposure period, remove tarpaulins and aerate for 3 days before seeding and 5 to 7 days before introducing transplants or vegetative plant parts.

2. Row or Bed Application.

Apply the broadcast rate to the area actually treated, i.e., the area delimited by the film mulch. Consult Table II for treatment rates.

Use one or more shanks per bed spaced not more than 12 inches apart, depending on the area to be treated. Inject the fumigant 6-8 inches below the surface of the bed and simultaneously cover with polyethylene film or other suitable cover. At the end of the exposure period, remove tarpaulins and aerate for 3 days before seeding and 5-7 days before introducing transplants or vegetative plant parts. Where polyethylene film is to be utilized as a mulch, aeration is accomplished by making holes in the film on spacings appropriate for the crop to be planted.

3. Raised Tarp Fumigation Method for Plant Beds and Other Small Areas.

- A. Dig a trench around the perimeter of area to be treated, throwing soil to the outside so it can be used to bury tarpaulin edges after covering.
- B. Place items such as inflated plastic bags, crumpled fertilizer bags, burlap bags stuffed lightly with hay or straw, inverted baskets, flowerpots or bottles on the soil surface of the area to be treated to support the cover and provide a small gas dome to facilitate fumigant distribution.
- C. Evaporating pans are essential for the volatilization and uniform dispersion of fumigant except where a vaporizer is used as described in step I below. Shallow pans or basins

made of plastic or metal, except aluminum, are satisfactory for this purpose. Use one evaporator pan for each 300 to 400 square feet of area. Special units are available for use of 1 and 1 1/2 pound cans that combine opener and evaporative pan functions, and are designed to be used with all parts under the tarp.

- D. For delivery of Brom-O-Gas from outside the tarp, polyethylene tubing is required. Anchor one end of each polyethylene tube into an evaporating pan with tape or a suitable weight. This ensures that the liquid will be directed into the evaporating pan.
- E. Extend the free ends of the polyethylene tubes outside of the area to be covered.
- F. After the supports and tubing are in place, cover the area to be fumigated with polyethylene film or other suitable material.
- G. Seal by placing the outside edges of tarpaulin in the trench and covering with soil. Tamp soil down so edges will not pull loose.
- H. Attach a polyethylene tube to the can applicator or cylinder valve outlet and release fumigant. Use a cylinder dispenser or scale to meter small amounts from cylinders. Consult Table II for proper rates of application and exposure periods.
- I. Fumigant may be vaporized before introduction by means of a commercially manufactured heat exchanger, by using a copper coil immersed in a vessel of hot water or by immersing a can in hot water. CAUTION: Puncture can with applicator before immersing in hot water; keeping outlet up to allow only vapor to enter polyethylene tube.

4. Special Instructions for Tree Site Replants.

Use practices as described above in method for plant beds, etc. except for the following:

1. Confine the treatment to an area not exceeding 10 feet by 10 feet.
2. The center of the treated zone must be at least 5 feet from the dripline of the nearest existing tree.

5. Special Instructions for Florida Citrus.

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

B. Non-Tarp Nematode Control.

All precautionary procedures as outlined immediately following SECTION II, SOIL FUMIGATION DIRECTIONS, must be followed.

This is a preplant or replant treatment for citrus, vineyards and deciduous fruits and nuts. 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.

This method controls plant parasitic nematodes when present in soil at the time of treatment.

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 and residue from previous crops should be worked into the soil to allow for decomposition prior to fumigation. To ensure maximum fumigant penetration the soil at the point of injection should not contain more than 5 to 15% moisture depending on soil type. However, to improve sealing, the soil surface may be moistened by means of a sprinkler application of 1/4 to 1/2 inch of water prior to final preparation and application. Avoid treatment of soils that contain more than 30% clay or those with high organic content. For best results, fumigate when the soil temperature is 60° to 80°F. at the depth of 6 inches. Do not fumigate when soil temperature is below 50°F.

Methods of Application.

