EPA Registration Number 19713-672

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

March 24, 2016

Luz G. Chan
Registration Manager
Drexel Chemical Company
1700 Channel Ave.
P.O. Box 13327
Memphis, TN 38113

Subject: Label Amendment – Removal of chloropicrin to match me-too product
Product Name: Master Fume AG
EPA Registration Number: 19713-672
Application Date: 1/21/2016
Decision Number: 513415

Dear Ms. Luz:

The amended label referred to above, submitted in connection with registration under the Federal Insecticide, Fungicide and Rodenticide Act, as amended, is acceptable. This approval does not affect any conditions that were previously imposed on this registration. You continue to be subject to existing conditions on your registration and any deadlines connected with them.

A stamped copy of your labeling is enclosed for your records. This labeling supersedes all previously accepted labeling. You must submit one copy of the final printed labeling before you release the product for shipment with the new labeling. In accordance with 40 CFR 152.130(c), you may distribute or sell this product under the previously approved labeling for 18 months from the date of this letter. After 18 months, you may only distribute or sell this product if it bears this new revised labeling or subsequently approved labeling. "To distribute or sell" is defined under FIFRA section 2(gg) and its implementing regulation at 40 CFR 152.3.

Should you wish to add/retain a reference to the company's website on your label, then please be aware that the website becomes labeling under the Federal Insecticide Fungicide and Rodenticide Act and is subject to review by the Agency. If the website is false or misleading, the product would be misbranded and unlawful to sell or distribute under FIFRA section 12(a)(1)(E). 40 CFR 156.10(a)(5) list examples of statements EPA may consider false or misleading. In addition, regardless of whether a website is referenced on your product's label, claims made on the website may not substantially differ from those claims approved through the registration process. Therefore, should the Agency find or if it is brought to our attention that a website contains false or misleading statements or claims substantially differing from the EPA approved registration, the website will be referred to the EPA's Office of Enforcement and Compliance.

Your release for shipment of the product constitutes acceptance of these conditions. If these conditions are not complied with, the registration will be subject to cancellation in accordance

with FIFRA section 6. If you have any questions, you may contact Jacquelyn Marchese at 703-347-0559 or via email at marchese.jacquelyn@epa.gov.

Sincerely,

Venus Eagle, Product Manager 01
Invertebrate and Vertebrate Branch 3
Registration Division (7505P)
Office of Pesticide Programs

Enclosure: Stamped label

RESTRICTED USE PESTICIDE

(Due To Acute Inhalation Toxicity Of Sulfuryl Fluoride)

FOR 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. AN APPLICATOR CERTIFIED BY THE STATE MUST BE PRESENT ON SITE AT ALL TIMES DURING INTRODUCTION OF FUMIGANT, RE-ENTRY PRIOR TO AERATION AND INITIATION OF THE AERATION PROCEDURE.

ACCEPTED

Mar 24, 2016

Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 19713-672

Drexel®

MASTER FUME® AG

Gas Fumigant

For control of rodent, insect and other listed invertebrate pests.

Use Sites: Stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, mills and food processing facilities, and storage structures.

Read the entire container label and Applicator's Manual before using this product. Refer to the Applicator's Manual for additional precautionary information and directions for use. The Applicator's Manual must be in the user's possession during fumigation. If the Applicator's Manual is lost, obtain a replacement copy from your distributor or Drexel Chemical Company.

APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

ACTIVE INGREDIENT:

Sulfuryl fluoride	99.8%
OTHER INGREDIENTS:	0.2%
TOTAL:	100.0%

KEEP OUT OF REACH OF CHILDREN

DANGER ☠ PELIGRO
POISON ☠ VENENO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See FIRST AID Below

EPA Reg. No. 19713-672 **Net Content:**
EPA Est. No. 19713-XX-XXX **125 Lbs. (56.70 Kg)**

FIRST AID

IF INHALED:
- Move person to fresh air.
- If person is not breathing, call 911 or ambulance, then give artificial respiration.
- **DO NOT** give mouth-to-mouth resuscitation.
- Call a poison control center or doctor for further treatment advice.

IF IN EYES:
- Hold eye open and rinse slowly and gently with water for 15 to 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

(Continued)

FIRST AID *(Cont.)*

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip glass of water if able to swallow.
- Do not induce vomiting unless told to by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15 to 20 minutes.
- Call a poison control center or doctor for treatment advice.

In all cases of over exposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also call CHEMTREC at 800-424-9300 for emergency.

Note to Physician: This product is a gas which has no warning properties such as odor or eye irritation. Early symptoms of exposure to this product are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations of this product can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically. The liquid form of this product in the eye may cause damage due to refrigeration or freezing.

Manufactured By:
Drexel Chemical Company
P.O. Box 13327, Memphis, TN 38113-0327
SINCE 1972

MASTER FUME and the DREXEL logo are registered trademarks of Drexel Chemical Company. All other brand names, product names, or trademarks belong to their respective holders.

PRECAUTIONARY STATEMENTS

Hazards To Humans And Domestic Animals

DANGER: Corrosive. Extremely hazardous liquid and vapor under pressure. Fatal if inhaled. Causes irreversible eye damage. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Liquid may cause chemical burns, which may have a delayed onset, or may freeze exposed skin. May be fatal if swallowed. May be fatal if absorbed through skin. Sulfuryl fluoride is odorless. Exposure to toxic levels may occur without warning or detection by the user.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles (goggles designed and made of material that allows no measurable movement of the liquid pesticide being used to pass through them during use) or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR™) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Before using any make or brand of SCBA, learn how to use it correctly. Determine that it has an adequate air supply for the job at hand, that it fits properly providing an adequate seal around the face and that it is in good working order. For more detailed information on the source and use of air monitoring devices and respirators, consult the Applicator's Manual of this product.

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read *"Warranty Disclaimer"*.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information, call Drexel Chemical Company at (901) 774-4370.

USER SAFETY RECOMMENDATIONS

Users should: 1) Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. 2) Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. 3) Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Sulfuryl fluoride is a highly toxic gas. Do not expose non-target organisms. This pesticide is toxic to fish and wildlife.

PHYSICAL OR CHEMICAL HAZARDS

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near heat or open flame. Exposures to temperatures above 158°F will cause a fusible plug to melt and the contents will be released. Under high heat conditions (temperatures above 752°F), this product can decompose into sulfur dioxide (SO_2), hydrofluoric acid (HF), and other decomposition products.

Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc., that represent a reasonable risk of a heat source that is at or near 752°F. Shut off automatic switch controls for appliances and lighting systems

that will be included in the space to be fumigated. Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Notice: Read the entire label. Use only according to label directions. Before using this product, read Warranty-Conditions of Sale, *"Inherent Risks of Use"*, and *"Limitation of Remedies"* elsewhere on the label. If terms are unacceptable, return at once unopened.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information call Drexel Chemical Company at (901) 774-4370.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: Store in dry, cool, well ventilated area under lock and key. Post as a pesticide storage area. If the storage area is in an occupied building, the storage area must have either 1) a forced air ventilation system that meets required local ordinances for the storage of hazardous materials and operates continuously; or 2) be equipped with a permanently mounted and properly maintained and functioning sulfuryl fluoride monitoring device designed to alert occupants of the building if sulfuryl fluoride in the air of the storage area is greater than 1 ppm. Store cylinders upright secured to a rack or wall to prevent tipping.

Pesticide Handling: Do not subject cylinders to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use ropes, 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 transport any cylinders in closed vehicles where they occupy the same common airspace as personnel. Transport securely only in an upright position. 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 supplier. Only the registrant is authorized to refill cylinders. Do not use cylinder for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.

Leak Procedures: Evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator, such as manufactured by Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant is determined to be 1 ppm or less in the breathing zone, as determined by a detection device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR. For more detailed information on the source and use of air monitoring devices or respirators, consult the Applicator's Manual of this product.

CYLINDER AND PRODUCT DISPOSAL: Promptly return all empty cylinders to your distributor of this product. Follow proper cylinder handling directions above. 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, consult your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

WARRANTY DISCLAIMER

Manufacturer warrants that this product conforms to the chemical description on the label and based upon tests believed reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. To the extent consistent with applicable law, Manufacturer makes no other expressed or implied warranty of merchantability or fitness for a particular purpose or any other express or implied warranty.

Use Risk

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable weather, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Manufacturer or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to one of the following, at Manufacturer's discretion:

1. Refund of purchase price paid by Buyer or use for product bought, or
2. Replacement of amount of product used.

To the extent consistent with applicable law, in no case shall Manufacturer or the Seller be liable for consequential, special or indirect damages or losses from the use, handling or storage of this product.

The terms of the *"Warranty Disclaimer"* above and this *"Limitation of Remedies"* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of the Manufacturer or the Seller is authorized to vary or exceed the terms of the *"Warranty Disclaimer"* or this *"Limitation of Remedies"* in any manner.

RESTRICTED USE PESTICIDE

(Due To Acute Inhalation Toxicity Of Sulfuryl Fluoride)

FOR 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. AN APPLICATOR CERTIFIED BY THE STATE MUST BE PRESENT ON SITE AT ALL TIMES DURING INTRODUCTION OF FUMIGANT, RE-ENTRY PRIOR TO AERATION AND INITIATION OF THE AERATION PROCEDURE.

APPLICATOR'S MANUAL

ACCEPTED

Mar 24, 2016

Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 19713-672

Drexel

MASTER FUME® AG

Gas Fumigant

For control of rodent, insect and other listed invertebrate pests.

Use Sites: Stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, mills and food processing facilities, and storage structures.

Read the entire container label and Applicator's Manual before using this product. Refer to the Applicator's Manual for additional precautionary information and directions for use. The Applicator's Manual must be in the user's possession during fumigation. If the Applicator's Manual is lost, obtain a replacement copy from your distributor or Drexel Chemical Company.

APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

ACTIVE INGREDIENT:

Sulfuryl fluoride	99.8%
OTHER INGREDIENTS:	0.2%
TOTAL:	100.0%

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO

POISON VENENO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See FIRST AID Below

EPA Reg. No. 19713-672 **Net Content:**

EPA Est. No. 19713-XX-X **125 Lbs. (56.70 Kg)**

FIRST AID

IF INHALED:
- Move person to fresh air.
- If person is not breathing, call 911 or ambulance, then give artificial respiration.
- **DO NOT** give mouth-to-mouth resuscitation.
- Call a poison control center or doctor for further treatment advice.

IF IN EYES:
- Hold eye open and rinse slowly and gently with water for 15 to 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

(Continued)

FIRST AID *(Cont.)*

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip glass of water if able to swallow.
- Do not induce vomiting unless told to by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15 to 20 minutes.
- Call a poison control center or doctor for treatment advice.

In all cases of over exposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also call CHEMTREC at 800-424-9300 for emergency.

Note to Physician: This product is a gas which has no warning properties such as odor or eye irritation. Early symptoms of exposure to this product are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations of this product can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically. The liquid form of this product in the eye may cause damage due to refrigeration or freezing.

Manufactured By:
Drexel Chemical Company
P.O. Box 13327, Memphis, TN 38113-0327
SINCE 1972

MASTER FUME and the DREXEL logo are registered trademarks of Drexel Chemical Company. All other brand names, product names, or trademarks belong to their respective holders.

PRECAUTIONARY STATEMENTS

Hazards To Humans And Domestic Animals

DANGER: Corrosive. Extremely hazardous liquid and vapor under pressure. Fatal if inhaled. Causes irreversible eye damage. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Liquid may cause chemical burns, which may have a delayed onset, or may freeze exposed skin. May be fatal if swallowed. May be fatal if absorbed through skin. Sulfuryl fluoride is odorless. Exposure to toxic levels may occur without warning or detection by the user.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles (goggles designed and made of material that allows no measurable movement of the liquid pesticide being used to pass through them during use) or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR™) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Before using any make or brand of SCBA, learn how to use it correctly. Determine that it has an adequate air supply for the job at hand, that it fits properly providing an adequate seal *around the face and that it is in good working order.* For more detailed information on the source and use of air monitoring devices and respirators, consult the Applicator's Manual of this product.

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read *"Warranty Disclaimer"*.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information, call Drexel Chemical Company at (901) 774-4370.

USER SAFETY RECOMMENDATIONS

Users should: 1) Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. 2) Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. 3) Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Sulfuryl fluoride is a highly toxic gas. Do not expose non-target organisms. This pesticide is toxic to fish and wildlife.

PHYSICAL OR CHEMICAL HAZARDS

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near heat or open flame. Exposures to temperatures above 158°F will cause a fusible plug to melt and the contents will be released. Under high heat conditions (temperatures above 752°F), this product can decompose into sulfur dioxide (SO_2), hydrofluoric acid (HF), and other decomposition products.

Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc., that represent a reasonable risk of a heat source that is at or near 752°F. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated. Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Notice: *Read the entire label. Use only according to label directions.* Before using this product, read Warranty-Conditions of Sale, *"Inherent Risks of Use"*, and *"Limitation of Remedies"* elsewhere on the label. If terms are unacceptable, return at once unopened.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information call Drexel Chemical Company at (901) 774-4370.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

TABLE OF CONTENTS

Page

First Aid 1
Precautionary Statements 2
Environmental Hazards 2
Physical or Chemical Hazards 2
Table of Contents 3
Information 4
Compressed Gas Hazards 4
Product Information 4
Directions For Use 4
Chapter 1 4
Commodities That Can Be Fumigated 4
Use Restrictions and Precautions 5
Pest Controlled 5
Chapter 2 5
General Safety 5
Symptoms of Poisoning 5
First Aid 5
Notes to Physician 5
Personal Protective Equipment (PPE) 5
Fire Fighting 5
Preventing Static Electricity 6
Fumigant Introduction Hose and Fittings 6
Personal Safety 6
Material Safety 6
Chapter 3 6
Cylinder 6
Chapter 4 7
Equipment 7
Monitoring Equipment 7
Clearance Testing Equipment 7
Chapter 5 8
Fumigation Management Plan (FMP) 8
Guidance for Preparation of an FMP 8
Chapter 6 9
Preparations for Fumigation 9
Occupants/Customers Need to Know 9
What to Remove Prior to Fumigation 9
Flames or Heating Elements 10
Checking for Connected Areas 10
Distribution/Aeration Fan Use and Placement 10
Monitoring Hoses 10
Sealing the Structure 10
Placarding and Securing fumigated Areas 11
Chapter 7 12
Introduction and Distribution of this Product 12
Choosing Introduction Sites 12
Selection and Use of Equipment for Fumigant Introduction 12
Calculating Dosage 13
Fumigant Dosage Factors 13
Using Drexel Chemical's Master Fume Ag Calculator Program 14

Page

Chapter 8 15
Monitoring this Product 15
Specific Guidelines for Monitoring a Typical Fumigation 15
Chapter 9 15
Aeration Clearing, and Re-entry 15
Aeration - Practices 16
Factors Influencing Aeration Time 16
Handling Unaerated Commodities 16
Clearance and Re-entry 16
Chapter 10 16
Site Specific Considerations
Key Considerations for Fumigating Storage Facilities, Transport Vehicles and Processing Plants 16
Preparation for Chamber or Stack Fumigation 17
Stored Bulk Commodity Fumigation 19
Chapter 11 20
Troubleshooting 20
Cylinders 20
Corrosion of Metals 20
Glass Etching 20
Run Stains 20
Staining 20
Fumigant Introduction Hose Freezing 20
Plant and Turf Damage 20
Odor Problems 21
Poor Control of Pests 21
Storage and Disposal 21
Warranty Disclaimer 21
APPENDIX A 23
English-Metric Conversion Tables 23
APPENDIX B 23
Glossary of Terms 23

INFORMATION

APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

Carefully read the container label and this Applicator's Manual before using this product. Do not use this product without Drexel Chemical's Master Fume AG Calculator Program. Drexel Chemical's Master Fume AG Calculator Program is a computer program available to calculate safe and effective levels of this product for fumigating structures and commodities. Never allow untrained individuals to use this product.

Prior to fumigation, read the Applicator's Manual carefully. Notify appropriate owners, employees, and/or operators at the facility where the fumigation will occur, and provide relevant safety and health information to local fire and rescue officials for use in the event of an emergency.

Do not connect cylinders to introduction equipment until all fumigation warning signs have been posted and the space to be fumigated is clear of people, non-target animals and secured.

COMPRESSED GAS HAZARDS

The release of high pressure fumigant can be forceful and there is potential for personal injury. Care must be exercised when fumigating, especially tarped commodities, so that the fumigant is not released too rapidly and "balloons" the tarp off of the restraining sand or water snakes. A fog-out can also occur if the fumigant is released too rapidly, cooling the air temperature below the dew point. This is avoided by following the instructions in the Applicator's Manual.

The rapid discharge of this product through introduction equipment will result in cooling parts of the equipment and the cylinders. Contact with the cooled equipment can cause frostbite.

This product is a highly hazardous material and should be used only by individuals knowledgeable of its chemical hazards and trained in the use of required respiratory equipment, detection devices, emergency procedures and proper use.

Two persons trained in the use of this product (at least one person being an applicator certified by the State) must be present on site at all times during introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure and when testing for re-entry after aeration (if aerated in an enclosed space). It is essential that no occupant re-enter the fumigated space after fumigation until the fumigant has been aerated and the space has been fully tested and cleared for re-entry.

Only a detection device of sufficient sensitivity (LOD < 1 ppm), such as the INTERSCAN gas analyzer [Model CF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR can be used to confirm a concentration of 1 ppm or less of this product. The INTERSCAN gas analyzer [Model CF 1900] must be calibrated within one month prior to use as a detection device. All other approved detection devices must be calibrated according to manufacturer directions. The concentration of this product must be monitored throughout the structure. The structure or enclosure must remain posted for fumigation until cleared for re-entry.

PRODUCT INFORMATION

MASTER FUME AG IS A RESTRICTED USE PESTICIDE DUE TO ACUTE INHALATION TOXICITY OF SULFURYL FLUORIDE.

PHYSICAL PROPERTIES

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near excessive heat or open flame. Exposures to temperatures of more than 158°F will cause a fusible plug to melt and the contents will be released. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Structural formula: SO_2F_2

$$\begin{array}{c} O \\ \| \\ F-S-F \\ \| \\ O \end{array}$$

Molecular Weight:	102.07 AMU
Color:	None
Active Ingredient:	10.8 pounds sulfuryl fluoride per gallon of the product
Specific Gravity:	1.35 at 20°C (68°F)
Vapor Density:	4.3 g/L at 20°C (68°F) air = 1
Vapor Pressure:	15.2 atm at 20°C (68°F)
Boiling Point:	-55.2°C (-67°F) at 760 mmHg

GAS SOLUBILITY (at 25°C (77°F) at 760 mm Hg): In water 0.075% (750 ppm) by weight, only slightly soluble in organic solvents and vegetable oils.

STABILITY: Stable to temperatures normally encountered in space fumigations. Non-flammable under normal conditions in all atmospheric concentrations. However, heaters and open flames must be extinguished as temperatures over 400°C (752°F) will cause decomposition products to be formed which can be corrosive and etch metal and glass.

HEAT OF VAPORIZATION: 81.1 BTU per pound at -55°C (-67°F) or 4600 cal./mol. 1 pound of sulfuryl fluoride = 4.45 moles. 1 pound of this product will lower 1000 cubic foot of dry air by 2.5°C (4.5°F).

VOLUME PER POUND: 1 pound of gas occupies 3.8 cubic foot at 25°C (77°F) and 760 mm Hg. 1 pound of gas per 1000 cubic foot of unoccupied space equals approximately 3850 ppm at room temperature and pressure (25°C at 760 mm Hg).

HYDROLYSIS: Slow in water; Rapid in basic solutions.

REACTIVITY: Sulfuryl fluoride is relatively non-reactive as a gas. No malodor or corrosive effects have been detected when the chemical has been used as directed. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

DIRECTIONS FOR USE

RESTRICTED USE PESTICIDE

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

When fumigating, all local, State, and Federal rules and regulations regarding use of detection devices, positive-pressure self-contained breathing apparatus, security requirements and placement of warning signs must be observed.

Read carefully all Directions for Use before using this product.

FUMIGATING WITH THIS PRODUCT

INTRODUCTION

MASTER FUME AG contains the active ingredient, sulfuryl fluoride, and is registered for use only by professional fumigators to control existing infestations of stored product insect pests in stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.

Read the entire label and this Applicator's Manual before using this product. If the Applicator's Manual is lost, obtain a replacement copy from your distributor of this product or your Drexel Chemical Company representative.

Each fumigator using this product is responsible for complying with all Federal, State and local regulations or codes regulating the use of this product. The fumigator should stay informed about State and local regulations in areas where they operate.

State and local government offices, distributors of this product or Drexel Chemical Company sales representatives responsible for your area can help identify the relevant agencies responsible for regulating fumigation practices in your area.

Chapter 1

COMMODITIES THAT CAN BE FUMIGATED

This product can be used on the following raw agricultural and processed food commodities:

Raw Agricultural* and Processed Commodities		
Barley	Rice	Triticale
Corn	Rice bran	Wheat
Corn flour	Rice flour	Wheat bran
Corn grits	Rice hull	Wheat flour
Corn meal	Rice (Polished)	Wheat germ
Millet	Rice (Wild)	Wheat milled by-products
Oat	Sorghum	Wheat shorts

*This product can be used to fumigate seeds of these commodities. Sites containing additional seed varieties may be fumigated as long as the fumigated seeds will not be part of the food chain for human consumption.

For a list of sites than can be fumigated with this product and site specific considerations for doing an effective and safe fumigation, see *"Chapter 10"*.

USE RESTRICTIONS AND PRECAUTIONS

- Do not exceed a maximum cumulative dosage of 1500 oz-h/1000 cubic foot for normal atmospheric pressure (NAP) fumigations.
- Do not exceed a maximum cumulative dosage of 200 oz-h/1000 cubic foot for vacuum fumigations.
- Do not exceed the maximum cumulative dosages of NAP and vacuum fumigations, respectively, for sequential fumigations.
- When fumigating storage tanks, silos, etc. containing bulk flour, empty or draw down Wheat flour to less than 3 feet deep. Minimize quantities of flour in the processing plant, structure or enclosure prior to fumigation to prevent excessive residues in Wheat flour.
- Use this product together with a dosage calculator called Drexel Chemical's Master Fume AG Calculator (*"Chapter 7"*). Drexel Chemical's Master Fume AG Calculator must be used to calculate the initial dosage required for treatment and for any additional quantities needed during the fumigation to improve efficacy and/or to rectify loss due to leakage.
- Special care should be taken to minimize quantities of processed foods prior to space fumigations. Processed food not practical to remove prior to fumigation may undergo incidental fumigation with this product. However, no direct fumigation of processed foods is permitted unless the processed food is found in *"COMMODITIES THAT CAN BE FUMIGATED"* section of this manual.
- Only for use on stationary transportation vehicles (railcars, shipping containers, trucks), temporary and permanent fumigation chambers, and storage structures either empty or filled with specified agricultural commodities.

PEST CONTROLLED

This product is used to control the following pests including all its life stages (i.e., egg, larva, pupa and adult):

Common Name	Scientific Name
Codling moth	*Cydia pomonella*
Flour beetles	*Tribolium* spp.
Granary weevil	*Sitophilus granarius*
Indian meal moth	*Plodia interpunctella*
Mediterranean flour moth	*Ephestia kuehniella*
Navel Orange worm	*Amyelois transitella*
Rats and Mice	-
Rice weevil	*Sitophilus oryzae*
Saw toothed grain beetle	*Oryzaephilis suranamensis*
Warehouse beetle	*Trogoderma variable*

Chapter 2

GENERAL SAFETY

This product is colorless, odorless and non-irritating to mucous membranes at low concentrations. This product gives no warning of its presence.

This product is toxic and must be handled carefully. Ignoring the potential hazards of this product can result in serious illness or even death.

SYMPTOMS OF POISONING

Symptoms in humans from inhalation exposure to this product will depend on the concentration and the length of exposure experienced. The earliest sign of overexposure to this product is central nervous system (CNS) depression.

Exposure to progressively higher concentrations is expected to result in convulsions, tremors and/or strychnine-like muscular rigidity.

Humans exposed to high concentrations of this product may experience respiratory irritation, nausea, abdominal pain, CNS depression, slowing of movements and speech and numbness in the extremities. Survival after exposure to high concentrations can occur even following convulsions, if exposure has been brief.

FIRST AID

Refer to the *"FIRST AID"* section of this manual or container label.

In all cases of overexposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility immediately. Have the product container or label with you when calling a poison control center or doctor or going for treatment. For information on this pesticide product (including health concerns, medical emergencies or pesticide incidents), call 1-877-208-2593 or CHEMTREC at 1-800-424-9300.

NOTES TO PHYSICIAN

Depending on the length of exposure, it is predicted that persons exposed to this product will probably show little evidence of intoxication at first unless the concentration was moderate to high (more than 500 ppm). Initial effects will probably be depression of the CNS with slow speech and body movement the first signs noted. Convulsions may ensue with respiratory arrest being a terminal event. Assisted respiration may be necessary.

Remove exposed patient to fresh air and put at rest. Keep exposed individual at bed rest and under observation for at least 24 hours. Clinical observation should be directed at the pulmonary, hepatic and renal systems. A post-mortem finding in a fatality attributed to sulfuryl fluoride was pulmonary edema. Death was attributed to cardiorespiratory failure.

Also see *"FIRST AID"* section of this manual for additional notes to physician.

There is no known antidote. Clinical observation is essential. Treatment is based on the clinical judgment of the physician and the individual reaction of the patient.

IN CASE OF EMERGENCY,
CALL 1-877-208-2593 OR 1-800-424-9300.

IN CASE OF ACCIDENTIAL EXPOSURE,
SEEK MEDICAL ATTENTION.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded, or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott, or MSA. Before using any make or brand of SCBA, learn how to use it correctly.

Determine that it has an adequate air supply for the job at hand, that it fits properly, providing an adequate seal around the face and that it is in good working order.

The INTERSCAN must be calibrated according to manufacturer specifications within one month prior to use as a clearance device. All other approved detection devices must be calibrated according to manufacturer specifications.

FIRE FIGHTING

Information

This product is not combustible. However, in temperatures exceeding approximately 400°C (752°F), this product will degrade to form hydrogen fluoride (HF) and sulfur dioxide. Theoretically, the number of ounces of HF per 1000 cubic feet produced during a fire in a structure containing this product would equal 0.4x number of ounces of this product per 1000 cubic feet (in temperatures exceeding approximately 752°F, each mole (102 gm) of sulfuryl fluoride will degrade to form 2 moles (40 gm) of hydrogen fluoride (HF)). Nonetheless, amounts of HF actually produced during fires involving this product may be insignificant because this product rapidly diffuses from structures.

Use of Water

Evolution of hazardous materials can be minimized by use of water during a fire. Water will scrub out part of the HF and SO_2 formed by decomposition of this product in the flame. Water also can be used to cool cylinders of this product and prevent discharge of the product caused by melted fusible plugs. If possible, avoid runoff into waterways because HF is toxic to fish.

Protective Clothing

Self-contained breathing apparatus (SCBA) and normal "turn-out" gear must be worn when fighting fires in structures under fumigation with this product.

For Fires Involving Cylinders of this Product
When fighting fires in atmospheres containing potentially high concentrations of this product, self-contained breathing apparatus (SCBA) and encapsulating protective suits must be worn. Protective suit material must be compatible with exposure to hydrofluoric acid.

PREVENTING STATIC ELECTRICITY
The flow of liquid gas in the introduction hose may be a source of static electricity. To prevent the risk of static sparking, the introduction hose must be properly grounded using acceptable demonstrated methods (e.g., securely attaching a length of copper tubing with adequate fittings to the end of the introduction hose).
When using copper tubing as a ground, attach the copper tubing with a grounding wire to the fan cage frame or to a neutral ground. The copper tubing mounted at the end of the introduction hose must be securely attached to the fan or some other stable object.

FUMIGANT INTRODUCTION HOSE AND FITTINGS
- Use hose with minimum burst pressure of 3450 kPa (500 psi) that is compatible with liquid Master Fume. Polyethylene or polypropylene hoses have proven satisfactory.
- Use care not to kink or crush the hose. Reinforced hose helps prevent collapse.

PERSONAL SAFETY
- Always wear eye protection when introducing this product or repairing leaks on introduction manifolds or hoses.
- Proper respiratory protection (SCBA) must be on hand in case of required emergency entry into structure.
- Make a security check for personnel, structure preparation and persons in nearby buildings and grounds. Apply proper lock-outs and placarding.

MATERIAL SAFETY
- Use proper fumigant introduction techniques to help prevent corrosion or water stains on interior materials.
- To the extent possible, provide protection for nearby desirable plants.
- Use circuit breakers or fuses for fans.
- To the extent possible, place fans to minimize the risk of damage to equipment.

Chapter 3
CYLINDER

Cylinders of this Product
This product is packaged as a gas under pressure in cylinders. Cylinders contain both gas and liquid. Cylinders containing this product are designed not to explode in high temperatures. A fusible plug in the cylinder valve body melts at 158°F to 165°F (70°C to 73.8°C) releasing the contents of the cylinder.

Cylinder Information
This product is sold as a compressed liquid gas in a high-pressure cylinder and must be handled, stored and transported with precaution. Inspect every cylinder upon delivery for damage. If the cylinder is damaged, immediately return the cylinder to the distributor of this product.
No additional gas is used to pressurize the cylinder. Each full cylinder contains 57 kg (125 lbs.) of product normally under about 1380 to 2070 kPa (200 to 300 psi).

Cylinder Handling
- Avoid manhandling the cylinder when moving or weighing; e.g., use a hoist with a hanging bonnet.
- Protect the valve from damage by always replacing the valve cover and safety bonnet.
- Open valve slowly at first, then completely open it (one full turn) so the valve and the introduction hose do not frost. Use proper size adjustable wrench (25 to 30 cm). Keep wrench attached to valve while valve is open.
- Bear in mind that frosting of the outside cylinder surface when releasing the last 3 to 5 pounds of this product is likely.
- Close valve completely when fumigant introduction is finished or cylinder is "empty."

SEE *"STORAGE AND DISPOSAL"* SECTION AT THE END OF THIS MANUAL FOR STORAGE AND DISPOSAL OF THIS PRODUCT.

Cylinder Valve System
Cylinders of this product are fitted with special valves (see **Figure 1.**).

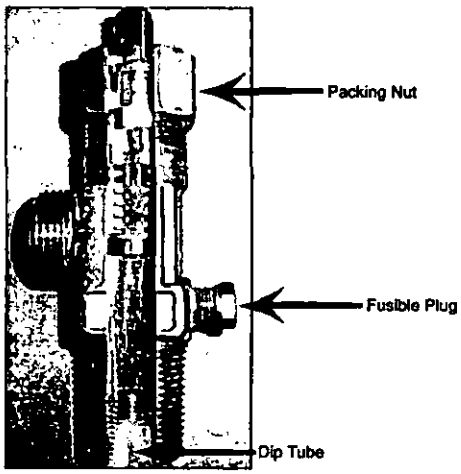


Figure 1. Cylinder Valve

The cylinder is equipped with both a safety cap and a covering called a "bonnet." The safety cap and bonnet must be securely in place at all times except when gas is to be released from the cylinder. This protects the valve system from being damaged and/or prevents accidental release of the fumigant.
Do not hang or lift cylinders by the valves. Use a proper sling to lift cylinders. Use a "hanging" bonnet or other device specifically designed for this purpose when weighing a cylinder on a hanging scale. (Hanging bonnet can be obtained from the fumigation supply distributor.)

Leaking Cylinders
If a cylinder is suspected of leaking fumigant, evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/ SCBA respirator, such as manufactured by Draeger, Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. The SCBA must be worn when exposure is more than 1 ppm or when the concentration is unknown.
Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant in the breathing zone is determined to be 1 part per million (ppm) or less as determined by a detection device with sufficient sensitivity such as an INTERSCAN gas analyzer [Model: GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR.
Often tightening the packing nut on the top of the valve to 35 to 40 N.m. (25 to 30 foot pounds) of torque with an adjustable wrench will stop the leak. Never use excessive force to open a stuck or improperly sealed valve. See valve stem adjustment procedures at the end of this chapter.
Once the cylinder is empty, contact your distributor for proper return instructions.

Frozen Valves and Hoses
If the cylinder valve is "just cracked" to reduce the rate of release, this product will expand from a liquid to a gas within the hose and frosting of the outside of the valve and hose may occur.
FROSTING CAN BE AVOIDED By ALLOWING FULL FLOW THROUGH THE VALVE AND LINES.
Do not control the rate of flow of this product by restricting flow through the cylinder valve.

Frozen Cylinders
If a break occurs on the dip tube in the cylinder, this product will be discharged in the gas phase when the liquid level falls below the break. As the liquid expands in the cylinder, heat will be taken from the surrounding area and the cylinder will frost or freeze at that point. This product will still be discharged, but at a much slower rate. If cylinder shows signs of a broken dip tube (a very rare occurrence), paint it red on the shoulder of the cylinder, put a red tag on it and return to the distributor so that the problem can be corrected before refilling.

Empty Cylinders
Handle, store and transport empty cylinders using the same precautions as previously discussed for full cylinders. The last 1.5 to 2 kg (3 to 5 lbs.) of gas in the cylinder which is the final pounds of this product in a cylinder generally are in a gaseous state and will not move out of the cylinder as rapidly as when it is a liquid. However, it will move through the introduction hose.
REMEMBER TO CLOSE VALVE COMPLETELY ON EMPTY CYLINDERS.

Cylinder Return Policy
When the cylinder is empty, fully close the valve and replace the safety cap and protection bonnet and return the empty cylinder to your distributor. Broken or defective cylinder must be returned to your Master Fume Ag distributor. Only Drexel is authorized to refill cylinders. Do not use cylinders of this product for any other purpose.

Transportation of Cylinders
Transport cylinders capped and secured in an upright position. Do not transport cylinders that are unsecured or laying on their side. These are requirements of the Department of Transportation (DOT) when transporting compressed air cylinders. Loose cylinders can become airborne and significant damage to dip tube may occur in an accident. Because of the toxicity of this product, do not transport cylinders in the same airspace as the driver or other occupants of vehicles, such as in vans or unpartitioned trucks.
Always store and transport cylinders in a secure upright position.
Do not transport cylinders of this product in the same airspace or breathing zone of any area occupied by the driver and other occupants of vehicles.
Consult your local distributor or Drexel Chemical Company for training resources for DOT regulations.

Air Transportation: Never transport cylinders of this product by aircraft.

Valve Stem Adjustments in the Field

Introduction
When cylinders are filled at the plant, a soap solution is applied to the valve stem (the square shaft area) and valve threads at the top of the cylinder. The cylinder is not released if leaks are present. Each time the valve is opened and closed, the stem works against the packing causing the packing to flow away from the valve stem. Over time this may allow product to escape past the valve stem when the valve is in the open position. This document describes how this situation can be safely corrected in the field.

Hazards and PPE
Operators performing the valve stem adjustment must follow all precautions on the product label section for *"Leak Procedures"*. This may include, but is not limited to, immediate evacuation followed by re-entry using positive pressure self-contained breathing apparatus.
Move cylinders outdoors or to a ventilated isolated location prior to adjusting the stem. Allow no unprotected persons in the area during the adjustment procedure until fumigant concentration is verified with sufficiently sensitive detection equipment to be below the levels of concern indicated on the product label.

Indications
This procedure is appropriate when a cylinder shows indication of product loss from around the valve stem. Loss may be indicated either by a sufficiently sensitive detection device or hissing/bubbling at the stem when the valve is open. This procedure may not be effective or appropriate for other valve problems.

Training
Only persons appropriately trained for Hazardous Material handling are permitted to perform this task. While operators who transport this product are required to receive Hazardous Material training, individuals have to check with their employer if they have any questions regarding required training.

Procedure
To stop a loss of this product from around the valve stem in the field, follow the following steps.
Follow directions in *"HAZARDS AND PPE"* section above prior to starting this procedure. Make sure all PPE and sufficiently sensitive detection devices are used.

