

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

22 SEP 1988

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Dennis K. Prober
Van Waters & Rogers, Inc.
Subsidiary of UNIVAC
2256 Junction Avenue
San Jose, CA 95131

Subject: Methyl Bromide Registration Standard
NAMCO Pintofume
EPA Registration No. 550-123
Your Application of July 19, 1988

Dear Mr. Prober:

Your submission has been reviewed and found to be acceptable for the product listed above.

Enclosed for this product is stamped, approved labeling. Incorporate the following comment and submit five copies of finished printed labeling for our records.

Under "Disposal" revise "Pesticide wastes are acutely hazardous." to "Pesticide wastes are toxic."

You are reminded that an application manual must be provided to applicators who use this product. You should contact one of your suppliers and have them provide you with their approved application manual for distribution.

Sincerely,



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

Enclosure

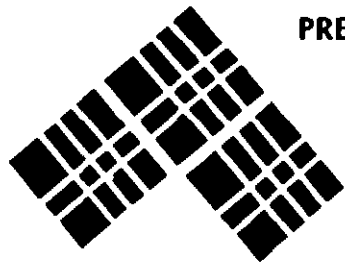
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CONCURRENCES

SYMBOL	NAME	DATE						

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**.



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

NAMCO®

Pintofume

(Methyl bromide odorized with 2% chloropicrin)

For use as a pre-plant soil treatment and as a fumigant for structures in which the food- and feedstuffs have been removed.

ACTIVE INGREDIENT: Methyl bromide 98%
INERT INGREDIENT: Chloropicrin 2%

KEEP OUT REACH OF CHILDREN, IRRESPONSIBLE PERSONS AND PETS

DANGER



POISON



PELIGRO

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

STATEMENT OF PRACTICAL TREATMENT

IF INHALED: Get exposed to fresh air. 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.

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.

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 over-exposures 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. See the product MSDS for additional information.

BEST AVAILABLE COPY

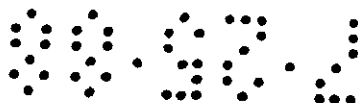
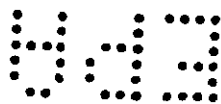
Formulated by

Van Waters & Rogers Inc.

subsidiary of UNIVAR

Seattle, WA 98104

EPA Reg. No. 550-123
 EPA Est. No. 550-CA-1



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NET WT

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**PRECAUTION
 HAZARDS TO H**

Extremely hazardous liquid and vapors or cause serious acute illness or death or skin or eye injury which may be permanent.

This product contains chloropicrin in the respiratory tract, and even at low concentrations these symptoms occur, leave the fumigated persons until monitoring shows the absence of chloropicrin.

RESPIRATORY PROTECTION: If in a confined area, as measured by a pump and analyzer (Kitagawa, MSA and Sensidyne), do not enter until the concentration of chloropicrin is less than 0.1 mg/M3 for chloropicrin, no respiratory protection is required at any time, or the concentration of chloropicrin is less than 0.1 mg/M3. NIOSH/MSHA approved self-contained breathing apparatus or evacuate the area. Protection is required.

PROTECTIVE CLOTHING: Methy bromide is a skin irritant. Wear loose, long-sleeved clothing, or disposable clothing. Do not wear respiratory protection is not required. After exposure, immediately remove clothing until thoroughly decontaminated and should be disposed of.

REQUIREMENT FOR BACK-UP PERSONS: Enclosed spaces (e.g., homes and cars, ships, and other transport vehicles) of this product must be present during fumigation when testing for re-entry. Two persons (one inside the area being fumigated and one outside) must be present.

PLACARDING/POSTING REQUIREMENTS: Placard or post all railcars, trucks, and trailers with the following placard or post in Spanish:

1. The signal word DANGER/PELIGRO
2. The statement, "Area under fumigation"
3. The date of fumigation
4. Name of fumigant used; i.e., methyl bromide
5. Name, address, and telephone number of the fumigator
6. Additional information required by the regulatory agency

RE-ENTRY, AERATION AND PLACARDING: Domestic animals or unprotected plants and **PROTECTIVE CLOTHING** also is permitted to remove placards a complete when monitoring of each bromide and 0.1 ppm chloropicrin treated goods. Incompletely aerate with the goods to the new site. Be informed and appropriate measure exposure from exceeding 5 ppm is not to be run over the road before re-entry.

It is a violation of Federal Law to use this fumigant in a manner not in accordance with the proper use. Before using, read the label.

All persons working with this fumigant must use of required respiratory equipment.

Do not use in sites which are not suitable for fumigation.

Conditions of Sale and Warranty: The Directions for Use of this product shall be reliable and should be followed carefully. Crop injury, ineffectiveness, or other conditions, presence of other materials, or other factors are assumed by the user. All such risks shall be assumed by the user. **SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, OTHER THAN INDICATED ON THE LABEL WHEN SUCH USE OR HANDLING IS CO**

STATEMENTS DOMESTIC ANIMALS

do not breathe vapor. Inhalation may be fatal injury. Liquid or vapor can cause serious injury. Do not allow re-entry of unprotected animals for methyl bromide and 0.1 ppm for chloropicrin.

Methyl bromide and chloropicrin in the worker tubes (for example, Draeger, Matheson-YM3 for methyl bromide or 0.1 ppm (0.3 if the above concentrations are exceeded) in the fumigation area must wear a SCBA or combination air-supplied/SCBA to be worn any time respiratory protection

may be trapped inside clothing and cause chills and socks that are cleaned after each wear. Use other gas confining apparel. If full-face respirator for eye protection when handling liquid and socks. Do not reuse contaminated clothing. Drenched shoes cannot be adequately

RESPIRATORY PROTECTION: When used for fumigation of spaces, vaults, chambers, trucks, vans, boxed goods), two persons trained in the use of fumigant, initiation of aeration, and after aeration if monitoring is conducted remotely