1. **Chisel Application.** After the soil has been properly prepared, inject 400-870 pounds of *Brom-O-Gas* per acre by chisel application with chisels spaced up to 66 inches apart to a depth of 24-30 inches. In the row, strip treatments may be made by using a single shank. Chisels should have a wing welded on the back 2-4 inches above the chemical outlet to partially break the chisel mark. To fill in the chisel mark and seal the surface, disc and cultipack immediately after fumigant injection. Be sure that the disc and cultipacker cover an area at least 33 inches beyond the chisel lines. Refer to Table II for dosage rates and exposure times.
2. **Deep Injection Auger-Probe Treatment.** Use one pound of *Brom-O-Gas* per injection site in lighter soils; two pounds in fine textured soils, to a depth of 24-36 inches. Use one injection site per 100 square feet (or a 10 ft.x 10 ft. grid pattern) with the injection in the center of the area to be treated. Tamp or compact the soil at the point of injection. For replant applications in orchards and vineyards, do not locate center of injection site less than 5 feet from the dripline of the nearest tree or vine. Refer to Table " for dosage rates and exposure times.

C. Special Instructions for the control of *Armillaria mellea* (Oak Root Fungus) on Citrus, Vineyards, and Deciduous Fruits and Nuts.

Pretreatment Soil Preparation

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

Dosage and Method of Application

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

1. Non-tarp Chisel Application (Not for use in California). After the soil has been properly prepared, inject 400-870 pounds of *Brom-O-Gas* per acre by chisel application with chisels spaced up to 66 inches apart to a depth of 24-30 inches. In the row strip, treatments may be made by using a single shank. Chisels should have a wing welded on the back 2-4 inches above the chemical outlet to partially break the chisel mark. To fill in the chisel mark and seal the surface, disc and cultipack immediately after fumigant injection. Be sure that the disc and cultipacker cover an area at least 33 inches beyond the chisel lines.
2. Tarp Chisel Application. After the soil has been properly prepared, apply 400-870 pounds of fumigant per acre by chisels spaced up to 66 inches apart, as described above, and cover with polyethylene film.
3. Deep Injection Auger-Probe Treatment. Use one pound of *Brom-O-Gas* in light soils (two pounds in fine-textured soils) to a depth of 36 inches or more below the soil surface. Assume one injection site per 100 square feet (on a 10 ft. x 10 ft. grid pattern) with the injection in the center of the area to be treated.

Exposure and Aeration Period

To ensure the proper time-concentration relationship to control oak root fungus, observe a seven day exposure period before removing the polyethylene film cover. Allow a 14-day aeration period after removal of tarp or application by non-tarp methods before planting trees or vines.

D. Special Instructions for Control of Ants (including Texas leaf-cutting ant and red imported fire ant).

Do not fumigate near or under homes or other structures. Plant injury may result if used within the dripline of trees or adjacent to desired shrubs and ornamental plantings.

To control ants, use at least one pound of *Brom-O-Gas* per 100 square feet of colony. Apply fumigant with a can opener designed for methyl bromide cans and with at least eight feet of plastic tubing or other equipment designed specifically for this purpose. When either tubing or a probe at the end of the tubing is used, a few holes or notches near the tip will help prevent plugging. Insert tubing or probe into an active feeder hole near the center of the main cavity. The main cavity is marked by numerous crater-shaped mounds where a considerable amount of soil has been

brought to the surface. Seal or pack other mound openings with soil. Secure tubing so it will not whip loose. Stand upwind to release fumigant. Do not remove tubing or probe from soil for 10 minutes. After removal of tubing or probe, pack treated mound opening with soil to better seal fumigant in ant galleries. Fumigation is more effective when soil moisture is high. A plastic tarp may also be used to improve sealing.

E. Special Instructions for Greenhouse Soil Fumigation.

The use of methyl bromide in confined spaces presents a potential hazard to humans and plant life. Special precautions must be taken 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 are strictly observed. 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 ensure proper application.

Two persons trained in the use of this 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). If the concentration of methyl bromide in the worker area, as measured by a pump and appropriate detector tubes (for example, Draeger, Kitagawa, MSA, and Sensidyne), does not exceed 5 ppm, no respiratory protection is required. If this concentration is exceeded at any time, all persons in the fumigation area must wear a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator or evacuate the area.