1. If product loss is detected, immediately close the valve. This will stop this product from leaking out of the stem.
2. Secure the cylinder against a stationary object (rack, wall, etc.) to prevent tipping. Using the same wrench you use to remove the cap from the valve exit, tighten the packing nut on top of the valve. Turn the packing nut in a clockwise direction to tighten the packing nut. Do not overtighten this nut. The specification is 34 to 40 N.m. (25 to 30 foot pounds) of torque, which is easily reached with a 25 to 30 cm (10 to 12 inches) adjustable wrench.
3. Open the valve. If product is still leaking from around the valve stem, repeat steps 1 and 2. If product loss still persists, close the valve, red tag the cylinder and return it for credit. The valve will be replaced at the plant.

Chapter 4
EQUIPMENT

MONITORING EQUIPMENT: FUMISCOPE, REPORTIR™
The monitoring equipment is designed to measure the actual concentration of this product within the fumigation site to determine accumulated dosage. This equipment is not sensitive enough to use as a clearing device after the exposure period. This equipment also is used in conjunction with Drexel Chemical's Master Fume Calculator for determining actual HLTs.
Fumiscopes can be purchased through your distributor or from the manufacturer. For more information, contact:

Key Chemical and Equipment Co., Inc.
13195 49th Street N., Unit A
Clearwater, FL 34622
Phone: (727) 572-1159
Fax: (727) 572-4595

Note: Contact the manufacturer for Fumiscope calibration and repair procedures.
All companies with Master Fume AG must own 2 pieces of monitoring equipment and they must be calibrated and inspected yearly by Drexel and/or Master Fume AG distributor.

CLEARANCE TESTING EQUIPMENT
A. INTERSCAN GAS ANALYZER
Model GF1900 has an integral pump that draws the air sample through a pyrolyzer (furnace) where the product is converted to SO_2 which then passes through an SO_2 sensor. The unit is lightweight and is battery or AC powered for easy portability. For more information, contact the manufacturer or:

Key Chemical and Equipment Co. Inc.
13195 49th Street N., Unit A
Clearwater, FL 34622
Phone: (727) 572-1159
Fax: (727) 572-4595

B. MIRAN GAS ANALYZER
The Miran SapphIRe utilizes a single beam, infrared detection technology to directly measure low concentrations (0 to 5 ppm) of sulfuryl fluoride. For more information, contact:

Thermo Environmental Instruments
8 West Forge Parkway
Franklin, MA 02038
Phone: (508) 520-0430
www.thermo.com/AQI

C. SF-EXPLORIR GAS MONITOR
The SF-ExplorIR is a portable monitor that uses non-dispersive infrared (NDIR) technology. It features direct measurement of sulfuryl fluoride at 0 to 5 ppm. For more information, contact: Spectros Instruments, Inc. or their representatives.

D. OTHER UNITS
The listed detection and monitoring equipment in this label is not intended to be all inclusive. As new technology is developed, new devices may be evaluated by Drexel Chemical Company to detect this product. Contact your nearest representative from Drexel Chemical Company for the latest information on sufficiently sensitive detection devices.
Prior to using the above instruments to clear a structure, meters must be "zeroed." This must be done according to the manufacturer's

directions, away from the fumigation site and in an atmosphere that does not contain this product. Manufacturer's instructions also include information regarding appropriate and necessary calibration and maintenance. Manufacturer's specifications must be followed to ensure proper operation of these instruments.
Please refer to the manufacturer for the latest specifications and instructions for any equipment used with this product.

Chapter 5
FUMIGATION MANAGEMENT PLAN (FMP)

The certified applicator is responsible for working with the owners and/or responsible employees of the site to be fumigated to develop an FMP for this product. The FMP is intended to ensure a safe and effective fumigation. Critical components of a fumigation of this product include Drexel Chemical's Master Fume AG Calculator Program and the documentation it creates and the Precision Fumigation™ Techniques. The FMP must address characterization of the site and appropriate monitoring and notification requirements consistent with, but not limited to, the following:

1. Inspect the site to determine its suitability for fumigation.
2. When sealing is required, consult previous records for any changes to the structure, potential leaks and monitoring of occupied and adjacent buildings.
3. Consult with company officials (whose area or commodity is fumigated) and appropriate employees, prior to each fumigation, for any existing FMPs, SDS, Applicator's Manual and other relevant safety procedures.
4. Consult company officials in the development of procedures and appropriate safety measures for nearby workers and public personnel who will be in and around the area during fumigation and aeration.
5. Consult with company officials to develop an appropriate exterior monitoring plan that will confirm that nearby workers and bystanders are not exposed to levels above the allowed limits during application, fumigation and aeration. This plan must also demonstrate that nearby residents will not be exposed to concentrations above the allowable limits.
6. Consult with company officials to develop procedures for local authorities to notify nearby residents in the event of an emergency.
7. Confirm the placement of warning placards around the fumigation site as described in this Manual.
8. Confirm the required safety equipment (including that required for entry into an area under fumigation) is in place and the necessary manpower is available to complete a safe, effective fumigation.

GUIDANCE FOR PREPARATION OF AN FMP

An FMP is an organized, documented description of the steps involved to help ensure a safe, legal and effective fumigation. Drexel Chemical's Master Fume AG Calculator Program supports the creation of documentation needed to satisfy an FMP. Drexel Chemical's Master Fume AG Calculator Program and the FMP will assist you and others in complying with pesticide product label requirements. The guidance that follows is designed to help assist you in addressing all the necessary factors involved in preparing for and fumigating a site. This guidance is intended to help you organize any fumigation that you might perform prior to actual treatment. It is meant to be somewhat prescriptive, yet flexible enough to allow the experience and expertise of the fumigator to make changes based on circumstances which may exist in the field. Precision Fumigation techniques support this flexible and adaptive approach. By following a step-by-step procedure, yet allowing for flexibility, safe and effective fumigation can be performed. Before any fumigation begins, carefully read and review the label and the Applicator's Manual. This information must be given to the appropriate company officials (supervisors, foreman, safety officer, etc.) in charge of the site. Preparation is the key to any successful fumigation. If you do not find specific instructions for the type of fumigation that you are to perform listed in this guidance document, you will want to construct a similar set of procedures using this document as your guide or contact Drexel Chemical Company for assistance and/or additional resources. Finally, before any fumigation begins you must be familiar with and comply with all applicable Federal, State and local laws. The success and future of fumigation are not only dependent on your ability to do your job, but also by carefully following all rules, regulations, and procedures required by governmental agencies.

Checklist Guide for an FMP

This checklist is provided to help you take into account factors that must be addressed prior to performing all fumigations. It emphasizes safety steps to protect people and property. The checklist is general in nature and cannot be expected to apply to all types of fumigation situations. It is to be used as a guide to prepare the required plan. Each item must be considered. However, it is understood that each fumigation is different and not all items will be necessary for each fumigation.

A. PRELIMINARY PLANNING AND PREPARATION

1. Determine the purpose of the fumigation and record in Drexel Chemical's Master Fume AG Calculator.
   a. Control of insect infestation
   b. Control of rodent infestation
   c. Plant pest quarantine
2. Determine the type of fumigation and record in Drexel Chemical's Master Fume AG Calculator. For example:
   a. Space: tarp, mill, warehouse, food plant, railcar or ship (when fumigating vessels such as ships read the U.S. Coast Guard Regulations 46 CFR 147A, in addition to the Applicator's Manual)
   b. Commodity: raw agricultural or processed foods
3. Fully acquaint yourself with the site and commodity to be fumigated, and record the following in Drexel Chemical's Master Fume AG Calculator when necessary:
   a. In conjunction with the owner/operator/person in charge, take note of the general structure layout, structure construction (materials, design, age, maintenance), fire or combustibility hazards, connecting structures, other significant fumigant escape routes and other unique hazards or structure characteristics.
   b. The number and identification of persons who will routinely enter the proximate area fumigated (i.e., employees, visitors, customer, etc.).
   c. The specific commodity to be fumigated.
   d. The previous treatment history of the commodity, if available.
   e. Accessibility of utility service connections.
   f. Nearest telephone or other means of communication and note the location of these items.
   g. Emergency shut-off stations for electricity water and gas. Note the location of these items.
   h. Location and number of fans, introduction sites and monitoring lines.
   i. Current emergency telephone numbers of local health, fire, police, hospitals and physician responders.
   j. Name and phone number (both day and night) of appropriate company officials.
   k. Location of command center.
   l. Review labeling including the Applicator's Manual.
   m. Location of cylinders.
   n. Cylinder temperature or pressure.
   o. Introduction line: length, inside diameter, and burst pressure.
   p. Fan capacity (i.e., cu. ft/mm).
   q. Record and calculate dosage in Drexel Chemical's Master Fume AG Calculator.
      (1) Cubic footage or other appropriate space/location calculations
      (2) Estimated HLT
      (3) Temperature
      (4) Exposure time
      (5) Target pest
      (6) Whether the low, high or user-defined CT was used and the resultant CT target value
      (7) Initial, additional and total amount of fumigant used
      (8) Time of introduction and if any, times of introduction of add gas applied
      (9) Actual CT achieved

B. PERSONNEL

1. Confirm that all relevant personnel in and around the structure to be fumigated have been notified prior to application of the fumigant. Consider using a checklist that each employee initials indicating they have been notified.
2. Instruct all relevant fumigation personnel to read the Applicator's Manual about the hazards that may be encountered and about the selection of personal protection devices including sufficiently sensitive detection equipment.

3. Confirm that all personnel are aware of and know how to proceed in case of an emergency situation.
4. Instruct all relevant personnel on how to report any accident and/or incidents related to fumigant exposure. Provide a telephone number for emergency response reporting.
5. Instruct all personnel to report to proper authorities any theft of fumigant and/or equipment related to fumigation.
6. Establish a meeting area for all personnel in case of emergency.

C. MONITORING
1. Safety
   a. Monitoring of conditions of this product must be conducted in areas to prevent excessive exposure and bystander exposure.
   b. Keep a log or manual of monitoring records for each fumigation site. This log must at a minimum contain the timing, number of readings taken, location, and level of concentrations found.
   c. When monitoring, document even if there is no fumigant present above the safe levels. In such cases, subsequent monitoring is not routinely required. However, spot checks must be made occasionally, especially if conditions significantly change.
   d. Monitoring must be conducted during aeration and corrective action taken if gas levels exceed the allowed levels in an area where bystanders and/or nearby residents or domestic animals may be exposed.
2. Efficacy
   a. Readings of this product should be taken from within the fumigated structure to insure proper gas concentrations. Drexel Chemical's Master Fume AG Calculator analysis of these readings must be used as a basis for any decisions to add gas and the determination of subsequent amounts needed.
   b. All readings of this product must be recorded in Drexel Chemical's Master Fume AG Calculator.
   c. Readings should be of sufficient nature to reasonably determine HLT and, thus, identify whether any significant unforeseen leaks are occurring.

D. NOTIFICATION
1. Confirm the appropriate local authorities (fire departments, police departments, etc.) have been notified as per label instructions, local ordinances or instructions of the client.
2. Prepare written procedure ("Emergency Response Plant") that contains explicit instructions, names and telephone numbers so as to be able to notify local authorities if levels of this product are exceeded in an area that could be dangerous to bystanders and/or domestic animals.

E. SEALING PROCEDURES
1. Sealing must be adequate to control the pests. Care should be taken to ensure that sealing materials will remain adequately intact until the fumigation is complete.
2. If the site has been fumigated before, review the previous FMP and/or Drexel Chemical's Master Fume AG Calculator files for previous sealing and HLT information.
3. Make sure that construction/remodeling has not changed the building in a manner that will materially affect the fumigation.
4. Warning placards must be placed on all entrances and all sides of the fumigation site.

F. APPLICATION PROCEDURES AND FUMIGATION PERIOD
1. Plan carefully and apply the product in accordance with the label requirements.
2. Two persons trained in the use of the product, at least one being an applicator certified by the State, must be present on site at all times during the introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure, when testing for re-entry after aeration (if aerated in an enclosed space) and during re-entry.
3. Apply fumigant from the outside when and where appropriate.
4. Provide watchmen when entry into the fumigation site by unauthorized persons cannot otherwise be assured (e.g., by secondary locks, barricades, etc.).
5. When entering structures, always follow OSHA rules for confined spaces.
6. Keep the flexibility and record keeping function of Drexel Chemical's Master Fume AG Calculator in mind - it will provide a basis for improved understanding and thus, safer fumigation application in the future.
   a. If Drexel Chemical's Master Fume AG Calculator calculated CT is achieved early, the fumigation can be ended early.
   b. If additional time is necessary, use Drexel Chemical's Master Fume AG Calculator to calculate how much time is needed.
   c. If it is necessary to add gas, use Drexel Chemical's Master Fume AG Calculator to calculate how much additional gas is required.

G. POST-APPLICATION OPERATIONS
1. Provide watchmen when you cannot otherwise secure the fumigation site from entry (e.g., by secondary locks, barricades, etc.) by unauthorized persons during the aeration process.
2. Determine gas concentration in the fumigated environment from outside if possible. Use a sufficiently sensitive gas detector before re-entry into a fumigated structure to determine fumigant concentration.
3. Turn on ventilating or aerating fans where appropriate.
4. Ventilate and aerate in accordance with structural limitations and nearby occupied areas so as to minimize bystander exposure.
5. Consider temperature when aerating.
6. Determine gas concentration in the surrounding area if required.
7. Remove warning placards when aeration is complete and the fumigated space has been cleared for re-entry using a detection device of sufficient sensitivity.
8. Inform business/client that employees/other persons may return to work or otherwise be allowed to re-enter the aerated structure.
9. Keep records of monitoring of gas concentration inside (efficacy readings) and outside (safety readings) the fumigation environment to document completion of aeration.

Chapter 6
PREPARATIONS FOR FUMIGATION

Prior to fumigation, read the Applicator's Manual carefully. Notify appropriate owners, employees, and/or operators at the facility where the fumigation will occur and provide relevant safety and health information to local fire and rescue officials for use in the event of an emergency.

Best practice is to notify local police, fire department and emergency responders of impending start and finish times for the fumigation.

Property Owner/Customer Checklist: The owners of buildings to be fumigated need to be informed of circumstances and conditions associated with the fumigation process and of their involvement in preparation, vacancy and re-occupancy. Some States require the fumigator to provide the customer with a list of preparations required for the fumigation. The customer may also be required to acknowledge in writing certain liabilities.

The responsibility for proper fumigation procedures lies with the certified fumigator regardless of who does the work.

OCCUPANTS/CUSTOMERS NEED TO KNOW:
1. Qualifications of the certified applicator who will be doing the fumigation.
2. Their specific role in preparation for fumigation - what to prepare, turn off, remove, etc.
3. What the fumigation process (introduction, exposure, aeration and clearance) entails so that there can be absolutely NO ENTRY by unauthorized personnel into the structure until it is certified clear for re-entry by the fumigator.
4. The specific times to leave the structure and when re-occupancy may occur.
5. That the fumigator often requires that the property owners surrender keys to the structure to be fumigated. The fumigator should have access to all areas of the fumigation site during the whole period that the site is under their control.
6. This product has no residual effectiveness and so does not control future infestations of pests.
7. To reveal to the fumigator known or potential connections to adjacent/other buildings.

WHAT TO REMOVE PRIOR TO FUMIGATION

Remove from the structure to be fumigated all persons, non-target animals and desirable growing plants. All drugs (including tobacco

products) and medicinals (including those items in refrigerators and freezers) need to be removed prior to fumigation.

FLAMES OR HEATING ELEMENTS

This product is a very stable compound that is relatively non-reactive and non-flammable. However, under high heat conditions present in gas flames or glowing electric elements, this product can decompose into sulfur dioxide SO_2, hydrofluoric acid HF, and other decomposition products. Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Therefore, extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated.

Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. When a single gas meter serves more than one structure, gas service to all sources may be interrupted. The gas lines should be cleared. Fumigation companies may request that customers have the local gas company turn off the gas prior to fumigation. The local gas company will always need to turn gas service on after it has been turned off to determine that the gas flow rate and pressure are appropriate.

Important: Before fumigating, ALL pilot lights must be turned off. The heat of gas flames, pilot light flames, or the glowing wires or hot surfaces of electric heaters can cause this product to break down to form a corrosive material. Make sure the gas flames and pilot flames of furnaces, gas refrigerators and kitchen ranges are extinguished and that glowing electric heaters that represent a reasonable risk of a heat source that is at or near 752°F are turned off.

CHLORINE GAS: Damage to metals can also occur from the inclusion of chlorine gas for bleaching or chlorination processes. Ensure this equipment is turned off with no leaks or excluded from the fumigation.

CHECKING FOR CONNECTED AREAS

Prior to fumigation, the certified applicator is required to check for connected areas. A connected area is defined as any area connected with the space to be fumigated by construction elements (e.g., pipes, conduits, ducts, etc.) that may allow the passage of fumigant between the spaces.

Any connected areas must be vacated during the fumigation process unless it is isolated from the space to be fumigated by methods that will prevent passage of the fumigant from the space to be fumigated into the connected area. When it is necessary to vacate areas that have been isolated, that area shall be considered as a fumigated space and all applicable rules, regulations and label instructions apply such as preparation, placarding, securing and aeration.

Concentrations of this product must be continually measured during the fumigation of a structure in any occupied isolated connected structures to verify concentrations are less than 1 ppm to confirm that individuals in the isolated areas are not exposed to unacceptable levels of this product.

Use only a detection device of sufficient sensitivity such as the INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR to confirm a concentration of 1 ppm or less. If concentrations of this product is more than 1 ppm, then the sealing of the isolated space from the fumigated area is probably not working and the immediate space must be evacuated unless the concentration is continuously monitored to prevent exposure greater than 1 ppm. SCBA must be worn by the applicator if the concentration is more than 1 ppm. **Important:** All connected/adjoining areas must be vacated if required by State or local laws or regulations.

DISTRIBUTION / AERATION FAN USE AND PLACEMENT

Purpose of Fans

The purposes for fans in a structural fumigation are:

1. Fumigant introduction
2. Equilibrium and circulation
3. Aeration

Positioning Fans

- There is no set pattern established for the positioning or the number of fans to use.
- Fans should be strategically placed in order to mix the fumigant and rapidly reach equilibrium.
- At least one fan for each level of the structure.
- It is good fumigation practice to use more fans in structures that are divided into numerous smaller compartments or rooms.

A rule of thumb is to use one fan for each 75,000 ft^3 and at least one fan for each area or level of the fumigation.

In structures frequently used or dedicated to fumigation, air circulation equipment and fans can be built into the structure. Examples of some systems include air-handling systems that provide for the fumigant introduction, continuous circulation, and also aid in the quick, effective aeration of the structure.

Reaching Equilibrium

When the liquid form of this product is released from the introduction hose, it extracts a substantial amount of heat from the surrounding air as it expands to form a gas. A pound of the liquid form of this product changing to the gas phase will drop the temperature of 1000 cubic foot of dry air 4.5°F (28.3 cubic meters of air 2.5°C).

The chilling causes the formation of a cloud of condensed water (fog) that must be dissipated before it collects on a surface. The rate of dissipation depends upon the release rate, atmospheric conditions and mixing rate. The fan capacity, quantity, and placement determine the mixing rate. The chilled gas of this product is much denser than the surrounding air and can settle to the bottom of the fumigation space unless mechanically mixed with the surrounding air.

All gases tend to move from an area of high concentration to low concentration and will eventually come to equilibrium in a confined space. This product will do the same when it is introduced into a fumigation space, regardless of the fact that molecules of this product are heavier than air molecules. However, the rate of passive diffusion may be too slow to achieve equilibrium within a practical period. Thus, mechanical mixing by fans is essential.

Important: High capacity fans are needed when introducing this product into a space to prevent stratification, to aid in proper dispersion and to assist temperature distribution.

Continuous Circulation with Fans

A significant benefit of continuous circulation is the movement of this product from areas of high concentration to areas of lower concentration. This continuous circulation maintains a more equal concentration within the fumigation space and helps ensure that this product will penetrate all areas where infestation may exist.

It is next to impossible to seal a structure so that there are no leaks. Unless there are abnormally large leaks, continuous circulation during the entire exposure period will not appreciably affect the loss rate for this product. Obviously, the air stream should not flow directly against "leaky" areas because excessive fumigant loss can occur.

Preparing for Aeration

When first preparing the fumigation, plan ahead for the aeration period and take steps to aid aeration by strategic placement of fans and other aeration tools. Just as fans are useful in achieving equilibrium of fumigants, they are excellent aids in attaining rapid aeration and are essential where cross ventilation is poor. Have a detailed plan in place for safe, effective aeration of the structure. Be sure to consult local regulations for more restrictive aeration procedures.

MONITORING HOSES

Arrangements should be made to place sampling hoses in the structure prior to fumigant introduction. Semi-rigid vinyl hoses (3 to 6 mm or 1/8 to 1/2" ID) should be placed to allow sample representative concentrations with a Fumiscope or similar device. Monitoring hoses larger than 6 mm ID may take a longer time to pull the sample from the fumigated space to the monitoring device because of the larger volume of air needed to be moved.

Ideally, monitoring lines should be placed on all levels of the fumigated structure. If the structure is compartmentalized into separate rooms or other sub-units, place lines in areas representative of the different units.

SEALING THE STRUCTURE

No two fumigations are exactly alike. Each job requires the fumigator to establish and maintain an effective fumigation environment. The fumigation must be conducted in a manner that will effectively control the pests without causing undue risk to people or property. The fumigator must conform to the label for this product and the Applicator's Manual, as well as to Federal, State and local regulations. When in doubt, a fumigator should seek assistance from suppliers,

regulators, Drexel Chemical Company representatives or other educational sources.

The quality of the seal has a huge influence on the effectiveness of the fumigation. Increasing the seal of the fumigation site is one of the most effective ways to ensure a quality fumigation and reduce the total amount of fumigant needed.

There are several approaches to the challenges of confining the fumigant. The fumigator needs to make field judgments how to best seal a space. Pay special attention to drains, vents, conduits, wiring, electrical junction boxes, floor cracks, wall/floor or wall/ceiling joints and damage to outside walls from equipment. When sealing, keep in mind a few basic thoughts:

1. Identify and address key leakage areas. Careful inspection of the structure will help identify leaky areas. Be sure to carefully seal protruding equipment on the top floors and roofs. Building eaves also can be very leaky.
2. To the extent necessary and possible, close off all connected structures and install an "air break" to stop gas moving to connected structures.

Tape and Seal

For fumigation structures that can be appropriately sealed with materials such as plastic or tape, seal adequately around doors, windows, vents and other openings. When necessary to minimize escape of fumigant through the soil and to avoid injury to nearby plants, wet soil (if not sufficiently moist) around the structure to act as a barrier for the fumigant. Often, structures are too large to be completely tarped for fumigant confinement. The most common practices are to use polyethylene sheeting, non-porous panels, fumigation tape, spray adhesives, foams and insulation materials to seal the structure for fumigation. These techniques are usually used around doors, windows, roof eaves, loading docks, pipes, augers, conveyers, vents, etc. If properly used, these materials can do an ample job of confining the fumigant within the structure.

Stucco or masonry block buildings may be sealed by taping laminated paper or plastic film over outside doorways, windows and vents. This sealing method is recommended for structures in which any wooden section, including roofing, is exposed to the outside.

However, even with an excellent job of tape and seal around windows, doors, etc., if the building walls, roof or basement have holes that are not sealed, the structure may not hold fumigant satisfactorily.

Always monitor with a Fumiscope or similar device when necessary.

Foam Sealing

The use of expandable spray foams have been effectively used to help seal structures. Expandable foam is economical and can be used for both permanent and temporary seals. Refer to the foam product directions for proper use and compatibility issues.

Tarping

Good sealing is necessary for an effective fumigation. Tarpaulins (tarps) can be used in the sealing process with tapes/adhesives to help seal leaky areas or to envelop the entire area to be fumigated. This method is effective on almost any size or type of space/site. The ability of a tarp to contain a gas depends on the condition of the tarp, the material of construction and its thickness.

One of the most critical operations in tarping a space is achieving a tight seal at the ground where protrusions, debris or rough-textured soil or concrete may provide an opening for gas to escape. The edges of the cover that contact the floor or soil must be sealed by techniques such as taping the tarp to the floor or placing sand or water snakes over the edges of the tarp. Sand or water snakes may be used effectively if the ground surface is very smooth. One method of improving the seal with a sand or water snake is to run a trough of water on the tarps along with the snakes. Vinyl/nylon snake covers do not deteriorate readily. To minimize escape of fumigant through the soil and to avoid injury to nearby plants, wet soil (if not sufficiently moist) around the structure to act as a barrier for the fumigant. When possible, avoid walking on tarped, fumigated material to maintain seal during the exposure period. To achieve an adequate ground seal, allow at least 2 feet of tarp to clear the ground snakes. This will accommodate movement of the tarps from wind movement.

TARP MATERIAL: Plastic tarps are semi-permeable membranes that permit different fumigants to pass through them at different rates. The passage of this product through most plastic sheeting of sufficient thickness is very slow (see **TABLE 1.**).

Use only tarps made of materials that will adequately confine this product for the required time. Tarps are sold in many sizes. Experience has shown that the following have proven satisfactory:

1. 4 to 6 mil polyethylene for "single use" tarps
2. Laminated (several layers) polyethylene
3. Vinyl coated nylon
4. Neoprene coated nylon
5. PVC (polyvinyl chloride) coated nylon

THICKNESS: As a minimum, 4 to 6 mil (160 to 240 microns) thickness of the above materials adequately confines this product. A tarp of 100 microns is equivalent to a 400 gauge material. Polyethylene tarps less than 4 mil (160 microns) are not of an adequate thickness to confine this product because they do not possess the strength and weight needed for the handling, wind resistance and abrasion encountered in most fumigations.

TABLE 1. Percent permeation loss and adsorption of 8 oz./1000 ft.^{3} sulfuryl fluoride after 24 hours from 11 ounce glass bell jar with lid made of tarp materials.

	% Permeation Loss	% Adsorption*
	Sulfuryl fluoride	Sulfuryl fluoride
Polyethylene 4 mil	0.0	1.3
Tarp A, 10.3 oz/yd^2	3.3	6.1
Tarp B, 7.2 oz/yd^2	5.5	3.1
Tarp C, 9.6 oz/yd^2	0.2	3.3
Used tarp**	100.0	8.8

* Values reflect subtraction of fumigant loss due to glass container adsorption (2.2% for sulfuryl fluoride). (n=4)

** A used tarp is a tarp which has abrasions of the vinyl coating causing the nylon fabric to be exposed in a few spots.

Source: Scheffrahn, R.H. and E.M. Thomas (1993) "Penetration of Sulfuryl Fluoride and Methyl Bromide Through Substrates During Fumigation." DOWN TO EARTH 48 (1) pp. 15-19.

PLACARDING AND SECURING FUMIGATED AREAS

Placarding of Fumigated Areas

This product is a toxic gas without a warning agent.

All entrances and all sides of the fumigated environment and any connected area not monitored must have warning signs. Do not connect cylinders to introduction equipment until all fumigation warning signs have been posted, the space to be fumigated is clear of people and non-target animals, and it is secured. Warning signs must be of weather resistant material and should be securely affixed to the structure. Do not allow entry by unprotected persons into fumigated area until the signs are removed. Signs must remain legible during the entire posting period. Warning signs should be placed in advance of the fumigation in order to keep unauthorized persons away. The warning signs must be printed in English and Spanish with:

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 and time.
4) Name of fumigant used and EPA Reg. No.
5) Name, address and telephone number of the applicator.

Only a certified applicator may authorize removal of placards and only when concentration of this product in the breathing zone of the treated site is 1 ppm or less.

Use the following considerations when posting warning signs:

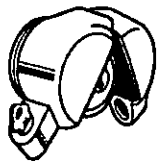
- Follow local, State and Federal regulations for sign format, size, durability or additional information requirements.
- Use materials that will allow information to remain legible when posted.
- Use information that allows for 24 hour communication with the certified applicator in the event of an emergency.

Transfer of incompletely aerated commodity to a new storage site within a facility is permissible. However, the new storage site must have placarding and security similar to the fumigation site if concentration of this product is equal to or greater than 1 ppm. Workers who handle incompletely aerated commodity must be informed and appropriate

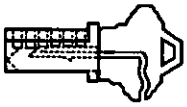
measures must be taken (ventilation and wearing of SCBA) to prevent any exposure greater than 1 ppm.

Securing Structures

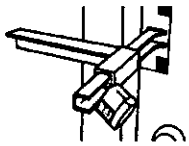
In order to secure against unauthorized entry during the fumigation exposure period, a locking device or barricade must be used on all exterior doors or doorways. A locking device or barricade must be effective in preventing entry of any exterior door or doorway using normal opening or entering processes by anyone other than the certified applicator in charge of the fumigation or persons in his/her on-site direct supervision. Consult State and local regulations for any supplementary instructions and local restrictions on securing against entry. Several additional security options to consider might include:



CLAM SHELL LOCKS:
CLAM SHELL LOCKS are designed to prevent use of the door or occupant's keys to unlock entrance doors.



KEY-WAY LOCKS:
KEY-WAY LOCKS are designed to prevent use of the occupant's keys to unlock entrance doors. These function by inserting a two-part locking key into the door keyhole and removing only half of the key. The other half of the locking key remaining in the door prevent insertion of the occupant's key.



J-SAFE LOCKS:
J-SAFE LOCKS or chains can also be used on certain structures.

GUARDS:
Guards may be considered in some circumstances and may be required in some locations. Consult local regulations. Best practice is to notify local police, fire department and emergency responders of impending start and finish times for the fumigation.

RAILCARS, TRAILERS OR SHIPS:
Railcars, trailers or ships must be secured against unauthorized entry during the fumigation exposure period.

Chapter 7
INTRODUCTION AND DISTRIBUTION OF THIS PRODUCT

CHOOSING INTRODUCTION SITES

The specific site(s) of release of this product is (are) very important to the success of the fumigation. This product should be introduced in a manner to achieve rapid equilibrium, avoid excessive loss, prevent fog-out and ensure safety to personnel and materials.

Site selection should be made using good judgment. Ask, "If this product was introduced in this location, how and when will it get to the most remote locations in the commodity or structure?" The size and configuration of the space and the adequacy of the circulation typically dictate the number of release sites for this product. Therefore, for many applications, it is often appropriate to use multiple introduction sites to rapidly attain equilibrium.

In structures that are frequently used for fumigation, permanent introduction systems can be built into the structure to ensure safe, effective and adequate fumigant introduction. Be sure to inspect all components of introduction systems prior to each use.

The proper introduction of this product (release from the cylinder) is essential to the success, safety and economy of a fumigation. It is imperative that the fumigator understands the principles involved and the conditions that exist for introducing the fumigant on each job.

Below are points that are considered when introducing this product:

1. The introduction methods used will practically achieve the target dosage (sufficient ounce-hours for the working temperature to control the target pest).
2. This product must be introduced in a manner that is safe to personnel and property inside and outside of the fumigation space.
3. The goal is to reach concentration equilibrium of this product throughout the fumigated space as quickly as is safe and practical.

Important: Prior to release of this product, make sure a thorough check of the structure and surroundings is conducted and all safety precautions have been taken.

Do not apply for insect control when temperature at the site of the pest is below 40°F. This temperature may be measured wherever the infestation may be. This restriction does not apply when fumigating for rodents. To prevent damage, do not apply liquid fumigant directly to any surface within the fumigation area.

This product is packaged as a liquid under pressure and requires a heat source for conversion of the liquid to a gas during introduction. The heat source can be the air around the introduction site or mechanical heat exchanging systems.

The introduction system must:

- Prevent breakdown or contamination of this product.
- Confine this product until it is released into the fumigation area.
- Prevent liquid sulfuryl fluoride from contacting surfaces which could be damaged or the commodity within the fumigation area.
- Prevent a fog-out in the fumigation area. A fog-out is substantial condensation of moisture inside a fumigated structure that is caused by the air temperature dropping below the dew point.

Damage to materials can occur if the rate of release of this product exceeds fan capacity. Use electric fan(s) to facilitate forced distribution and aeration of other dead air spaces and rapid dispersion of the gas. This product must be introduced from the cylinder through a suitable leak-proof delivery system (hoses, connectors, gauges, solenoids, etc.) with a minimum burst pressure of 500 psi. It is recommended to:

- Release the fumigant into a large open space.
- Direct the fumigant into the blast of air from a fan(s) having a capacity of at least 1000 cubic foot per minute per pound of this product released per minute.
- Introduce no more than 4 cylinders per introduction site.
- Have one introduction site per every 75,000 cubic foot.

SELECTION AND USE OF EQUIPMENT FOR FUMIGANT INTRODUCTION

Weighing the Fumigant

Either platform or hanging scales can be used to weigh the cylinder during fumigant introduction. If hanging scales are used, hanging bonnets or cylinder slings must be used to hang the cylinder from the scale.

Consult your distributor or Drexel Chemical Company for a source of hanging bonnets. Scales should be routinely calibrated to assure correct readings. Refer to the scale manufacturer for calibration and maintenance details.

THE CYLINDER SHOULD NEVER BE SUSPENDED BY THE VALVE!

Hoses

Release the fumigant through a suitable leak-proof hose with a minimum burst pressure of 3450 kPa (500 psi). The hose should be flexible, kink-resistant, durable and compatible with the liquid form of this product.

Prior to use, confirm with distributor or manufacturer that the introduction hose meets the above requirements.

The introduction rate of this product is mostly controlled by the inside diameter and the length (resistance) of the fumigant introduction hose. Flow rates can be easily calculated using Drexel Chemical's Master Fume AG Calculator.

Protective Sheeting

Protective sheeting, such as polyethylene plastic, can be placed under the hose and fan to further protect floors and other materials during application from potential moisture condensation.

Securing Introduction Hose

A widely used method is to securely attach the introduction hose to a tarp clamp and then use the tarp clamp to attach the hose to the fan cage. The fan cage is angled upward at about 45°. Another option is to attach the fumigant introduction hose to a solid heavy object in front of a fan angled upward at 45°. If the introduction hoses are part of a permanent introduction system, be sure to inspect the hoses prior to each use to ensure they are securely mounted and still in required working order.

Fog-Outs
A cloud of fine droplets suspended in air near the ground is called fog. It is very important when introducing this product to prevent excessive fog and dew formation. Releasing this product will cause some condensation near the release point - slow release rate and low humidity will cause less and a fast release rate and high humidity will cause more. After the condensation forms, it will evaporate at a rate that is dependent on the relative humidity, the temperature of the fumigation atmosphere and the air mixing rate controlled by the introduction fans.
Condensation forming on the photoelectric eye of a smoke detector or motion detector can cause the alarm to activate. It is very important to use proper fans to help mix the heat of the building and fumigation atmosphere to evaporate the condensation. Liquid water absorbs the very small amount of impurities in this product and can result in corrosion.

Fog-Out Prevention
There are several options to reduce the incidence of moisture condensation when fumigating air-conditioned structures in hot, humid weather:
1. Let structure warm a day or two before fumigation to equalize inside and outside temperature and stabilize the Relative Humidity (RH).
2. Reduce the introduction rate with a smaller diameter hose, longer hose or pulsed (interrupted) introduction.
3. Reduce the amount of this product introduced into one area by using multiple introduction sites. This would be most important in high-dosage fumigations.
4. Use multiple fans or larger fans to hasten the mixing of air and heat exchange.
5. Monitor the fumigation or extend the exposure period to reduce the overall fumigant requirements, if practical.
6. When necessary, use a combination of several of these techniques to reduce the release rate and relative humidity, and increase the heat exchange of the structure to the fumigation atmosphere. Drexel Chemical's Master Fume AG Calculator takes into consideration fan capacity to recommend the fumigant introduction rate.
7. Do not tarp or seal a space that is excessively wet.

Fumigated Space Leak Detection and Mitigation
During release of this product, the fumigator must monitor around the perimeter of the fumigation area (especially downwind) with a leak detector with sufficient sensitivity to ensure a good seal so that concentrations of this product are kept within 1 ppm or less outside of the fumigation area. An SCBA must be readily available during the fumigant introduction period in case of leaks.
Detectors such as TIF 5750 and XP-1 manufactured by TIF Instruments, Inc., Miami, Florida, can detect concentrations of this product over 50 ppm. These devices can only be used to check cylinders for significant leaks. A device capable of measuring to 1 ppm of this product must be used for all other tasks.
If more than 1 ppm of this product is detected, then clear the area of all personnel. Only persons wearing a self-contained breathing apparatus (SCBA) with full facemask and operating in pressure demand mode or its equivalent are permitted in the area to address the leak. Only after levels of this product are 1 ppm or less, are unprotected personnel permitted in the area.
Large leaks must be minimized as quickly as possible to help avoid risk of exposure to bystanders and/or occupants of nearby structures and to minimize loss of fumigant. This involves walking around the structure or fumigated area with a monitoring device to determine if excessive amounts of fumigant are escaping. Proper respiratory protection must be worn when sealing leaks. Seal leaks from the exterior of the structure whenever possible. If it is necessary to seal a leak from the interior of the structure, the applicator must follow all proper re-entry procedures.