Methyl bromide as a space fumigant, the application area with signs bearing, in English and

cross-bones symbol
"NO ENTRY"

with chloropicrin

Persons. Contact Van Waters & Rogers Inc. for

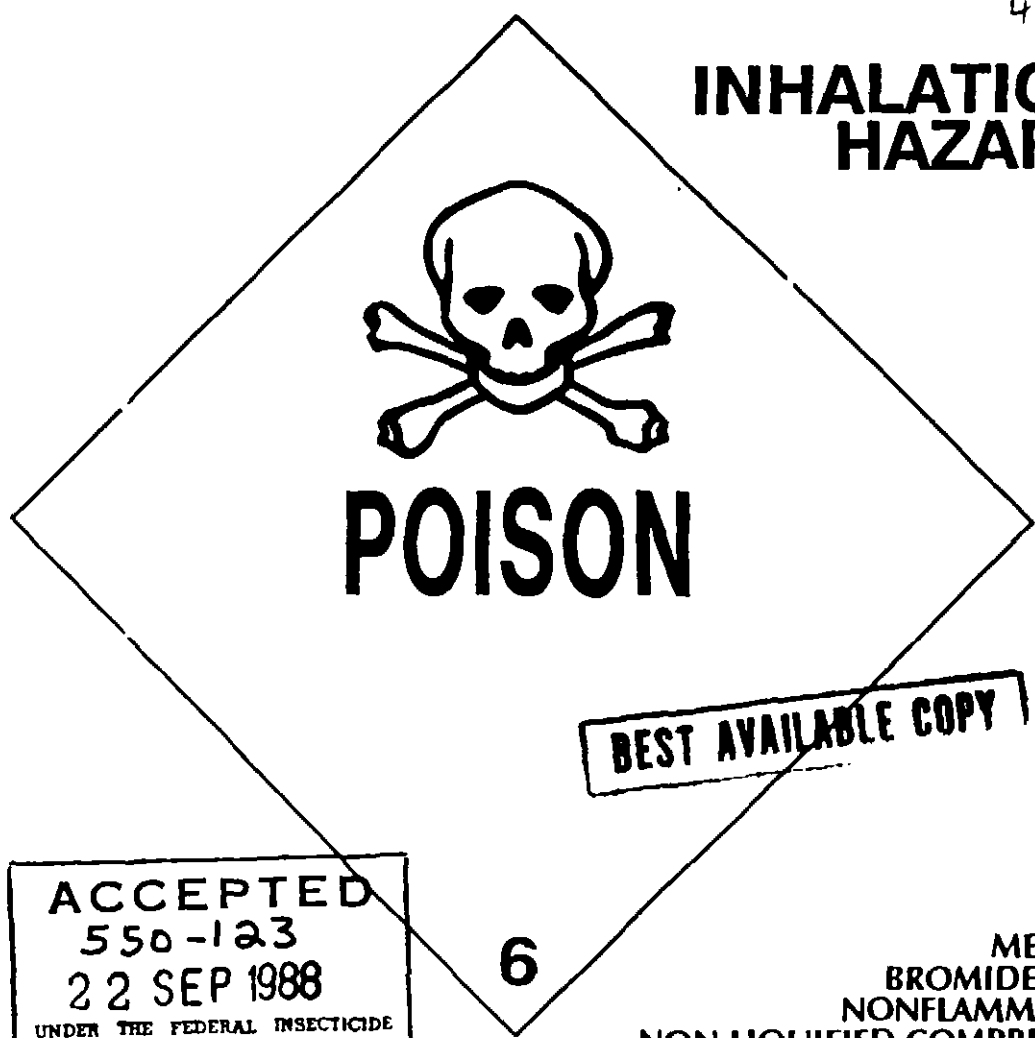
Do not remove placards or allow re-entry of unprotected area until the fumigation area is aerated completely. Aeration is determined that less than 5 ppm methyl bromide and, when feasible, in the mass of the fumigant, the placards must be transferred to the incompletely aerated goods must be protected (by use of respiratory protection) to prevent chloropicrin. Trucks, vans and trailers are

USE

Do not use in a manner inconsistent with its label. This product is used only by individuals trained in its use and label precautions and directions. Do not use in areas where the hazards, and trained in the use of emergency procedures, and proper use for storage or transportation of food.

Do not use on field use and tests. The directions are believed to eliminate all risks normally associated with use of this product. However, some risks may result because of such factors as weather conditions, all of which are beyond the control of Van Waters & Rogers.

THIS MATERIAL OR THE USE OF THIS PRODUCT IS NOT TO BE USED FOR THE STORAGE OR HANDLING OF THIS MATERIAL



INHALATION HAZARD

BEST AVAILABLE COPY

ACCEPTED
550-123
22 SEP 1988
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UNDER THE FEDERAL INSECTICIDE FUNGICIDE AND RODENTICIDE ACT FOR ECONOMIC POISON REGISTRATION UNDER NO. SUBJECT TO ATTACHED COMMENTS.

METHYL BROMIDE AND NONFLAMMABLE, NON LIQUIFIED COMPRESSED GAS, MIXTURE, LIQUID (INCLUDING UP TO 2% CHLOROPICRIN) NA1955 POISON B

STORAGE, HANDLING AND DISPOSAL

CYLINDER STORAGE AND HANDLING: Store in a dry, cool, well-ventilated area under lock and key. Post as a pesticide area. Store cylinders upright, secured to a rack or wall to prevent tipping. 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 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 onto valve outlet, and replace protection bonnet before returning to shipper. Only registrant, or his designee, is authorized to refill cylinders. Do not use cylinders for any other purpose.

DISPOSAL - Pesticides: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide or rinsate 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.

Cylinders: Cylinders remain the property of Van Waters & Rogers Inc. Any empty, defective, and unneeded cylinders should be returned to Waters & Rogers Inc. by calling the local office to arrange for pick-up, or call (408) 437-8700. Do not ship cylinders without safety caps or protection bonnets.

SPILL AND LEAK PROCEDURES: Evacuate immediate area of spill or leak. Do not permit re-entry into spill area by unprotected persons until the concentrations are determined to be less than 5 ppm for methyl bromide and less than 0.1 ppm for chloropicrin. Applying water to spills of this product complicates detection of spilled material, increases the product's evaporation time, and spreads the contamination. If leak occurs while cylinder is on tractor, i.e., rupture of hose or fitting, immediately stop tractor and motor. Use NIOSH/MSHA approved self-contained SCBA or combination air-supplied/SCBA respirator for entry into affected area to correct problem. Move leaking or damaged cylinders outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Allow spill to evaporate. Increasing the air flow and/or temperature in the area of the spill will speed up the evaporation process. Alternatively, a leaking cylinder may be removed to an isolated area and the contents discharged under a polyethylene sheeting of 4 mil or greater thickness into the soil surface in accordance with instructions under SOIL FUMIGATION DIRECTIONS. Contaminated soil, water, and other clean-up debris is a toxic hazardous waste. Report spill to the National Response Center (800/424-8802) if the reportable quantity of 4800 pounds is exceeded.

See PRODUCT BULLETIN for additional precautions and specific directions for use

present during the fumigation... the action level for the fumigant is not exceeded in adjacent work areas.

1. Load the chamber with the material to be fumigated, close exhaust ports, turn on circulation fan and close chamber door.
2. Determine the proper rate of application and exposure time from the following table.
3. Place the structure. Turn on red warning light on the door if present. Leave light on and placards in place until level are below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin.