Fumigation of greenhouse soils may be done by any of the tarpaulin methods described in Section II. A., depending on the greenhouse size and accessibility to equipment. Consult Table II for proper rates of application and exposure periods. If a wind is blowing, all injection should be made upwind from a previous injection site. Immediately after injection of the fumigant and tarping, a qualified person, wearing protective equipment, should monitor the tarped area with a halide detector. If excessive leaks are found, the source of the leak should be resealed immediately.

During this operation, all windows and doors should be open and fans operating to maximize ventilation. The greenhouse must be placarded on all entrances to the fumigated area with signs bearing, in English and Spanish:

1. The signal word DANGER/PELIGRO and the skull and crossbones symbol.
2. The statement, "Area under fumigation, DO NOT ENTER/NO ENTRE".
3. The date of fumigation.
4. Name of the fumigant used (i.e., *Brom-O-Gas*).
5. Name, address and telephone number of the applicator.

Aeration and Reentry.

After fumigation, treated areas must be aerated until the level of methyl bromide is below 5 ppm. Do not allow entry into the treated area by any person before this time, unless provided

with a respiratory protection device (NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator). Only a certified applicator or someone under his/her supervision, may remove placards.

F. Potting Mix Fumigation Directions.

Potting mixes including decomposed compost, soil mixes, and manure can be fumigated with *Brom-O-Gas*. Fumigation should take place outdoors or in a well ventilated area away from desirable plants or occupied buildings. The material to be treated should have a temperature of 60°F. or above, be loose, and moist enough for good seed germination. To ensure a good seal, pile the material on a concrete floor or on wet ground. Pile to a depth of 18 inches. Piles two to three 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. Evaporating pans are essential for the volatilization and uniform dispersion of fumigant except where a vaporizer is used. Shallow pans or basins made of plastic or metal (except aluminum) are satisfactory for this purpose. For delivery of *Brom-O-Gas* from outside the tarpaulin, polyethylene tubing is required. Anchor one end of each polyethylene tube into an evaporating pan with tape or a suitable weight. This ensures that the liquid will be directed into the evaporating pan. Place evaporating pan(s) with anchored applicator tubing about 30 feet apart on the pile surface. Extend the free ends of the polyethylene tubes outside the area to be covered. Cover with a polyethylene sheeting or other gas confining material of 4 mil or greater thickness. Seal the edges by burying, covering with moist sand or soil or by means of sand snakes. Attach applicator tube to the can or cylinder valve outlet and release fumigant. Use a cylinder dispenser or scale to meter small amounts from cylinders. Special units are available for use of 1 and 1 1/2 pound cans that combine opener and evaporating pan functions, and are designed to be used with all parts under the tarpaulin. Consult Table II for proper rates of application and exposure periods. At the end of the exposure period, unseal opposite ends of the tarpaulin and allow to aerate for at least 30 minutes before completely removing the tarp. To avoid phytotoxicity, aerate for 24-72 hours before planting.

Potting mixes in flats may also be treated. Arrange the flats in loose criss-cross stacks no more than 5 feet high, then cover and seal as described above. Introduce the fumigant at the top and in the center of the stack. Use one injection point for each 100 cubic feet. Aerate for 24 hours.

TABLE I
BROM-O-GAS
APPLICATION SUMMARY FOR STRUCTURAL PEST CONTROL AND OTHER SITES¹

TREATMENT SITE	PESTS	VOLUME	RATE (lb/1000ft ³)	EXPOSURE TIME (hrs)
Structures:				
Dwellings ²	termites (drywood & dampwood), bedbugs, cockroaches, silverfish, powder post beetle, death watch beetle, carpenter ants		1-3	16-24
	rats and mice		4-5 oz.	12-18
Warehouses (empty)	cockroaches, confused flour beetle, rice weevil, saw toothed grain beetle, lesser grain borer, cadelle, khapra beetle, drugstore beetle, larder beetle, carpet beetle, copra beetle, coffee bean weevil, groundnut bruchid, common bean weevil, dried fruit beetle, golden spider beetle, Australian spider beetle, cigarette beetle, angoumois grain moth, Mediterranean flour moth, warehouse moth, Indian meal moth, common grain mite	Less than 100,000 cu.ft.	1-3	16-24
Feed Room (empty)		100,000-500,000 cu.ft.	1-1.5	16-24
Grain Bins (empty)		500,000-1,000,000 cu.ft.	1-1.25	16-24
		over 1,000,000 cu.ft.	1	16-24
Greenhouse (empty)	mealybugs, scale insects and mites		3	3-4
Mushroom Houses (empty)	mushroom flies		2	16-24
Poultry Houses (empty)	poultry mites, bedbugs		2	16-24
	rats and mice		4-5 oz.	12-18
Materials:				