Re-entry Procedures
If re-entry into a fumigated area is necessary after introduction of the fumigant, but before complete aeration, to troubleshoot distribution of the fumigant or repair leaks, follow the re-entry procedures specified in *"Chapter 9"*.

CALCULATING DOSAGE
Establishing the Required Dosage
The fumigator is challenged with the task of distributing and maintaining a concentration of fumigant over the fumigation period to achieve the target dosage. Because of the multitude of factors, no two fumigations are identical. To specify a single dosage rate for all conditions would seldom be correct — usually it would be either excessive or insufficient for expected pest control.

Drexel Chemical's Master Fume AG Calculator Program
Drexel Chemical's Master Fume AG Calculator is used for all fumigations using this product. See directions for details and specific use. Do not use this product without the Drexel Chemical's Master Fume AG Calculator. Drexel Chemical's Master Fume AG Calculator must be used to calculate the dosage. Drexel Chemical's Master Fume AG Calculator Program may be modified and updated from time to time; please contact your Drexel Chemical Company representative for current information.

Precision Fumigation Defined
Precision Fumigation is not a new concept; however, most fumigators have lacked the tools to consistently plan and conduct precision fumigations. Precision Fumigation can be defined as "Optimizing fumigant use to maximize efficiency and minimize risk."

Precision Fumigation Concepts
Use of this product allows fumigators to use their skills, knowledge and experience to create and implement successful, flexible fumigations. Precision Fumigation methods: a) allow fumigation when/how necessary, b) capitalize on enhanced sealing methods, c) maximize exposure time, and d) utilize temperature modification.

Fumigant Dosage
All fumigants utilize some form of the dosage relationship which is often referred to as the "CT Concept":

Dosage = Concentration (C) X Time (T)
or
D = C x T (CT)

Therefore, the dosage required to kill the target pest(s) is accumulated over a period of time and is measured in ounce-hours or gram-hours.
CT = oz-h/1000 cu. ft.

The concentration in ounce per 1000 cubic foot of fumigant multiplied by the exposure time in hours

The maximum target concentration in Drexel Chemical's Master Fume AG Calculator is 128 ounces per 1000 cubic foot.

The maximum target dosage for all normal atmospheric pressure (NAP) fumigations is 1500 CT (1500 ounce-hours per 1000 cubic foot).

For vacuum chamber fumigations, the maximum target concentration is 128 ounces per l000 cubic foot, and the maximum target dosage is 200 CT (200 ounce-hours per 1000 cubic foot).

Concentration Units of this Product
1 ounce per 1000 cubic foot = 240 ppm

FUMIGANT DOSAGE FACTORS
The proper dosage for efficacy and the total amount of this product needed for a fumigation is determined by four interrelated factors:
1. Pest species and life stages
2. Temperature at the site of infestation
3. Exposure time
4. Half-Loss Time (HLT)

Pest Factor
This product is effective on all key stored product insect pest species and can control all life stages of insects. However, different pest species and life stages require different dosages for effective control. Adult, larval and pupal stages are controlled with relatively low dosages of this product, while the egg stage requires higher dosages. Several rodent pests such as rats and mice may infest commodities and sites, and damage materials within facilities. The temperature restriction of 40°F for insect fumigation does not apply to rodents because they are warm blooded. The target dosage for rodents is 36 ounces-hour per 1000 cubic foot.

Temperature Factor
Temperature is an important factor for successful fumigation. Insects are ectothermic, so increasing temperature increases insect metabolism. Increasing insect metabolism greatly improves the efficacy of this product. Increasing temperature can decrease

exposure time and/or gas needed. Relatively large changes in temperature are generally not required. Achieving temperatures of 25 to 30°C (78 to 86°F), for example, can have a very positive effect on fumigation efficacy and efficiency.

Fumigators can use the following methods for increasing temperature of the fumigated space. Permanent/built-in systems utilizing hot water, steam, electric, fossil, solar heat sources. Temporary/leased units operating on propane or natural gas, electric or other fuels can be used. Fans, heater fans and other electrical equipment should be grounded and have a good protective fusable or breaker system. Planning fumigations during the warmer seasons or even during the warmer periods of the day can positively affect temperature factor.

Do not apply this product for insect control when the temperature of the site of the pests is below 40°F.

The measured minimum temperature at the site of the insect pest should be used for dosage calculations.

For rodents, temperature does not affect dosage because they are warm blooded.

Time Factor (T)

The time factor is a key component of C x T = Dosage formula. The exposure time is defined as the number of hours the target insect is exposed to the fumigant. If the structure has good gas confinement, increasing the exposure period is one of the most cost effective practices available to the fumigator. Doubling exposure time in a well-sealed structure can decrease gas needed by up to 50%. The fumigator should work with the customer to plan and optimize exposure time to minimize the fumigant needed.

Increase time = Decrease gas needed
Decrease time = Increase gas needed

Half Loss Time (HLT)

HLT is the measurement of how well a fumigated space or area holds fumigant from loss. HLT is defined as the time in hours during which 50% of the initial concentration of fumigant is lost. Research has shown fumigant retention is often extremely variable between and even among areas within a structure. Results from numerous measurements for this product indicate the main influencing factors are:

1. Condition of seal (wall construction, number and size of leaks, etc.).
2. Type of underseal (slab, soil, wood).
3. Volume of structure (ratio of surface area to volume).
4. Wind velocity.
5. Number of windows and doors and other openings such as pipes, vents, racks, etc.

If HLT is more than 20 hours for structures, the seal is considered very good. HLT is calculated by actively monitoring the fumigation with a Fumiscope or similar device over a period of time and determining the specific loss of gas in that time period. To get a reasonably accurate picture of the HLT in a large structure, monitoring points should be established throughout the building. This ensures that each area or compartment of the structure will achieve the required dosage. Drexel Chemical's Master Fume AG Calculator will calculate an HLT by area using the collected monitoring data.

Under conditions of rapid fumigant loss (low HLT), only the initial hours of exposure significantly accumulate dosage. If the HLT is significantly shorter than expected (fumigant leaking drastically faster than planned), to achieve the required dosage, the fumigator must take additional steps. These steps include, but are not limited to, stopping the addition of fumigant and addressing the leak (following re-entry procedures if there is a need to reenter or wearing SCBA if working from outside), before increasing gas concentration of this product, increasing the time of exposure or utilizing a combination of the two methods.

Best practice is to use monitoring data, from previous fumigations for this or similar sites and conditions to estimate the HLT, and then monitor to confirm the true HLT. When a reasonable estimate of HLT is not available prior to the initiation of exposure, the following Precision Fumigation method should be used. Introduce part of the calculated dosage of this product, monitoring to determine the actual HLT and then introduce additional parts of the calculated dosage and/or increase exposure time to achieve the target dosage.

USING DREXEL CHEMICAL'S MASTER FUME AG CALCULATOR PROGRAM

Drexel Chemical's Master Fume AG Calculator is a computer-based program that requires entry of key information to determine the dosage and amount of this product to be used. Before Drexel Chemical's Master Fume AG Calculator Program can be used, contact your Drexel Chemical Company representative on how to activate the computer program for calculating dosage. Drexel Chemical's Master Fume AG Calculator Program may be modified and updated from time to time; please contact your Drexel Chemical Company representative for more information.

Drexel Chemical's Master Fume AG Calculator Program has been developed to allow fumigators to calculate the correct dosage over a broad range of pest species, life stages, temperatures and exposure times. Drexel Chemical's Master Fume AG Calculator determines the necessary dosage (gram-hours or ounce hours), converts this to pounds of this product per 1000 cubic feet (or cubic meter) based on volume of fumigated space for all target pests referenced in this Manual. The program also can calculate the necessary adjustments to the exposure period or pounds of this product required to reach the target dosage based on fumigation monitoring data.

- The maximum target concentration in Drexel Chemical's Master Fume AG Calculator is 128 ounces per 1000 cubic foot.
- The maximum target dosage for NAP fumigation in Drexel Chemical's Master Fume AG Calculator is 1500 CT (ounces-hour per 1000 cu. ft.).

Drexel Chemical's Master Fume AG Calculator Temperature Range

This Manual states that the lower fumigation temperature limit is 40°F for insects. At present, however, Drexel Chemical's Master Fume AG Calculator calculates specific dosages for temperatures between 68°F (20°C) and 86°F (30°C). Drexel Chemical's Master Fume AG Calculator allows the user to input temperatures higher than 86°F, but will calculate the dosage based on 86°F. Since the efficacy of this product increases with temperature, Drexel Chemical's Master Fume AG Calculator dosages for temperatures higher than 86°F are conservative.

Drexel Chemical's Master Fume AG Calculator allows the user to input temperatures below 68°F, but will calculate the dosage based on 68°F and provide a warning message that insect control may be less than optimal due to the cooler temperature and decreased insect metabolism. Following the fumigation, monitoring the pest population is recommended to assess control.

Drexel Chemical's Master Fume AG Calculator Exposure Time Range

Drexel Chemical's Master Fume AG Calculator allows the user to input exposure times between 1 and 168 hours. Short exposures of a few hours are best suited for vacuum fumigations, while exposure periods of several days can be appropriate for reasonably sealed structures. Fumigations will commonly be 24 hours due to the need to limit shutdown time, but extending the exposure time can decrease the amount of fumigant necessary. Use Drexel Chemical's Master Fume AG Calculator to determine the most appropriate exposure time to meet both the customer's and fumigator's needs.

Drexel Chemical's Master Fume AG Calculator HLT Range

Drexel Chemical's Master Fume AG Calculator accepts HLTs from 1 to 1000 hours. The fumigator estimates this value prior to the fumigation preferably based on results of monitoring previous fumigations of this structure or of fumigations conducted under similar conditions. HLTs of greater than 50 hours are normally achieved only in chambers and other tightly sealed silos. Change HLTs in Drexel Chemical's Master Fume AG Calculator to see the impact of HLT on the amount of fumigant needed for a fumigation.

Drexel Chemical's Master Fume AG Calculator Area Volume Range

Drexel Chemical's Master Fume AG Calculator calculates fumigant dosages for structures ranging in volume from 35 to 10,000,000 cubic foot. Errors in measuring the volume can lead to under-dosing and not achieving the target dosage or using more fumigant than is needed to achieve the target dosage.

Drexel Chemical's Master Fume AG Calculator Ranges

Temperature:	68 to 86°F
HLT:	1 to 1000 hours
Exposure Time:	1 to 168 hours
Volume:	35 to 10,000,000 cu. ft.
Dosage:	"Low" or "High"
Fumigation Type:	"Space" or "Commodity"
Pressure Type:	"Normal Atmospheric" or "Vacuum"

Limits

Dosage (CT):	1500 oz-h/1000 cu. ft. (NAP)
	200 oz-h/1000 cu. ft. (vacuum)
Concentration:	128 oz/1000 cu. ft.

Drexel Chemical's Master Fume AG Calculator Example

INPUT	
Species:	Red Flour Beetle
Temperature:	86°F
HLT:	15 hours
Exposure Time:	24 hours
Volume:	800,000 cu. ft.
Dosage:	Low
Fumigation Type:	Space
Pressure Type:	Normal Atmospheric
OUTPUT	
Dosage (CT):	338 oz-h/1000 cu. ft.
Concentration:	23.3 oz/1000 cu. ft.
Quantity:	1164 lbs.

Steps of Operation

Preparation prior to fumigant release:

1. Determine pest species and life stages to be controlled.
2. Measure temperature at pest location with a thermometer. (Drexel Chemical's Master Fume AG Calculator operates in both English (°F) and metric (°C) units.)
3. Calculate volume of fumigation space.
4. Determine the targeted exposure period.
5. Estimate the HLT based on previous experience or estimation.
6. In Drexel Chemical's Master Fume AG Calculator, calculate dosage of this product in ounce per 1000 cubic foot (or gm/m³) and get pound (or kg) of this product needed for the job.

Sequential Fumigations

Sequential fumigations are an alternative dosage strategy that may be used to control insect infestations. Fumigate once at the low dosage, which is sufficient for control of the post-embryonic (larva, pupa, adult) stages, plus a significant portion of the eggs. If there are any surviving insect eggs, then after they have hatched, but prior to their maturation and deposition of new eggs, fumigate a second time, again at the low dosage. When sequential fumigations are done, do not exceed the maximum cumulative target dosage of 1500 CT (1500 oz-h/1000 cu. ft.) for the target commodity.

Using Drexel Chemical's Master Fume AG Calculator When Monitoring

During the exposure period, the concentration of this product can be measured by a Fumiscope or similar device. After the fumigant concentration has reached equilibrium, measurements taken over an interval of time will give the actual loss rate from which the HLT can be determined. Use of Drexel Chemical's Master Fume AG Calculator during monitored fumigations has shown that significant quantities of this product can be saved compared to unmonitored fumigations and better control achieved. Refer to Drexel Chemical's Master Fume AG Calculator help file for specific directions on how to use this program. Drexel Chemical's Master Fume AG Calculator is designed to determine actual HLT based on measurements of concentrations of this product during fumigation.

Monitoring to Determine Status and Updated Dosing Directions

1. Measure (with a gas measuring instrument such as a Fumiscope or similar device) concentration of this product ounce per 1000 cubic foot (gm/m³).
2. After one or more hours, take a second measurement of concentration of this product. Accuracy of HLT increases as time between monitoring intervals is increased.
3. Drexel Chemical's Master Fume AG Calculator will calculate the actual measured HLT.
4. If the HLT is shorter than estimated (more rapid loss of fumigant), then either more of this product needs to be added to finish on time or the exposure time may be extended if sufficient product is present. Drexel Chemical's Master Fume AG Calculator will provide the time and "add gas" directions.

Chapter 8
MONITORING THIS PRODUCT

Monitoring discussed within this chapter refers to measuring accumulated dosage and does not refer to required monitoring for worker and bystander exposure.

Monitoring fumigant concentration at key places in the fumigated environment is directed because it can provide important information to the fumigator regarding the placement of fumigant introduction sites that will assist in the efficiency and success of future fumigations.

Thus, in addition to helping maximize efficiency of a large fumigation, monitoring fumigant concentration can serve as a learning experience for the fumigator. For instance, if equilibrium is not achieved quickly, the fumigator can consider placing additional introduction sites or fans in the next fumigation.

Measurement of the accumulated concentration of this product while the fumigation is in progress becomes increasingly valuable as the structure size, complexity and the repercussions of poor pest control increase.

THE OBJECTIVES OF MONITORING FUMIGANT CONCENTRATION OF THIS PRODUCT ARE:

1. To allow Drexel Chemical's Master Fume AG Calculator to determine the optimal amount of this product needed to control the target pests under the actual fumigation conditions.
2. To allow Drexel Chemical's Master Fume AG Calculator to calculate CT (dosage) needed and achieved to ensure a successful fumigation.
3. To allow Drexel Chemical's Master Fume AG Calculator to calculate the actual HLT vs. just estimating the HLT.
4. To create a reasonable history of Drexel Chemical's Master Fume AG Calculator file records so that enhanced Precision Fumigation techniques can be built upon in subsequent fumigations.

SPECIFIC GUIDELINES FOR MONITORING A TYPICAL FUMIGATION

This product should be circulated so as to reach equilibrium rapidly, ideally within an hour of introduction. The time for HLT determination starts only after equilibrium of this product has been established.

1. Monitor this product in spaces most representative of the atmosphere in which insects will be located within the structure. In larger jobs, more sampling points may be necessary.
2. In structures with partitions or poor air circulation, samples should be taken from the separate sections, such as each floor of multiple story structures or each room in a partitioned building.
3. Measurements should be as dependable and accurate as possible, especially when low concentrations are involved.
4. The time required between measurements to determine the HLT will depend on the estimated HLT or past history of the structure.

Monitoring Hoses

Arrangements should be made to place sampling hoses in the structure prior to fumigant introduction. Semi-rigid vinyl hoses (3 to 6 mm or 1/8 inch to ¼ inch ID) should be placed so as to sample representative concentrations with a Fumiscope or similar device. Monitoring hoses larger than 6 mm ID may take a longer time to pull the sample from the fumigated space to the monitoring device because of the larger volume of air needed to be moved.

Adequate tubing must be connected to the Fumiscope or similar device to direct all of the fumigant exhausted from the unit back into the enclosure or structure to prevent exposure to the fumigant.

Chapter 9
AERATION, CLEARING, AND RE-ENTRY

Two persons trained in the use of this product, at least one being an applicator certified by the State, must be present on site at all times during introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure, when testing for re-entry after aeration (if aerated in an enclosed space) and during re-entry.

It is essential that no occupant reenter the structure after fumigation until the fumigant has been aerated and the space has been fully tested and cleared for re-entry.

One of the features of this product for structural fumigation is its capacity to rapidly diffuse into the sites of the pests. Then, when the confinement seals are removed, aeration is also typically rapid. Fans are excellent aids in attaining quick aeration and are essential where cross ventilation is poor. The "opening" of a fumigation should be carried out with care to minimize crew and bystander exposure to this product.

PRECAUTION: Prior to aeration, fumigators need to take into account the proximity to bystanders, location of other structures, wind speed and direction.

AERATION — PRACTICES

Successful, timely, and safe aerations following fumigations must be planned. The following five practices should always be factored into the fumigation prior to fumigant introduction:

1. MINIMIZE CONCENTRATIONS AT END OF EXPOSURE PERIOD: The lower the concentration of fumigant at the end of the exposure period, the easier and more timely the aeration process will be. By using Precision Fumigation techniques, the fumigator can minimize the amount of fumigant introduced, maximize its efficiency and maximize the accumulated dosage (CT).
2. AERATE AT THE HIGHEST POINT PRACTICAL: By aerating at the highest point on the structure, the highest concentrations of fumigant are directed away from workers and bystanders and are allowed to quickly dilute to less than 1 ppm levels.
3. DIRECT AERATION GASES UPWARD: Aeration in an upward manner also directs fumigant away from workers and bystanders and by using additional fans, acts to further dilute the fumigant to safe levels. In many cases, a permanent exhaust system that forcefully directs the air column upward or emits it through a stack would aid in the efficiency and safety of the aeration process.
4. CONTROL THE EXHAUST RATE: The exhaust rate during the aeration process should be controlled to ensure large volumes of fumigant laden air have time to disperse, thus minimizing the risk of bystander exposure to concentrations greater than 1 ppm. Many structures have air handling systems that can easily achieve a total air exchange within the facility in a very short period of time.
5. MONITOR TO ENSURE WORKER AND BYSTANDER EXPOSURE LEVELS ARE NOT EXCEEDED: The perimeter of the fumigation area, especially downwind, must be monitored to ensure that concentrations of this product are kept within acceptable levels outside the fumigation area.

FACTORS INFLUENCING AERATION TIME

Five factors affect the time needed for aeration:

1. Rate of air exchange
2. Terminal fumigant concentration
3. Load factor - sorption/desorption and diffusion rate
4. Temperature
5. Interior layout of the structure

Rate of Air Exchange

The most important factor in aeration is the rate of air exchange in a structure. The air exchange rate will be influenced by openings in the external walls (windows, vents, door, etc.), wind velocity, size and arrangement of the structure. The most effective, practical method to increase the rate of aeration is to increase cross ventilation by opening doors and windows. Fans are also useful for this purpose as a means of establishing a directed airflow through the structure in which fresh air is introduced and air inside the structure is exhausted/ventilated as efficiently as possible.

Terminal Fumigant Concentration

The amount of fumigant left in a structure at the end of the fumigation period can vary greatly. All other factors being equal, the greater the terminal concentration, the longer the time required to complete aeration. Thus, good planning and monitoring to ensure only the necessary amount of this product is introduced can decrease the aeration period.

Load Factor — Sorption, Desorption and Diffusion

The "load factor" can be expressed as the amount of materials fumigated that will adsorb or absorb the fumigant. This product has relatively low sorptive characteristics, meaning it has a low potential to stick to or react with fumigated materials.

The sorption that does occur, however, can affect aeration in some situations. Desorbing fumigant can slow the time to reach safe re-entry levels of 1 ppm or less. Often, the greatest amount of this product to be desorbed is associated with the commodities.

The sorption/desorption phenomenon is a function of fumigant concentration and temperature — the higher the concentration throughout the fumigation, the greater the driving force for sorption and, therefore, the higher the quantity to be desorbed. As with sorption, desorption initially occurs very rapidly. Most of the fumigant will desorb during the initial part of the aeration period in response to the immediate lowered concentration inside the structure when seal is broken.

Temperature

Temperature has a direct effect on the clearance rate of a fumigant. The higher the temperature, the faster the rate of gas diffusion and desorption.

HANDLING UNAERATED COMMODITIES

Transfer of an unaerated commodity to a new storage site within a facility prior to complete aeration is permissible; however, transfer of unaerated containers or truck trailers over public roads is prohibited. Also, railcars cannot be moved off site until aerated.

While handling unaerated commodities, people must not be exposed to this product in excess of permitted exposure levels.

Transfer of incompletely aerated commodity via bulk handling equipment such as augers, drag conveyors and conveyor belts to a new site is permissible. However, the new storage must have proper placarding and adequate security if it contains greater than 1 ppm of this product. Workers who handle incompletely aerated commodity must be informed and appropriate safety measures must be taken (i.e., ventilation and respiratory protection) to prevent exposures from exceeding 1 ppm.

CLEARANCE AND RE-ENTRY

Re-entry Procedures

Before aeration, if re-entry into an area under fumigation is required for any reason, the following procedures must be strictly adhered to:

1. Before re-entry, measure the concentration of this product using a sufficiently sensitive device to adequately prepare for worker safety.
2. A minimum of two persons, one an applicator certified by the State and others being trained in the use of this product, must be present on site to reenter an area under fumigation for initiating aeration or trouble shooting and testing for concentration of the fumigant after aeration before releasing for reoccupation.
3. The person before entering must be wearing a self-contained breathing apparatus (SCBA) with full facemask and operating in pressure demand mode or its equivalent.
4. Other appropriate worker protective equipment must be worn by all workers at the site depending upon the site and the type of work being done.
5. Notify authorities, emergency personnel and other required personnel if re-entry is done under emergency conditions (see *"Chapter 9"*).

No one shall be in fumigated areas if the level of this product is more than 1 ppm unless wearing a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air supplied/SCBA respirator, such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Only a detection device of sufficient sensitivity, such as the INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR can be used to confirm a concentration of 1 ppm or less of this product.

Re-occupancy

Do not allow re-occupancy of any fumigated area until the aeration and clearing process is complete according to directions and levels of this product do not exceed 1 ppm as determined by the use of a detection device with sufficient sensitivity.

Following the aeration period, the fumigator must test the breathing spaces in the space or structure to make certain that the concentration of this product is 1 ppm or less before allowing re-occupation of the structure.

Follow all Federal, State, and local requirements for re-occupancy.

Chapter 10
SITE SPECIFIC CONSIDERATIONS

KEY CONSIDERATIONS FOR FUMIGATING STORAGE FACILITIES, TRANSPORT VEHICLES AND PROCESSING PLANTS

Follow all local, State and Federal regulations covering the fumigation of vehicles and processing plants.

Stationary vs. In-Transit
Container, trucks, railcars, surface ships and other transport vehicles or vessels, empty or loaded with listed food commodities, may be fumigated in essentially the same way as other storage facilities. However, in-transit fumigation (including aeration) of any vehicle is prohibited on public roads or waterways. Nevertheless, stationary vehicles under fumigation may be moved within the confines of the fumigation site if necessary. Special care must be given while moving a stationary vehicle or vessel under fumigation so as to prevent exposure to bystanders or workers to levels of 1 ppm or more of this product. Vehicles and vessels successfully moved must have proper placarding and adequate security. Workers who handle incompletely aerated commodity must be informed and appropriate safety measures must be taken (i.e., ventilation and respiratory protection) to prevent exposures from exceeding 1 ppm. Moving vehicles while under fumigation on the fumigation site may result in loss of fumigant and, therefore, potentially less effective fumigation.

Selection of Fumigation Location
The size and configuration of the space and the adequacy of the circulation will dictate the placement and number of release sites for this product in a stationary vehicle or vessel. Careful planning must be made for fumigant introduction in railcars, shipping containers and trailers. Prevent the liquid form of this product from contacting any part of the vehicle or contents as it can damage paint or tarnish metals. Railcars, shipping containers and trailers must be placed in a location appropriate for conducting fumigation. The location should be away from other work areas in a secured place.

Sealing the Vehicle or Vessel
Stationary vehicles should be prepared and sealed following general fumigation using tarpaulin and tape.
Seal vessels using tarping, taping, and other methods specific for ships to confine this product to the fumigation area.

Securing the Vehicle or Vessel
After the fumigation site has been selected, railcars and trailers should be moved into position and secured by setting the brakes and blocking the wheels so that the vehicle will not move during the fumigation and aeration periods.
When fumigating vessels, place warning signs at all entrances and secure the fumigated space. Only certified applicator and trained workers involved in the fumigation, wearing appropriate personal protective equipment, may be at the site during fumigation and aeration.
Follow label instructions for securing entrances and posting warning signs on fumigated spaces and structures.

Fumigation of Surface Ships and Vessels in Port
Because of its physical properties, this product is ideally suited to control pest infestations in surface ships. Its high volatility allows the gas to penetrate into all areas of the vessel very quickly, control the pest and aerate rapidly. However, due to its lack of warning properties and high inhalation toxicity, this product must not be used to fumigate ships or other vessels while they are in use. People and desirable plants or pets must not remain on board during the fumigation.
Surface ships and barges may be fumigated with this product, but all aeration procedures must be completed before these vessels are allowed to sail. The vessel must not be moved during the fumigation and aeration periods. If re-entry is necessary before aeration is completed, strictly follow re-entry procedures (see *"Chapter 9"*). Only those persons involved in the fumigation may be at the fumigation site, including during the aeration process.

Important: Submarines and other below-the-surface ships must not be treated with this product.
Except for those persons involved in the fumigation, no people, desirable plants, or pets may be on board during fumigation. The professional fumigator and the ship's captain (or owner) shall follow all applicable regulations including those listed in the Coast Guard, DOT, Title 46, Shipping, section Parts 147A.1-147A.43. Since the codes listed are for fumigants in general, do not use procedures that are not permissible for this product as directed by label instructions and regulations.
If conditions of high relative humidity exist in the vessel during fumigation, great care should be exercised to use the proper sized fan and shooting hose to avoid overshooting the fan capacity, thereby causing a "fog out" in the vessel and possibly tarnishing and staining.

Vehicle (Containers, Railcars, Trailers, etc.) Aeration
Aerate the vehicle using active ventilation methods. To help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry, to the extent possible, control the ventilation process using the best practices procedures described in this Manual (*"Chapter 7"*), monitor concentrations of this product around the fumigated ship and/or prohibit entry into the area in question. At the end of the aeration time when the vehicle has been cleared for re-entry, the warning signs should be removed, the chocks removed from the wheels, and the vehicle put back into service. In-transit fumigation and aeration of railcars and other transportation vehicles are not permitted.

Surface Ship Aeration
Only those persons involved in the fumigation may be at the present fumigation site until the site is cleared for re-occupancy. In-transit aeration of ships is not permitted. Ships must be aerated and cleared for re-entry prior to being reoccupied. Aerate the ship using active ventilation methods to ventilate the bulk of the fumigant from the ship. To help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry, to the extent possible, control the ventilation process using the best practices procedures in this Manual (*"Chapter 7"*), monitor concentrations of this product around the fumigated ship and/or prohibit entry into the area in question.

PREPARATION FOR CHAMBER OR STACK FUMIGATION
Safety precautions and fumigation procedures vary by whether the chamber or stack is outside or within another structure. Before any chamber or stack is fumigated, it is appropriate to:

1. Determine the correct dosage (concentration x time = ounce-hours) to control the designated pest under the specific treatment conditions.
2. Confirm that the chamber or stack and any accessory equipment perform as intended.
3. Determine that this product will be confined within the chamber or stack by making a test run and monitoring for leaks with appropriate equipment. Pressure testing can also indicate the gas confinement capabilities of the chamber.
4. Have on hand proper respiratory protection equipment (SCBA) and personnel trained in how to properly use it.
5. Train personnel in the proper handling of the cylinders.
6. Educate personnel in first aid procedures to be followed should an accident occur and personnel be exposed to this product.
7. Notify other appropriate individuals that fumigations of this product will be taking place: Company employees other than those performing the fumigations such as security patrols, janitors, etc., police and fire department personnel and others required by local, State and Federal laws.

A. CHAMBERS AND STACKS WITHIN STRUCTURES
Permanent Chambers
Fumigations with this product may be conducted in permanent fumigation chambers enclosed within a larger structure. A permanent chamber is defined as a durable hard-walled structure engineered specifically for fumigation that effectively confines this product.
Monitor indoor areas around the permanent fumigation chamber for concentrations of this product during the fumigation, especially during introduction. No one is permitted to be in an area where the concentration of this product is more than 1 ppm without proper respiratory protection (SCBA). It is advisable to position the chamber away from work areas.

LOADING: Chambers and stacks should be loaded so that adequate air movement can occur around commodities to allow even distribution of the gas.

CIRCULATION FAN(S): A shooting fan/circulation fan is recommended when introducing this product. A small circulating fan inside the chamber will provide a gentle movement of air adequate to achieve even gas distribution throughout the chamber. However, if a large open space is not available or if use of an introduction fan is dangerous or impractical, an introduction/circulation fan is not required. If a fan is not used, ensure introduction will not result in a fog-out within the fumigation chamber. Slow introduction rates (1 to 4 pounds per minute) are recommended to prevent excessive cooling of air near the introduction site. Do not apply liquid fumigant directly onto food commodities. Another recommendation is to increase the number of

introduction sites. Without circulation fans, reaching equilibrium will be delayed or may not be achieved. Thus, insect control may not be achieved throughout the chamber and aeration will be slowed since ventilation will be lessened.

TESTING SEAL EFFECTIVENESS: Fittings for conducting pressure tests and for monitoring lines during fumigation should be incorporated in the chamber.

Vacuum Chambers
Vacuum fumigations often require a lower use rate than normal atmospheric fumigations. Do not exceed 200 ounces-hour per 1000 cubic foot. Vacuum fumigations can be conducted in vacuum chambers located within an enclosed structure without considering the entire structure as being under fumigation.

PLACARDING: Post warning signs at all entrances to the vacuum chamber.

INTRODUCTION: This product should be released from outside the building. If this product is released into the vacuum chamber from within the enclosing structure, then the occupied area must be monitored to ensure the concentration of this product does not exceed 1 ppm.

WORKER EXPOSURE MONITORING: The area surrounding the vacuum chamber should be frequently monitored for concentrations of this product to ensure that occupants and workers are not exposed above 1 ppm. Special care should be taken to monitor during introduction to ensure that the introduction lines and cylinder connections are not leaking. If any leak resulting in detectable levels greater than 1 ppm is encountered during application, immediately clear the area of all personnel not wearing an SCBA. Only persons who are wearing an SCBA are permitted in the area to address the leak. Only after the level of this product has dropped to 1 ppm or less are unprotected personnel permitted to enter the area.

AERATION: Aerate the vacuum chamber following instructions above for vacuum chamber fumigations outside structures.
If re-entry is necessary before aeration is completed, strictly follow re-entry procedures (see *"Chapter 9"*).

Tarped-Stacks
This product may be used to fumigate stacked commodities by covering the commodity with highly fumigant-resistant tarpaulins and then sealing them to the subsurface to create a temporary fumigation chamber (tarped-stack).
All personnel not trained or not involved in the fumigation must be vacated from the immediate area in which the tarped-stack fumigation is occurring until the fumigation is completed and the immediate area has been cleared for re-entry.
The indoor areas around the tarped-stack must be monitored for concentrations of this product when fumigation workers, without proper respiratory protection (SCBA) are present within the structure. Perform air monitoring by utilizing a detection device with sufficient sensitivity such as an INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR to ensure that workers are not exposed to concentrations of this product exceeding 1 ppm. No one is permitted to be in an area where the concentration of this product is above 1 ppm without proper respiratory protection (SCBA).

PLACARDING: Post warning signs to all sides of the structure that encloses the stack. For a tarped-stack, post all sides of the stack as well as all entrances and sides of the building.

OCCUPANCY: All personnel not trained or involved in execution of the fumigation are not permitted within the immediate area of the tarped-stack during the fumigation.

SECURING THE ENCLOSING STRUCTURE: When the fumigation workers are not present at the fumigation site, the enclosing structure must be secured from entry by anyone other than the certified fumigator or persons under his/her direct supervision.

WORKER EXPOSURE MONITORING: Workers and bystanders should not be exposed above 1 ppm of this product. When fumigation workers are present within the enclosing structure during the fumigation, frequently monitor with a detection device of sufficient sensitivity to measure at the 1 ppm level. Immediately vacate the area or use proper respiratory protection (SCBA) if the concentration of this product exceeds 1 ppm. Utilize ventilation procedures to reduce this product below 1 ppm prior to allowing re-entry without an SCBA.

INTRODUCTION: This product should be released from outside the building. If this product is released into the tarped-stack from within the enclosing structure, then the occupied area must be monitored to ensure the concentration of this product does not exceed 1 ppm.
If any leak resulting in detectable levels above 1 ppm is encountered during application, immediately clear the area of all personnel not wearing an SCBA. Only persons who are wearing an SCBA are permitted in the area to address the leak. Only after the level of this product has dropped below 1 ppm are unprotected personnel permitted to enter the area.

AERATION: Aeration should be designed to exhaust fumigant from the enclosing structure to ensure that workers and bystanders are not exposed to levels above 1 ppm.

B. CHAMBERS AND STACKS OUTSIDE OF STRUCTURES

Atmospheric Pressure Chambers
DESIGN AND CONSTRUCTION: A suitable atmospheric fumigation chamber consists of a sufficiently gas-tight room with an appropriate door. An application system, exhaust blower and a small fan for even gas distribution are recommended.

PLACARDING: The applicator must post all entrances and all sides of the chamber (if accessible) to be fumigated with warning signs.

INTRODUCING FUMIGANT: Release this product from the cylinder placed outside the chamber through an introduction system (introduction lines, connectors, etc.) with a minimum 500 psi burst pressure rating. A small fan should be used to distribute the gas uniformly within the chamber. Monitoring gas concentrations within the chamber can confirm the distribution of gas within the chamber.

DOSAGE MONITORING: Monitoring gas concentrations within the chamber during the exposure period with a Fumiscope or similar device is recommended to confirm HLT, describe gas distribution throughout the chamber, and ensure the target dosage is achieved. Recommended monitoring site locations include one at high, medium, and low heights and in the front, middle and back of the chamber.

EXHAUST FAN(S): The size of the exhaust blower will depend on the size of the fumigation chamber and the aeration time requirements. Generally, a fan capable of changing the air in the chamber in 5 to 10 minutes is recommended. The chamber must exhaust this product outside the building and away from adjoining buildings or work areas. Consult your State agency for emission control requirements.

Vacuum Chambers
Vacuum chambers require special designs which take into account the vacuum pressure exerted on the materials of construction. For this reason, it is recommended that trained engineers be consulted before constructing a vacuum chamber. Follow all directions given by the manufacturer or design engineer.
Vacuum fumigations often require a lower use rate than normal atmospheric fumigations. Do not exceed 200 oz-h/1000 cubic foot.
Specially built steel chambers for vacuum fumigations provide the fastest and most effective fumigation. After the commodity is placed in the chamber, pumps evacuate air. This product is introduced and rapidly penetrates all space previously occupied by air. A lethal dosage of this product results when the proper concentration is maintained for the required fumigation period. With the sustained concentration (no leakage) and a vacuum of 25 to 27 inches Hg, the time of exposure and the dosage may be reduced for some insects and life stages.

PLACARDING: The applicator must post all entrances and all sides of the chamber (if accessible) to be fumigated with warning signs.