...the fumigant into the chamber by releasing it into the atmosphere in front of a blower or fan, passing it through a...

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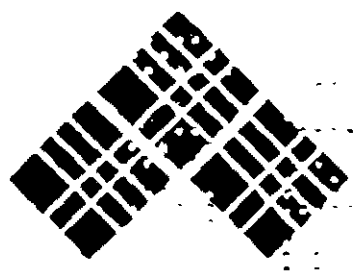
BEST AVAILABLE COPY

Product Bulletin

RESTRICTED USE PESTICIDE DUE TO ACUTE TOXICITY

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NAMCO®

Pintofume

(Methyl bromide odorized with 2% chloropicrin)

For use as a pre-plant soil treatment and as a fumigant for structures in which the food- and feedstuffs have been removed.

ACTIVE INGREDIENT: Methyl bromide 98%
INERT INGREDIENT: Chloropicrin 2%

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KEEP OUT REACH OF CHILDREN, IRRESPONSIBLE PERSONS AND PETS

DANGER



POISON



PELIGRO

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

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IF INHALED: Get exposed to fresh air. 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.

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.

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 over-exposures 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. See the product MSDS for additional information.

ACCEPTED

550-123

2 SEP 1988

VWR

UNDER THE FEDERAL INSECTICIDE
FUNGICIDE AND RODENTICIDE ACT
FOR ECONOMIC POISON REGISTERED
UNDER NO. SUBJECT
IC ATTACHED COMMENTS.

Formulated by

Van Waters & Rogers Inc.

subsidiary of UNIVAR

Seattle, WA 98104

EPA Reg. No. 550-123-AA

This product contains chloropicrin as a warning odorant. Chloropicrin may be irritating to the upper respiratory tract and even at low levels can cause painful irritation to the eyes, producing tearing. If these symptoms occur, leave the fumigation area immediately. Do not allow re-entry of unprotected persons until monitoring shows levels to be lower than 5 ppm for methyl bromide and 0.1 ppm for chloropicrin.

RESPIRATORY PROTECTION: If the concentrations of methyl bromide and chloropicrin in the work area, as measured by a pump and the appropriate detector tubes (for example, Draeger, Matheson Kitagawa, MSA and Sensidyne), do not exceed 5 ppm (20 mg/M³ for methyl bromide or 0.1 ppm (0.3 mg/M³) for chloropicrin, no respiratory protection is required. If the above concentrations are exceeded at any time, or the concentration is unknown, 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. Protective clothing is required to be worn any time respiratory protection is required.

PROTECTIVE CLOTHING: Methyl bromide and chloropicrin may be trapped inside clothing and cause skin injury. Wear loose, long-sleeved shirts, long trousers and socks that are cleaned after each wearing, or disposable clothing. 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 fumigant. After exposure, immediately remove clothing, shoes and socks. Do not reuse contaminated clothing until thoroughly decontaminated by airing, and washing. Drenched shoes cannot be adequately decontaminated and should be disposed of properly.

REQUIREMENT FOR BACK-UP PERSONNEL IN ENCLOSED SPACES: When used for fumigation of enclosed spaces (e.g., homes and other structures, greenhouses, vaults, chambers, trucks, vans, boxcars, ships, and other transport vehicles, and tarpaulin-covered goods), 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 re-entry. Two persons do not need to be present if monitoring is conducted remotely (outside the area being fumigated).

PLACARDING/POSTING REQUIREMENT: 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 cross-bones symbol
2. The statement, "Area under fumigation, DO NOT ENTER/NO ENTREE"
3. The date of fumigation
4. Name of fumigant used; i.e., odorized methyl bromide with chloropicrin
5. Name, address, and telephone number of the applicator
6. Additional information required by local or state regulations

Railcars must be placarded with D.O.T. specified warning signs. Contact Van Waters & Rogers Inc. for appropriate signs.

RE-ENTRY, AERATION AND PLACARD REMOVAL: Do not remove placards or allow re-entry of domestic animals or unprotected persons until aeration is complete—see RESPIRATORY PROTECTION and PROTECTIVE CLOTHING above. Only a certified applicator or someone under his/her supervision is permitted to remove placards and only when the fumigated area is aerated completely. Aeration is complete when monitoring of each fumigation site or vehicle determines that less than 5 ppm methyl bromide and 0.1 ppm chloropicrin are present in the air space and, when feasible, in the mass of the treated goods. Incompletely aerated goods may be moved; however, the placards must be transferred with the goods to the new site. Workers who transfer or handle incompletely aerated goods must be informed and appropriate measures must be taken (i.e., ventilation or respiratory protection) to prevent exposure from exceeding 5 ppm methyl bromide or 0.1 ppm chloropicrin. Trucks, vans and trailers are not to be run over the road before completely aerated.

ENVIRONMENTAL HAZARDS: The high volatility of this fumigant permits it to be vented from spaces being fumigated and to dissipate rapidly. In sensitive situations, monitor the area immediately surrounding the fumigation site with a suitable detector during exposure and aeration periods to establish that dangerous levels of this fumigant are not present.

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 on an NPDES permit. Do not discharge effluent containing this product to sewer systems without notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

PHYSICAL HAZARDS: Contents under pressure. Do not use or store near heat or open flame. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.

CHEMICAL HAZARDS: This product is nonflammable. There is no danger from fire or explosion in use concentrations. However, flames and other heat sources above 300°F can cause degradation of this product to form hazardous and corrosive acids which can damage items in the space being fumigated. Pilot lights and glowing wire heaters should be turned off. Since pilot lights can continue to burn using gas remaining in the gas line, appropriate actions should be taken so the pilot light is extinguished before the fumigant is injected into the structure. Do not apply fumigant directly to metal surfaces because of possible corrosive effects on some metals. Releasing this fumigant in the liquid form into the space to be fumigated at a rate which exceeds the capability of the surrounding air to volatilize it readily can result in the liquid fumigant contacting surfaces and damaging them. Also, if the fumigant is released too quickly, moisture from the air may condense with the fumigant to form a water/fumigant mixture which may damage items. The use of this product with aluminum, magnesium, zinc, and steel will result in the liberation of toxic gases, and possible

DIRECTIONS FOR USE

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

This fumigant is a highly hazardous material and should be used only by individuals trained in its proper use. Before using, 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 this fumigant.