TREATMENT SITE	PESTS	VOLUME	RATE (lb/1000ft ³)	EXPOSURE TIME (hrs)
Bags, Boxes and crates (empty)	cockroaches, confused flour beetle, rice weevil, granary weevil, saw toothed grain beetle, rusty grain beetle, lesser grain borer, cadelle, khapra beetle, carpet beetle, copra beetle, coffee bean weevil, groundnut bruchid, common bean weevil, dried fruit beetle, golden spider beetle, Australian spider beetle, cigarette beetle, angoumois grain moth, Mediterranean flour moth, warehouse moth, Indian meal moth, common grain mite		1.5-3 ^a 2-3 ^b	16-24 2
	rats and mice		4-5 oz.	12-18
Furniture	termites (drywood & dampwood), bedbugs, cockroaches, silverfish, powder post beetle, death watch beetle, carpenter ants, clothes moth, cigarette beetle, drugstore beetle, carpet beetle		1-3 ^a 2-3 ^b	16-24 2
Lumber and Wood Products	termites (drywood & dampwood), powder post beetle, round and flat headed borers, carpenter ants and bark beetles		1-3 ^a 2-3 ^b	16-24 2
Used Tires	Mosquitoes		2 ^c	16-24
Baled Tobacco	drugstore beetle, cigarette beetle, tobacco beetle, tobacco moth		2-3 ^a 4 ^b	48-72 4
Baled Cotton	pink bollworm, boll weevil		3 ^a 4 ^b	16-24 2

¹ At temperatures below 60°F, increase the dosage by 1/2 pound per 1,000 cu. ft. for every 10°F drop in temperature or use an approved procedure to heat the fumigant. Do not fumigate when temperature is below 40°F.

² For dwellings, do not use methyl bromide formulations containing 2% or more chloropicrin.

^a Atmospheric ^b Vacuum Chamber (25-27) Remove food and feed commodities before fumigating dwellings.

^c Warning: Tires may off-gas for 2 to 3 days. During this period, gas levels may exceed 5 ppm. Tires must be free of water during fumigation.

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TABLE II
BROM-O-GAS SOIL FUMIGATION USES

TREATMENT SITE	RATE* & METHOD ^b	EXPOSURE TIME
Field Soils to be Planted to:		
asparagus, broccoli, cauliflower, eggplants, lettuce, muskmelons, onions (dry bulb), peppers, pineapples, strawberries, tomatoes	180-240 lb/A (IT) 0.4-0.55 lb/100 ft ² (RT)	24-48 hours 24-48 hours
Florida citrus ^c	1.0 lb/100 ft ² (IT) ^d	96 hr. ^d
Citrus, vineyards and deciduous fruits and nuts	400-870 lb/A (NTC) ^e (IT) 1-2 lb/100 ft ² (NTP)	7 days ^f 7 days ^f
Nursery and Greenhouse Soils, Seed and Transplant Beds and Turf:		
Non-food crops	180-435 lb/A (IT)	24-48 hours
Non-food crops	0.4-1.0 lb/100 ft ² (RT)	24-48 hours
Tobacco	872 lb/A (IT)	24-48 hours
Tobacco	2 lb/100 ft ² (RT)	24-48 hours
Tomato (Greenhouse Crop)	180-240 lb/A (IT)	24-48 hours
Potting Mix	1 lb/cu.yd. (RT)	24-48 hours

- * Use higher rates indicated for muck and heavy clay soils.
- ^b Methods of application: IT = Injected with chisels plus covered with tarpaulin.
RT = Raised tarp with topical (surface) application.
NTC = Non-tarp chisel injection 24-30 inches deep.
NTP = Non-tarp deep injection, auger-probe.
- ^c May not bear harvestable fruit within 24 months.
- ^d Also requires 4 mil tarp.
- ^e Not for use in California for *Armillaria* control.
- ^f For control of *Armillaria*; must use tarpaulin.