DRAWING A VACUUM: A vacuum of 25 to 27 inches of mercury is commonly drawn for vacuum fumigations. Check to ensure that the vacuum is maintained according to plan. Unplanned vacuum release indicates leakage. Note that some vacuum fumigations are planned to allow release of the vacuum during exposure with the objective of improving penetration of the commodity as air enters the chamber.

INTRODUCING FUMIGANT: Because of the special design of vacuum chambers, the manufacturer or design engineer's operation procedure be followed. Release this product from the cylinder placed outside the chamber through an introduction system (introduction lines, connectors, etc.) with a minimum 500 psi burst pressure rating. A small fan can be used to distribute the gas uniformly in the chamber if the vacuum is to be maintained throughout the exposure period.

DOSAGE MONITORING: The Fumiscope or similar device cannot be used to measure this product during a vacuum fumigation unless the vacuum is released. If the vacuum is maintained, and thus no gas is leaking from chamber, the achieved dosage (CT) can be calculated by using the simple Concentration x Time formula.

AERATION PROCEDURES: At the end of the exposure, release the vacuum, ensuring any exhaust does not expose workers or bystanders above the permissible exposure limit. Purge the chamber of air/fumigant 2 times by pulling a partial vacuum prior to checking the gas concentration for re-entry purposes. Aeration of this product is very rapid, but desorption can occur for a longer period of time.
Manage the aeration process (location, exhaust rate and direction) to ensure that workers and bystanders are not exposed to levels above 1 ppm.
Always check for the concentration of this product with a suitable detector before entering the chamber without proper respiratory protection (SCBA). Keep the exhaust fans running during the aeration period and also while unloading the chamber. Remove the warning signs when aeration has been completed and it has been determined that the area is safe to enter.

Tarped-Stacks
Fumigations may be conducted in temporary chambers created using tarpaulins or other gas impermeable sheeting as the "walls" to hold in the fumigant. These are sometimes called "stack fumigations." The following instructions pertain to fumigation of tarped-stacks located outside other structures.
The items should be placed on a sufficiently airtight foundation, such as another tarp or on concrete, and covered with a fumigation tarp to ensure a tight seal. The tarp over the items should be supported so as to create a gas expansion dome. The edge of the tarp on the foundation must be sealed either by weighting the edges with sand or water "snakes" or equivalent.

PRECAUTION: Tarp fumigations should be conducted out of doors or in a building that will not be occupied during fumigation and aeration periods.

PLACARDING: All entrances and all sides of the fumigated environment and any connected area not monitored must have warning signs.

DOSAGE MONITORING: Monitoring gas concentrations within the tarped-stack during the exposure period with a Fumiscope or similar device is recommended to confirm HLT, describe gas distribution throughout the stack, and ensure the target dosage is achieved. Monitoring site locations include one at high, medium, and low heights and in the front, middle and back of the stack.

AERATION: Best practices for aeration of tarped-stacks involves setting up a chimney system that will ventilate from the highest point of the stack in an upward direction at a rate that will not lead to workers or bystanders being exposed to levels above 1 ppm.

STORED BULK COMMODITY FUMIGATION (e.g., Silos, etc.)
In many commodity storage situations, the amount of open space for introducing this product is limited compared to the total volume of the structure. It may not be possible to use shooting fans and release methods that are recommended for space fumigations.
Because of limited free air volume and lower air movement, fumigators can best adjust by slowing the introduction rate by using smaller diameter shooting hoses and/or extending the hose length. If the fumigant is released directly into the headspace of a storage structure, care should be taken to avoid contact of liquid fumigant and the commodity. Sufficient air circulation should be provided to prevent moisture condensation in the introduction area.
It is strongly recommended that recirculation systems (portable or built-in) be used to rapidly and evenly distribute this product throughout the space being treated. Existing aeration blowers that are vented to the outside should not be used.

Procedures for Fumigating Bulk Commodities
1. Follow instructions in this Manual regarding sealing, securing, placarding, and aeration/clearing.
2. Seal and secure the storage structure.
3. Determine the target dosage and quantity of fumigant needed using Drexel Chemical's Master Fume AG Calculator.
4. Make adjustments to the dosage based on the fumigant monitoring results and Drexel Chemical's Master Fume AG Calculator recommendations for achieving target dosages.
5. Determine where the fumigant will be released.
6. Best practice is to introduce fumigant directly into the air stream of a recirculation system. This may either be inside the storage structure or directly into the ducting of the system. If the fumigant is released into the recirculation system, it should be down stream of the fan itself.
7. In almost all cases fumigant introduction rates should be slower than for space fumigations of similar volumes to provide time for the fumigant to penetrate the grain mass and not establish high fumigant concentrations in the introduction space.
8. In the event that a recirculation system is not available, the fumigant should be released into the headspace above the commodity. Care should be taken to prevent contact of liquid fumigant with the commodity.
9. Air circulation should be started prior to fumigant introduction and continued during introduction to aid in the penetration of this product into the commodity mass. High concentrations in the introduction space can result in excessive fumigant loss via leakage before the fumigant penetrates evenly into commodity mass.
10. After introducing the initial amount of fumigant to reach the targeted dosage, gas concentrations should be monitored periodically. Any adjustments in terms of amount of fumigant or exposure time should be made based on Drexel Chemical's Master Fume AG Calculator status recommendations.

Bulk Commodity Aeration
1. Prior to the initiation of fumigation procedures, equipment should be put in place for a safe aeration.
2. The fumigant laden air should be vented from the highest practical point of the storage structure slow enough to not exceed exposure limits.
3. If available, aeration blowers can be used to rapidly exhaust remaining fumigant so long as these do not vent in areas where workers or bystanders might be affected.
4. SCBA equipment must be worn if workers must enter the fumigated space to initiate aeration or levels exceed 1 ppm.
5. The storage facility should be finally aerated to 1 ppm or less.
6. The area or site must be monitored to ensure that liberation of fumigant from the treated commodity does not result in the development of unacceptable levels of this product. Do not allow re-entry into treated areas by any person before this time without proper respiratory protection.
7. Actively aerate commodity a minimum of 24 hours prior to offering to consumers.

Mills and Food Processing Facilities
For mills and food processing facilities, special consideration should be given to help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry. To the extent possible, control the ventilation process using the best practices procedures described in this Manual (*"Chapter 7"*), monitor concentrations of this product around the fumigated site, and/or prohibit entry into the area in question.
Precautions to help protect accidental bystander exposure to this product in excess of 1 ppm can be of particular importance because of the sometimes proximate location of residential structures and bystanders that can occasionally occur around mills and food processing facilities.

Special care should be taken to minimize quantities of processed foods prior to space fumigations. Processed food not practical to remove prior to fumigation may undergo incidental fumigation with this product. However, no direct fumigation of processed foods is permitted unless the processed food is specifically listed in the section *"COMMODITIES THAT CAN BE FUMIGATED"*.

Chapter 11
TROUBLESHOOTING

This product in the gaseous phase is a very slightly reactive chemical compared to other fumigants such as methyl bromide, hydrocyanic acid (HCN) or acrylonitrile.

CYLINDERS

Valve Problems

Cylinders of this product are fitted with special valves that are appropriate for use with this product. These valves can be damaged if the wrong size wrench is used. A 25 to 30 cm adjustable wrench should be used to open or close these valves.

STUCK VALVE: Never use excessive force to open a stuck valve. If a valve will not open using normal force, return the cylinder to your distributor.

LEAKING VALVE: Make sure the valve is completely shut off; however, do not use excessive force. Reopening and then closing can usually properly seal the valve and stop the leak. If the valve continues to leak, often tightening the packing nut on the top of the valve to 25 to 30 foot pounds of torque with an adjustable wrench will stop the leak. If the valve still leaks, move the cylinder to an isolated, secured area and allow the cylinder to continue to vent to the air. Be sure to keep people away from the area. When all the gas has escaped, replace the bonnet and identify faulty cylinders by painting the cylinder shoulders red and tagging the cylinder describing the problem in detail. Return the cylinder to your distributor so it may be sent to Drexel Chemical Company for repairs.

Dip Tubes

A broken dip tube rarely is the reason the liquid form of this product cannot be moved out of the cylinder when the valve is wide open. Sharp blows to the cylinder, rough handling, or dropping the cylinder can break off the dip tube from the bottom of the valve. If the dip tube is broken, this product will be released from the cylinder, but at a much slower rate. Either introduce this product slowly or replace the bonnet and call your distributor for instructions on cylinder return procedures.

Leaking Cylinders

Leaking may occur if cylinders receive rough handling. Abrasion on the side of the cylinder may produce pinholes in the metal.

Always identify faulty cylinders, valves and dip tube by painting the cylinder shoulders red. Attach a red tag describing the problem in detail. Return cylinders to your distributor.

CORROSION OF METALS

This product is not known to cause any corrosion when it is in the vapor (gaseous) phase under normal temperatures. Every batch of this product is tested for metal corrosion before being released for sale.

Metal surfaces of copper, silver, steel, stainless steel, brass, aluminum, etc., may become corroded or rusted if this product is released incorrectly. If this product is introduced too rapidly, the temperature of the air will drop below the dew point resulting in the formation of condensation.

Condensation generally occurs in or near the area of introduction of this product. Minute quantities of acids (by-products of the manufacturing process) are soluble in water condensation and can etch metal surfaces. The fumigant introduction rate should not exceed the fan capacity (1 kg of this product per 60 cubic meters per minute of fan capacity) to thoroughly mix the colder air when this product is introduced into the warmer air in the structure.

Metal tarnishing/corrosion can also occur if heat sources are left on during fumigation. This product is decomposed by heat from flames such as pilot lights in furnaces, stoves, dryers or refrigerators and such glowing heat sources as electric heaters. Heat sources above 400°C (752°F) decompose this product to corrosive materials (mainly HF). Therefore, it is imperative that pilot lights and other heat sources which pose this risk be eliminated or turned off during fumigations.

Damage to metals can also occur from the inclusion in the fumigated space of chlorine generators. These pieces of equipment should either be turned off or excluded from the fumigation.

Damage to metals can usually be corrected by cleaning the metal items with a good metal cleanser or polish. The corrosion or rust is usually only on the surface.

GLASS ETCHING

This product in the gaseous phase is not known to cause etching of glass. HF, the decomposition product of this product, may react with ceramic material such as window glass, china, glazed tile, etc., creating a condition referred to as "etching" or "frosting." Therefore, it is imperative that all heat sources which produce temperatures at or near 752°F and pilot lights be turned off during fumigation. Fog-outs can also cause etching of glass and ceramic tile. Each batch of this product is also tested for glass etching before it leaves the production plant.

RUN STAINS

This product in the gaseous phase is not known to cause staining of fabrics, walls, paintings, etc. Staining, however, can be caused by the presence of liquid water (dew or fog) caused by exceeding the capacity of the fan to mix cold air when this product is introduced with the air in the structure. A condition can occur when condensation forms on the interior and/or exterior surfaces of the structures and a "sticky" light to dark brown liquid (from grease, dirt, and smoke) runs down wall surfaces. This may have the appearance in color and consistency of cola. Spots also may form on the bottom side of horizontal surfaces. Most stains can be removed by washing.

Condensation forming and running down vertical surfaces can occur even without the introduction of this product. A structure that is air conditioned to a much lower temperature than the air temperature and then opened to introduce hot humid outside air will form condensation on cold surfaces such as heavy brass. This condition can be avoided by either warming the structure slowly prior to sealing or waiting until all seals are in place before opening windows and doors to avoid introducing outside air.

STAINING

This product in the vapor phase does not cause staining or discoloration of fabric or other materials normally found in a structure under fumigation. Fabric staining or color changes can occur when a high heat source (i.e., pilot light) converts this product to SO_2 and other corrosive materials. Many fabric dyes are acid or base indicators and will change color in the presence of acids or bases. For staining caused by frosting of the fumigant introduction hose, see *"FUMIGANT INTRODUCTION HOSE FREEZING"* section below.

FUMIGANT INTRODUCTION HOSE FREEZING

When this product is introduced according to label directions, the introduction hose will not freeze and the liquid will change to a gas at the end of the hose. The use of the proper size fumigant introduction hose is important. Initially, slowly open the valve a quarter to one-half turn to begin the liquid flow of this product. Then, open valve to one full turn or full flow through the hose. If the liquid changes to a gas within the hose, frost will collect along the length of the hose and water damage can occur to floors, furniture, etc., where the hose rests. Also, this product may change from a liquid to a gas in a hose with kinks. This can cause freeze damage from either frost accumulating on the outside of the hose or the hose becoming brittle, breaking and splashing the liquid form of this product on surfaces. Replace kinked or damaged hoses. Use mesh-reinforced, flexible hosing of proper specifications to avoid this problem.

During release of this product from the cylinder, some chilling of the valves, cylinder, and fumigant introduction hoses can occur under normal circumstances. Valves can freeze if this product is allowed to change from a liquid to a gas within the valve area. Valve freezing is usually caused by using an improper fumigant introduction hose connector. Carpeting and floors can be damaged if cylinders, fans and hoses are allowed to rest upon them. When this could pose a problem, plastic or other protective material should be placed under the fumigant introduction hoses and fans.

PLANT AND TURF DAMAGE

This product is quite toxic to most plants and they should be protected from the fumigant; however, plants should not be used as an indicator of the success or failure of a fumigation. Plants should be removed from inside the fumigation site. Structural foundation plantings of ornamental shrubs and trees can be protected to a certain degree from the gas by wetting the soil, thereby sealing off the gas from the plant root system. Water is an excellent barrier and this product will not readily move through moist soil.

Certain plants have been found to be more sensitive to this product than others. These include junipers, some dwarf palms, springeri fern,

orchids and Lily grasses (*Liriope* spp. and *Ophiopogon* spp.) which are commonly used as border plantings. Special attention should be given to these plants during fumigation and the initiation of aeration to reduce the exposure to this product. Plants that have been moved should be placed in a similar environment to that where they were being grown — same temperature, light, humidity, etc.

ODOR PROBLEMS

Odors can also be caused by the decomposition of dead animals. Occasionally, animals such as rats or mice are trapped inside the fumigation site and killed during the fumigation. Many times they die in inaccessible areas within the structure and cannot be easily removed.

POOR CONTROL OF PESTS

Poor control of the target pest is caused by not generating the target CT (Concentration x Time) for the temperature to kill the pest. Accumulation of target CT does not begin until the fumigant has reached equilibrium in the site. Many factors may contribute to insufficient CT accumulation.

1. Confinement of fumigant, primarily ground seal or tarps is worse than estimated.
2. Inaccurate monitoring device.
3. Too short an exposure period (insufficient CT).
4. Using the wrong dosage (insufficient ounces per hour).
5. Not using adequate fans to distribute the gas properly within the site.
6. Not accurately determining the temperature of the pest site.
7. Error in calculating volume to be fumigated.
8. High winds which can cause excessive loss of gas.
9. Target pest excluded from exposure to fumigant by some gas inhibiting barrier.

Latent Mortality

Sometimes live insects may be found immediately after fumigation. Under optimum or favorable conditions, the target pest will be dead or obviously dying by the end of the fumigation period. Researchers have evaluated eventual mortality of several stages of key postharvest pests following exposure to this product. Latent mortality in insects occurs for exposures very near mortality threshold levels. Within a species, the latent mortality period for the egg stage is generally longer and more variable than other life stages.

Non-target Organisms

Signs of activity of live non-target organisms (organisms which are not specific targets of the fumigation) found within the fumigated space does not mean the fumigation failed to control the target pests. Consider the following:

- Lethal dosage requirements vary for different organisms and may be higher for non-target organisms than for the target pest.
- The organism may have received a toxic dosage and will eventually die (latent mortality).
- The non-target organism may have entered the structure during the aeration period.

Therefore, judgment of the success or failure of the fumigation should not be made on the presence of live organisms immediately following the fumigation.

PLASTICS

Liquid form of this product can be a solvent of some plastic materials. This product should not be introduced directly onto plastic surfaces, such as windows, as liquid droplets may discolor or etch the material.

MISCELLANEOUS

WHITE POWDER LEFT AS RESIDUE: A white powder substance found on windows, tile, glass, lamps, etc., indicates that a source of heat (pilot lights, etc.) was left on during the fumigation.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: Store in dry, cool, well ventilated area under lock and key. Post as a pesticide storage area. If the storage area is in an occupied building, the storage area must have either 1) a forced air ventilation system that meets required local ordinances for the storage of hazardous materials and operates continuously; or 2) be equipped with a permanently mounted and properly maintained and functioning sulfuryl fluoride monitoring device designed to alert occupants of the building if sulfuryl fluoride in the air of the storage area is greater than 1 ppm. Store cylinders upright secured to a rack or wall to prevent tipping.

Pesticide Handling: Do not subject cylinders to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use ropes, 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 transport any cylinders in closed vehicles where they occupy the same common airspace as personnel. Transport securely only in an upright position. 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 supplier. Only the registrant is authorized to refill cylinders. Do not use cylinder for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.

Leak Procedures: Evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator, such as manufactured by Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant is determined to be 1 ppm or less in the breathing zone, as determined by a detection device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR.

CYLINDER AND PRODUCT DISPOSAL:

Promptly return all empty cylinders to your distributor of this product. Follow proper cylinder handling directions above. 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, consult your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

WARRANTY DISCLAIMER

Manufacturer warrants that this product conforms to the chemical description on the label and based upon tests believed reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. To the extent consistent with applicable law, Manufacturer makes no other expressed or implied warranty of merchantability or fitness for a particular purpose or any other express or implied warranty.

Use Risk

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable weather, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Manufacturer or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to one of the following, at Manufacturer's discretion:

1. Refund of purchase price paid by Buyer or use for product bought, or
2. Replacement of amount of product used.

To the extent consistent with applicable law, in no case shall Manufacturer or the Seller be liable for consequential, special or indirect damages or losses from the use, handling or storage of this product.

The terms of the *"Warranty Disclaimer"* above and this *"Limitation of Remedies"* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of the Manufacturer or the Seller is authorized to vary or exceed the terms of the *"Warranty Disclaimer"* or this *"Limitation of Remedies"* in any manner.

APPENDIX A
ENGLISH-METRIC CONVERSION TABLES

Temperature	Volume	Wind Speed
(°C x 1.8) + 32 = °F	1 ft^3 = 0.0283 m^3	1.609 kph = 1 mph
(°F - 32) + 1.8 = °C	1 m^3 = 35.31 ft^3	0.621 = 1 kph

°F	°C
104	40
102	39
100	38
98	37
96	36
94	35
92	34
90	33
88	32
86	31
84	30
82	29
80	28
78	27
76	26
74	25
72	24
70	23
68	22
66	21
64	20
62	19
60	18
58	17
56	16
54	15
52	14
50	13
48	12
46	11
44	10
42	9
40	8
38	7
36	6
34	5
32	4
	3
	2
	1
	0

M^3	FT^3
1	35.3
10	353
25	706
50	1,765
75	2,647
100	3530
200	7,060
300	10,590
400	14,120
500	17,650
600	21,180
700	24,710
800	28,240
900	31,770
1,000	35,300
1,500	52,950
2,000	70,600
3,000	105,900
4,000	141,200
5,000	176,500
6,000	211,800
7,000	247,100
8,000	282,400
9,000	317,700
10,000	353,000
20,000	706,000
30,000	1,057,000
40,000	1,412,000
50,000	1,765,000
100,000	3,530,000

KMPH	MPH
50	31
48	30
46	29
44	28
42	27
40	26
38	25
36	24
34	23
32	22
30	21
28	20
26	19
24	18
22	17
20	16
18	15
16	14
14	13
12	12
10	11
8	10
6	9
4	8
2	7
0	6
	5
	4
	3
	2
	1
	0

DOSAGE: oz-hr/1000 ft^3 ~~ gm-hr/m^3
PRESSURE: 1 PSI ~~ 6.9Kpa~~ 0.689 bar
1 bar ~~ 100 Kpa ~~ 14.50 PSI

APPENDIX B
GLOSSARY TERMS

ACTIVE AERATION: Aeration that is not passive. Any increased aeration as a result of human intervention or process.
ACTIVE INGREDIENT: Components of a pesticide that control the target pest and is responsible for the pesticidal effect.
ACUTE INHALATION TOXICITY: Immediate poisoning from a single elevated inhalation exposure to a substance; causes injury or death from a single exposure.
ACUTE ORAL TOXICITY: Immediate poisoning from a single oral elevated ingestion exposure to a substance; causes injury or death from a single exposure.
ACUTE TOXICITY: A rapid response, often within minutes or hours to a single exposure or dose of a chemical.
ADSORBTION/ABSORBTION = SORPTION: The action of a material in holding a gas or substance. The opposite of desorption.
AERATE: Exchange fumigant-laden air with fresh air until the concentration of fumigant has reached the permitted entry level.
AERATION: The final step of a fumigation that involves proper ventilation and clearance of this product from the structure.
AMERICAN CONFERENCE FOR GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH): The professional organization of governmental industrial hygienists which establishes annual recommended guideline threshold limit values (TLVs) for lifetime noise, radiation and chemical occupational exposures for eight hours per day, 40 hours per week.
ANTIDOTE: A remedy that counteracts the effects of a poison.
ARTHROPOD: Any segmented invertebrate of the phylum Arthropoda having jointed legs.
ATMOSPHERE: A mass or body of gases that are present in a region or place.
AXIAL FLOW FAN: A fan in which the air flows through the impeller and casing is primarily axial. The impeller is contained within a cylinder housing (AMCA Publication 211).
BOILING POINT (BP): The temperature at which a liquid converts from liquid phase into a gas (the temperature at which the vapor pressure in a liquid equals the external pressure).
BONNET: The cap that covers the valve and safety cap on the fumigant cylinder to protect the valving system from damage and prevent accidental release of the fumigant.
CARCINOGENICITY: Possessing the power, ability or tendency to produce or incite cancer in a living tissue.
CENTRAL NERVOUS SYSTEM (CNS) DEPRESSION: An alteration of level of consciousness that proceeds other changes in vital and neurologic signs.
CERTIFIED APPLICATOR: Member of a fumigation crew who has successfully completed the proper training and is approved by the State and the manufacturer to release the fumigant.
CIRCULATION: Mechanically stir or circulate the fumigation atmosphere.
CLAMPS: Devices used to attach tarps together and hold them in place during a fumigation.
CLEARING: The procedure following the aeration period when the fumigator tests the breathing space in the structure with sensitive equipment to make certain the concentration of this product is 1 ppm or less before allowing re-occupancy.
CONCENTRATION: Amount of fumigant per unit area within the fumigated space during exposure period. Usually measured in ounces per 1000 cubic feet or grams per cubic meter.
CONDENSATION: The change of a vapor or gas into a liquid.
CUBIC FEET PER MINUTE (CFM): Often used as a rating system for the amount of air a fan can move.
CYLINDER SLING: A type of holster or suspension ring used to suspend a fumigant cylinder.
DESORPTION: The liberation or removal of a fumigant substance from other substances.
DEW POINT: The temperature at which water will condense from air (the temperature at which dew forms).
DEW POINT DEPRESSION: The number of degrees the temperature must be lowered for dew (water condensation form air) to form.
DIP TUBE: A PVC tube that extends from the bottom of the cylinder to the valve on the top that releases liquid Master Fume.
DISPERSE: Distribute the fumigant throughout the fumigation site.
DIFFUSION: The spontaneous process whereby a fumigant moves from an area of high concentration toward an area of lower concentration.

DOSAGE: The number of ounce-hours (gram-hours) accumulated during the exposure period. Target dosage is the ounce-hours targeted during the planning phase.
DOSE: The amount of fumigant introduced into the fumigation space — oz/1000 cubic feet (gm/cubic meter). Often confused with dosage.
DRIERITE: The hygroscopic material used in the Fumiscope unit to remove moisture from the air. Drierite in good condition is normally blue in color.
EQUILIBRIUM: The state when all the sulfuryl fluoride molecules are at equal concentrations from each other in a confined area.
EXPOSURE TIME: The amount of time a fumigant is confined in a structure to kill the target pest.
°F/°C: Working temperature. Usually the temperature of the closest spots insect pests are located. Usually expressed in degrees Fahrenheit or Celsius. In the case of chamber fumigations, the internal temperature of the commodities to be fumigated (i.e., site of pest).
FACE SHIELD: One of two pieces of safety equipment permitted to protect the eyes required when releasing the fumigant (see goggles).
FLASH POINT: The temperature at which vapor explodes.
FLUOROSIS: A mottling or blackening of the teeth caused by an overexposure to fluorine.
FOG: Very fine droplets of liquid moisture in air.
FOG-OUT: The condensation of moisture inside a fumigated structure which is caused by a large drop in air temperature. Methods to prevent a fog-out include: (1) using the proper inside diameter and length of the introduction hose, and (2) using appropriate fans with sufficient velocity to effectively mix the warmer air inside the structure with the colder Master Fume gas.
FUMIGANT INTRODUCTION: Release of the fumigant from its containers into the fumigation space.
FUMISCOPE: A thermal conductivity analyzer used to monitor the concentration of this product during a fumigation. Measures in ounces per 1000 cubic feet or gm per cubic meter. The Fumiscope is not for monitoring for human exposure.
GAS: Matter in vapor state. That fluid form of matter which is compressible with limits and, which owing to the relatively free movement of its molecules, diffuses readily in other like forms of matter and is capable of indefinite expansion in all directions.
GOGGLES: One of two pieces of approved safety equipment to protect the eyes required when releasing the fumigant (see face shield).
GROUND SEAL: The sealing of tarps to the ground to prevent fumigant loss during a fumigation.
HALF-LOSS TIME (HLT): The relative measure of how well a structure holds fumigant. Actual time required to lose one-half of the fumigant concentration, measured in hours. The fumigant loss rate depends on the building construction, sealing practices, wind, and fumigant distribution influences. The *actual/HLT* can be established only by measuring the fumigant concentration during the exposure period with a gas measuring measuring instrument and using Drexel Chemical's MasteRate program.
HANGING BONNET: A type of cap or ring used to suspend the fumigant cylinder.
HEAT OF VAPORIZATION: The amount of heat necessary to change a liquid state to a gaseous state. This is usually measured in British Thermal Units (BTUs).
HEPATIC: Pertaining to the liver.
HOURS EXPOSURE (HE): The number of hours the site is exposed to the fumigant.
HYDROFLUORIC ACID: A highly reactive chemical which can corrode or damage many household effects. This product can decompose into hydrofluoric acid and sulfur dioxide if exposed to high heat conditions present in gas, flames or glowing electric elements.
HYDROGEN FLUORIDE: A colorless liquid made by the action of sulfuric acid on calcium fluoride. The compound is an extremely strong fluorinating agent, which attacks glass.
HYDROLYSIS: A chemical reaction that causes chemical breakdown in the presence of water.
INSIDE DIAMETER (ID): The measurement of the interior width of the fumigant introduction and monitoring hoses.
INERT INGREDIENT: Other non-pesticidal or formulating ingredients in a pesticide formulation.
INTERSCAN GAS ANALYZER: A portable analyzer designed to measure low concentrations of this product for worker and bystander exposure and final clearing. The Interscan provides immediate and continuous readings of gas concentrations from 1 to 50 ppm.
LATENT HEAT OF VAPORIZATION: The number of calories per mole of substance needed to change a liquid at its boiling point to a gas. For this product, this is 4600 cal/mole. When liquid fumigants under pressure are released, available heat is "pulled" from the immediate surroundings as the liquid changes to a gas.
LATENT MORTALITY: The delayed kill of an organism receiving a toxic dose.
LEAK DETECTOR: Device used to detect leaks in the structure or seal during a fumigation. An example would be a TIF 5750 or XP-1 detector models.
LOAD FACTOR: The amount of material within the fumigated space. Sometimes fumigant is sorbed by materials and made unavailable for insect control.
MAXIMUM CONCENTRATION: The greatest concentration of chemical that can or is permitted to exist as a gas in a given space. The higher the maximum concentration of the fumigant, the more that can be applied in a given space.
MIRAN SapphIRe (mobile infrared analyzer): A type of clearance device used to clear a structure for re-occupancy after a fumigation. Uses infrared technology to measure down to ppm.
MOLECULAR WEIGHT: The sum of the weights of the constituent atoms of a molecule. For this product it is 102.07.
MONITORED FUMIGATION: Repeated observations of a fumigation during the exposure period to determine the concentration of gas at a specific location, detect gas loss over time, ensure the appropriate amount of fumigant and the exposure time, and/or to reduce potential problems or expenses.
MUTAGENICITY: Possessing the power, ability or tendency to produce genetic changes or mutations.
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH): The U.S. government agency responsible for research regarding occupational safety and health issues in the workplace. They also approve appropriate safety equipment, such as hard hats, respirators, eye protection, etc.
NON-FLAMMABLE: Not flammable or readily ignitable.
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA): Federal agency that regulates worker health and safety procedures and practices.
ODOR POTENTIAL: The possibility of malodor being generated due to the fumigant having been in contact with certain materials.
OUNCE-HOURS (OH) OR GRAM-HOURS: Dosage = concentration X hours exposure.
OVICIDAL: Possessing the ability to kill the egg stage of an insect.
PARTIAL PRESSURE (DALTON'S LAW): In any mixture of gases the total pressure is equal to the sum of the partial pressures each gas would exert were it present alone in the volume occupied by the mixture. The total pressure P is equal to the sum of the partial pressures of the individual gases.
PARTS PER MILLION (PPM): A measure of the concentration of a substance, e.g., 10 ppm = 10 drops of water in a million drops.
PERMISSIBLE EXPOSURE LIMIT (PEL): The eight-hour time weighted average acceptable inhalation exposure limit for any regulated substance in the workplace. This exposure limit is enforced by OSHA and is the law.
PENETRATION: The passage of fumigant into or through an object, such as flour, commodities, wood, tarps, soil, etc.
POST-EMBRYONIC: The larval, pupal and adult stages of insects.
POUNDS PER SQUARE INCH ABSOLUTE (PSIA): A measure of atmospheric pressure. PSIG is pounds per square inch as measured by a gauge.
PULMONARY: Pertaining to or affecting the lungs.
PULMONARY EDEMA: The presence of abnormally large amounts of fluids in the intercellular spaces of the lungs.
REACTIVITY: The ability of the fumigant to react with (combine with or change) other compounds in which it comes into contact.
RELATIVE HUMIDITY: The ratio of the amount of water present in the air relative to the amount it could hold at 100% saturation; usually expressed in percent.
RELEASE OF FUMIGANT: The actual introduction of fumigant into the fumigation space or site.
RENAL: Relating to the kidneys.
REVOLUTIONS PER MINUTE (RPM): A measure of fan speed.
RODENTS: Any animal from the order Rodentia, such as mice and rats.
SAFETY CAP: A covering that protects the cylinder valve from damage or accidental release of the fumigant.

SAND SNAKES: Sand- or water-filled tubes made of material used to seal tarps to the ground to minimize release of the fumigant.
SCBA - POSITIVE PRESSURE: Self-contained breathing apparatus that maintains a slightly positive pressure of air inside the face piece at all times.
SECONDARY LOCKS: Securing mechanisms used during fumigation to prevent inadvertent or illegal entry to a structure under fumigation.
SHORT-TERM EXPOSURE LIMIT (STEL): The time-weighted average exposure limit for a particular compound which should not be exceeded at any time during a work day, even if the eight hour time-weighted average is within the threshold limit value (TLV). Exposures to this level of a compound should not be longer than 15 minutes and should not occur more than four times per day. There should be 60 minutes between exposures in this range.
SOLUBILITY: The capability of being dissolved in a solvent such as water.
SORPTION: The uptake of gaseous fumigant resulting from the attraction and retention by liquid and solid materials present. If great enough, there is a gradual reduction of fumigant available to kill the target pest. Sorption may also negatively affect the penetrability of the gas.
SPECIFIC GRAVITY: The ratio of the weight of a body to that of an equal volume of some standard substance — water in the case of solids and liquids, air in the case of gases. The ratio of the mass of a liquid to the mass of an equal volume of water at 4°C, water = 1.
SUBCHRONIC ORAL TOXICITY: The oral toxicity of a material determined for an exposure period between an acute (24 hours) and chronic (weeks to months) in length.
SULFURYL FLUORIDE: The active ingredient of this product, which is non-flammable, non-corrosive and does not cause undesirable odors, is a gas at temperatures above -55°C (-67°F).
TARPAULIN: Semi-permeable membranes used during fumigation to confine the fumigant in a specific area during the exposure period.
TEMPERATURE (°C OR °F): The pesticidal activity of a fumigant varies with temperature. The dosage requirements for this product are based on the mean temperature of the coldest potential pest infested site in the structure. This temperature is nearly always represented by that of the sub-area soil or slab. A probe or surface thermometer can be used to measure temperature. It is very important to accumulate the proper ounce-hours for the temperature that exists.
TERATOGENIC: The potential for an effect to cause congenital abnormality.
TERATOLOGY: The division of embryology and pathology that deals with abnormal development and congenital malformations.
THRESHOLD LIMIT VALUE (TLV): The time-weighted average concentration for a normal eight-hour day and 40-hour work week to which nearly all workers may be repeatedly exposed day-to-day without adverse effects.
VACUUM CHAMBER: Specially built steel chamber used for fumigation. After the material to be fumigated is placed in the chamber, air is evacuated by pumps. The fumigant is then admitted and rapidly fills all the air space previously occupied by air.
VALVE STEM: Opening at the top of the cylinder through which the fumigant is released.
VAPOR CORROSIVENESS: The tendency of the gas to corrode materials. When properly introduced, this product is not corrosive.
VAPOR DENSITY: The weight ratio of a gas to air.
VAPOR PRESSURE: The pressure exerted by a gas that is in equilibrium with its solid or liquid state. The higher the vapor pressure, the more easily and rapidly a fumigant will diffuse and penetrate to reach a gas-air equilibrium and the more rapidly it will aerate and desorb.
WATER SOLUBILITY: The ability of the fumigant to dissolve in water. The less soluble in water, the less that compound is attracted to and adsorbed on the surface of materials. It is also important when considering penetration of the fumigant into soil moisture.
WATER VAPOR: Water in the gaseous state.

Drexel Chemical Company

January 21, 2016

Document Processing Desk **(AMEND)**
ATTN: Ms. Venus Eagle, PM 1
OPP (7504P), U.S. EPA
Rm S-4900, One Potomac Yard
2777 South Crystal Drive
Arlington, VA 22202

Re: Submission of Amended Label
DREXEL MASTER FUME AG (EPA Reg. No. 19713-672)

Dear Ms. Eagle,

Please find:

1. Completed EPA Form 8570-1

2. Three copies (one is marked up) of the container label (672SPCL-0116*Pending) and Applicator's manual (672SPAM-0116*Pending) removing the statements pertaining to chloropicrin in the First Aid and Precautionary Statements sections.

   These chloropicrin verbiage came from the Master Fume (Reg. No. 19713-596) Structural Fumigation label we used as template for setting up the Master Fume AG label and inadvertently left it. These statements are not on the EPA currently accepted label for Profume Gas Fumigant (Reg. No. 62719-376) that we me-tooed.

   Chloropicrin leaves an unwanted odor on the commodity, thus, it is not used with sulfuryl fluoride for fumigating agricultural commodities.

If you have questions/clarification regarding this submission or need anything further, I can be reached at (901) 774-4370 or e-mail Lchan@drexchem.com.

Thank you.

Respectfully yours,
FOR DREXEL CHEMICAL COMPANY

Luz G Chan
Registration Manager

1700 Channel Avenue • Post Office Box 13327 • Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 • Fax: (901) 774-4666 • E-Mail: info@drexchem.com • www.DrexChem.com
SINCE 1972

Please read instructions on reverse before com form. Form Approv IB No. 2070-0060. Approval expires 2-28-95

EPA

United States
Environmental Protection Agency
Washington, DC 20460

☐ Registration
☑ Amendment
☐ Other

OPP Identifier Number

Application for Pesticide - Section I

1. Company/Product Number	2. EPA Product Manager	3. Proposed Classification
19713-672	Venus Eagle	☐ None ☑ Restricted
4. Company/Product (Name) DREXEL MASTER FUME AG	PM# 1	

5. Name and Address of Applicant *(Include ZIP Code)*

Drexel Chemical Company
P.O. Box 13327
Memphis, TN 38113-0327

☐ *Check if this is a new address*

6. **Expedited Reveiw.** In accordance with FIFRA Section 3(c)(3)(b)(i), my product is similar or identical in composition and labeling to:

EPA Reg. No. _____

Product Name _____

Section - II

☑ Amendment - Explain below.
☐ Resubmission in response to Agency letter dated _____
☐ Notification - Explain below.
☐ Final printed labels in repsonse to Agency letter dated _____
☐ "Me Too" Application.
☐ Other - Explain below.