STORAGE, HANDLING AND DISPOSAL

CYLINDER STORAGE AND HANDLING: Store in a dry, cool, well-ventilated area under lock and key. Post as a pesticide area. Store cylinders upright, secured to a rack or wall to prevent tipping. Cylinder 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 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 onto valve outlet, and replace protection bonnet before returning to shipper. Only registrant, or his designee, is authorized to refill cylinders. Do not use cylinders for any other purpose.

DISPOSAL - Pesticides: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide or rinsate 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.

Cylinders: Cylinders remain the property of Van Waters & Rogers Inc. Any empty, defective, and unneeded cylinders should be returned to Waters & Rogers Inc. by calling the local office to arrange for pick-up, or call (408) 435-8700. Do not ship cylinders without safety caps or protection bonnets.

SPILL AND LEAK PROCEDURES: Evacuate immediate area of spill or leak. Do not permit re-entry into spill area by unprotected persons until the concentrations are determined to be less than 5 ppm for methyl bromide and less than 0.1 ppm for chloropicrin. Applying water to spills of this product complicates detection of spilled material, increases the product's evaporation time, and spreads the contamination. If leak occurs while cylinder is on tractor, i.e., rupture of hose or fitting, immediately stop tractor and motor. Use NIOSH/MSHA approved self-contained SCBA or combination air-supplied/SCBA respirator for entry into affected area to correct problem. Move leaking or damaged cylinders outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Allow spill to evaporate. Increasing the air flow and/or temperature in the area of the spill will speed up the evaporation process. Alternatively, a leaking cylinder may be removed to an isolated area and the contents discharged under a polyethylene sheeting of 4 mil or greater thickness into the soil surface in accordance with instructions under SOIL FUMIGATION DIRECTIONS. Contaminated soil, water, and other clean-up 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.

Conditions of Sale and Warranty

The Directions for Use of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness, or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application all of which are beyond the control of Van Waters & Rogers Inc. All such risks shall be assumed by the Buyer.

SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THIS MATERIAL OR THE USE OF THIS PRODUCT OTHER THAN INDICATED ON THE LABEL. BUYER ASSUMES ALL RISK OF USE AND/OR HANDLING OF THIS MATERIAL WHEN SUCH USE/OR HANDLING IS CONTRARY TO LABEL INSTRUCTIONS.

Residues and Tolerances

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 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, Van Waters & Rogers Inc. assumes no responsibility as to their accuracy nor for any loss due to excessive residues.

Measuring Less Than Cylinder Quantities

This fumigant may be measured by one of two means: by scaling the cylinder during application, or by measuring the fumigant volumetrically. Scaling of the cylinder can be done either using a hanging or platform weighing device. The weighing device chosen must be able to weigh in the appropriate units and be properly calibrated. When cylinders are hung from scales, a suitable hanger must be used. A hanger can be made by removing the top of the cylinder protective bonnet and welding a U-shaped piece of 3/8 to 1/2 inch steel rod to the threaded base. Screw the cylinder securely to the modified bonnet when used. Volumetric measuring devices are most useful for measuring smaller quantities as they only measure a maximum of 3 to 10 pounds per filling.

Application Methods

This product may be applied in one of three methods:

(Regardless of the method chosen, use materials suitable to handle the liquid and heated vaporized methyl bromide. Contact your local Van Waters & Rogers Inc. representative for additional information.)

1. By spraying this fumigant as a liquid into the space or airstream of a fan or blower.
2. By using a vaporizing pan of plastic (polyethylene), or non-aluminum metal to which the material is led from the cylinder using suitable tubing. Care should be taken when using this method to fasten the tubing securely to the vaporizing pan and to assure the liquid methyl bromide will not splash out of or overflow the vaporizing pan.
3. By using a heat exchanger to volatilize the liquid methyl bromide into the vapor phase. This is also known as the "hot gas method". It is recommended that the largest size tubing, pipe, or hose practical be used for the line from the heat exchanger into the structure or area to be fumigated. If a thermometer is placed in the exit line, the minimum temperature of the volatilized fumigant should not be less than 130°F.

Of these three methods, the "hot gas method" is generally preferred for the following reasons. First, contact with the gaseous form of methyl bromide is less likely to cause burns. Secondly, the need for specialized gear, such as volatilization pans, is minimized. Third, when liquid methyl bromide is introduced into the fumigation area, volatilization of the liquid fumigant withdraws heat from the surroundings. This has two detrimental effects: fumigant movement, and hence equilibrium, is slowed; and insect metabolism is slowed, decreasing the effectiveness of the treatment. The "hot gas method" overcomes these disadvantages because the volatilization takes place before the fumigant is injected.

MATERIALS WHICH SHOULD NOT BE SUBJECTED TO FUMIGATION

Remove the following before fumigation:

1. Persons, birds, fish and other pets
2. All plants including bulbs and seeds
3. Food- and feedstuffs not sealed in metal or glass
4. Medicinals not sealed in metal or glass
5. Automobiles

NOTE: Should food- or feedstuffs or medicinals not sealed in metal or glass be inadvertently exposed during the fumigation, they should be disposed of properly.

Materials that react adversely to this product:

This product may react with some substances to cause unpleasant odors or other deleterious effects. For this reason the following list is provided as a guide to those materials which should not normally be exposed to this product. Because so many of the older materials mentioned below have been replaced by newer synthetic materials it is worthwhile for the fumigator to ascertain whether or not the material is really present. Should there be any question as to the possible reactions of a material in question, there are three options available. The first is the preferred removal of the material during fumigation. The second is to perform a small scale test fumigation of the material in question. The third choice is to inform the owners or their agent of possible adverse effects and allow the owners or agent to assume responsibility for any adverse effects and the appropriate corrective actions to be taken. This agreement should be in writing. The fumigator should attempt to verify before releasing the fumigant whether the suspected malodor or other adverse effect occurred and advise the owners or agent of the results of any adverse effects found so that the agreed upon corrective action may be taken.

1. Real rubber goods: be careful of the following:
 - 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.
- NOTE: The polyurethanes and silicones generally do not react with this fumigant.
2. Furs
 3. Horsehair
 4. Feathers, especially in feather pillows
 5. Leather goods, particularly white kid or other leather goods tanned with sulfur processes
 6. 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.
 7. Viscose rayon: those rayons processed or manufactured by a process in which carbon bisulfide is used.
 8. Vinyl
 9. Paper:
 - a) Silver polishing papers
 - b) Certain writing and other papers cured by the sulfide processes
 - c) Photographic prints and blueprints stored in quantity
 - d) Carbonless carbon paper
 - e) Blueprint papers
 10. Cellophane
 11. Photographic chemicals: darkroom chemicals, but not cameras or film.
 12. Rug padding: foam rubber and felt, but not the polyurethane materials typically used today.
 13. Ozonite® indoor and outdoor carpeting
 14. Cinder block
 15. Mixed concrete occasionally picks up odors.
 16. Absorbers of mortar and/or soil used for chinking log cabins.
 18. Charcoal: The components in this product are readily absorbed by charcoal. This may not only contaminate such materials, but may reduce the concentration of the fumigant in the fumigated area to the point of ineffectiveness.

Consult CHEMICAL HAZARDS IN PRECAUTIONARY STATEMENTS for dangers from heat and open flame, items to be removed, etc.

1. Prior to Fumigation

a. Open all interior doors, openings into attics and crawl spaces. Open cabinet doors and drawers. Windows should be open when tarpaulins are used.

b. Seal the Building. The most important part of the entire fumigation job lies in 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 free openings with a tarpaulin or plastic sheet 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 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 paper 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 detector during fumigation to insure the safety of the occupants. Check local regulations for specific requirements.

Establish Dosage: Dosage recommendations are made on the basis of cubic content. In square or rectangular buildings simply multiply the interior length by width by height. In irregular shaped buildings, find the cubic content of each unit, then add them together to find the total. In the case of peaked roofs, the average height between 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, goods or furnishings.

d. Place Placards: Place placards on all entrances to the building. The placards should conform to all local, state, and federal regulations and remain in place until levels are below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin.

2. During Fumigation

Releasing the fumigant from outside the space to be fumigated is possible in some situations and will probably minimize applicator exposure to the fumigant.

The use of fans is recommended. These will help in both volatilizing and distributing the fumigant and in aeration. When used, the fans should be running while the gas is being released and left running for 30 to 60 minutes or until the vaporized fumigant has been distributed. The fans should be turned off from outside the building or by using timers. There is no hard rule to the use of fans. Each case must be considered separately. Generally one 16-inch fan per 50,000 cubic feet will be sufficient. Alternatively use the building's heating system or other installations already in the building for improved circulation for distribution of the fumigant.

Outside Release—Non-Furnished Structures

a. Secure the ends of each shooting line to each point where the fumigant is to be released. If the "hot gas method" is not used, use vaporizing pans or plastic sheeting to prevent possible damage to some surfaces. Run each line to the cylinder(s) located outside the area to be treated.

b. Connect each line to the cylinders(s) or manifold.

c. Lock and seal the last exit.

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

Outside Release—Furnished Structures, Including Dwellings

Do not fumigate if temperature inside is below 50°F.

a. Use a heat exchanger to vaporize the fumigant. Maintain the temperature of the vaporized fumigant at 130°F. or higher.

b. 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.

c. Use a shooting hose and bucket or tub made of chemically resistant material. Direct the shooting hose into the bucket or tub and attach firmly so it will not come loose.

d. Direct the airstream of a fan toward the bucket or tub to circulate the vaporized fumigant. 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.

e. Lock and seal the last exit.

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

Inside Release.

* is best to inform police, fire and health officials of the fumigation prior to beginning and when aeration is complete.

Operators should not be in the building longer than 30 minutes while releasing this fumigant. If it is not possible 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.

a. Place Cylinders: Cylinders should be placed by a team of two persons, using a clip-board to map the location of each cylinder in the building.

The applicator should be able to open the cylinder on the top floor and continue walking away from the released fumigant

me and compress one end of the tube to seal it. Then drill one or more 1/32" to 1/16" holes at right angle completely through the tubing one inch from the sealed end. Fasten this end securely to some suitable object in the structure.

To minimize exposure to the applicator during release, the California Department of Food and Agriculture would like the release point at least 10 feet horizontal distance from the cylinder valve with the holes pointed away from the cylinder and the pathway to the next cylinder.

- b. **Make Practice Run:** Prior to the actual full-scale release of the cylinders, it is recommended that a "practice run" be made. This should be started with a check of respirator protection. Next the crew should don the respiratory protection and quickly, open and close the valves on all cylinders to make certain they are in working order and, thus, avoid delay during the actual release.
- c. **Release Fumigant:** 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. One member of the team should record the release of the fumigant from each cylinder so that none are missed. While fumigant is being released, it is advisable to have additional people, with respiratory protection ready, waiting outside to assist if necessary. If visual contact between personnel is not possible, the use of "walkie-talkies" to communicate position, i.e., cylinder location number, is suggested.
- d. Lock and seal the last exit.

3. Aeration

Do not allow domestic animals or unprotected persons to re-enter until structure is aerated below 5 ppm for methyl bromide and 0.1 ppm chloropicrin.

Small Structures: At the end of the exposure period, remove all seals and open all doors and windows as appropriate. Unseal tarpaulins from the roof and drop sides to the ground. Use fans to aid in aeration and removal of the fumigant. Allow at least four hours for aeration, then check for fumigant concentration with a detector device before allowing unprotected persons to enter the structure.

Large Structures: At the end of the exposure period, aeration generally begins 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. Allow at least four hours for aeration, then check for fumigant concentration with a detector device before allowing unprotected persons to enter the structure.

B. Chamber Fumigation—Atmospheric

Fumigation chambers have been constructed of a wide variety of materials and designs. All are suitable if they will hold the fumigant the required period of time. To check fumigation chambers for leaks prior to releasing the fumigant a variety of methods have been developed. Gross leaks can be detected by igniting a "smoke bomb" such as those used for burrowing rodents inside the chamber, if no fire hazard exists. The seal can be further checked by pressurizing the chamber with air or inert gas and determining how long the pressure is held in the chamber. While the chamber is under pressure, a soap and water solution can be applied to determine the location of small leaks. Testing for leaks can be done during the fumigation period using a halide leak detector. All controls should be located outside the chamber.

It is recommended that fumigation chambers not be located inside any building where personnel may be required to be present during the fumigation and/or aeration period because of the requirement for continuous monitoring to determine that the action level for the fumigant is not exceeded in adjacent work areas.

1. Load the chamber with the material to be fumigated, close exhaust ports, turn on circulation fan and close chamber door.
2. Determine the proper rate of application and exposure time from the following tables.
3. Placard the structure. Turn on red warning light on the door if present. Leave light on and placards in place until levels are below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin.
4. Introduce the fumigant into the chamber by releasing it into the airstream in front of a blower or fan, passing it through a vaporizer, or allowing it to evaporate from a shallow pan.
5. Always check completeness of aeration with detection devices before allowing unprotected persons to enter the chamber. Initial readings may be misleading; materials used to construct the chamber and those being fumigated may retain fumigant which will continue to be released after aeration seems to be complete.