Explanation: Use additional page(s) if necessary. (For section I and Section II.)

Submission of revised label. Details are in the cover letter accompanying this submission.

Section - III

1. Material This Product Will Be Packaged In:

Child-Resistant Packaging	Unit Packaging	Water Soluble Packaging	2. Type of Container
☐ Yes ☑ No	☐ Yes ☑ No	☐ Yes ☐ No	☐ Metal ☐ Plastic ☐ Glass ☐ Paper ☑ Other (Specify) Pressurized cylinder
* *Certification must be submitted*	If "Yes" Unit Packaging wgt. / No. per container	If "Yes" Package wgt / No. per container	

3. Location of Net Contents Information	4. Size(s) Retail Container	5. Location of Label Directions
☑ Label ☐ Container	125 pounds	☐ On the label

6. Manner in Which Label is Affixed to Product ☑ Lithograph Paper glued Stenciled ☐ Other _____

Section - IV

1. Contact Point *(Complete items directly below for identification of individual to be contacted, if necessary, to process this application.)*

Name	Title	Telephone No. (Include Area Code)
Luz G Chan	Registration Manager	(901) 774-4370

Certification

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowlingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law.

8. Date Application Received (Stamped)

2. Signature	3. Title
Luz G. Chan	Registration Manager
4. Typed Name	**5. Date**
Luz G Chan	01/21/2016

Marchese, Jacquelyn

From: Marchese, Jacquelyn
Sent: Monday, March 28, 2016 8:06 AM
To: 'Luz Chan'
Subject: RE: 19713-672 Amendment
Attachments: 19713-672-20160324.pdf

Hi Luz,

Please see the letter and stamped label, attached. If you have any questions, please let me know.

Thanks,
Jackie

Jacquelyn Marchese
Entomologist
EPA/HQ/OSCPP/OPP/RD/IVB3
marchese.jacquelyn@epa.gov
703-347-0559

From: Luz Chan [mailto:lchan@drexchem.com]
Sent: Thursday, March 24, 2016 3:54 PM
To: Marchese, Jacquelyn <Marchese.Jacquelyn@epa.gov>
Subject: RE: 19713-672 Amendment

Jackie, appreciate it. Our Master Fume representative is here in the office. I will let him know.
Thank you so very much, Jackie. Deeply appreciate your help on this.
Have a good one.
Luz

From: Marchese, Jacquelyn [mailto:Marchese.Jacquelyn@epa.gov]
Sent: Thursday, March 24, 2016 2:51 PM
To: Luz Chan <lchan@drexchem.com>
Subject: RE: 19713-672 Amendment

Hi Luz,

The labels are in final review and should be stamped and ready at any time now. I'll send them your way when they are done.

Thanks,
Jackie

Jacquelyn Marchese
Entomologist
EPA/HQ/OSCPP/OPP/RD/IVB3
marchese.jacquelyn@epa.gov
703-347-0559

From: Luz Chan [mailto:lchan@drexchem.com]
Sent: Wednesday, March 23, 2016 5:50 PM
To: Marchese, Jacquelyn <Marchese.Jacquelyn@epa.gov>
Subject: RE: 19713-672 Amendment

Hi, Jackie. Any news?
Thank you,
Luz

From: Luz Chan
Sent: Thursday, March 17, 2016 12:12 PM
To: 'Marchese, Jacquelyn' <Marchese.Jacquelyn@epa.gov>
Subject: FW: 19713-672 Amendment
Importance: High

Jackie, here is the revised label, marked and clean.
Per our manager here, the use (mills and food processing facilities) which is found on page 19 of the manual was added to the statement appearing above the ingredient statement.
Hope it's ok. Save us from making a notification submission.
Thank you so very much, Jackie.
Hope we can shore this up.
Thank you, thank you.
Luz

From: Marchese, Jacquelyn [mailto:Marchese.Jacquelyn@epa.gov]
Sent: Thursday, March 17, 2016 9:30 AM
To: Luz Chan <lchan@drexchem.com>
Subject: RE: 19713-672 Amendment

Hi Luz,

My apologies for the confusion, but we would also like the following revision to be made:

On page 17 of the highlighted manual, can you revise the very first sentence to read "Container, trucks, railcars, surface ships and other transport vehicles or vessels, empty or loaded with listed food commodities, may be fumigated in essentially the same way as other storage facilities."

Thanks,
Jackie

Jacquelyn Marchese
Entomologist
EPA/HQ/OSCPP/OPP/RD/IVB3
marchese.jacquelyn@epa.gov
703-347-0559

From: Marchese, Jacquelyn
Sent: Thursday, March 17, 2016 10:20 AM
To: 'Luz Chan' <lchan@drexchem.com>
Subject: RE: 19713-672 Amendment

Hi Luz,

Venus and I have 2 comments. Please see the label + manual, attached.

Let me know if you have any questions.

Thank you for your patience,
Jackie

Jacquelyn Marchese
Entomologist
EPA/HQ/OSCPP/OPP/RD/IVB3
marchese.jacquelyn@epa.gov
703-347-0559

From: Luz Chan [mailto:lchan@drexchem.com]
Sent: Thursday, March 17, 2016 9:27 AM
To: Marchese, Jacquelyn <Marchese.Jacquelyn@epa.gov>
Subject: RE: 19713-672 Amendment

Thanks, Jackie. I'll tell our guy here as he kept on asking.
Thank you,
Luz

From: Marchese, Jacquelyn [mailto:Marchese.Jacquelyn@epa.gov]
Sent: Thursday, March 17, 2016 7:40 AM
To: Luz Chan <lchan@drexchem.com>
Subject: RE: 19713-672 Amendment

Thanks for the email Luz. Venus and I have been working on the label this week, we'll let you know when its ready.

Jackie

Jacquelyn Marchese
Entomologist
EPA/HQ/OSCPP/OPP/RD/IVB3
marchese.jacquelyn@epa.gov
703-347-0559

From: Luz Chan [mailto:lchan@drexchem.com]
Sent: Wednesday, March 16, 2016 9:47 AM
To: Marchese, Jacquelyn <Marchese.Jacquelyn@epa.gov>
Subject: FW: 19713-672 Amendment

Jackie, good morning.
At the outset, I apologize. I know you did tell me but so sorry to follow up with you again. I know you understand.
Thank you,
Luz

From: Luz Chan
Sent: Friday, February 26, 2016 8:23 AM
To: 'Marchese, Jacquelyn' <Marchese.Jacquelyn@epa.gov>
Subject: RE: 19713-672 Amendment

Jackie, good morning to you.
Here is the marked up and clean container label and Applicator's Manual.
I truly appreciate your help.
Thank you so much.
Luz

From: Marchese, Jacquelyn [mailto:Marchese.Jacquelyn@epa.gov]
Sent: Friday, February 26, 2016 8:07 AM
To: Luz Chan <lchan@drexchem.com>
Subject: 19713-672 Amendment

Hi Luz,

Can you send me an electronic version of the revised label (clean and highlighted)?

Thanks,
Jackie

Jacquelyn Marchese
Entomologist
EPA/HQ/OSCPP/OPP/RD/IVB3
marchese.jacquelyn@epa.gov
703-347-0559

FAST-TRACK AMENDMENTS – Completeness Screening Checklist

Expert's In-Processing Signature: E. Fa[illegible] Date: 2/2/16 PM #: 1

EPA Reg. Number: 19713-672	EPA Receipt Date: 1/27/16		
	Checklist Item	Yes	No	N/A
1	**Application Form** (EPA Form 8570-1) - signed?	Y		
2	**Confidential Statement of Formula** (EPA Form 8570-29) - signed?			Y
3	**Certification with Respect to Citation of Data** (EPA Form 8570-34) - signed?			Y
4	**Formulator's Exemption Statement** (EPA Form 8570-27) - signed?			Y
5	**Data Matrix** (EPA Form 8570-35) [Applicable for adding me-too uses] - signed?			Y
	a) Selective Method?			
	b) Cite-All Method?			
	c) Public copy of Matrix provided? See PR Notice 98-5			
6	**Is Label included?** (5 copies)	Y		
	a) Electronic Label submitted?			
	Comments: Jackie due 4/26 take time opportunity to say "only grain" fumigation			

Create/E... Collections Utilities Query T... tal Help Exit

S: 980110 Milestone Email:

Regulatory Type: Product Registration - Section 3

Application Type: Amendment

Company: 19713 DREXEL CHEMICAL COMPANY

Resubmission: Yes No

Fee For Service: Yes No

Billable: Yes No

Print Letter

Enter More Information

Tracking

Risk Manager: Registration Division, Risk Management Team 1

Product #: 19713-672 Product Name: DREXEL MASTER FUME AG

Override#:

Me Too Section3: 1015-79 Me Too Product Name: PROFUME

Application Date: 21-Jan-2016

Front End Date: 28-Jan-2016

FFS Due Date:

OPP Target Date:

OPP Rec'vd Date: 27-Jan-2016

Risk Manager Send Date: 01-Feb-2016

Negotiated Due Date:

Receipt Content | Des

Paper Label

View/Edit

Fast Track

New Ingredient:

Receipt Description:

Amendment for revised label.

New Ingredient Request Date:

New Ingredient Received Date:

Form A Signature Date:

Form B Signature Date:

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

February 1, 2016

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

LUZ G. CHAN
DREXEL CHEMICAL COMPANY
PO Box 13327
MEMPHIS, TN 38113-0327

PRODUCT NAME: DREXEL MASTER FUME AG
COMPANY NAME: DREXEL CHEMICAL COMPANY
OPP IDENTIFICATION NUMBER:
EPA FILE SYMBOL: 19713-672
EPA RECEIPT DATE: 01/27/16

SUBJECT: RECEIPT OF AMENDMENT

DEAR REGISTRANT:

The Office of Pesticide Programs has received your application for an amendment and it has passed an administrative screen for completeness.

During the initial screen we determined that the application appears to qualify for fast track review. The package will now be forwarded to the Product Manager for review to determine its acceptability for fast track status.

If you have any questions, please contact Registration Division, Risk Management Team 1, at (703) 308-8045.

Sincerely,

Front End Processing Staff
Information Services Branch
Information Technology & Resources Management Division

Fee for Service

{980110}~

This package includes the following

- ○ New Registration
- ◉ Amendment

☐ Studies? ☐ Fee Waiver?

☐ volpay % Reduction: ___

for Division

- ○ AD
- ○ BPPD
- ◉ RD

Risk Mgr. 1

Receipt No.	S- 980110
EPA File Symbol/Reg. No.	19713-672
Pin-Punch Date:	1/27/2016

☑ This item is NOT subject to FFS action.

Action Code:

Requested:

Granted:

Amount Due: $ _____

Parent/Child Decisions:

▣ Inert Cleared for Intended Use ▣ Uncleared Inert in Product

Reviewer: _____ Date: 1-29-16

Remarks:

RESTRICTED USE PESTICIDE

(Due To Acute Inhalation Toxicity Of Sulfuryl Fluoride)

FOR 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. AN APPLICATOR CERTIFIED BY THE STATE MUST BE PRESENT ON SITE AT ALL TIMES DURING INTRODUCTION OF FUMIGANT, RE-ENTRY PRIOR TO AERATION AND INITIATION OF THE AERATION PROCEDURE.

Drexel

MASTER FUME® AG

Gas Fumigant

For control of rodent, insect and other listed invertebrate pests.

Use Sites: Stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.

Read the entire container label and Applicator's Manual before using this product. Refer to the Applicator's Manual for additional precautionary information and directions for use. The Applicator's Manual must be in the user's possession during fumigation. If the Applicator's Manual is lost, obtain a replacement copy from your distributor or Drexel Chemical Company.

APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

ACTIVE INGREDIENT: 2 words

Sulfuryl fluoride	99.8%
OTHER INGREDIENTS:	0.2%
TOTAL:	100.0%

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO
POISON VENENO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See FIRST AID Below

EPA Reg. No. 19713-672 **Net Content:**
EPA Est. No. 19713-XX-XXX **125 Lbs. (56.70 Kg)**

FIRST AID

IF INHALED:
- Move person to fresh air.
- If person is not breathing, call 911 or ambulance, then give artificial respiration.
- **DO NOT** give mouth-to-mouth resuscitation.
- Call a poison control center or doctor for further treatment advice.

IF IN EYES:
- Hold eye open and rinse slowly and gently with water for 15 to 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

(Continued)

FIRST AID *(Cont.)*

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip glass of water if able to swallow.
- Do not induce vomiting unless told to by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15 to 20 minutes.
- Call a poison control center or doctor for treatment advice.

~~In all cases of overexposure~~, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also call CHEMTREC at 800-424-9300 for emergency.

Note to Physician: This product is a gas which has no warning properties such as odor or eye irritation. ~~(However, chloropicrin is used as a warning agent and is a known lachrymator).~~ Early symptoms of exposure to this product are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations of this product can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically. The liquid form of this product in the eye may cause damage due to refrigeration or freezing.

Manufactured By:
Drexel Chemical Company
P.O. Box 13327, Memphis, TN 38113-0327
SINCE 1972

MASTER FUME and the DREXEL logo are registered trademarks of Drexel Chemical Company. All other brand names, product names, or trademarks belong to their respective holders.

672SPCL-0116(asterisk).indd 1 42 2/14/2016 3:36:55 PM

PRECAUTIONARY STATEMENTS

Hazards To Humans And Domestic Animals

DANGER: Corrosive. Extremely hazardous liquid and vapor under pressure. Fatal if inhaled. Causes irreversible eye damage. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Liquid may cause chemical burns, which may have a delayed onset, or may freeze exposed skin. May be fatal if swallowed. May be fatal if absorbed through skin. Sulfuryl fluoride is odorless. Exposure to toxic levels may occur without warning or detection by the user. ~~This product is used with 0.25% 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.~~

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles (goggles designed and made of material that allows no measurable movement of the liquid pesticide *being used to pass through them during use) or full face shield for* eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR™) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down. If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Before using any make or brand of SCBA, learn how to use it correctly. Determine that it has an adequate air supply for the job at hand, that it fits properly providing an adequate seal around the face and that it is in good working order. For more detailed information on the source and use of air monitoring devices and respirators, consult the Applicator's Manual of this product.

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read *"Warranty Disclaimer"*.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information, call Drexel Chemical Company at (901) 774-4370.

USER SAFETY RECOMMENDATIONS

Users should: 1) Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. 2) Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. 3) Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Sulfuryl fluoride is a highly toxic gas. Do not expose non-target organisms. This pesticide is toxic to fish and wildlife.

PHYSICAL OR CHEMICAL HAZARDS

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near heat or open flame. Exposures to temperatures above 158°F will cause a fusible plug to melt and the contents will be released. Under high heat conditions (temperatures above 752°F), this product can decompose into sulfur dioxide (SO_2), hydrofluoric acid (HF), and other decomposition products.
Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc., that represent a reasonable risk of a heat source that is at or near 752°F. Shut off automatic switch controls for appliances and lighting systems
that will be included in the space to be fumigated. Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Notice: Read the entire label. Use only according to label directions. Before using this product, read Warranty-Conditions of Sale, *"Inherent Risks of Use"*, and *"Limitation of Remedies"* elsewhere on the label. If terms are unacceptable, return at once unopened.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information call Drexel Chemical Company at (901) 774-4370.

Agricultural Chemical: Do not ship or store with food, feeds, drugs *or clothing.*

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.
PESTICIDE STORAGE: Store in dry, cool, well ventilated area under lock and key. Post as a pesticide storage area. If the storage area is in an occupied building, the storage area must have either 1) a forced air ventilation system that meets required local ordinances for the storage of hazardous materials and operates continuously; or 2) be equipped with a permanently mounted and properly maintained and functioning sulfuryl fluoride monitoring device designed to alert occupants of the building if sulfuryl fluoride in the air of the storage area is greater than 1 ppm. Store cylinders upright secured to a rack or wall to prevent tipping.
Pesticide Handling: Do not subject cylinders to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use ropes, 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 transport any cylinders in closed vehicles where they occupy the same common airspace as personnel. Transport securely only in an upright position. 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 supplier. Only the registrant is authorized to refill cylinders. Do not use cylinder for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.
Leak Procedures: Evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator, such as manufactured by Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant is determined to be 1 ppm or less in the breathing zone, as determined by a detection device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR. For more detailed information on the source and use of air monitoring devices or respirators, consult the Applicator's Manual of this product.
CYLINDER AND PRODUCT DISPOSAL: Promptly return all empty cylinders to your distributor of this product. Follow proper cylinder handling directions above. 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, consult your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

WARRANTY DISCLAIMER

Manufacturer warrants that this product conforms to the chemical description on the label and based upon tests believed reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. To the extent consistent with applicable law, Manufacturer makes no other expressed or implied warranty of merchantability or fitness for a particular purpose or any other express or implied warranty.

Use Risk

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable weather, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Manufacturer or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to one of the following, at Manufacturer's discretion:

1. Refund of purchase price paid by Buyer or use for product bought, or
2. Replacement of amount of product used.

To the extent consistent with applicable law, in no case shall Manufacturer or the Seller be liable for consequential, special or indirect damages or losses from the use, handling or storage of this product.

The terms of the *"Warranty Disclaimer"* above and this *"Limitation of Remedies"* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of the Manufacturer or the Seller is authorized to vary or exceed the terms of the *"Warranty Disclaimer"* or this *"Limitation of Remedies"* in any manner.

672SPCL-0116(asterisk).indd 3 44 4/14/2016 3:36:55 PM

RESTRICTED USE PESTICIDE

(Due To Acute Inhalation Toxicity Of Sulfuryl Fluoride)

FOR 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. AN APPLICATOR CERTIFIED BY THE STATE MUST BE PRESENT ON SITE AT ALL TIMES DURING INTRODUCTION OF FUMIGANT, RE-ENTRY PRIOR TO AERATION AND INITIATION OF THE AERATION PROCEDURE.

APPLICATOR'S MANUAL

Drexel

MASTER FUME® AG

Gas Fumigant

For control of rodent, insect and other listed invertebrate pests.
Use Sites: Stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.

Read the entire container label and Applicator's Manual before using this product. Refer to the Applicator's Manual for additional precautionary information and directions for use. The Applicator's Manual must be in the user's possession during fumigation. If the Applicator's Manual is lost, obtain a replacement copy from your distributor or Drexel Chemical Company.

APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

ACTIVE INGREDIENT:

Sulfuryl fluoride	99.8%
OTHER INGREDIENTS:	0.2%
TOTAL:	100.0%

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO
POISON VENENO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See FIRST AID Below

EPA Reg. No. 19713-672 **Net Content:**
EPA Est. No. 19713-XX-X **125 Lbs. (56.70 Kg)**

FIRST AID

IF INHALED:
- Move person to fresh air.
- If person is not breathing, call 911 or ambulance, then give artificial respiration.
- **DO NOT** give mouth-to-mouth resuscitation.
- Call a poison control center or doctor for further treatment advice.

IF IN EYES:
- Hold eye open and rinse slowly and gently with water for 15 to 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

(Continued)

FIRST AID *(Cont.)*

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip glass of water if able to swallow.
- Do not induce vomiting unless told to by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15 to 20 minutes.
- Call a poison control center or doctor for treatment advice.

In all cases of overexposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also call CHEMTREC at 800-424-9300 for emergency.

Note to Physician: This product is a gas which has no warning properties such as odor or eye irritation. ~~(However, chloropicrin is used as a warning agent and is a known lachrymator).~~ Early symptoms of exposure to this product are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations of this product can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically. The liquid form of this product in the eye may cause damage due to refrigeration or freezing.

Manufactured By:
Drexel Chemical Company
P.O. Box 13327, Memphis, TN 38113-0327
SINCE 1972

MASTER FUME and the DREXEL logo are registered trademarks of Drexel Chemical Company. All other brand names, product names, or trademarks belong to their respective holders.

PRECAUTIONARY STATEMENTS

Hazards To Humans And Domestic Animals

DANGER: Corrosive. Extremely hazardous liquid and vapor under pressure. Fatal if inhaled. Causes irreversible eye damage. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Liquid may cause chemical burns, which may have a delayed onset, or may freeze exposed skin. May be fatal if swallowed. May be fatal if absorbed through skin. Sulfuryl fluoride is odorless. Exposure to toxic levels may occur without warning or detection by the user. ~~This product is used with 0.25% 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.~~

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles (goggles designed and made of material that allows no measurable movement of the liquid pesticide being used to pass through them during use) or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR™) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Before using any make or brand of SCBA, learn how to use it correctly. Determine that it has an adequate air supply for the job at hand, that it fits properly providing an adequate seal around the face and that it is in good working order. For more detailed information on the source and use of air monitoring devices and respirators, consult the Applicator's Manual of this product.

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read *"Warranty Disclaimer"*.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information, call Drexel Chemical Company at (901) 774-4370.

USER SAFETY RECOMMENDATIONS

Users should: 1) Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. 2) Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. 3) Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Sulfuryl fluoride is a highly toxic gas. Do not expose non-target organisms. This pesticide is toxic to fish and wildlife.

PHYSICAL OR CHEMICAL HAZARDS

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near heat or open flame. Exposures to temperatures above 158°F will cause a fusible plug to melt and the contents will be released. Under high heat conditions (temperatures above 752°F), this product can decompose into sulfur dioxide (SO_2), hydrofluoric acid (HF), and other decomposition products.
Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc., that represent a reasonable risk of a heat source that is at or near 752°F. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated. Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Notice: Read the entire label. Use only according to label directions. Before using this product, read Warranty-Conditions of Sale, *"Inherent Risks of Use"*, and *"Limitation of Remedies"* elsewhere on the label. If terms are unacceptable, return at once unopened.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information call Drexel Chemical Company at (901) 774-4370.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

TABLE OF CONTENTS

Page

First Aid 1
Precautionary Statements 2
Environmental Hazards 2
Physical or Chemical Hazards 2
Table of Contents 3
Information 4
Compressed Gas Hazards 4
Product Information 4
Directions For Use 4
Chapter 1 4
Commodities That Can Be Fumigated 4
Use Restrictions and Precautions 5
Pest Controlled 5
Chapter 2 5
General Safety 5
Symptoms of Poisoning 5
First Aid 5
Notes to Physician 5
Personal Protective Equipment (PPE) 5
Fire Fighting 5
Preventing Static Electricity 6
Fumigant Introduction Hose and Fittings 6
Personal Safety 6
Material Safety 6
Chapter 3 6
Cylinder 6
Chapter 4 7
Equipment 7
Monitoring Equipment 7
Clearance Testing Equipment 7
Chapter 5 8
Fumigation Management Plan (FMP) 8
Guidance for Preparation of an FMP 8
Chapter 6 9
Preparations for Fumigation 9
Occupants/Customers Need to Know 9
What to Remove Prior to Fumigation 9
Flames or Heating Elements 10
Checking for Connected Areas 10
Distribution/Aeration Fan Use and Placement 10
Monitoring Hoses 10
Sealing the Structure 10
Placarding and Securing fumigated Areas 11
Chapter 7 12
Introduction and Distribution of this Product 12
Choosing Introduction Sites 12
Selection and Use of Equipment for Fumigant Introduction 12
Calculating Dosage 13
Fumigant Dosage Factors 13
Using Drexel Chemical's Master Fume Ag
Calculator Program 14

Page

Chapter 8 15
Monitoring this Product 15
Specific Guidelines for Monitoring a Typical Fumigation 15
Chapter 9 15
Aeration Clearing, and Re-entry 15
Aeration - Practices 16
Factors Influencing Aeration Time 16
Handling Unaerated Commodities 16
Clearance and Re-entry 16
Chapter 10 16
Site Specific Considerations
Key Considerations for Fumigating Storage Facilities, Transport
Vehicles and Processing Plants 16
Preparation for Chamber or Stack Fumigation 17
Stored Bulk Commodity Fumigation 19
Chapter 11 20
Troubleshooting 20
Cylinders 20
Corrosion of Metals 20
Glass Etching 20
Run Stains 20
Staining 20
Fumigant Introduction Hose Freezing 20
Plant and Turf Damage 20
Odor Problems 21
Poor Control of Pests 21
Storage and Disposal 21
Warranty Disclaimer 21
APPENDIX A 23
English-Metric Conversion Tables 23
APPENDIX B 23
Glossary of Terms 23

672SPAM-0116(asterisk).indd 3 4/7/2016 3:25:28 PM

INFORMATION

APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

Carefully read the container label and this Applicator's Manual before using this product. Do not use this product without Drexel Chemical's Master Fume AG Calculator Program. Drexel Chemical's Master Fume AG Calculator Program is a computer program available to calculate safe and effective levels of this product for fumigating structures and commodities. Never allow untrained individuals to use this product.

Prior to fumigation, read the Applicator's Manual carefully. Notify appropriate owners, employees, and/or operators at the facility where the fumigation will occur, and provide relevant safety and health information to local fire and rescue officials for use in the event of an emergency.

Do not connect cylinders to introduction equipment until all fumigation warning signs have been posted and the space to be fumigated is clear of people, non-target animals and secured.

COMPRESSED GAS HAZARDS

The release of high pressure fumigant can be forceful and there is potential for personal injury. Care must be exercised when fumigating, especially tarped commodities, so that the fumigant is not released too rapidly and "balloons" the tarp off of the restraining sand or water snakes. A fog-out can also occur if the fumigant is released too rapidly, cooling the air temperature below the dew point. This is avoided by following the instructions in the Applicator's Manual.

The rapid discharge of this product through introduction equipment will result in cooling parts of the equipment and the cylinders. Contact with the cooled equipment can cause frostbite.

This product is a highly hazardous material and should be used only by individuals knowledgeable of its chemical hazards and trained in the use of required respiratory equipment, detection devices, emergency procedures and proper use.

Two persons trained in the use of this product (at least one person being an applicator certified by the State) must be present on site at all times during introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure and when testing for re-entry after aeration (if aerated in an enclosed space). It is essential that no occupant re-enter the fumigated space after fumigation until the fumigant has been aerated and the space has been fully tested and cleared for re-entry.

Only a detection device of sufficient sensitivity (LOD < 1 ppm), such as the INTERSCAN gas analyzer [Model CF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR can be used to confirm a concentration of 1 ppm or less of this product. The INTERSCAN gas analyzer [Model CF 1900] must be calibrated within one month prior to use as a detection device. All other approved detection devices must be calibrated according to manufacturer directions. The concentration of this product must be monitored throughout the structure. The structure or enclosure must remain posted for fumigation until cleared for re-entry.

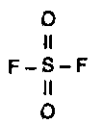
PRODUCT INFORMATION

MASTER FUME AG IS A RESTRICTED USE PESTICIDE DUE TO ACUTE INHALATION TOXICITY OF SULFURYL FLUORIDE.

PHYSICAL PROPERTIES

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near excessive heat or open flame. Exposures to temperatures of more than 158°F will cause a fusible plug to melt and the contents will be released. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Structural formula: SO_2F_2



Molecular Weight:	102.07 AMU
Color:	None
Active Ingredient:	10.8 pounds sulfuryl fluoride per gallon of the product
Specific Gravity:	1.35 at 20°C (68°F)
Vapor Density:	4.3 g/L at 20°C (68°F) air = 1
Vapor Pressure:	15.2 atm at 20°C (68°F)
Boiling Point:	-55.2°C (-67°F) at 760 mmHg

GAS SOLUBILITY (at 25°C (77°F) at 760 mm Hg): In water 0.075% (750 ppm) by weight, only slightly soluble in organic solvents and vegetable oils.

STABILITY: Stable to temperatures normally encountered in space fumigations. Non-flammable under normal conditions in all atmospheric concentrations. However, heaters and open flames must be extinguished as temperatures over 400°C (752°F) will cause decomposition products to be formed which can be corrosive and etch metal and glass.

HEAT OF VAPORIZATION: 81.1 BTU per pound at -55°C (-67°F) or 4600 cal./mol. 1 pound of sulfuryl fluoride = 4.45 moles. 1 pound of this product will lower 1000 cubic foot of dry air by 2.5°C (4.5°F).

VOLUME PER POUND: 1 pound of gas occupies 3.8 cubic foot at 25°C (77°F) and 760 mm Hg. 1 pound of gas per 1000 cubic foot of unoccupied space equals approximately 3850 ppm at room temperature and pressure (25°C at 760 mm Hg).

HYDROLYSIS: Slow in water; Rapid in basic solutions.

REACTIVITY: Sulfuryl fluoride is relatively non-reactive as a gas. No malodor or corrosive effects have been detected when the chemical has been used as directed. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

DIRECTIONS FOR USE

RESTRICTED USE PESTICIDE

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

When fumigating, all local, State, and Federal rules and regulations regarding use of detection devices, positive-pressure self-contained breathing apparatus, security requirements and placement of warning signs must be observed.

Read carefully all Directions for Use before using this product.

FUMIGATING WITH THIS PRODUCT

INTRODUCTION

MASTER FUME AG contains the active ingredient, sulfuryl fluoride, and is registered for use only by professional fumigators to control existing infestations of stored product insect pests in stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.

Read the entire label and this Applicator's Manual before using this product. If the Applicator's Manual is lost, obtain a replacement copy from your distributor of this product or your Drexel Chemical Company representative.

Each fumigator using this product is responsible for complying with all Federal, State and local regulations or codes regulating the use of this product. The fumigator should stay informed about State and local regulations in areas where they operate.

State and local government offices, distributors of this product or Drexel Chemical Company sales representatives responsible for your area can help identify the relevant agencies responsible for regulating fumigation practices in your area.

Chapter 1

COMMODITIES THAT CAN BE FUMIGATED

This product can be used on the following raw agricultural and processed food commodities:

Raw Agricultural* and Processed Commodities		
Barley	Rice	Triticale
Corn	Rice bran	Wheat
Corn flour	Rice flour	Wheat bran
Corn grits	Rice hull	Wheat flour
Corn meal	Rice (Polished)	Wheat germ
Millet	Rice (Wild)	Wheat milled by-products
Oat	Sorghum	Wheat shorts

*This product can be used to fumigate seeds of these commodities. Sites containing additional seed varieties may be fumigated as long as the fumigated seeds will not be part of the food chain for human consumption.

For a list of sites than can be fumigated with this product and site specific considerations for doing an effective and safe fumigation, see *"Chapter 10"*.

672SPAM-0116(asterisk).indd 4 4/8/2016 3:25:29 PM

Bulk flour use or — other fumigants or Cl-Pel w/ specified AG commodities.

USE RESTRICTIONS AND PRECAUTIONS

- Do not exceed a maximum cumulative dosage of 1500 oz-h/1000 cubic foot for normal atmospheric pressure (NAP) fumigations.
- Do not exceed a maximum cumulative dosage of 200 oz-h/1000 cubic foot for vacuum fumigations.
- Do not exceed the maximum cumulative dosages of NAP and vacuum fumigations, respectively, for sequential fumigations.
- When fumigating storage tanks, silos, etc. containing bulk flour, empty or draw down Wheat flour to less than 3 feet deep. Minimize quantities of flour in the processing plant, structure or enclosure prior to fumigation to prevent excessive residues in Wheat flour.
- Use this product together with a dosage calculator called Drexel Chemical's Master Fume AG Calculator (*"Chapter 7"*). Drexel Chemical's Master Fume AG Calculator must be used to calculate the initial dosage required for treatment and for any additional quantities needed during the fumigation to improve efficacy and/or to rectify loss due to leakage.
- Special care should be taken to minimize quantities of processed foods prior to space fumigations. Processed food not practical to remove prior to fumigation may undergo incidental fumigation with this product. However, no direct fumigation of processed foods is permitted unless the processed food is found in *"COMMODITIES THAT CAN BE FUMIGATED"* section of this manual.

PEST CONTROLLED

This product is used to control the following pests including all its life stages (i.e., egg, larva, pupa and adult):

Common Name	Scientific Name
Codling moth	*Cydia pomonella*
Flour beetles	*Tribolium* spp.
Granary weevil	*Sitophilus granarius*
Indian meal moth	*Plodia interpunctella*
Mediterranean flour moth	*Ephestia kuehniella*
Navel Orange worm	*Amyelois transitella*
Rats and Mice	-
Rice weevil	*Sitophilus oryzae*
Saw toothed grain beetle	*Oryzaephilis suranamensis*
Warehouse beetle	*Trogoderma variable*

Chapter 2

GENERAL SAFETY

This product is colorless, odorless and non-irritating to mucous membranes at low concentrations. This product gives no warning of its presence.

This product is toxic and must be handled carefully. Ignoring the potential hazards of this product can result in serious illness or even death.

SYMPTOMS OF POISONING

Symptoms in humans from inhalation exposure to this product will depend on the concentration and the length of exposure experienced. The earliest sign of overexposure to this product is central nervous system (CNS) depression.

Exposure to progressively higher concentrations is expected to result in convulsions, tremors and/or strychnine-like muscular rigidity.

Humans exposed to high concentrations of this product may experience respiratory irritation, nausea, abdominal pain, CNS depression, slowing of movements and speech and numbness in the extremities.

Survival after exposure to high concentrations can occur even following convulsions, if exposure has been brief.

FIRST AID

Refer to the *"FIRST AID"* section of this manual or container label.

In all cases of overexposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility immediately. Have the product container or label with you when calling a poison control center or doctor or going for treatment. For information on this pesticide product (including health concerns, medical emergencies or pesticide incidents), call 1-877-208-2593 or CHEMTREC at 1-800-424-9300.

NOTES TO PHYSICIAN

Depending on the length of exposure, it is predicted that persons exposed to this product will probably show little evidence of intoxication at first unless the concentration was moderate to high (more than 500 ppm). Initial effects will probably be depression of the CNS with slow speech and body movement the first signs noted. Convulsions may ensue with respiratory arrest being a terminal event. Assisted respiration may be necessary.

Remove exposed patient to fresh air and put at rest. Keep exposed individual at bed rest and under observation for at least 24 hours. Clinical observation should be directed at the pulmonary, hepatic and renal systems. A post-mortem finding in a fatality attributed to sulfuryl fluoride was pulmonary edema. Death was attributed to cardiorespiratory failure.

Also see *"FIRST AID"* section of this manual for additional notes to physician.

There is no known antidote. Clinical observation is essential. Treatment is based on the clinical judgment of the physician and the individual reaction of the patient.

IN CASE OF EMERGENCY,
CALL 1-877-208-2593 OR 1-800-424-9300.

IN CASE OF ACCIDENTIAL EXPOSURE,
SEEK MEDICAL ATTENTION.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded, or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott, or MSA. Before using any make or brand of SCBA, learn how to use it correctly.

Determine that it has an adequate air supply for the job at hand, that it fits properly, providing an adequate seal around the face and that it is in good working order.

The INTERSCAN must be calibrated according to manufacturer specifications within one month prior to use as a clearance device. All other approved detection devices must be calibrated according to manufacturer specifications.

FIRE FIGHTING

Information

This product is not combustible. However, in temperatures exceeding approximately 400°C (752°F), this product will degrade to form hydrogen fluoride (HF) and sulfur dioxide. Theoretically, the number of ounces of HF per 1000 cubic feet produced during a fire in a structure containing this product would equal 0.4x number of ounces of this product per 1000 cubic feet (in temperatures exceeding approximately 752°F, each mole (102 gm) of sulfuryl fluoride will degrade to form 2 moles (40 gm) of hydrogen fluoride (HF)). Nonetheless, amounts of HF actually produced during fires involving this product may be insignificant because this product rapidly diffuses from structures.

Use of Water

Evolution of hazardous materials can be minimized by use of water during a fire. Water will scrub out part of the HF and SO_2 formed by decomposition of this product in the flame. Water also can be used to cool cylinders of this product and prevent discharge of the product caused by melted fusible plugs. If possible, avoid runoff into waterways because HF is toxic to fish.

Protective Clothing

Self-contained breathing apparatus (SCBA) and normal "turn-out" gear must be worn when fighting fires in structures under fumigation with this product.