C. Vacuum Chamber Fumigation

1. Place material to be fumigated in the steel chamber and draw the desired vacuum (25-27 inches Hg).
2. Determine the proper rate of application and exposure time from the following tables.
3. Placard chamber and allow placards to remain until chamber is completely aerated.
4. Release fumigant into the chamber (usually through a heating unit to insure complete vaporization).
5. 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 inches Hg should be drawn for this purpose. Check for thoroughness of aeration with suitable detector before allowing unprotected persons to enter.

D. Truck, Van or Trailer Fumigation

Do not fumigate while strong winds are blowing. Always apply fumigant from outside the truck, van or trailer.

1. Seal the off-side door, ventilators and other openings from the inside if possible.
2. If the "hot gas method" of application is not used, the liquid fumigant should be applied through a quarter-inch closed-ended perforated tube secured to the ceiling so the perforations direct fumigant toward the floor.
3. Seal the remaining door and placard both sides and ends of the truck, van or trailer. These placards must remain in place until levels are below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin.
4. Apply fumigant.
5. After 12 to 18 hours, open the unit and aerate for 1 to 1-1/2 hours. The truck, van or trailer may then be resealed for shipment. Do not move trucks, vans or trailers during fumigation. They must be completely aerated to below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin before movement is allowed.

E. Truck, Van or Trailer Fumigation: Open Top Conveyances

1. Park trailer or van out of traffic area if possible on the lee side of a building to protect from winds.
2. Roll back the protective tarpaulin to expose the goods.
3. 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 goods after replacement.
4. If the fumigant is to be injected using the "hot gas method", run the injection hose the center of the future gas expansion dome. If liquid fumigant is to be used, lead it into the trailer via two quarter-inch tubes into separate shallow plastic (polyethylene) or non-aluminum metal containers placed on the center line of the goods approximately 0.3 and 0.6 the distance from the front of the conveyance. Firmly attach the end of the quarter-inch tubing leading to the volatilizing pans so that the fumigant is directed into the pans and not on to the goods. Hang the other end of each hose over the side of

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STATEMENT OF PRACTICAL TREATMENT

IF INHALED: Get exposed to fresh air. Keep warm. Make sure person can breathe freely. If

the conveyance down to approximately waist height from the ground. The ends of the hoses should have a brass fitting for attaching to the applicator.

5. 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.
6. 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 applicator hoses exposed for attaching the applicator.
7. Do not occupy truck cabs, van cabs or trailer attached tractor cabs during exposure and aeration periods. Lock the tag cab doors during the exposure and aeration periods.
8. CLEAR THE IMMEDIATE WORKING AREA OF ALL UNAUTHORIZED PERSONNEL. Inject the fumigant either as vaporized fumigant or release one-half of the recommended dosage of liquid fumigant through each of the applicator tubes into the two volatilizing pans. Methyl bromide boils at 39°F (3.8°C).
9. 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.
10. Using a halide gas detector, check for gross fumigant leaks at all taped margins and at the floor of the conveyance. Seal any point where flame color readings (faint green to blue-green) indicate methyl bromide leakage.
11. Both sides and ends of the truck, van or trailer must be placarded and remain so until levels are below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin.
12. Do not move the van, truck or trailer during the exposure period of 12 to 24 hours. At the end of the exposure period, working in a well-ventilated area at 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 load surface at each end. The truck, van or trailer must be aerated to below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin before movement is allowed.

F. Railroad Car Fumigation

1. Rail car should be placed on seldom used trackage or siding so that it will not have to be moved while under fumigation.
2. This product must always be applied from outside the railroad car. This may be done either by the "hot gas method" or by injecting the liquid fumigant into the railroad car by means of a quarter-inch copper or polyethylene tubing attached to the methyl bromide cylinder. The tubing 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 walls of the tube about 1 to 2 inches below the tip to permit escape of the methyl bromide mist above the load and toward the opposite ends of the car.
3. All car openings should be carefully sealed. Particular attention should be given 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 up to and surrounding 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.
4. Both side doors must be placarded with signs conforming to the Department of Transportation regulations and remain so until levels are below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin.
5. 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 halide detector may be used to check sealed areas for gross leaks.
6. 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 suitable detector. Keep all persons out of the car during fumigation and aeration and until such time as a suitable detector shows levels below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin. Only then is it safe to enter the car without wearing respiratory protection.

G. Tarpaulin Fumigation

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 (polyethylene) or non-aluminum metal are satisfactory for this purpose. Use one evaporator pan for each 1000 cubic feet contained under the tarp. For delivery of this product 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 cylinder valve outlet and release fumigant. Use a cylinder dispenser or scale to meter small amounts from cylinders. Use rates and exposure times shown in the following table(s). 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.

H. Shipboard, In Transit Ship or Shiphold Fumigation

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

1. Prior to fumigating a vessel for in-transit cargo fumigation, the master of the vessel or his representative, and the fumigator must determine whether the vessel is suitably designed and configured so as to allow for safe occupancy by the ship's crew throughout the duration of the fumigation. If it is determined that the design and configuration of the vessel does not allow for safe occupancy by the ship's crew throughout the duration of the fumigation, then the vessel will not be fumigated unless all crew members are removed from the vessel. The crew members will not be allowed to reoccupy the vessel until the vessel has been properly aerated and a determination has been made by the master of the vessel and the fumigator that the vessel is safe for occupancy (below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin).
2. The person responsible for the fumigation must notify the master of the vessel or his representative of the requirements: i.e. 1) placarding requirements; 2) relating to the use of personal protection equipment; 3) detection equipment; and 4) 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.

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3. During the fumigation, or until a manned vessel leaves port, 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.

Using appropriate detection equipment, monitor spaces adjacent to the areas containing fumigated cargo and all regularly occupied areas for fumigant leakage. If leakage above 5 ppm for methyl bromide or 0.1 ppm for chloropicrin is detected, the area should be evacuated of all personnel, ventilated, and action taken to correct the leakage, before allowing the area to be re-occupied. 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 protective equipment). Never enter fumigated area alone.

If necessary to enter holds prior to discharge, test spaces directly above cargo surface for fumigant concentration, using appropriate gas detection and personal protection equipment. Do not enter without respiratory protection unless fumigation concentrations are at or below 5 ppm for methyl bromide or 0.1 ppm for chloropicrin, as indicated by a suitable detector.

If the fumigation is not completed and the vessel aerated before the 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 appropriate tables for specific goods, rates of application and exposure times.

II. SOIL FUMIGATION DIRECTIONS

SEE PRECAUTIONARY STATEMENTS FOR PROCEDURES WHICH MUST BE FOLLOWED FOR ALL USE ADDRESSED IN THIS SECTION. SEE STORAGE HANDLING AND DISPOSAL FOR INFORMATION ABOUT LEAK AND SPILL PROCEDURES.

This fumigant is designed to be applied under a gas-proof cover for treating soil and certain other materials in which plants may be grown for non-food and non-feed crop uses, including seed and lawns, and other ornamental and recreational lawns, forest and shade trees, ornamental flowers, vines and shrubs, and other similar plants. It may also be used for treatment of vegetable planting sites as shown in the tables.

Pests Controlled

This product is to be used only as a pre-plant soil fumigant. It is useful in controlling the following pests when present at the time of treatment:

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

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

Weeds and weed seed, seeds of broadleaf and grass weeds and their roots, stolons and bulbs. This product is particularly useful for the eradication of patches of quackgrass, johnson grass, nutgrass, wild garlic and onions, broom-rape and certain other noxious plants. While normally not effective against seeds of dodder, fillaree, mallow, morningglory and some species of clover, enhanced control may be obtained by using higher dosages and/or longer exposure periods.

Insects in the soil at the time of treatment, including wire-worms, cutworms, grubs, rootworms, ants and garden symphylans.

Fumigation Prerequisites

When to treat: Treatments can be made any time of year when soil conditions are suitable. In northern states, late summer or early fall treatments are best for land to be planted to early spring crops.

Temperature requirements: Do not fumigate if the soil temperature is below 50°F (10°C).

Fumigation Prerequisites

When to treat: Treatments can be made any time of year when soil conditions are suitable. In northern states, late summer or early fall treatments are best for land to be planted to early spring crops.

Temperature requirements: Do not fumigate if the soil temperature is below 50°F (10.0°C). For the best results, fumigate when soil temperature is 60 to 80°F (15.6 to 26.7°C) at the depth of 6 to 8 inches.

Pre-treatment soil preparation: This fumigant will effectively penetrate only as deep as the soil is properly worked, except in loose soils. Plow or rip or otherwise till the soil to the depth to which effective treatment is required—preferably just before treatment. Deep tillage 12 to 18 inches often improves results, especially in heavy or muck soils. 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.

This product should be used when there is sufficient moisture for weed-seed germination and the soil is dry enough to work well. The best control of weed and grass seeds is obtained when the seeds have a high moisture content and the germination process has begun. Dry soil should be irrigated and kept moist for 3 to 4 days prior to treatment in order to raise the moisture of the seed. Wetting the soil immediately before treatment is not satisfactory because this does not allow time for the weed seeds to pick up moisture. Coarse textured soils can be fumigated with higher moisture content than the fine textured soils. For best results soil should be kept moist for at least four days prior to treatment.

Application Precautions

Prior to Fumigation

1. Comply with all local regulations and ordinances. Obtain an application permit from agricultural regulatory agencies as required.
2. Never fumigate alone. It is imperative always to have an assistant and proper protective equipment in case of accidents.
3. 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.
4. Handle this fumigant in the open, with the operator "upwind" from the container where there is good ventilation.
5. Calibrate equipment before application.
6. Check fumigant pressure system for leaks before beginning operation.
7. 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 additional water must be available from the service truck. This water must be potable and in containers marked "Decontamination water not to be used for drinking."
8. All trash should be cleared from the field before starting fumigation.

During Fumigation

1. Two trained persons must be present during introduction of the fumigant.
2. This product should not be applied when there is little or no air movement nor when there is an atmospheric inversion. If an atmospheric inversion occurs following application, the tarpaulins should not be removed for 48 hours to prevent uncomfortable concentrations of chloropicrin from drifting into nearby inhabited areas.
3. Do not lift injection shanks to turn at the end of a pass until fumigant has drained from system following closure of shutoff valve.
4. If trash is inadvertently pulled up by the shanks when fumigating, it must be covered with polyethylene film.
5. When changing the cylinders, be certain they are turned off and fumigant system is not under pressure.

After Applying Fumigant

1. Post all treated areas with warning signs as proscribed in PLACARDING/POSTING REQUIREMENT under PRECAUTIONARY STATEMENTS.
2. Keep all animals, children and unauthorized people away from area during removal of tarpaulin.
3. Two trained persons must be present during removal of the tarpaulin.
4. Tarpaulins should be removed when there adequate air movement to dilute remaining fumigant in the working area below 5 ppm for methyl bromide and 0.1 ppm for chloropicrin. Because air movement is generally greater during the daytime this is the preferred time for removal of the tarpaulins.

Additional Precautions

Extreme caution should be taken when fumigating next to fields with animals or valuable crops or next to buildings inhabited by humans or animals. This product is toxic to plants, so do not apply to areas containing roots of desirable vegetation. The edge of the cover should be at least two feet away from the roots of living plants.

Care should be taken to prevent chloropicrin vapors from reaching adjacent desirable vegetation.

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

Effect on nitrification: Fumigation with methyl bromide 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. 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 following the 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. This response appear to be more severe if soils are very cold (below 50°F or 10°C) or very wet.

Preventing recontamination of treated areas: 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 treated area for proper drainage. Wooden frames around the beds are also satisfactory for preventing this type of contamination.

Cleaning of application equipment: Application equipment should be cleaned immediately after use by flushing with diesel oil or kerosene. NOTE: Water will increase the corrosive action of soil fumigants and should not be used.

Aeration

When tarpaulin is used, do not remove cover until the minimum exposure period has elapsed. At the end of the exposure period, remove tarpaulins and begin aerating. Allow soil to aerate for at least 14 days before planting out transplants or vegetative plant parts. Crop seeds may be planted after 96 hours following the exposure period recommended when vegetative plant parts are to be planted.

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

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Aeration

When tarpaulin is used, do not remove cover until the minimum exposure period has elapsed. At the end of the exposure period, remove tarpaulins and begin aerating. Allow soil to aerate for at least 14 days before planting out transplants or vegetative plant parts. Crop seeds may be planted after 96 hours following the exposure period recommended when vegetative plant parts are to be planted.

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

A. Use Procedures, Soil Fumigation

1. Broadcast or Over-all Treatment Fumigation

Inject the product with a chisel type applicator having the chisels spaced no more than 12 inches apart and injecting the fumigant to a depth of 6 to 10 inches below the soil surface. The soil surface must be covered immediately after treatment with simultaneous film laying equipment or by sealing with a roller or cultipacker and covered within 20 minutes with polyethylene film or other suitable cover. Consult appropriate table for proper rate of application and exposure periods. See Aeration above.