For Fires Involving Cylinders of this Product
When fighting fires in atmospheres containing potentially high concentrations of this product, self-contained breathing apparatus (SCBA) and encapsulating protective suits must be worn. Protective suit material must be compatible with exposure to hydrofluoric acid.

PREVENTING STATIC ELECTRICITY
The flow of liquid gas in the introduction hose may be a source of static electricity. To prevent the risk of static sparking, the introduction hose must be properly grounded using acceptable demonstrated methods (e.g., securely attaching a length of copper tubing with adequate fittings to the end of the introduction hose).
When using copper tubing as a ground, attach the copper tubing with a grounding wire to the fan cage frame or to a neutral ground. The copper tubing mounted at the end of the introduction hose must be securely attached to the fan or some other stable object.

FUMIGANT INTRODUCTION HOSE AND FITTINGS
- Use hose with minimum burst pressure of 3450 kPa (500 psi) that is compatible with liquid Master Fume. Polyethylene or polypropylene hoses have proven satisfactory.
- Use care not to kink or crush the hose. Reinforced hose helps prevent collapse.

PERSONAL SAFETY
- Always wear eye protection when introducing this product or repairing leaks on introduction manifolds or hoses.
- Proper respiratory protection (SCBA) must be on hand in case of required emergency entry into structure.
- Make a security check for personnel, structure preparation and persons in nearby buildings and grounds. Apply proper lock-outs and placarding.

MATERIAL SAFETY
- Use proper fumigant introduction techniques to help prevent corrosion or water stains on interior materials.
- To the extent possible, provide protection for nearby desirable plants.
- Use circuit breakers or fuses for fans.
- To the extent possible, place fans to minimize the risk of damage to equipment.

Chapter 3
CYLINDER

Cylinders of this Product
This product is packaged as a gas under pressure in cylinders. Cylinders contain both gas and liquid. Cylinders containing this product are designed not to explode in high temperatures. A fusible plug in the cylinder valve body melts at 158°F to 165°F (70°C to 73.8°C) releasing the contents of the cylinder.

Cylinder Information
This product is sold as a compressed liquid gas in a high-pressure cylinder and must be handled, stored and transported with precaution. Inspect every cylinder upon delivery for damage. If the cylinder is damaged, immediately return the cylinder to the distributor of this product.
No additional gas is used to pressurize the cylinder. Each full cylinder contains 57 kg (125 lbs.) of product normally under about 1380 to 2070 kPa (200 to 300 psi).

Cylinder Handling
- Avoid manhandling the cylinder when moving or weighing; e.g., use a hoist with a hanging bonnet.
- Protect the valve from damage by always replacing the valve cover and safety bonnet.
- Open valve slowly at first, then completely open it (one full turn) so the valve and the introduction hose do not frost. Use proper size adjustable wrench (25 to 30 cm). Keep wrench attached to valve while valve is open.
- Bear in mind that frosting of the outside cylinder surface when releasing the last 3 to 5 pounds of this product is likely.
- Close valve completely when fumigant introduction is finished or cylinder is "empty."

SEE *"STORAGE AND DISPOSAL"* SECTION AT THE END OF THIS MANUAL FOR STORAGE AND DISPOSAL OF THIS PRODUCT.

Cylinder Valve System
Cylinders of this product are fitted with special valves (see **Figure 1.**).

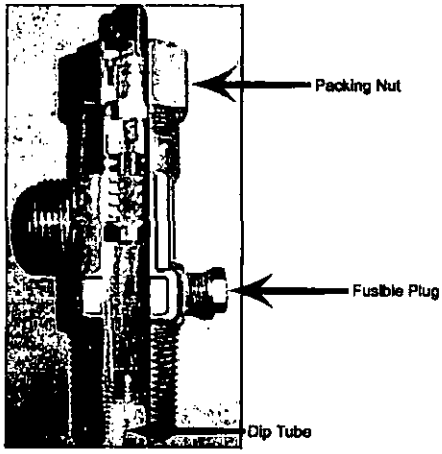


Figure 1. Cylinder Valve

The cylinder is equipped with both a safety cap and a covering called a "bonnet." The safety cap and bonnet must be securely in place at all times except when gas is to be released from the cylinder. This protects the valve system from being damaged and/or prevents accidental release of the fumigant.
Do not hang or lift cylinders by the valves. Use a proper sling to lift cylinders. Use a "hanging" bonnet or other device specifically designed for this purpose when weighing a cylinder on a hanging scale. (Hanging bonnet can be obtained from the fumigation supply distributor.)

Leaking Cylinders
If a cylinder is suspected of leaking fumigant, evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/ SCBA respirator, such as manufactured by Draeger, Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. The SCBA must be worn when exposure is more than 1 ppm or when the concentration is unknown.
Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant in the breathing zone is determined to be 1 part per million (ppm) or less as determined by a detection device with sufficient sensitivity such as an INTERSCAN gas analyzer [Model: GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR.
Often tightening the packing nut on the top of the valve to 35 to 40 N.m. (25 to 30 foot pounds) of torque with an adjustable wrench will stop the leak. Never use excessive force to open a stuck or improperly sealed valve. See valve stem adjustment procedures at the end of this chapter.
Once the cylinder is empty, contact your distributor for proper return instructions.

Frozen Valves and Hoses
If the cylinder valve is "just cracked" to reduce the rate of release, this product will expand from a liquid to a gas within the hose and frosting of the outside of the valve and hose may occur.
FROSTING CAN BE AVOIDED By ALLOWING FULL FLOW THROUGH THE VALVE AND LINES.
Do not control the rate of flow of this product by restricting flow through the cylinder valve.

Frozen Cylinders
If a break occurs on the dip tube in the cylinder, this product will be discharged in the gas phase when the liquid level falls below the break. As the liquid expands in the cylinder, heat will be taken from the surrounding area and the cylinder will frost or freeze at that point. This product will still be discharged, but at a much slower rate. If cylinder shows signs of a broken dip tube (a very rare occurrence), paint it red on the shoulder of the cylinder, put a red tag on it and return to the distributor so that the problem can be corrected before refilling.

672SPAM-0116(asterisk).indd 6 50 2016 3:25:32 PM

Empty Cylinders
Handle, store and transport empty cylinders using the same precautions as previously discussed for full cylinders. The last 1.5 to 2 kg (3 to 5 lbs.) of gas in the cylinder which is the final pounds of this product in a cylinder generally are in a gaseous state and will not move out of the cylinder as rapidly as when it is a liquid. However, it will move through the introduction hose.
REMEMBER TO CLOSE VALVE COMPLETELY ON EMPTY CYLINDERS.

Cylinder Return Policy
When the cylinder is empty, fully close the valve and replace the safety cap and protection bonnet and return the empty cylinder to your distributor. Broken or defective cylinder must be returned to your Master Fume Ag distributor. Only Drexel is authorized to refill cylinders. Do not use cylinders of this product for any other purpose.

Transportation of Cylinders
Transport cylinders capped and secured in an upright position. Do not transport cylinders that are unsecured or laying on their side. These are requirements of the Department of Transportation (DOT) when transporting compressed air cylinders. Loose cylinders can become airborne and significant damage to dip tube may occur in an accident. Because of the toxicity of this product, do not transport cylinders in the same airspace as the driver or other occupants of vehicles, such as in vans or unpartitioned trucks.
Always store and transport cylinders in a secure upright position.
Do not transport cylinders of this product in the same airspace or breathing zone of any area occupied by the driver and other occupants of vehicles.
Consult your local distributor or Drexel Chemical Company for training resources for DOT regulations.

Air Transportation: Never transport cylinders of this product by aircraft.

Valve Stem Adjustments in the Field

Introduction
When cylinders are filled at the plant, a soap solution is applied to the valve stem (the square shaft area) and valve threads at the top of the cylinder. The cylinder is not released if leaks are present. Each time the valve is opened and closed, the stem works against the packing causing the packing to flow away from the valve stem. Over time this may allow product to escape past the valve stem when the valve is in the open position. This document describes how this situation can be safely corrected in the field.

Hazards and PPE
Operators performing the valve stem adjustment must follow all precautions on the product label section for *"Leak Procedures"*. This may include, but is not limited to, immediate evacuation followed by re-entry using positive pressure self-contained breathing apparatus.
Move cylinders outdoors or to a ventilated isolated location prior to adjusting the stem. Allow no unprotected persons in the area during the adjustment procedure until fumigant concentration is verified with sufficiently sensitive detection equipment to be below the levels of concern indicated on the product label.

Indications
This procedure is appropriate when a cylinder shows indication of product loss from around the valve stem. Loss may be indicated either by a sufficiently sensitive detection device or hissing/bubbling at the stem when the valve is open. This procedure may not be effective or appropriate for other valve problems.

Training
Only persons appropriately trained for Hazardous Material handling are permitted to perform this task. While operators who transport this product are required to receive Hazardous Material training, individuals have to check with their employer if they have any questions regarding required training.

Procedure
To stop a loss of this product from around the valve stem in the field, follow the following steps.
Follow directions in *"HAZARDS AND PPE"* section above prior to starting this procedure. Make sure all PPE and sufficiently sensitive detection devices are used.

1. If product loss is detected, immediately close the valve. This will stop this product from leaking out of the stem.
2. Secure the cylinder against a stationary object (rack, wall, etc.) to prevent tipping. Using the same wrench you use to remove the cap from the valve exit, tighten the packing nut on top of the valve. Turn the packing nut in a clockwise direction to tighten the packing nut. Do not overtighten this nut. The specification is 34 to 40 N.m. (25 to 30 foot pounds) of torque, which is easily reached with a 25 to 30 cm (10 to 12 inches) adjustable wrench.
3. Open the valve. If product is still leaking from around the valve stem, repeat steps 1 and 2. If product loss still persists, close the valve, red tag the cylinder and return it for credit. The valve will be replaced at the plant.

Chapter 4
EQUIPMENT

MONITORING EQUIPMENT: FUMISCOPE, REPORTIR™
The monitoring equipment is designed to measure the actual concentration of this product within the fumigation site to determine accumulated dosage. This equipment is not sensitive enough to use as a clearing device after the exposure period. This equipment also is used in conjunction with Drexel Chemical's Master Fume Calculator for determining actual HLTs.
Fumiscopes can be purchased through your distributor or from the manufacturer. For more information, contact:

Key Chemical and Equipment Co., Inc.
13195 49th Street N., Unit A
Clearwater, FL 34622
Phone: (727) 572-1159
Fax: (727) 572-4595

Note: Contact the manufacturer for Fumiscope calibration and repair procedures.
All companies with Master Fume AG must own 2 pieces of monitoring equipment and they must be calibrated and inspected yearly by Drexel and/or Master Fume AG distributor.

CLEARANCE TESTING EQUIPMENT
A. INTERSCAN GAS ANALYZER
Model GF1900 has an integral pump that draws the air sample through a pyrolyzer (furnace) where the product is converted to SO_2 which then passes through an SO_2 sensor. The unit is lightweight and is battery or AC powered for easy portability. For more information, contact the manufacturer or:

Key Chemical and Equipment Co. Inc.
13195 49th Street N., Unit A
Clearwater, FL 34622
Phone: (727) 572-1159
Fax: (727) 572-4595

B. MIRAN GAS ANALYZER
The Miran SapphIRe utilizes a single beam, infrared detection technology to directly measure low concentrations (0 to 5 ppm) of sulfuryl fluoride. For more information, contact:

Thermo Environmental Instruments
8 West Forge Parkway
Franklin, MA 02038
Phone: (508) 520-0430
www.thermo.com/AQI

C. SF-EXPLORIR GAS MONITOR
The SF-ExplorIR is a portable monitor that uses non-dispersive infrared (NDIR) technology. It features direct measurement of sulfuryl fluoride at 0 to 5 ppm. For more information, contact: Spectros Instruments, Inc. or their representatives.

D. OTHER UNITS
The listed detection and monitoring equipment in this label is not intended to be all inclusive. As new technology is developed, new devices may be evaluated by Drexel Chemical Company to detect this product. Contact your nearest representative from Drexel Chemical Company for the latest information on sufficiently sensitive detection devices.
Prior to using the above instruments to clear a structure, meters must be "zeroed." This must be done according to the manufacturer's

672SPAM-0116(asterisk).indd 7 51 3/11/2016 3:25:32 PM

directions, away from the fumigation site and in an atmosphere that does not contain this product. Manufacturer's instructions also include information regarding appropriate and necessary calibration and maintenance. Manufacturer's specifications must be followed to ensure proper operation of these instruments.

Please refer to the manufacturer for the latest specifications and instructions for any equipment used with this product.

Chapter 5
FUMIGATION MANAGEMENT PLAN (FMP)

The certified applicator is responsible for working with the owners and/or responsible employees of the site to be fumigated to develop an FMP for this product. The FMP is intended to ensure a safe and effective fumigation. Critical components of a fumigation of this product include Drexel Chemical's Master Fume AG Calculator Program and the documentation it creates and the Precision Fumigation™ Techniques. The FMP must address characterization of the site and appropriate monitoring and notification requirements consistent with, but not limited to, the following:

1. Inspect the site to determine its suitability for fumigation.
2. When sealing is required, consult previous records for any changes to the structure, potential leaks and monitoring of occupied and adjacent buildings.
3. Consult with company officials (whose area or commodity is fumigated) and appropriate employees, prior to each fumigation, for any existing FMPs, SDS, Applicator's Manual and other relevant safety procedures.
4. Consult company officials in the development of procedures and appropriate safety measures for nearby workers and public personnel who will be in and around the area during fumigation and aeration.
5. Consult with company officials to develop an appropriate exterior monitoring plan that will confirm that nearby workers and bystanders are not exposed to levels above the allowed limits during application, fumigation and aeration. This plan must also demonstrate that nearby residents will not be exposed to concentrations above the allowable limits.
6. Consult with company officials to develop procedures for local authorities to notify nearby residents in the event of an emergency.
7. Confirm the placement of warning placards around the fumigation site as described in this Manual.
8. Confirm the required safety equipment (including that required for entry into an area under fumigation) is in place and the necessary manpower is available to complete a safe, effective fumigation.

GUIDANCE FOR PREPARATION OF AN FMP

An FMP is an organized, documented description of the steps involved to help ensure a safe, legal and effective fumigation. Drexel Chemical's Master Fume AG Calculator Program supports the creation of documentation needed to satisfy an FMP. Drexel Chemical's Master Fume AG Calculator Program and the FMP will assist you and others in complying with pesticide product label requirements. The guidance that follows is designed to help assist you in addressing all the necessary factors involved in preparing for and fumigating a site. This guidance is intended to help you organize any fumigation that you might perform prior to actual treatment. It is meant to be somewhat prescriptive, yet flexible enough to allow the experience and expertise of the fumigator to make changes based on circumstances which may exist in the field. Precision Fumigation techniques support this flexible and adaptive approach. By following a step-by-step procedure, yet allowing for flexibility, safe and effective fumigation can be performed. Before any fumigation begins, carefully read and review the label and the Applicator's Manual. This information must be given to the appropriate company officials (supervisors, foreman, safety officer, etc.) in charge of the site. Preparation is the key to any successful fumigation. If you do not find specific instructions for the type of fumigation that you are to perform listed in this guidance document, you will want to construct a similar set of procedures using this document as your guide or contact Drexel Chemical Company for assistance and/or additional resources. Finally, before any fumigation begins you must be familiar with and comply with all applicable Federal, State and local laws. The success and future of fumigation are not only dependent on your ability to do your job, but also by carefully following all rules, regulations, and procedures required by governmental agencies.

Checklist Guide for an FMP

This checklist is provided to help you take into account factors that must be addressed prior to performing all fumigations. It emphasizes safety steps to protect people and property. The checklist is general in nature and cannot be expected to apply to all types of fumigation situations. It is to be used as a guide to prepare the required plan. Each item must be considered. However, it is understood that each fumigation is different and not all items will be necessary for each fumigation.

A. PRELIMINARY PLANNING AND PREPARATION

1. Determine the purpose of the fumigation and record in Drexel Chemical's Master Fume AG Calculator.
   a. Control of insect infestation
   b. Control of rodent infestation
   c. Plant pest quarantine
2. Determine the type of fumigation and record in Drexel Chemical's Master Fume AG Calculator. For example:
   a. Space: tarp, mill, warehouse, food plant, railcar or ship (when fumigating vessels such as ships read the U.S. Coast Guard Regulations 46 CFR 147A, in addition to the Applicator's Manual)
   b. Commodity: raw agricultural or processed foods
3. Fully acquaint yourself with the site and commodity to be fumigated, and record the following in Drexel Chemical's Master Fume AG Calculator when necessary:
   a. In conjunction with the owner/operator/person in charge, take note of the general structure layout, structure construction (materials, design, age, maintenance), fire or combustibility hazards, connecting structures, other significant fumigant escape routes and other unique hazards or structure characteristics.
   b. The number and identification of persons who will routinely enter the proximate area fumigated (i.e., employees, visitors, customer, etc.).
   c. The specific commodity to be fumigated.
   d. The previous treatment history of the commodity, if available.
   e. Accessibility of utility service connections.
   f. Nearest telephone or other means of communication and note the location of these items.
   g. Emergency shut-off stations for electricity water and gas. Note the location of these items.
   h. Location and number of fans, introduction sites and monitoring lines.
   i. Current emergency telephone numbers of local health, fire, police, hospitals and physician responders.
   j. Name and phone number (both day and night) of appropriate company officials.
   k. Location of command center.
   l. Review labeling including the Applicator's Manual.
   m. Location of cylinders.
   n. Cylinder temperature or pressure.
   o. Introduction line: length, inside diameter, and burst pressure.
   p. Fan capacity (i.e., cu. ft/mm).
   q. Record and calculate dosage in Drexel Chemical's Master Fume AG Calculator.
      (1) Cubic footage or other appropriate space/location calculations
      (2) Estimated HLT
      (3) Temperature
      (4) Exposure time
      (5) Target pest
      (6) Whether the low, high or user-defined CT was used and the resultant CT target value
      (7) Initial, additional and total amount of fumigant used
      (8) Time of introduction and if any, times of introduction of add gas applied
      (9) Actual CT achieved

B. PERSONNEL

1. Confirm that all relevant personnel in and around the structure to be fumigated have been notified prior to application of the fumigant. Consider using a checklist that each employee initials indicating they have been notified.
2. Instruct all relevant fumigation personnel to read the Applicator's Manual about the hazards that may be encountered and about the selection of personal protection devices including sufficiently sensitive detection equipment.

672SPAM-0116(asterisk).indd 8 5/2/2016 3:25:32 PM

3. Confirm that all personnel are aware of and know how to proceed in case of an emergency situation.
4. Instruct all relevant personnel on how to report any accident and/or incidents related to fumigant exposure. Provide a telephone number for emergency response reporting.
5. Instruct all personnel to report to proper authorities any theft of fumigant and/or equipment related to fumigation.
6. Establish a meeting area for all personnel in case of emergency.

C. MONITORING

1. Safety
   a. Monitoring of conditions of this product must be conducted in areas to prevent excessive exposure and bystander exposure.
   b. Keep a log or manual of monitoring records for each fumigation site. This log must at a minimum contain the timing, number of readings taken, location, and level of concentrations found.
   c. When monitoring, document even if there is no fumigant present above the safe levels. In such cases, subsequent monitoring is not routinely required. However, spot checks must be made occasionally, especially if conditions significantly change.
   d. Monitoring must be conducted during aeration and corrective action taken if gas levels exceed the allowed levels in an area where bystanders and/or nearby residents or domestic animals may be exposed.
2. Efficacy
   a. Readings of this product should be taken from within the fumigated structure to insure proper gas concentrations. Drexel Chemical's Master Fume AG Calculator analysis of these readings must be used as a basis for any decisions to add gas and the determination of subsequent amounts needed.
   b. All readings of this product must be recorded in Drexel Chemical's Master Fume AG Calculator.
   c. Readings should be of sufficient nature to reasonably determine HLT and, thus, identify whether any significant unforeseen leaks are occurring.

D. NOTIFICATION

1. Confirm the appropriate local authorities (fire departments, police departments, etc.) have been notified as per label instructions, local ordinances or instructions of the client.
2. Prepare written procedure ("Emergency Response Plant") that contains explicit instructions, names and telephone numbers so as to be able to notify local authorities if levels of this product are exceeded in an area that could be dangerous to bystanders and/or domestic animals.

E. SEALING PROCEDURES

1. Sealing must be adequate to control the pests. Care should be taken to ensure that sealing materials will remain adequately intact until the fumigation is complete.
2. If the site has been fumigated before, review the previous FMP and/or Drexel Chemical's Master Fume AG Calculator files for previous sealing and HLT information.
3. Make sure that construction/remodeling has not changed the building in a manner that will materially affect the fumigation.
4. Warning placards must be placed on all entrances and all sides of the fumigation site.

F. APPLICATION PROCEDURES AND FUMIGATION PERIOD

1. Plan carefully and apply the product in accordance with the label requirements.
2. Two persons trained in the use of the product, at least one being an applicator certified by the State, must be present on site at all times during the introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure, when testing for re-entry after aeration (if aerated in an enclosed space) and during re-entry.
3. Apply fumigant from the outside when and where appropriate.
4. Provide watchmen when entry into the fumigation site by unauthorized persons cannot otherwise be assured (e.g., by secondary locks, barricades, etc.).
5. When entering structures, always follow OSHA rules for confined spaces.
6. Keep the flexibility and record keeping function of Drexel Chemical's Master Fume AG Calculator in mind - it will provide a basis for improved understanding and thus, safer fumigation application in the future.
   a. If Drexel Chemical's Master Fume AG Calculator calculated CT is achieved early, the fumigation can be ended early.
   b. If additional time is necessary, use Drexel Chemical's Master Fume AG Calculator to calculate how much time is needed.
   c. If it is necessary to add gas, use Drexel Chemical's Master Fume AG Calculator to calculate how much additional gas is required.

G. POST-APPLICATION OPERATIONS

1. Provide watchmen when you cannot otherwise secure the fumigation site from entry (e.g., by secondary locks, barricades, etc.) by unauthorized persons during the aeration process.
2. Determine gas concentration in the fumigated environment from outside if possible. Use a sufficiently sensitive gas detector before re-entry into a fumigated structure to determine fumigant concentration.
3. Turn on ventilating or aerating fans where appropriate.
4. Ventilate and aerate in accordance with structural limitations and nearby occupied areas so as to minimize bystander exposure.
5. Consider temperature when aerating.
6. Determine gas concentration in the surrounding area if required.
7. Remove warning placards when aeration is complete and the fumigated space has been cleared for re-entry using a detection device of sufficient sensitivity.
8. Inform business/client that employees/other persons may return to work or otherwise be allowed to re-enter the aerated structure.
9. Keep records of monitoring of gas concentration inside (efficacy readings) and outside (safety readings) the fumigation environment to document completion of aeration.

Chapter 6
PREPARATIONS FOR FUMIGATION

Prior to fumigation, read the Applicator's Manual carefully. Notify appropriate owners, employees, and/or operators at the facility where the fumigation will occur and provide relevant safety and health information to local fire and rescue officials for use in the event of an emergency.

Best practice is to notify local police, fire department and emergency responders of impending start and finish times for the fumigation.

Property Owner/Customer Checklist: The owners of buildings to be fumigated need to be informed of circumstances and conditions associated with the fumigation process and of their involvement in preparation, vacancy and re-occupancy. Some States require the fumigator to provide the customer with a list of preparations required for the fumigation. The customer may also be required to acknowledge in writing certain liabilities.

The responsibility for proper fumigation procedures lies with the certified fumigator regardless of who does the work.

OCCUPANTS/CUSTOMERS NEED TO KNOW:

1. Qualifications of the certified applicator who will be doing the fumigation.
2. Their specific role in preparation for fumigation - what to prepare, turn off, remove, etc.
3. What the fumigation process (introduction, exposure, aeration and clearance) entails so that there can be absolutely NO ENTRY by unauthorized personnel into the structure until it is certified clear for re-entry by the fumigator.
4. The specific times to leave the structure and when re-occupancy may occur.
5. That the fumigator often requires that the property owners surrender keys to the structure to be fumigated. The fumigator should have access to all areas of the fumigation site during the whole period that the site is under their control.
6. This product has no residual effectiveness and so does not control future infestations of pests.
7. To reveal to the fumigator known or potential connections to adjacent/other buildings.

WHAT TO REMOVE PRIOR TO FUMIGATION

Remove from the structure to be fumigated all persons, non-target animals and desirable growing plants. All drugs (including tobacco

or page 21.
see page 6 of 1015-78
should we add a Chloropicrin section?
+ there is a whole chapter on Chloropicrin pg. 28-31
NO, not for now, more impo to get Chloropicrin off label

672SPAM-0116(asterisk).indd 9 53 10/2018 3:25:33 PM

products) and medicinals (including those items in refrigerators and freezers) need to be removed prior to fumigation.

FLAMES OR HEATING ELEMENTS

This product is a very stable compound that is relatively non-reactive and non-flammable. However, under high heat conditions present in gas flames or glowing electric elements, this product can decompose into sulfur dioxide SO_2 hydrofluoric acid HF, and other decomposition products. Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Therefore, extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated.

Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. When a single gas meter serves more than one structure, gas service to all sources may be interrupted. The gas lines should be cleared. Fumigation companies may request that customers have the local gas company turn off the gas prior to fumigation. The local gas company will always need to turn gas service on after it has been turned off to determine that the gas flow rate and pressure are appropriate.

Important: Before fumigating, ALL pilot lights must be turned off. The heat of gas flames, pilot light flames, or the glowing wires or hot surfaces of electric heaters can cause this product to break down to form a corrosive material. Make sure the gas flames and pilot flames of furnaces, gas refrigerators and kitchen ranges are extinguished and that glowing electric heaters that represent a reasonable risk of a heat source that is at or near 752°F are turned off.

CHLORINE GAS: Damage to metals can also occur from the inclusion of chlorine gas for bleaching or chlorination processes. Ensure this equipment is turned off with no leaks or excluded from the fumigation.

CHECKING FOR CONNECTED AREAS

Prior to fumigation, the certified applicator is required to check for connected areas. A connected area is defined as any area connected with the space to be fumigated by construction elements (e.g., pipes, conduits, ducts, etc.) that may allow the passage of fumigant between the spaces.

Any connected areas must be vacated during the fumigation process unless it is isolated from the space to be fumigated by methods that will prevent passage of the fumigant from the space to be fumigated into the connected area. When it is necessary to vacate areas that have been isolated, that area shall be considered as a fumigated space and all applicable rules, regulations and label instructions apply such as preparation, placarding, securing and aeration.

Concentrations of this product must be continually measured during the fumigation of a structure in any occupied isolated connected structures to verify concentrations are less than 1 ppm to confirm that individuals in the isolated areas are not exposed to unacceptable levels of this product.

Use only a detection device of sufficient sensitivity such as the INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR to confirm a concentration of 1 ppm or less. If concentrations of this product is more than 1 ppm, then the sealing of the isolated space from the fumigated area is probably not working and the immediate space must be evacuated unless the concentration is continuously monitored to prevent exposure greater than 1 ppm. SCBA must be worn by the applicator if the concentration is more than 1 ppm. **Important:** All connected/adjoining areas must be vacated if required by State or local laws or regulations.

DISTRIBUTION / AERATION FAN USE AND PLACEMENT

Purpose of Fans

The purposes for fans in a structural fumigation are:

1. Fumigant introduction
2. Equilibrium and circulation
3. Aeration

Positioning Fans

- There is no set pattern established for the positioning or the number of fans to use.
- Fans should be strategically placed in order to mix the fumigant and rapidly reach equilibrium.
- At least one fan for each level of the structure.
- It is good fumigation practice to use more fans in structures that are divided into numerous smaller compartments or rooms.

A rule of thumb is to use one fan for each 75,000 ft^3 and at least one fan for each area or level of the fumigation.

In structures frequently used or dedicated to fumigation, air circulation equipment and fans can be built into the structure. Examples of some systems include air-handling systems that provide for the fumigant introduction, continuous circulation, and also aid in the quick, effective aeration of the structure.

Reaching Equilibrium

When the liquid form of this product is released from the introduction hose, it extracts a substantial amount of heat from the surrounding air as it expands to form a gas. A pound of the liquid form of this product changing to the gas phase will drop the temperature of 1000 cubic foot of dry air 4.5°F (28.3 cubic meters of air 2.5°C).

The chilling causes the formation of a cloud of condensed water (fog) that must be dissipated before it collects on a surface. The rate of dissipation depends upon the release rate, atmospheric conditions and mixing rate. The fan capacity, quantity, and placement determine the mixing rate. The chilled gas of this product is much denser than the surrounding air and can settle to the bottom of the fumigation space unless mechanically mixed with the surrounding air.

All gases tend to move from an area of high concentration to low concentration and will eventually come to equilibrium in a confined space. This product will do the same when it is introduced into a fumigation space, regardless of the fact that molecules of this product are heavier than air molecules. However, the rate of passive diffusion may be too slow to achieve equilibrium within a practical period. Thus, mechanical mixing by fans is essential.

Important: High capacity fans are needed when introducing this product into a space to prevent stratification, to aid in proper dispersion and to assist temperature distribution.

Continuous Circulation with Fans

A significant benefit of continuous circulation is the movement of this product from areas of high concentration to areas of lower concentration. This continuous circulation maintains a more equal concentration within the fumigation space and helps ensure that this product will penetrate all areas where infestation may exist.

It is next to impossible to seal a structure so that there are no leaks. Unless there are abnormally large leaks, continuous circulation during the entire exposure period will not appreciably affect the loss rate for this product. Obviously, the air stream should not flow directly against "leaky" areas because excessive fumigant loss can occur.

Preparing for Aeration

When first preparing the fumigation, plan ahead for the aeration period and take steps to aid aeration by strategic placement of fans and other aeration tools. Just as fans are useful in achieving equilibrium of fumigants, they are excellent aids in attaining rapid aeration and are essential where cross ventilation is poor. Have a detailed plan in place for safe, effective aeration of the structure. Be sure to consult local regulations for more restrictive aeration procedures.

MONITORING HOSES

Arrangements should be made to place sampling hoses in the structure prior to fumigant introduction. Semi-rigid vinyl hoses (3 to 6 mm or 1/8 to 1/2" ID) should be placed to allow sample representative concentrations with a Fumiscope or similar device. Monitoring hoses larger than 6 mm ID may take a longer time to pull the sample from the fumigated space to the monitoring device because of the larger volume of air needed to be moved.

Ideally, monitoring lines should be placed on all levels of the fumigated structure. If the structure is compartmentalized into separate rooms or other sub-units, place lines in areas representative of the different units.

SEALING THE STRUCTURE

No two fumigations are exactly alike. Each job requires the fumigator to establish and maintain an effective fumigation environment. The fumigation must be conducted in a manner that will effectively control the pests without causing undue risk to people or property. The fumigator must conform to the label for this product and the Applicator's Manual, as well as to Federal, State and local regulations. When in doubt, a fumigator should seek assistance from suppliers,

regulators, Drexel Chemical Company representatives or other educational sources.

The quality of the seal has a huge influence on the effectiveness of the fumigation. Increasing the seal of the fumigation site is one of the most effective ways to ensure a quality fumigation and reduce the total amount of fumigant needed.

There are several approaches to the challenges of confining the fumigant. The fumigator needs to make field judgments how to best seal a space. Pay special attention to drains, vents, conduits, wiring, electrical junction boxes, floor cracks, wall/floor or wall/ceiling joints and damage to outside walls from equipment. When sealing, keep in mind a few basic thoughts:

1. Identify and address key leakage areas. Careful inspection of the structure will help identify leaky areas. Be sure to carefully seal protruding equipment on the top floors and roofs. Building eaves also can be very leaky.
2. To the extent necessary and possible, close off all connected structures and install an "air break" to stop gas moving to connected structures.

Tape and Seal

For fumigation structures that can be appropriately sealed with materials such as plastic or tape, seal adequately around doors, windows, vents and other openings. When necessary to minimize escape of fumigant through the soil and to avoid injury to nearby plants, wet soil (if not sufficiently moist) around the structure to act as a barrier for the fumigant. Often, structures are too large to be completely tarped for fumigant confinement. The most common practices are to use polyethylene sheeting, non-porous panels, fumigation tape, spray adhesives, foams and insulation materials to seal the structure for fumigation. These techniques are usually used around doors, windows, roof eaves, loading docks, pipes, augers, conveyers, vents, etc. If properly used, these materials can do an ample job of confining the fumigant within the structure.

Stucco or masonry block buildings may be sealed by taping laminated paper or plastic film over outside doorways, windows and vents. This sealing method is recommended for structures in which any wooden section, including roofing, is exposed to the outside.

However, even with an excellent job of tape and seal around windows, doors, etc., if the building walls, roof or basement have holes that are not sealed, the structure may not hold fumigant satisfactorily.

Always monitor with a Fumiscope or similar device when necessary.

Foam Sealing

The use of expandable spray foams have been effectively used to help seal structures. Expandable foam is economical and can be used for both permanent and temporary seals. Refer to the foam product directions for proper use and compatibility issues.

Tarping

Good sealing is necessary for an effective fumigation. Tarpaulins (tarps) can be used in the sealing process with tapes/adhesives to help seal leaky areas or to envelop the entire area to be fumigated. This method is effective on almost any size or type of space/site. The ability of a tarp to contain a gas depends on the condition of the tarp, the material of construction and its thickness.

One of the most critical operations in tarping a space is achieving a tight seal at the ground where protrusions, debris or rough-textured soil or concrete may provide an opening for gas to escape. The edges of the cover that contact the floor or soil must be sealed by techniques such as taping the tarp to the floor or placing sand or water snakes over the edges of the tarp. Sand or water snakes may be used effectively if the ground surface is very smooth. One method of improving the seal with a sand or water snake is to run a trough of water on the tarps along with the snakes. Vinyl/nylon snake covers do not deteriorate readily. To minimize escape of fumigant through the soil and to avoid injury to nearby plants, wet soil (if not sufficiently moist) around the structure to act as a barrier for the fumigant. When possible, avoid walking on tarped, fumigated material to maintain seal during the exposure period. To achieve an adequate ground seal, allow at least 2 feet of tarp to clear the ground snakes. This will accommodate movement of the tarps from wind movement.

TARP MATERIAL: Plastic tarps are semi-permeable membranes that permit different fumigants to pass through them at different rates. The passage of this product through most plastic sheeting of sufficient thickness is very slow (see **TABLE 1.**).

Use only tarps made of materials that will adequately confine this product for the required time. Tarps are sold in many sizes. Experience has shown that the following have proven satisfactory:

1. 4 to 6 mil polyethylene for "single use" tarps
2. Laminated (several layers) polyethylene
3. Vinyl coated nylon
4. Neoprene coated nylon
5. PVC (polyvinyl chloride) coated nylon

THICKNESS: As a minimum, 4 to 6 mil (160 to 240 microns) thickness of the above materials adequately confines this product. A tarp of 100 microns is equivalent to a 400 gauge material. Polyethylene tarps less than 4 mil (160 microns) are not of an adequate thickness to confine this product because they do not possess the strength and weight needed for the handling, wind resistance and abrasion encountered in most fumigations.

TABLE 1. Percent permeation loss and adsorption of 8 oz./1000 ft.^{3} sulfuryl fluoride after 24 hours from 11 ounce glass bell jar with lid made of tarp materials.

	% Permeation Loss	% Adsorption*
	Sulfuryl fluoride	Sulfuryl fluoride
Polyethylene 4 mil	0.0	1.3
Tarp A, 10.3 oz/yd^2	3.3	6.1
Tarp B, 7.2 oz/yd^2	5.5	3.1
Tarp C, 9.6 oz/yd^2	0.2	3.3
Used tarp**	100.0	8.8

* Values reflect subtraction of fumigant loss due to glass container adsorption (2.2% for sulfuryl fluoride). (n=4)

** A used tarp is a tarp which has abrasions of the vinyl coating causing the nylon fabric to be exposed in a few spots.

Source: Scheffrahn, R.H. and E.M. Thomas (1993) "Penetration of Sulfuryl Fluoride and Methyl Bromide Through Substrates During Fumigation." DOWN TO EARTH 48 (1) pp. 15-19.

PLACARDING AND SECURING FUMIGATED AREAS

Placarding of Fumigated Areas and in some instances is use

This product is a toxic gas without a warning agent.

All entrances and all sides of the fumigated environment and any connected area not monitored must have warning signs. Do not connect cylinders to introduction equipment until all fumigation warning signs have been posted, the space to be fumigated is clear of people and non-target animals, and it is secured. Warning signs must be of weather resistant material and should be securely affixed to the structure. Do not allow entry by unprotected persons into fumigated area until the signs are removed. Signs must remain legible during the entire posting period. Warning signs should be placed in advance of the fumigation in order to keep unauthorized persons away. The warning signs must be printed in English and Spanish with:

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 and time.
4) Name of fumigant used and EPA Reg. No.
5) Name, address and telephone number of the applicator.

Only a certified applicator may authorize removal of placards and only when concentration of this product in the breathing zone of the treated site is 1 ppm or less.

Use the following considerations when posting warning signs:

- Follow local, State and Federal regulations for sign format, size, durability or additional information requirements.
- Use materials that will allow information to remain legible when posted.
- Use information that allows for 24 hour communication with the certified applicator in the event of an emergency.

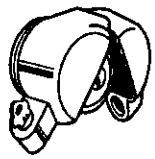
Transfer of incompletely aerated commodity to a new storage site within a facility is permissible. However, the new storage site must have placarding and security similar to the fumigation site if concentration of this product is equal to or greater than 1 ppm. Workers who handle incompletely aerated commodity must be informed and appropriate

672SPAM-0116(asterisk).indd 11 55 3/2016 3:25:33 PM

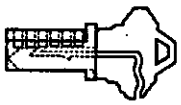
measures must be taken (ventilation and wearing of SCBA) to prevent any exposure greater than 1 ppm.

Securing Structures

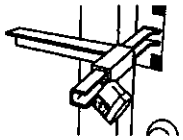
In order to secure against unauthorized entry during the fumigation exposure period, a locking device or barricade must be used on all exterior doors or doorways. A locking device or barricade must be effective in preventing entry of any exterior door or doorway using normal opening or entering processes by anyone other than the certified applicator in charge of the fumigation or persons in his/her on-site direct supervision. Consult State and local regulations for any supplementary instructions and local restrictions on securing against entry. Several additional security options to consider might include:



CLAM SHELL LOCKS:
CLAM SHELL LOCKS are designed to prevent use of the door or occupant's keys to unlock entrance doors.



KEY-WAY LOCKS:
KEY-WAY LOCKS are designed to prevent use of the occupant's keys to unlock entrance doors. These function by inserting a two-part locking key into the door keyhole and removing only half of the key. The other half of the locking key remaining in the door prevent insertion of the occupant's key.



J-SAFE LOCKS:
J-SAFE LOCKS or chains can also be used on certain structures.

GUARDS:
Guards may be considered in some circumstances and may be required in some locations. Consult local regulations. Best practice is to notify local police, fire department and emergency responders of impending start and finish times for the fumigation.

RAILCARS, TRAILERS OR SHIPS:
Railcars, trailers or ships must be secured against unauthorized entry during the fumigation exposure period.

Chapter 7
INTRODUCTION AND DISTRIBUTION OF THIS PRODUCT

CHOOSING INTRODUCTION SITES

The specific site(s) of release of this product is (are) very important to the success of the fumigation. This product should be introduced in a manner to achieve rapid equilibrium, avoid excessive loss, prevent fog-out and ensure safety to personnel and materials.

Site selection should be made using good judgment. Ask, "If this product was introduced in this location, how and when will it get to the most remote locations in the commodity or structure?" The size and configuration of the space and the adequacy of the circulation typically dictate the number of release sites for this product. Therefore, for many applications, it is often appropriate to use multiple introduction sites to rapidly attain equilibrium.

In structures that are frequently used for fumigation, permanent introduction systems can be built into the structure to ensure safe, effective and adequate fumigant introduction. Be sure to inspect all components of introduction systems prior to each use.

The proper introduction of this product (release from the cylinder) is essential to the success, safety and economy of a fumigation. It is imperative that the fumigator understands the principles involved and the conditions that exist for introducing the fumigant on each job.

Below are points that are considered when introducing this product:

1. The introduction methods used will practically achieve the target dosage (sufficient ounce-hours for the working temperature to control the target pest).
2. This product must be introduced in a manner that is safe to personnel and property inside and outside of the fumigation space.
3. The goal is to reach concentration equilibrium of this product throughout the fumigated space as quickly as is safe and practical.

Important: Prior to release of this product, make sure a thorough check of the structure and surroundings is conducted and all safety precautions have been taken.

Do not apply for insect control when temperature at the site of the pest is below 40°F. This temperature may be measured wherever the infestation may be. This restriction does not apply when fumigating for rodents. To prevent damage, do not apply liquid fumigant directly to any surface within the fumigation area.

This product is packaged as a liquid under pressure and requires a heat source for conversion of the liquid to a gas during introduction. The heat source can be the air around the introduction site or mechanical heat exchanging systems.

The introduction system must:

- Prevent breakdown or contamination of this product.
- Confine this product until it is released into the fumigation area.
- Prevent liquid sulfuryl fluoride from contacting surfaces which could be damaged or the commodity within the fumigation area.
- Prevent a fog-out in the fumigation area. A fog-out is substantial condensation of moisture inside a fumigated structure that is caused by the air temperature dropping below the dew point.

Damage to materials can occur if the rate of release of this product exceeds fan capacity. Use electric fan(s) to facilitate forced distribution and aeration of other dead air spaces and rapid dispersion of the gas.

This product must be introduced from the cylinder through a suitable leak-proof delivery system (hoses, connectors, gauges, solenoids, etc.) with a minimum burst pressure of 500 psi. It is recommended to:

- Release the fumigant into a large open space.
- Direct the fumigant into the blast of air from a fan(s) having a capacity of at least 1000 cubic foot per minute per pound of this product released per minute.
- Introduce no more than 4 cylinders per introduction site.
- Have one introduction site per every 75,000 cubic foot.

SELECTION AND USE OF EQUIPMENT FOR FUMIGANT INTRODUCTION

Weighing the Fumigant

Either platform or hanging scales can be used to weigh the cylinder during fumigant introduction. If hanging scales are used, hanging bonnets or cylinder slings must be used to hang the cylinder from the scale.

Consult your distributor or Drexel Chemical Company for a source of hanging bonnets. Scales should be routinely calibrated to assure correct readings. Refer to the scale manufacturer for calibration and maintenance details.

THE CYLINDER SHOULD NEVER BE SUSPENDED BY THE VALVE!

Hoses

Release the fumigant through a suitable leak-proof hose with a minimum burst pressure of 3450 kPa (500 psi). The hose should be flexible, kink-resistant, durable and compatible with the liquid form of this product.

Prior to use, confirm with distributor or manufacturer that the introduction hose meets the above requirements.

The introduction rate of this product is mostly controlled by the inside diameter and the length (resistance) of the fumigant introduction hose. Flow rates can be easily calculated using Drexel Chemical's Master Fume AG Calculator.

Protective Sheeting

Protective sheeting, such as polyethylene plastic, can be placed under the hose and fan to further protect floors and other materials during application from potential moisture condensation.

Securing Introduction Hose

A widely used method is to securely attach the introduction hose to a tarp clamp and then use the tarp clamp to attach the hose to the fan cage. The fan cage is angled upward at about 45°. Another option is to attach the fumigant introduction hose to a solid heavy object in front of a fan angled upward at 45°. If the introduction hoses are part of a permanent introduction system, be sure to inspect the hoses prior to each use to ensure they are securely mounted and still in required working order.

Fog-Outs
A cloud of fine droplets suspended in air near the ground is called fog. It is very important when introducing this product to prevent excessive fog and dew formation. Releasing this product will cause some condensation near the release point - slow release rate and low humidity will cause less and a fast release rate and high humidity will cause more. After the condensation forms, it will evaporate at a rate that is dependent on the relative humidity, the temperature of the fumigation atmosphere and the air mixing rate controlled by the introduction fans.
Condensation forming on the photoelectric eye of a smoke detector or motion detector can cause the alarm to activate. It is very important to use proper fans to help mix the heat of the building and fumigation atmosphere to evaporate the condensation. Liquid water absorbs the very small amount of impurities in this product and can result in corrosion.

Fog-Out Prevention
There are several options to reduce the incidence of moisture condensation when fumigating air-conditioned structures in hot, humid weather:
1. Let structure warm a day or two before fumigation to equalize inside and outside temperature and stabilize the Relative Humidity (RH).
2. Reduce the introduction rate with a smaller diameter hose, longer hose or pulsed (interrupted) introduction.
3. Reduce the amount of this product introduced into one area by using multiple introduction sites. This would be most important in high-dosage fumigations.
4. Use multiple fans or larger fans to hasten the mixing of air and heat exchange.
5. Monitor the fumigation or extend the exposure period to reduce the overall fumigant requirements, if practical.
6. When necessary, use a combination of several of these techniques to reduce the release rate and relative humidity, and increase the heat exchange of the structure to the fumigation atmosphere. Drexel Chemical's Master Fume AG Calculator takes into consideration fan capacity to recommend the fumigant introduction rate.
7. Do not tarp or seal a space that is excessively wet.

Fumigated Space Leak Detection and Mitigation
During release of this product, the fumigator must monitor around the perimeter of the fumigation area (especially downwind) with a leak detector with sufficient sensitivity to ensure a good seal so that concentrations of this product are kept within 1 ppm or less outside of the fumigation area. An SCBA must be readily available during the fumigant introduction period in case of leaks.
Detectors such as TIF 5750 and XP-1 manufactured by TIF Instruments, Inc., Miami, Florida, can detect concentrations of this product over 50 ppm. These devices can only be used to check cylinders for significant leaks. A device capable of measuring to 1 ppm of this product must be used for all other tasks.
If more than 1 ppm of this product is detected, then clear the area of all personnel. Only persons wearing a self-contained breathing apparatus (SCBA) with full facemask and operating in pressure demand mode or its equivalent are permitted in the area to address the leak. Only after levels of this product are 1 ppm or less, are unprotected personnel permitted in the area.
Large leaks must be minimized as quickly as possible to help avoid risk of exposure to bystanders and/or occupants of nearby structures and to minimize loss of fumigant. This involves walking around the structure or fumigated area with a monitoring device to determine if excessive amounts of fumigant are escaping. Proper respiratory protection must be worn when sealing leaks. Seal leaks from the exterior of the structure whenever possible. If it is necessary to seal a leak from the interior of the structure, the applicator must follow all proper re-entry procedures.

Re-entry Procedures
If re-entry into a fumigated area is necessary after introduction of the fumigant, but before complete aeration, to troubleshoot distribution of the fumigant or repair leaks, follow the re-entry procedures specified in *"Chapter 9"*.

CALCULATING DOSAGE
Establishing the Required Dosage
The fumigator is challenged with the task of distributing and maintaining a concentration of fumigant over the fumigation period to achieve the target dosage. Because of the multitude of factors, no two fumigations are identical. To specify a single dosage rate for all conditions would seldom be correct — usually it would be either excessive or insufficient for expected pest control.

Drexel Chemical's Master Fume AG Calculator Program
Drexel Chemical's Master Fume AG Calculator is used for all fumigations using this product. See directions for details and specific use. Do not use this product without the Drexel Chemical's Master Fume AG Calculator. Drexel Chemical's Master Fume AG Calculator must be used to calculate the dosage. Drexel Chemical's Master Fume AG Calculator Program may be modified and updated from time to time; please contact your Drexel Chemical Company representative for current information.

Precision Fumigation Defined
Precision Fumigation is not a new concept; however, most fumigators have lacked the tools to consistently plan and conduct precision fumigations. Precision Fumigation can be defined as "Optimizing fumigant use to maximize efficiency and minimize risk."

Precision Fumigation Concepts
Use of this product allows fumigators to use their skills, knowledge and experience to create and implement successful, flexible fumigations. Precision Fumigation methods: a) allow fumigation when/how necessary, b) capitalize on enhanced sealing methods, c) maximize exposure time, and d) utilize temperature modification.

Fumigant Dosage
All fumigants utilize some form of the dosage relationship which is often referred to as the "CT Concept":

Dosage = Concentration (C) X Time (T)
or
D = C x T (CT)

Therefore, the dosage required to kill the target pest(s) is accumulated over a period of time and is measured in ounce-hours or gram-hours.
CT = oz-h/1000 cu. ft.

The concentration in ounce per 1000 cubic foot of fumigant multiplied by the exposure time in hours

The maximum target concentration in Drexel Chemical's Master Fume AG Calculator is 128 ounces per 1000 cubic foot.

The maximum target dosage for all normal atmospheric pressure (NAP) fumigations is 1500 CT (1500 ounce-hours per 1000 cubic foot).

For vacuum chamber fumigations, the maximum target concentration is 128 ounces per l000 cubic foot, and the maximum target dosage is 200 CT (200 ounce-hours per 1000 cubic foot).

Concentration Units of this Product
1 ounce per 1000 cubic foot = 240 ppm

FUMIGANT DOSAGE FACTORS
The proper dosage for efficacy and the total amount of this product needed for a fumigation is determined by four interrelated factors:
1. Pest species and life stages
2. Temperature at the site of infestation
3. Exposure time
4. Half-Loss Time (HLT)

Pest Factor
This product is effective on all key stored product insect pest species and can control all life stages of insects. However, different pest species and life stages require different dosages for effective control. Adult, larval and pupal stages are controlled with relatively low dosages of this product, while the egg stage requires higher dosages. Several rodent pests such as rats and mice may infest commodities and sites, and damage materials within facilities. The temperature restriction of 40°F for insect fumigation does not apply to rodents because they are warm blooded. The target dosage for rodents is 36 ounces-hour per 1000 cubic foot.

Temperature Factor
Temperature is an important factor for successful fumigation. Insects are ectothermic, so increasing temperature increases insect metabolism. Increasing insect metabolism greatly improves the efficacy of this product. Increasing temperature can decrease

672SPAM-0116(asterisk).indd 13 6/4/2016 3:25:36 PM

exposure time and/or gas needed. Relatively large changes in temperature are generally not required. Achieving temperatures of 25 to 30°C (78 to 86°F), for example, can have a very positive effect on fumigation efficacy and efficiency.

Fumigators can use the following methods for increasing temperature of the fumigated space. Permanent/built-in systems utilizing hot water, steam, electric, fossil, solar heat sources. Temporary/leased units operating on propane or natural gas, electric or other fuels can be used. Fans, heater fans and other electrical equipment should be grounded and have a good protective fusable or breaker system. Planning fumigations during the warmer seasons or even during the warmer periods of the day can positively affect temperature factor.

Do not apply this product for insect control when the temperature of the site of the pests is below 40°F.

The measured minimum temperature at the site of the insect pest should be used for dosage calculations.

For rodents, temperature does not affect dosage because they are warm blooded.

Time Factor (T)

The time factor is a key component of C x T = Dosage formula. The exposure time is defined as the number of hours the target insect is exposed to the fumigant. If the structure has good gas confinement, increasing the exposure period is one of the most cost effective practices available to the fumigator. Doubling exposure time in a well-sealed structure can decrease gas needed by up to 50%. The fumigator should work with the customer to plan and optimize exposure time to minimize the fumigant needed.

Increase time = Decrease gas needed
Decrease time = Increase gas needed

Half Loss Time (HLT)

HLT is the measurement of how well a fumigated space or area holds fumigant from loss. HLT is defined as the time in hours during which 50% of the initial concentration of fumigant is lost. Research has shown fumigant retention is often extremely variable between and even among areas within a structure. Results from numerous measurements for this product indicate the main influencing factors are:

1. Condition of seal (wall construction, number and size of leaks, etc.).
2. Type of underseal (slab, soil, wood).
3. Volume of structure (ratio of surface area to volume).
4. Wind velocity.
5. Number of windows and doors and other openings such as pipes, vents, racks, etc.

If HLT is more than 20 hours for structures, the seal is considered very good. HLT is calculated by actively monitoring the fumigation with a Fumiscope or similar device over a period of time and determining the specific loss of gas in that time period. To get a reasonably accurate picture of the HLT in a large structure, monitoring points should be established throughout the building. This ensures that each area or compartment of the structure will achieve the required dosage. Drexel Chemical's Master Fume AG Calculator will calculate an HLT by area using the collected monitoring data.

Under conditions of rapid fumigant loss (low HLT), only the initial hours of exposure significantly accumulate dosage. If the HLT is significantly shorter than expected (fumigant leaking drastically faster than planned), to achieve the required dosage, the fumigator must take additional steps. These steps include, but are not limited to, stopping the addition of fumigant and addressing the leak (following re-entry procedures if there is a need to reenter or wearing SCBA if working from outside), before increasing gas concentration of this product, increasing the time of exposure or utilizing a combination of the two methods.

Best practice is to use monitoring data, from previous fumigations for this or similar sites and conditions to estimate the HLT, and then monitor to confirm the true HLT. When a reasonable estimate of HLT is not available prior to the initiation of exposure, the following Precision Fumigation method should be used. Introduce part of the calculated dosage of this product, monitoring to determine the actual HLT and then introduce additional parts of the calculated dosage and/or increase exposure time to achieve the target dosage.

USING DREXEL CHEMICAL'S MASTER FUME AG CALCULATOR PROGRAM

Drexel Chemical's Master Fume AG Calculator is a computer-based program that requires entry of key information to determine the dosage and amount of this product to be used. Before Drexel Chemical's Master Fume AG Calculator Program can be used, contact your Drexel Chemical Company representative on how to activate the computer program for calculating dosage. Drexel Chemical's Master Fume AG Calculator Program may be modified and updated from time to time; please contact your Drexel Chemical Company representative for more information.

Drexel Chemical's Master Fume AG Calculator Program has been developed to allow fumigators to calculate the correct dosage over a broad range of pest species, life stages, temperatures and exposure times. Drexel Chemical's Master Fume AG Calculator determines the necessary dosage (gram-hours or ounce hours), converts this to pounds of this product per 1000 cubic feet (or cubic meter) based on volume of fumigated space for all target pests referenced in this Manual. The program also can calculate the necessary adjustments to the exposure period or pounds of this product required to reach the target dosage based on fumigation monitoring data.

- The maximum target concentration in Drexel Chemical's Master Fume AG Calculator is 128 ounces per 1000 cubic foot.
- The maximum target dosage for NAP fumigation in Drexel Chemical's Master Fume AG Calculator is 1500 CT (ounces-hour per 1000 cu. ft.).

Drexel Chemical's Master Fume AG Calculator Temperature Range

This Manual states that the lower fumigation temperature limit is 40°F for insects. At present, however, Drexel Chemical's Master Fume AG Calculator calculates specific dosages for temperatures between 68°F (20°C) and 86°F (30°C). Drexel Chemical's Master Fume AG Calculator allows the user to input temperatures higher than 86°F, but will calculate the dosage based on 86°F. Since the efficacy of this product increases with temperature, Drexel Chemical's Master Fume AG Calculator dosages for temperatures higher than 86°F are conservative.

Drexel Chemical's Master Fume AG Calculator allows the user to input temperatures below 68°F, but will calculate the dosage based on 68°F and provide a warning message that insect control may be less than optimal due to the cooler temperature and decreased insect metabolism. Following the fumigation, monitoring the pest population is recommended to assess control.

Drexel Chemical's Master Fume AG Calculator Exposure Time Range

Drexel Chemical's Master Fume AG Calculator allows the user to input exposure times between 1 and 168 hours. Short exposures of a few hours are best suited for vacuum fumigations, while exposure periods of several days can be appropriate for reasonably sealed structures. Fumigations will commonly be 24 hours due to the need to limit shutdown time, but extending the exposure time can decrease the amount of fumigant necessary. Use Drexel Chemical's Master Fume AG Calculator to determine the most appropriate exposure time to meet both the customer's and fumigator's needs.

Drexel Chemical's Master Fume AG Calculator HLT Range

Drexel Chemical's Master Fume AG Calculator accepts HLTs from 1 to 1000 hours. The fumigator estimates this value prior to the fumigation preferably based on results of monitoring previous fumigations of this structure or of fumigations conducted under similar conditions. HLTs of greater than 50 hours are normally achieved only in chambers and other tightly sealed silos. Change HLTs in Drexel Chemical's Master Fume AG Calculator to see the impact of HLT on the amount of fumigant needed for a fumigation.

Drexel Chemical's Master Fume AG Calculator Area Volume Range

Drexel Chemical's Master Fume AG Calculator calculates fumigant dosages for structures ranging in volume from 35 to 10,000,000 cubic foot. Errors in measuring the volume can lead to under-dosing and not achieving the target dosage or using more fumigant than is needed to achieve the target dosage.

Drexel Chemical's Master Fume AG Calculator Ranges

Temperature:	68 to 86°F
HLT:	1 to 1000 hours
Exposure Time:	1 to 168 hours
Volume:	35 to 10,000,000 cu. ft.
Dosage:	"Low" or "High"
Fumigation Type:	"Space" or "Commodity"
Pressure Type:	"Normal Atmospheric" or "Vacuum"

Limits

Dosage (CT):	1500 oz-h/1000 cu. ft. (NAP)
	200 oz-h/1000 cu. ft. (vacuum)
Concentration:	128 oz/1000 cu. ft.

Drexel Chemical's Master Fume AG Calculator Example

INPUT	
Species:	Red Flour Beetle
Temperature:	86°F
HLT:	15 hours
Exposure Time:	24 hours
Volume:	800,000 cu. ft.
Dosage:	Low
Fumigation Type:	Space
Pressure Type:	Normal Atmospheric
OUTPUT	
Dosage (CT):	338 oz-h/1000 cu. ft.
Concentration:	23.3 oz/1000 cu. ft.
Quantity:	1164 lbs.

Steps of Operation

Preparation prior to fumigant release:

1. Determine pest species and life stages to be controlled.
2. Measure temperature at pest location with a thermometer. (Drexel Chemical's Master Fume AG Calculator operates in both English (°F) and metric (°C) units.)
3. Calculate volume of fumigation space.
4. Determine the targeted exposure period.
5. Estimate the HLT based on previous experience or estimation.
6. In Drexel Chemical's Master Fume AG Calculator, calculate dosage of this product in ounce per 1000 cubic foot (or gm/m³) and get pound (or kg) of this product needed for the job.

Sequential Fumigations

Sequential fumigations are an alternative dosage strategy that may be used to control insect infestations. Fumigate once at the low dosage, which is sufficient for control of the post-embryonic (larva, pupa, adult) stages, plus a significant portion of the eggs. If there are any surviving insect eggs, then after they have hatched, but prior to their maturation and deposition of new eggs, fumigate a second time, again at the low dosage. When sequential fumigations are done, do not exceed the maximum cumulative target dosage of 1500 CT (1500 oz-h/1000 cu. ft.) for the target commodity.

Using Drexel Chemical's Master Fume AG Calculator When Monitoring

During the exposure period, the concentration of this product can be measured by a Fumiscope or similar device. After the fumigant concentration has reached equilibrium, measurements taken over an interval of time will give the actual loss rate from which the HLT can be determined. Use of Drexel Chemical's Master Fume AG Calculator during monitored fumigations has shown that significant quantities of this product can be saved compared to unmonitored fumigations and better control achieved. Refer to Drexel Chemical's Master Fume AG Calculator help file for specific directions on how to use this program. Drexel Chemical's Master Fume AG Calculator is designed to determine actual HLT based on measurements of concentrations of this product during fumigation.

Monitoring to Determine Status and Updated Dosing Directions

1. Measure (with a gas measuring instrument such as a Fumiscope or similar device) concentration of this product ounce per 1000 cubic foot (gm/m³).
2. After one or more hours, take a second measurement of concentration of this product. Accuracy of HLT increases as time between monitoring intervals is increased.
3. Drexel Chemical's Master Fume AG Calculator will calculate the actual measured HLT.
4. If the HLT is shorter than estimated (more rapid loss of fumigant), then either more of this product needs to be added to finish on time or the exposure time may be extended if sufficient product is present. Drexel Chemical's Master Fume AG Calculator will provide the time and "add gas" directions.

Chapter 8
MONITORING THIS PRODUCT

Monitoring discussed within this chapter refers to measuring accumulated dosage and does not refer to required monitoring for worker and bystander exposure.

Monitoring fumigant concentration at key places in the fumigated environment is directed because it can provide important information to the fumigator regarding the placement of fumigant introduction sites that will assist in the efficiency and success of future fumigations.

Thus, in addition to helping maximize efficiency of a large fumigation, monitoring fumigant concentration can serve as a learning experience for the fumigator. For instance, if equilibrium is not achieved quickly, the fumigator can consider placing additional introduction sites or fans in the next fumigation.

Measurement of the accumulated concentration of this product while the fumigation is in progress becomes increasingly valuable as the structure size, complexity and the repercussions of poor pest control increase.

THE OBJECTIVES OF MONITORING FUMIGANT CONCENTRATION OF THIS PRODUCT ARE:

1. To allow Drexel Chemical's Master Fume AG Calculator to determine the optimal amount of this product needed to control the target pests under the actual fumigation conditions.
2. To allow Drexel Chemical's Master Fume AG Calculator to calculate CT (dosage) needed and achieved to ensure a successful fumigation.
3. To allow Drexel Chemical's Master Fume AG Calculator to calculate the actual HLT vs. just estimating the HLT.
4. To create a reasonable history of Drexel Chemical's Master Fume AG Calculator file records so that enhanced Precision Fumigation techniques can be built upon in subsequent fumigations.

SPECIFIC GUIDELINES FOR MONITORING A TYPICAL FUMIGATION

This product should be circulated so as to reach equilibrium rapidly, ideally within an hour of introduction. The time for HLT determination starts only after equilibrium of this product has been established.

1. Monitor this product in spaces most representative of the atmosphere in which insects will be located within the structure. In larger jobs, more sampling points may be necessary.
2. In structures with partitions or poor air circulation, samples should be taken from the separate sections, such as each floor of multiple story structures or each room in a partitioned building.
3. Measurements should be as dependable and accurate as possible, especially when low concentrations are involved.
4. The time required between measurements to determine the HLT will depend on the estimated HLT or past history of the structure.

Monitoring Hoses

Arrangements should be made to place sampling hoses in the structure prior to fumigant introduction. Semi-rigid vinyl hoses (3 to 6 mm or 1/8 inch to ½ inch ID) should be placed so as to sample representative concentrations with a Fumiscope or similar device. Monitoring hoses larger than 6 mm ID may take a longer time to pull the sample from the fumigated space to the monitoring device because of the larger volume of air needed to be moved.

Adequate tubing must be connected to the Fumiscope or similar device to direct all of the fumigant exhausted from the unit back into the enclosure or structure to prevent exposure to the fumigant.

Chapter 9
AERATION, CLEARING, AND RE-ENTRY

Two persons trained in the use of this product, at least one being an applicator certified by the State, must be present on site at all times during introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure, when testing for re-entry after aeration (if aerated in an enclosed space) and during re-entry.

It is essential that no occupant reenter the structure after fumigation until the fumigant has been aerated and the space has been fully tested and cleared for re-entry.

One of the features of this product for structural fumigation is its capacity to rapidly diffuse into the sites of the pests. Then, when the confinement seals are removed, aeration is also typically rapid. Fans are excellent aids in attaining quick aeration and are essential where cross ventilation is poor. The "opening" of a fumigation should be carried out with care to minimize crew and bystander exposure to this product.

PRECAUTION: Prior to aeration, fumigators need to take into account the proximity to bystanders, location of other structures, wind speed and direction.

AERATION — PRACTICES

Successful, timely, and safe aerations following fumigations must be planned. The following five practices should always be factored into the fumigation prior to fumigant introduction:

1. MINIMIZE CONCENTRATIONS AT END OF EXPOSURE PERIOD: The lower the concentration of fumigant at the end of the exposure period, the easier and more timely the aeration process will be. By using Precision Fumigation techniques, the fumigator can minimize the amount of fumigant introduced, maximize its efficiency and maximize the accumulated dosage (CT).
2. AERATE AT THE HIGHEST POINT PRACTICAL: By aerating at the highest point on the structure, the highest concentrations of fumigant are directed away from workers and bystanders and are allowed to quickly dilute to less than 1 ppm levels.
3. DIRECT AERATION GASES UPWARD: Aeration in an upward manner also directs fumigant away from workers and bystanders and by using additional fans, acts to further dilute the fumigant to safe levels. In many cases, a permanent exhaust system that forcefully directs the air column upward or emits it through a stack would aid in the efficiency and safety of the aeration process.
4. CONTROL THE EXHAUST RATE: The exhaust rate during the aeration process should be controlled to ensure large volumes of fumigant laden air have time to disperse, thus minimizing the risk of bystander exposure to concentrations greater than 1 ppm. Many structures have air handling systems that can easily achieve a total air exchange within the facility in a very short period of time.
5. MONITOR TO ENSURE WORKER AND BYSTANDER EXPOSURE LEVELS ARE NOT EXCEEDED: The perimeter of the fumigation area, especially downwind, must be monitored to ensure that concentrations of this product are kept within acceptable levels outside the fumigation area.

FACTORS INFLUENCING AERATION TIME

Five factors affect the time needed for aeration:

1. Rate of air exchange
2. Terminal fumigant concentration
3. Load factor - sorption/desorption and diffusion rate
4. Temperature
5. Interior layout of the structure

Rate of Air Exchange

The most important factor in aeration is the rate of air exchange in a structure. The air exchange rate will be influenced by openings in the external walls (windows, vents, door, etc.), wind velocity, size and arrangement of the structure. The most effective, practical method to increase the rate of aeration is to increase cross ventilation by opening doors and windows. Fans are also useful for this purpose as a means of establishing a directed airflow through the structure in which fresh air is introduced and air inside the structure is exhausted/ventilated as efficiently as possible.

Terminal Fumigant Concentration

The amount of fumigant left in a structure at the end of the fumigation period can vary greatly. All other factors being equal, the greater the terminal concentration, the longer the time required to complete aeration. Thus, good planning and monitoring to ensure only the necessary amount of this product is introduced can decrease the aeration period.

Load Factor — Sorption, Desorption and Diffusion

The "load factor" can be expressed as the amount of materials fumigated that will adsorb or absorb the fumigant. This product has relatively low sorptive characteristics, meaning it has a low potential to stick to or react with fumigated materials.

The sorption that does occur, however, can affect aeration in some situations. Desorbing fumigant can slow the time to reach safe re-entry levels of 1 ppm or less. Often, the greatest amount of this product to be desorbed is associated with the commodities.

The sorption/desorption phenomenon is a function of fumigant concentration and temperature — the higher the concentration throughout the fumigation, the greater the driving force for sorption and, therefore, the higher the quantity to be desorbed. As with sorption, desorption initially occurs very rapidly. Most of the fumigant will desorb during the initial part of the aeration period in response to the immediate lowered concentration inside the structure when seal is broken.

Temperature

Temperature has a direct effect on the clearance rate of a fumigant. The higher the temperature, the faster the rate of gas diffusion and desorption.

HANDLING UNAERATED COMMODITIES

Transfer of an unaerated commodity to a new storage site within a facility prior to complete aeration is permissible; however, transfer of unaerated containers or truck trailers over public roads is prohibited. Also, railcars cannot be moved off site until aerated.

While handling unaerated commodities, people must not be exposed to this product in excess of permitted exposure levels.

Transfer of incompletely aerated commodity via bulk handling equipment such as augers, drag conveyors and conveyor belts to a new site is permissible. However, the new storage must have proper placarding and adequate security if it contains greater than 1 ppm of this product. Workers who handle incompletely aerated commodity must be informed and appropriate safety measures must be taken (i.e., ventilation and respiratory protection) to prevent exposures from exceeding 1 ppm.

CLEARANCE AND RE-ENTRY

Re-entry Procedures

Before aeration, if re-entry into an area under fumigation is required for any reason, the following procedures must be strictly adhered to:

1. Before re-entry, measure the concentration of this product using a sufficiently sensitive device to adequately prepare for worker safety.
2. A minimum of two persons, one an applicator certified by the State and others being trained in the use of this product, must be present on site to reenter an area under fumigation for initiating aeration or trouble shooting and testing for concentration of the fumigant after aeration before releasing for reoccupation.
3. The person before entering must be wearing a self-contained breathing apparatus (SCBA) with full facemask and operating in pressure demand mode or its equivalent.
4. Other appropriate worker protective equipment must be worn by all workers at the site depending upon the site and the type of work being done.
5. Notify authorities, emergency personnel and other required personnel if re-entry is done under emergency conditions (see *"Chapter 9"*).

No one shall be in fumigated areas if the level of this product is more than 1 ppm unless wearing a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air supplied/SCBA respirator, such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Only a detection device of sufficient sensitivity, such as the INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR can be used to confirm a concentration of 1 ppm or less of this product.

Re-occupancy

Do not allow re-occupancy of any fumigated area until the aeration and clearing process is complete according to directions and levels of this product do not exceed 1 ppm as determined by the use of a detection device with sufficient sensitivity.

Following the aeration period, the fumigator must test the breathing spaces in the space or structure to make certain that the concentration of this product is 1 ppm or less before allowing re-occupation of the structure.

Follow all Federal, State, and local requirements for re-occupancy.

Chapter 10

SITE SPECIFIC CONSIDERATIONS

KEY CONSIDERATIONS FOR FUMIGATING STORAGE FACILITIES, TRANSPORT VEHICLES AND PROCESSING PLANTS

Follow all local, State and Federal regulations covering the fumigation of vehicles and processing plants.

loaded with food commodities

In these instances, when food commodities are not present, the warning agent, Chloropicrin, must be used

Stationary vs. In-Transit
Empty and ~~loaded~~ containers, trucks, railcars, surface ships and other transport vehicles or vessels may be fumigated in essentially the same way as other storage facilities. However, in-transit fumigation (including aeration) of any vehicle is prohibited on public roads or waterways. Nevertheless, stationary vehicles under fumigation may be moved within the confines of the fumigation site if necessary. Special care must be given while moving a stationary vehicle or vessel under fumigation so as to prevent exposure to bystanders or workers to levels of 1 ppm or more of this product. Vehicles and vessels successfully moved must have proper placarding and adequate security. Workers who handle incompletely aerated commodity must be informed and appropriate safety measures must be taken (i.e., ventilation and respiratory protection) to prevent exposures from exceeding 1 ppm. Moving vehicles while under fumigation on the fumigation site may result in loss of fumigant and, therefore, potentially less effective fumigation.

Selection of Fumigation Location
The size and configuration of the space and the adequacy of the circulation will dictate the placement and number of release sites for this product in a stationary vehicle or vessel. Careful planning must be made for fumigant introduction in railcars, shipping containers and trailers. Prevent the liquid form of this product from contacting any part of the vehicle or contents as it can damage paint or tarnish metals. Railcars, shipping containers and trailers must be placed in a location appropriate for conducting fumigation. The location should be away from other work areas in a secured place.

Sealing the Vehicle or Vessel
Stationary vehicles should be prepared and sealed following general fumigation using tarpaulin and tape.
Seal vessels using tarping, taping, and other methods specific for ships to confine this product to the fumigation area.

Securing the Vehicle or Vessel
After the fumigation site has been selected, railcars and trailers should be moved into position and secured by setting the brakes and blocking the wheels so that the vehicle will not move during the fumigation and aeration periods.
When fumigating vessels, place warning signs at all entrances and secure the fumigated space. Only certified applicator and trained workers involved in the fumigation, wearing appropriate personal protective equipment, may be at the site during fumigation and aeration.
Follow label instructions for securing entrances and posting warning signs on fumigated spaces and structures.

Fumigation of Surface Ships and Vessels in Port
Because of its physical properties, this product is ideally suited to control pest infestations in surface ships. Its high volatility allows the gas to penetrate into all areas of the vessel very quickly, control the pest and aerate rapidly. However, due to its lack of warning properties and high inhalation toxicity, this product must not be used to fumigate ships or other vessels while they are in use. People and desirable plants or pets must not remain on board during the fumigation.
Surface ships and barges may be fumigated with this product, but all aeration procedures must be completed before these vessels are allowed to sail. The vessel must not be moved during the fumigation and aeration periods. If re-entry is necessary before aeration is completed, strictly follow re-entry procedures (see *"Chapter 9"*). Only those persons involved in the fumigation may be at the fumigation site, including during the aeration process.