2. Bed or Row Fumigation

Apply the broadcast rate to the area actually treated, i.e., the area delimited by the film mulch. Consult the dosage rate table for treatment rates and exposure periods. Use one or more shanks per bed spaced not more than 12 inches apart, depending upon the area to be treated. Inject the product with a chisel type applicator having the chisels spaced no more than 12 inches apart and injecting the fumigant to a depth of 6 to 10 inches below the soil surface. The soil surface must be covered immediately after treatment with simultaneous film laying equipment or by sealing with a roller or cultipacker and covered within 20 minutes with polyethylene film or other suitable cover. See Aeration above. NOTE: Where polyethylene film is to be utilized as a mulch, aeration may be done 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

- 1) Dig a trench around the perimeter of area to be treated throwing soil to the outside so that it can be used to bury tarp edges after covering.
- 2) 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 to support the cover and provide a small gas dome to facilitate fumigant distribution.
- 3) Evaporating pans are essential for the volatilization and uniform dispersion of fumigant except when a vaporizer is used. Shallow pans or basins made of plastic (polyethylene) or non-aluminum metal are satisfactory for this purpose. Use one evaporator pan for each 300 to 400 square feet of area.
- 4) For delivery of this product 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 insures that the liquid will be directed into the evaporating pan.
- 5) Extend the free ends of the polyethylene tubes outside of the area to be covered.
- 6) After the supports and tubing are in place, cover the area to be fumigated with polyethylene or other suitable material.
- 7) Seal by placing the outside edges of tarpaulin in the trench and covering with soil. Tamp the soil down so edges will not pull loose.
- 8) Attach a polyethylene tube to the port valve of the cylinder and release fumigant. Use a cylinder dispenser or scale to meter small amounts. Take care to not over-fill evaporating pans. Consult appropriate table for proper rates and exposure periods.

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

B. Non-Tarp Nematode Control

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 time of treatment.

C. Special Instructions for the Control of *Armillaria mellea*, Armillaria Root Rot or Oak Root Fungus on Deciduous Fruits and Nuts, Citrus and Vineyards

Pretreatment Soil Preparation

To obtain the maximum control of *Armillaria mellea* with this product, 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, or, (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.

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Deep injection points: Use one injection point per 100 square feet (on a 10 foot x 10 foot grid pattern) to a depth of 36 inches or more below soil surface. Use one injection site per 100 square feet (on a 10 foot x 10 foot grid pattern) with the injection in the center of the area to be treated. Tamp or compact the soil at the point of injection before sealing soil surface with tarpaulin.

Exposure and Aeration Period

To insure the proper time/concentration relationship to control oak root fungus, observe a waiting period of seven days 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 ant only)

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 this product per 100 square feet of colony. Use a cylinder dispenser to measure amount of fumigant. Apply fumigant with at least 8 foot of plastic tubing or other equipment specially designed for this purpose. When either tubing or a probe at the end of 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 at least 10 minutes. After removal of tubing or probe, pack treated mound 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 Treatment Of Potting Soil And Mixes

Potting mixes include decomposed compost, soil mixes, and manure.

Fumigation should take place outdoors or in a well ventilated area away from desired plants or occupied buildings. The material should have a temperature of 60°F (15.6°C) or above, be loose, and moist enough for good seed germination.

Bulk Treatments

1. Place the material to be fumigated on a concrete floor, plastic tarpaulin, or wet ground. Piles 2 to 3 feet high can be treated provided perforations are made in the pile surface at one foot intervals to assist penetration.
2. Install supports to hold the cover a few inches above the pile surface to aid in proper fumigant diffusion.
3. Except when the "hot gas method" is used, evaporation pans should be used. The evaporation pans are shallow pans made of plastic (polyethylene or non-aluminum metal). The evaporation pans should be spaced about 30 feet apart.
4. For delivery of this product from outside the tarpaulin, polyethylene tubing is recommended. Anchor one end of the polyethylene tube into an evaporating pan with tape or a suitable weight. This ensures that the liquid will be directed into the evaporating pan. Extend the free ends polyethylene tubes outside the area to be covered.
5. Cover pile 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.
6. Consult Table II for proper rate of application and exposure periods.
7. Use a cylinder dispenser or scale to meter small amounts from cylinders. Attach applicator tube to the cylinder valve or cylinder dispenser as appropriate, and release fumigant.
8. Aerate for 24 to 72 hours before planting.

Potting mixes in flats. Arrange the flats in loose criss-cross stacks of 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.

F. 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.

During the application, post-application monitoring, and aeration periods, the greenhouse should be "opened", i.e., all operational doors, windows and vents should be open and fans, if present, should be running. During the exposure period the greenhouse should be "closed" and doors locked and placarded to prevent entry of unprotected persons.

The provisions in PRECAUTIONARY STATEMENTS: RESPIRATORY PROTECTION, PROTECTIVE CLOTHING, NEED FOR BACK-UP PERSONNEL, and PLACARDING/POSTING REQUIREMENT should be understood and followed.

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 to be fumigated, directly involved in the fumigation; and inspected the equipment to ensure proper application.

1. Fumigation of greenhouse soils may be done by any of the tarpaulin methods described in Section II. A. depending on greenhouse size and accessibility to equipment. Consult the appropriate Rate/Exposure Table below for proper rates of application and exposure periods.
2. If a wind is blowing, all injections should be made upwind from a previous injection site.

3. 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 sealed immediately.

ReEntry, Aeration and Placard Removal: Do not remove placards or allow re-entry of domestic animals or unprotected persons until aeration is complete—see PRECAUTIONARY STATEMENTS: RESPIRATORY PROTECTION and PROTECTIVE CLOTHING. Only a certified applicator or someone under his/her supervision is permitted to remove placards and only when the fumigated area is aerated completely. Aeration is complete when monitoring shows that there is less than 5 ppm of methyl bromide and 0.1 ppm of chloropicrin at the fumigation site.

Materials, Bags,
boxes and crates
(empty)⁴

RATS AND MICE

Cockroaches, confused flour beetle, rice weevil, grain weevil, saw-toothed grain beetle, rusty grain beetle, lesser grain borer, cadelle, Khaphra 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

1 1/2-3 (a) 24
2-3 (b) 2

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Rats and mice

4-5 oz. 12-18

Furniture

Termites (drywood and damp-wood), bedbugs, cockroaches, silverfish, powder post beetles, death watch beetle, carpenter ants, clothes moth, cigarette beetles, drug store beetle, carpet beetle

1-3 (a) 24
2-3 (b) 2

Lumber and wood products

Termites (drywood and damp-wood), powder post beetle, round and flat head borers, carpenter ants, bark beetles

1-3 (a) 24
2

Greenhouses (empty)

Mealybugs, scale insects, mites

3 4

100° F. drop in temperature