Important: Submarines and other below-the-surface ships must not be treated with this product.
Except for those persons involved in the fumigation, no people, desirable plants, or pets may be on board during fumigation. The professional fumigator and the ship's captain (or owner) shall follow all applicable regulations including those listed in the Coast Guard, DOT, Title 46, Shipping, section Parts 147A.1-147A.43. Since the codes listed are for fumigants in general, do not use procedures that are not permissible for this product as directed by label instructions and regulations.
If conditions of high relative humidity exist in the vessel during fumigation, great care should be exercised to use the proper sized fan and shooting hose to avoid overshooting the fan capacity, thereby causing a "fog out" in the vessel and possibly tarnishing and staining.

Vehicle (Containers, Railcars, Trailers, etc.) Aeration
Aerate the vehicle using active ventilation methods. To help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry, to the extent possible, control the ventilation process using the best practices procedures described in this Manual (*"Chapter 7"*), monitor concentrations of this product around the fumigated ship and/or prohibit entry into the area in question. At the end of the aeration time when the vehicle has been cleared for re-entry, the warning signs should be removed, the chocks removed from the wheels, and the vehicle put back into service. In-transit fumigation and aeration of railcars and other transportation vehicles are not permitted.

Surface Ship Aeration
Only those persons involved in the fumigation may be at the present fumigation site until the site is cleared for re-occupancy. In-transit aeration of ships is not permitted. Ships must be aerated and cleared for re-entry prior to being reoccupied. Aerate the ship using active ventilation methods to ventilate the bulk of the fumigant from the ship. To help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry, to the extent possible, control the ventilation process using the best practices procedures in this Manual (*"Chapter 7"*), monitor concentrations of this product around the fumigated ship and/or prohibit entry into the area in question.

PREPARATION FOR CHAMBER OR STACK FUMIGATION
Safety precautions and fumigation procedures vary by whether the chamber or stack is outside or within another structure. Before any chamber or stack is fumigated, it is appropriate to:

1. Determine the correct dosage (concentration x time = ounce-hours) to control the designated pest under the specific treatment conditions.
2. Confirm that the chamber or stack and any accessory equipment perform as intended.
3. Determine that this product will be confined within the chamber or stack by making a test run and monitoring for leaks with appropriate equipment. Pressure testing can also indicate the gas confinement capabilities of the chamber.
4. Have on hand proper respiratory protection equipment (SCBA) and personnel trained in how to properly use it.
5. Train personnel in the proper handling of the cylinders.
6. Educate personnel in first aid procedures to be followed should an accident occur and personnel be exposed to this product.
7. Notify other appropriate individuals that fumigations of this product will be taking place: Company employees other than those performing the fumigations such as security patrols, janitors, etc., police and fire department personnel and others required by local, State and Federal laws.

A. CHAMBERS AND STACKS WITHIN STRUCTURES
Permanent Chambers
Fumigations with this product may be conducted in permanent fumigation chambers enclosed within a larger structure. A permanent chamber is defined as a durable hard-walled structure engineered specifically for fumigation that effectively confines this product.
Monitor indoor areas around the permanent fumigation chamber for concentrations of this product during the fumigation, especially during introduction. No one is permitted to be in an area where the concentration of this product is more than 1 ppm without proper respiratory protection (SCBA). It is advisable to position the chamber away from work areas.

LOADING: Chambers and stacks should be loaded so that adequate air movement can occur around commodities to allow even distribution of the gas.

CIRCULATION FAN(S): A shooting fan/circulation fan is recommended when introducing this product. A small circulating fan inside the chamber will provide a gentle movement of air adequate to achieve even gas distribution throughout the chamber. However, if a large open space is not available or if use of an introduction fan is dangerous or impractical, an introduction/circulation fan is not required. If a fan is not used, ensure introduction will not result in a fog-out within the fumigation chamber. Slow introduction rates (1 to 4 pounds per minute) are recommended to prevent excessive cooling of air near the introduction site. Do not apply liquid fumigant directly onto food commodities. Another recommendation is to increase the number of

introduction sites. Without circulation fans, reaching equilibrium will be delayed or may not be achieved. Thus, insect control may not be achieved throughout the chamber and aeration will be slowed since ventilation will be lessened.

TESTING SEAL EFFECTIVENESS: Fittings for conducting pressure tests and for monitoring lines during fumigation should be incorporated in the chamber.

Vacuum Chambers
Vacuum fumigations often require a lower use rate than normal atmospheric fumigations. Do not exceed 200 ounces-hour per 1000 cubic foot. Vacuum fumigations can be conducted in vacuum chambers located within an enclosed structure without considering the entire structure as being under fumigation.

PLACARDING: Post warning signs at all entrances to the vacuum chamber.

INTRODUCTION: This product should be released from outside the building. If this product is released into the vacuum chamber from within the enclosing structure, then the occupied area must be monitored to ensure the concentration of this product does not exceed 1 ppm.

WORKER EXPOSURE MONITORING: The area surrounding the vacuum chamber should be frequently monitored for concentrations of this product to ensure that occupants and workers are not exposed above 1 ppm. Special care should be taken to monitor during introduction to ensure that the introduction lines and cylinder connections are not leaking. If any leak resulting in detectable levels greater than 1 ppm is encountered during application, immediately clear the area of all personnel not wearing an SCBA. Only persons who are wearing an SCBA are permitted in the area to address the leak. Only after the level of this product has dropped to 1 ppm or less are unprotected personnel permitted to enter the area.

AERATION: Aerate the vacuum chamber following instructions above for vacuum chamber fumigations outside structures.
If re-entry is necessary before aeration is completed, strictly follow re-entry procedures (see *"Chapter 9"*).

Tarped-Stacks
This product may be used to fumigate stacked commodities by covering the commodity with highly fumigant-resistant tarpaulins and then sealing them to the subsurface to create a temporary fumigation chamber (tarped-stack).
All personnel not trained or not involved in the fumigation must be vacated from the immediate area in which the tarped-stack fumigation is occurring until the fumigation is completed and the immediate area has been cleared for re-entry.
The indoor areas around the tarped-stack must be monitored for concentrations of this product when fumigation workers, without proper respiratory protection (SCBA) are present within the structure. Perform air monitoring by utilizing a detection device with sufficient sensitivity such as an INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR to ensure that workers are not exposed to concentrations of this product exceeding 1 ppm. No one is permitted to be in an area where the concentration of this product is above 1 ppm without proper respiratory protection (SCBA).

PLACARDING: Post warning signs to all sides of the structure that encloses the stack. For a tarped-stack, post all sides of the stack as well as all entrances and sides of the building.

OCCUPANCY: All personnel not trained or involved in execution of the fumigation are not permitted within the immediate area of the tarped-stack during the fumigation.

SECURING THE ENCLOSING STRUCTURE: When the fumigation workers are not present at the fumigation site, the enclosing structure must be secured from entry by anyone other than the certified fumigator or persons under his/her direct supervision.

WORKER EXPOSURE MONITORING: Workers and bystanders should not be exposed above 1 ppm of this product. When fumigation workers are present within the enclosing structure during the fumigation, frequently monitor with a detection device of sufficient sensitivity to measure at the 1 ppm level. Immediately vacate the area or use proper respiratory protection (SCBA) if the concentration of this product exceeds 1 ppm. Utilize ventilation procedures to reduce this product below 1 ppm prior to allowing re-entry without an SCBA.

INTRODUCTION: This product should be released from outside the building. If this product is released into the tarped-stack from within the enclosing structure, then the occupied area must be monitored to ensure the concentration of this product does not exceed 1 ppm.
If any leak resulting in detectable levels above 1 ppm is encountered during application, immediately clear the area of all personnel not wearing an SCBA. Only persons who are wearing an SCBA are permitted in the area to address the leak. Only after the level of this product has dropped below 1 ppm are unprotected personnel permitted to enter the area.

AERATION: Aeration should be designed to exhaust fumigant from the enclosing structure to ensure that workers and bystanders are not exposed to levels above 1 ppm.

B. CHAMBERS AND STACKS OUTSIDE OF STRUCTURES

Atmospheric Pressure Chambers
DESIGN AND CONSTRUCTION: A suitable atmospheric fumigation chamber consists of a sufficiently gas-tight room with an appropriate door. An application system, exhaust blower and a small fan for even gas distribution are recommended.

PLACARDING: The applicator must post all entrances and all sides of the chamber (if accessible) to be fumigated with warning signs.

INTRODUCING FUMIGANT: Release this product from the cylinder placed outside the chamber through an introduction system (introduction lines, connectors, etc.) with a minimum 500 psi burst pressure rating. A small fan should be used to distribute the gas uniformly within the chamber. Monitoring gas concentrations within the chamber can confirm the distribution of gas within the chamber.

DOSAGE MONITORING: Monitoring gas concentrations within the chamber during the exposure period with a Fumiscope or similar device is recommended to confirm HLT, describe gas distribution throughout the chamber, and ensure the target dosage is achieved. Recommended monitoring site locations include one at high, medium, and low heights and in the front, middle and back of the chamber.

EXHAUST FAN(S): The size of the exhaust blower will depend on the size of the fumigation chamber and the aeration time requirements. Generally, a fan capable of changing the air in the chamber in 5 to 10 minutes is recommended. The chamber must exhaust this product outside the building and away from adjoining buildings or work areas. Consult your State agency for emission control requirements.

Vacuum Chambers
Vacuum chambers require special designs which take into account the vacuum pressure exerted on the materials of construction. For this reason, it is recommended that trained engineers be consulted before constructing a vacuum chamber. Follow all directions given by the manufacturer or design engineer.
Vacuum fumigations often require a lower use rate than normal atmospheric fumigations. Do not exceed 200 oz-h/1000 cubic foot.
Specially built steel chambers for vacuum fumigations provide the fastest and most effective fumigation. After the commodity is placed in the chamber, pumps evacuate air. This product is introduced and rapidly penetrates all space previously occupied by air. A lethal dosage of this product results when the proper concentration is maintained for the required fumigation period. With the sustained concentration (no leakage) and a vacuum of 25 to 27 inches Hg, the time of exposure and the dosage may be reduced for some insects and life stages.

PLACARDING: The applicator must post all entrances and all sides of the chamber (if accessible) to be fumigated with warning signs.

DRAWING A VACUUM: A vacuum of 25 to 27 inches of mercury is commonly drawn for vacuum fumigations. Check to ensure that the vacuum is maintained according to plan. Unplanned vacuum release indicates leakage. Note that some vacuum fumigations are planned to allow release of the vacuum during exposure with the objective of improving penetration of the commodity as air enters the chamber.

INTRODUCING FUMIGANT: Because of the special design of vacuum chambers, the manufacturer or design engineer's operation procedure be followed. Release this product from the cylinder placed outside the chamber through an introduction system (introduction lines, connectors, etc.) with a minimum 500 psi burst pressure rating. A small fan can be used to distribute the gas uniformly in the chamber if the vacuum is to be maintained throughout the exposure period.

DOSAGE MONITORING: The Fumiscope or similar device cannot be used to measure this product during a vacuum fumigation unless the vacuum is released. If the vacuum is maintained, and thus no gas is leaking from chamber, the achieved dosage (CT) can be calculated by using the simple Concentration x Time formula.

AERATION PROCEDURES: At the end of the exposure, release the vacuum, ensuring any exhaust does not expose workers or bystanders above the permissible exposure limit. Purge the chamber of air/fumigant 2 times by pulling a partial vacuum prior to checking the gas concentration for re-entry purposes. Aeration of this product is very rapid, but desorption can occur for a longer period of time.
Manage the aeration process (location, exhaust rate and direction) to ensure that workers and bystanders are not exposed to levels above 1 ppm.
Always check for the concentration of this product with a suitable detector before entering the chamber without proper respiratory protection (SCBA). Keep the exhaust fans running during the aeration period and also while unloading the chamber. Remove the warning signs when aeration has been completed and it has been determined that the area is safe to enter.

Tarped-Stacks
Fumigations may be conducted in temporary chambers created using tarpaulins or other gas impermeable sheeting as the "walls" to hold in the fumigant. These are sometimes called "stack fumigations." The following instructions pertain to fumigation of tarped-stacks located outside other structures.
The items should be placed on a sufficiently airtight foundation, such as another tarp or on concrete, and covered with a fumigation tarp to ensure a tight seal. The tarp over the items should be supported so as to create a gas expansion dome. The edge of the tarp on the foundation must be sealed either by weighting the edges with sand or water "snakes" or equivalent.

PRECAUTION: Tarp fumigations should be conducted out of doors or in a building that will not be occupied during fumigation and aeration periods.

PLACARDING: All entrances and all sides of the fumigated *environment and any connected area not monitored must have* warning signs.

DOSAGE MONITORING: Monitoring gas concentrations within the tarped-stack during the exposure period with a Fumiscope or similar device is recommended to confirm HLT, describe gas distribution throughout the stack, and ensure the target dosage is achieved. Monitoring site locations include one at high, medium, and low heights and in the front, middle and back of the stack.

AERATION: Best practices for aeration of tarped-stacks involves setting up a chimney system that will ventilate from the highest point of the stack in an upward direction at a rate that will not lead to workers or bystanders being exposed to levels above 1 ppm.

STORED BULK COMMODITY FUMIGATION (e.g., Silos, etc.)
In many commodity storage situations, the amount of open space for introducing this product is limited compared to the total volume of the structure. It may not be possible to use shooting fans and release *methods that are recommended for space fumigations.*
Because of limited free air volume and lower air movement, fumigators can best adjust by slowing the introduction rate by using smaller diameter shooting hoses and/or extending the hose length. If the fumigant is released directly into the headspace of a storage structure, care should be taken to avoid contact of liquid fumigant and the commodity. Sufficient air circulation should be provided to prevent moisture condensation in the introduction area.
It is strongly recommended that recirculation systems (portable or built-in) be used to rapidly and evenly distribute this product throughout the space being treated. Existing aeration blowers that are vented to the outside should not be used.

Procedures for Fumigating Bulk Commodities
1. *Follow instructions in this Manual regarding sealing, securing,* placarding, and aeration/clearing.
2. Seal and secure the storage structure.
3. Determine the target dosage and quantity of fumigant needed using Drexel Chemical's Master Fume AG Calculator.
4. Make adjustments to the dosage based on the fumigant monitoring results and Drexel Chemical's Master Fume AG Calculator recommendations for achieving target dosages.
5. Determine where the fumigant will be released.
6. Best practice is to introduce fumigant directly into the air stream of a recirculation system. This may either be inside the storage structure or directly into the ducting of the system. If the fumigant is released into the recirculation system, it should be down stream of the fan itself.
7. In almost all cases fumigant introduction rates should be slower than for space fumigations of similar volumes to provide time for the fumigant to penetrate the grain mass and not establish high fumigant concentrations in the introduction space.
8. In the event that a recirculation system is not available, the fumigant should be released into the headspace above the commodity. Care should be taken to prevent contact of liquid fumigant with the commodity.
9. Air circulation should be started prior to fumigant introduction *and continued during introduction to aid in the penetration of* this product into the commodity mass. High concentrations in the introduction space can result in excessive fumigant loss via leakage before the fumigant penetrates evenly into commodity mass.
10. After introducing the initial amount of fumigant to reach the targeted dosage, gas concentrations should be monitored periodically. Any adjustments in terms of amount of fumigant or exposure time should be made based on Drexel Chemical's *Master Fume AG Calculator status recommendations.*

Bulk Commodity Aeration
1. Prior to the initiation of fumigation procedures, equipment should be put in place for a safe aeration.
2. The fumigant laden air should be vented from the highest practical point of the storage structure slow enough to not exceed exposure limits.
3. If available, aeration blowers can be used to rapidly exhaust remaining fumigant so long as these do not vent in areas where workers or bystanders might be affected.
4. SCBA equipment must be worn if workers must enter the fumigated space to initiate aeration or levels exceed 1 ppm.
5. The storage facility should be finally aerated to 1 ppm or less.
6. *The area or site must be monitored to ensure that liberation* of fumigant from the treated commodity does not result in the development of unacceptable levels of this product. Do not allow re-entry into treated areas by any person before this time without proper respiratory protection.
7. Actively aerate commodity a minimum of 24 hours prior to offering to consumers.

Mills and Food Processing Facilities
For mills and food processing facilities, special consideration should be given to help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry. To the extent possible, control the ventilation process using the best practices procedures described in this Manual (*"Chapter 7"*), monitor concentrations of this product around the fumigated site, and/or prohibit entry into the area in question.
Precautions to help protect accidental bystander exposure to this product in excess of 1 ppm can be of particular importance because of the sometimes proximate location of residential structures and bystanders that can occasionally occur around mills and food processing facilities.

Special care should be taken to minimize quantities of processed foods prior to space fumigations. Processed food not practical to remove prior to fumigation may undergo incidental fumigation with this product. However, no direct fumigation of processed foods is permitted unless the processed food is specifically listed in the section *"COMMODITIES THAT CAN BE FUMIGATED"*.

Chapter 11
TROUBLESHOOTING

This product in the gaseous phase is a very slightly reactive chemical compared to other fumigants such as methyl bromide, hydrocyanic acid (HCN) or acrylonitrile.

CYLINDERS

Valve Problems

Cylinders of this product are fitted with special valves that are appropriate for use with this product. These valves can be damaged if the wrong size wrench is used. A 25 to 30 cm adjustable wrench should be used to open or close these valves.

STUCK VALVE: Never use excessive force to open a stuck valve. If a valve will not open using normal force, return the cylinder to your distributor.

LEAKING VALVE: Make sure the valve is completely shut off; however, do not use excessive force. Reopening and then closing can usually properly seal the valve and stop the leak. If the valve continues to leak, often tightening the packing nut on the top of the valve to 25 to 30 foot pounds of torque with an adjustable wrench will stop the leak. If the valve still leaks, move the cylinder to an isolated, secured area and allow the cylinder to continue to vent to the air. Be sure to keep people away from the area. When all the gas has escaped, replace the bonnet and identify faulty cylinders by painting the cylinder shoulders red and tagging the cylinder describing the problem in detail. Return the cylinder to your distributor so it may be sent to Drexel Chemical Company for repairs.

Dip Tubes

A broken dip tube rarely is the reason the liquid form of this product *cannot be moved out of the cylinder when the valve is wide open.* Sharp blows to the cylinder, rough handling, or dropping the cylinder can break off the dip tube from the bottom of the valve. If the dip tube is broken, this product will be released from the cylinder, but at a much slower rate. Either introduce this product slowly or replace the bonnet and call your distributor for instructions on cylinder return procedures.

Leaking Cylinders

Leaking may occur if cylinders receive rough handling. Abrasion on the side of the cylinder may produce pinholes in the metal.

Always identify faulty cylinders, valves and dip tube by painting the cylinder shoulders red. Attach a red tag describing the problem in detail. Return cylinders to your distributor.

CORROSION OF METALS

This product is not known to cause any corrosion when it is in the vapor (gaseous) phase under normal temperatures. Every batch of this product is tested for metal corrosion before being released for sale.

Metal surfaces of copper, silver, steel, stainless steel, brass, aluminum, etc., may become corroded or rusted if this product is released incorrectly. If this product is introduced too rapidly, the temperature of the air will drop below the dew point resulting in the formation of condensation.

Condensation generally occurs in or near the area of introduction of this product. Minute quantities of acids (by-products of the manufacturing process) are soluble in water condensation and can etch metal surfaces. The fumigant introduction rate should not exceed the fan capacity (1 kg of this product per 60 cubic meters per minute of fan capacity) to thoroughly mix the colder air when this product is introduced into the warmer air in the structure.

Metal tarnishing/corrosion can also occur if heat sources are left on during fumigation. This product is decomposed by heat from flames such as pilot lights in furnaces, stoves, dryers or refrigerators and such glowing heat sources as electric heaters. Heat sources above 400°C (752°F) decompose this product to corrosive materials (mainly HF). Therefore, it is imperative that pilot lights and other heat sources which pose this risk be eliminated or turned off during fumigations.

Damage to metals can also occur from the inclusion in the fumigated space of chlorine generators. These pieces of equipment should either be turned off or excluded from the fumigation.

Damage to metals can usually be corrected by cleaning the metal items with a good metal cleanser or polish. The corrosion or rust is usually only on the surface.

GLASS ETCHING

This product in the gaseous phase is not known to cause etching of glass. HF, the decomposition product of this product, may react with ceramic material such as window glass, china, glazed tile, etc., creating a condition referred to as "etching" or "frosting." Therefore, it is imperative that all heat sources which produce temperatures at or near 752°F and pilot lights be turned off during fumigation. Fog-outs can also cause etching of glass and ceramic tile. Each batch of this product is also tested for glass etching before it leaves the production plant.

RUN STAINS

This product in the gaseous phase is not known to cause staining of fabrics, walls, paintings, etc. Staining, however, can be caused by the presence of liquid water (dew or fog) caused by exceeding the capacity of the fan to mix cold air when this product is introduced with the air in the structure. A condition can occur when condensation forms on the interior and/or exterior surfaces of the structures and a "sticky" light to dark brown liquid (from grease, dirt, and smoke) runs down wall surfaces. This may have the appearance in color and consistency of cola. Spots also may form on the bottom side of horizontal surfaces. Most stains can be removed by washing.

Condensation forming and running down vertical surfaces can occur even without the introduction of this product. A structure that is air conditioned to a much lower temperature than the air temperature and then opened to introduce hot humid outside air will form condensation on cold surfaces such as heavy brass. This condition can be avoided by either warming the structure slowly prior to sealing or waiting until all seals are in place before opening windows and doors to avoid introducing outside air.

STAINING

This product in the vapor phase does not cause staining or discoloration of fabric or other materials normally found in a structure under fumigation. Fabric staining or color changes can occur when a high heat source (i.e., pilot light) converts this product to SO_2 and other corrosive materials. Many fabric dyes are acid or base indicators and will change color in the presence of acids or bases. For staining caused by frosting of the fumigant introduction hose, see *"FUMIGANT INTRODUCTION HOSE FREEZING"* section below.

FUMIGANT INTRODUCTION HOSE FREEZING

When this product is introduced according to label directions, the introduction hose will not freeze and the liquid will change to a gas at the end of the hose. The use of the proper size fumigant introduction hose is important. Initially, slowly open the valve a quarter to one-half turn to begin the liquid flow of this product. Then, open valve to one full turn or full flow through the hose. If the liquid changes to a gas within the hose, frost will collect along the length of the hose and water damage can occur to floors, furniture, etc., where the hose rests. Also, this product may change from a liquid to a gas in a hose with kinks. This can cause freeze damage from either frost accumulating on the outside of the hose or the hose becoming brittle, breaking and splashing the liquid form of this product on surfaces. Replace kinked or damaged hoses. Use mesh-reinforced, flexible hosing of proper specifications to avoid this problem.

During release of this product from the cylinder, some chilling of the valves, cylinder, and fumigant introduction hoses can occur under normal circumstances. Valves can freeze if this product is allowed to change from a liquid to a gas within the valve area. Valve freezing is usually caused by using an improper fumigant introduction hose connector. Carpeting and floors can be damaged if cylinders, fans and hoses are allowed to rest upon them. When this could pose a problem, plastic or other protective material should be placed under the fumigant introduction hoses and fans.

PLANT AND TURF DAMAGE

This product is quite toxic to most plants and they should be protected from the fumigant; however, plants should not be used as an indicator of the success or failure of a fumigation. Plants should be removed from inside the fumigation site. Structural foundation plantings of ornamental shrubs and trees can be protected to a certain degree from the gas by wetting the soil, thereby sealing off the gas from the plant root system. Water is an excellent barrier and this product will not readily move through moist soil.

Certain plants have been found to be more sensitive to this product than others. These include junipers, some dwarf palms, springeri fern,

672SPAM-0116(asterisk).indd 20 64 14/2016 3:25:37 PM

orchids and Lily grasses (*Liriope* spp. and *Ophiopogon* spp.) which are commonly used as border plantings. Special attention should be given to these plants during fumigation and the initiation of aeration to reduce the exposure to this product. Plants that have been moved should be placed in a similar environment to that where they were being grown — same temperature, light, humidity, etc.

ODOR PROBLEMS

Odors can also be caused by the decomposition of dead animals. Occasionally, animals such as rats or mice are trapped inside the fumigation site and killed during the fumigation. Many times they die in inaccessible areas within the structure and cannot be easily removed.

POOR CONTROL OF PESTS

Poor control of the target pest is caused by not generating the target CT (Concentration x Time) for the temperature to kill the pest. Accumulation of target CT does not begin until the fumigant has reached equilibrium in the site. Many factors may contribute to insufficient CT accumulation.

1. Confinement of fumigant, primarily ground seal or tarps is worse than estimated.
2. Inaccurate monitoring device.
3. Too short an exposure period (insufficient CT).
4. Using the wrong dosage (insufficient ounces per hour).
5. Not using adequate fans to distribute the gas properly within the site.
6. Not accurately determining the temperature of the pest site.
7. Error in calculating volume to be fumigated.
8. High winds which can cause excessive loss of gas.
9. Target pest excluded from exposure to fumigant by some gas inhibiting barrier.

Latent Mortality

Sometimes live insects may be found immediately after fumigation. Under optimum or favorable conditions, the target pest will be dead or obviously dying by the end of the fumigation period. Researchers have evaluated eventual mortality of several stages of key postharvest pests following exposure to this product. Latent mortality in insects occurs for exposures very near mortality threshold levels. Within a species, the latent mortality period for the egg stage is generally longer and more variable than other life stages.

Non-target Organisms

Signs of activity of live non-target organisms (organisms which are not specific targets of the fumigation) found within the fumigated space does not mean the fumigation failed to control the target pests. Consider the following:

- Lethal dosage requirements vary for different organisms and may be higher for non-target organisms than for the target pest.
- The organism may have received a toxic dosage and will eventually die (latent mortality).
- The non-target organism may have entered the structure during the aeration period.

Therefore, judgment of the success or failure of the fumigation should not be made on the presence of live organisms immediately following the fumigation.

PLASTICS

Liquid form of this product can be a solvent of some plastic materials. This product should not be introduced directly onto plastic surfaces, such as windows, as liquid droplets may discolor or etch the material.

MISCELLANEOUS

WHITE POWDER LEFT AS RESIDUE: A white powder substance found on windows, tile, glass, lamps, etc., indicates that a source of heat (pilot lights, etc.) was left on during the fumigation.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: Store in dry, cool, well ventilated area under lock and key. Post as a pesticide storage area. If the storage area is in an occupied building, the storage area must have either 1) a forced air ventilation system that meets required local ordinances for the storage of hazardous materials and operates continuously; or 2) be equipped with a permanently mounted and properly maintained and functioning sulfuryl fluoride monitoring device designed to alert occupants of the building if sulfuryl fluoride in the air of the storage area is greater than 1 ppm. Store cylinders upright secured to a rack or wall to prevent tipping.

Pesticide Handling: Do not subject cylinders to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use ropes, 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 transport any cylinders in closed vehicles where they occupy the same common airspace as personnel. Transport securely only in an upright position. 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 supplier. Only the registrant is authorized to refill cylinders. Do not use cylinder for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.

Leak Procedures: Evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator, such as manufactured by Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant is determined to be 1 ppm or less in the breathing zone, as determined by a detection device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR.

CYLINDER AND PRODUCT DISPOSAL:

Promptly return all empty cylinders to your distributor of this product. Follow proper cylinder handling directions above. 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, consult your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

WARRANTY DISCLAIMER

Manufacturer warrants that this product conforms to the chemical description on the label and based upon tests believed reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. To the extent consistent with applicable law, Manufacturer makes no other expressed or implied warranty of merchantability or fitness for a particular purpose or any other express or implied warranty.

Use Risk

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable weather, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Manufacturer or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to one of the following, at Manufacturer's discretion:

1. Refund of purchase price paid by Buyer or use for product bought, or
2. Replacement of amount of product used.

To the extent consistent with applicable law, in no case shall Manufacturer or the Seller be liable for consequential, special or indirect damages or losses from the use, handling or storage of this product.

The terms of the *"Warranty Disclaimer"* above and this *"Limitation of Remedies"* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of the Manufacturer or the Seller is authorized to vary or exceed the terms of the *"Warranty Disclaimer"* or this *"Limitation of Remedies"* in any manner.

APPENDIX A
ENGLISH-METRIC CONVERSION TABLES

Temperature	Volume	Wind Speed
(°C x 1.8) + 32 = °F	1 ft^3 = 0.0283 m^3	1.609 kph = 1 mph
(°F - 32) ÷ 1.8 = °C	1 m^3 = 35.31 ft^3	0.621 = 1 kph

°F	°C
104	40
102	39
100	38
98	37
96	36
94	35
92	34
90	33
88	32
86	31
84	30
82	29
80	28
78	27
76	26
74	25
72	24
70	23
68	22
66	21
64	20
62	19
60	18
58	17
56	16
54	15
52	14
50	13
48	12
46	11
44	10
42	9
40	8
38	7
36	6
34	5
32	4
	3
	2
	1
	0

M^3	FT^3
1	35.3
10	353
25	706
50	1,765
75	2,647
100	3530
200	7,060
300	10,590
400	14,120
500	17,650
600	21,180
700	24,710
800	28,240
900	31,770
1,000	35,300
1,500	52,950
2,000	70,600
3,000	106,900
4,000	141,200
5,000	176,500
6,000	211,800
7,000	247,100
8,000	282,400
9,000	317,700
10,000	353,000
20,000	706,000
30,000	1,057,000
40,000	1,412,000
50,000	1,765,000
100,000	3,530,000

KMPH	MPH
50	31
48	30
46	29
44	28
42	27
40	26
38	25
36	24
34	23
32	22
30	21
28	20
26	19
24	18
22	17
20	16
18	15
16	14
14	13
12	12
10	11
8	10
6	9
4	8
2	7
0	6
	5
	4
	3
	2
	1
	0

DOSAGE: oz-hr/1000 ft^3 ~~ gm-hr/m^3
PRESSURE: 1 PSI ~~ 6.9Kpa~~ 0.689 bar
1 bar ~~ 100 Kpa ~~ 14.50 PSI

APPENDIX B
GLOSSARY TERMS

ACTIVE AERATION: Aeration that is not passive. Any increased aeration as a result of human intervention or process.
ACTIVE INGREDIENT: Components of a pesticide that control the target pest and is responsible for the pesticidal effect.
ACUTE INHALATION TOXICITY: Immediate poisoning from a single elevated inhalation exposure to a substance; causes injury or death from a single exposure.
ACUTE ORAL TOXICITY: Immediate poisoning from a single oral elevated ingestion exposure to a substance; causes injury or death from a single exposure.
ACUTE TOXICITY: A rapid response, often within minutes or hours to a single exposure or dose of a chemical.
ADSORBTION/ABSORBTION = SORPTION: The action of a material in holding a gas or substance. The opposite of desorption.
AERATE: Exchange fumigant-laden air with fresh air until the concentration of fumigant has reached the permitted entry level.
AERATION: The final step of a fumigation that involves proper ventilation and clearance of this product from the structure.
AMERICAN CONFERENCE FOR GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH): The professional organization of governmental industrial hygienists which establishes annual recommended guideline threshold limit values (TLVs) for lifetime noise, radiation and chemical occupational exposures for eight hours per day, 40 hours per week.
ANTIDOTE: A remedy that counteracts the effects of a poison.
ARTHROPOD: Any segmented invertebrate of the phylum Arthropoda having jointed legs.
ATMOSPHERE: A mass or body of gases that are present in a region or place.
AXIAL FLOW FAN: A fan in which the air flows through the impeller and casing is primarily axial. The impeller is contained within a cylinder housing (AMCA Publication 211).
BOILING POINT (BP): The temperature at which a liquid converts from liquid phase into a gas (the temperature at which the vapor pressure in a liquid equals the external pressure).
BONNET: The cap that covers the valve and safety cap on the fumigant cylinder to protect the valving system from damage and prevent accidental release of the fumigant.
CARCINOGENICITY: Possessing the power, ability or tendency to produce or incite cancer in a living tissue.
CENTRAL NERVOUS SYSTEM (CNS) DEPRESSION: An alteration of level of consciousness that proceeds other changes in vital and neurologic signs.
CERTIFIED APPLICATOR: Member of a fumigation crew who has successfully completed the proper training and is approved by the State and the manufacturer to release the fumigant.
CIRCULATION: Mechanically stir or circulate the fumigation atmosphere.
CLAMPS: Devices used to attach tarps together and hold them in place during a fumigation.
CLEARING: The procedure following the aeration period when the fumigator tests the breathing space in the structure with sensitive equipment to make certain the concentration of this product is 1 ppm or less before allowing re-occupancy.
CONCENTRATION: Amount of fumigant per unit area within the fumigated space during exposure period. Usually measured in ounces per 1000 cubic feet or grams per cubic meter.
CONDENSATION: The change of a vapor or gas into a liquid.
CUBIC FEET PER MINUTE (CFM): Often used as a rating system for the amount of air a fan can move.
CYLINDER SLING: A type of holster or suspension ring used to suspend a fumigant cylinder.
DESORPTION: The liberation or removal of a fumigant substance from other substances.
DEW POINT: The temperature at which water will condense from air (the temperature at which dew forms).
DEW POINT DEPRESSION: The number of degrees the temperature must be lowered for dew (water condensation form air) to form.
DIP TUBE: A PVC tube that extends from the bottom of the cylinder to the valve on the top that releases liquid Master Fume.
DISPERSE: Distribute the fumigant throughout the fumigation site.
DIFFUSION: The spontaneous process whereby a fumigant moves from an area of high concentration toward an area of lower concentration.

672SPAM-0116(asterisk).indd 23 67 /14/2018 3:25:38 PM

DOSAGE: The number of ounce-hours (gram-hours) accumulated during the exposure period. Target dosage is the ounce-hours targeted during the planning phase.
DOSE: The amount of fumigant introduced into the fumigation space — oz/1000 cubic feet (gm/cubic meter). Often confused with dosage.
DRIERITE: The hygroscopic material used in the Fumiscope unit to remove moisture from the air. Drierite in good condition is normally blue in color.
EQUILIBRIUM: The state when all the sulfuryl fluoride molecules are at equal concentrations from each other in a confined area.
EXPOSURE TIME: The amount of time a fumigant is confined in a structure to kill the target pest.
°F/°C: Working temperature. Usually the temperature of the closest spots insect pests are located. Usually expressed in degrees Fahrenheit or Celsius. In the case of chamber fumigations, the internal temperature of the commodities to be fumigated (i.e., site of pest).
FACE SHIELD: One of two pieces of safety equipment permitted to protect the eyes required when releasing the fumigant (see goggles).
FLASH POINT: The temperature at which vapor explodes.
FLUOROSIS: A mottling or blackening of the teeth caused by an overexposure to fluorine.
FOG: Very fine droplets of liquid moisture in air.
FOG-OUT: The condensation of moisture inside a fumigated structure which is caused by a large drop in air temperature. Methods to prevent a fog-out include: (1) using the proper inside diameter and length of the introduction hose, and (2) using appropriate fans with sufficient velocity to effectively mix the warmer air inside the structure with the colder Master Fume gas.
FUMIGANT INTRODUCTION: Release of the fumigant from its containers into the fumigation space.
FUMISCOPE: A thermal conductivity analyzer used to monitor the concentration of this product during a fumigation. Measures in ounces per 1000 cubic feet or gm per cubic meter. The Fumiscope is not for monitoring for human exposure.
GAS: Matter in vapor state. That fluid form of matter which is compressible with limits and, which owing to the relatively free movement of its molecules, diffuses readily in other like forms of matter and is capable of indefinite expansion in all directions.
GOGGLES: One of two pieces of approved safety equipment to protect the eyes required when releasing the fumigant (see face shield).
GROUND SEAL: The sealing of tarps to the ground to prevent fumigant loss during a fumigation.
HALF-LOSS TIME (HLT): The relative measure of how well a structure holds fumigant. Actual time required to lose one-half of the fumigant concentration, measured in hours. The fumigant loss rate depends on the building construction, sealing practices, wind, and fumigant distribution influences. The *actual/HLT* can be established only by measuring the fumigant concentration during the exposure period with a gas measuring measuring instrument and using Drexel Chemical's MasteRate program.
HANGING BONNET: A type of cap or ring used to suspend the fumigant cylinder.
HEAT OF VAPORIZATION: The amount of heat necessary to change a liquid state to a gaseous state. This is usually measured in British Thermal Units (BTUs).
HEPATIC: Pertaining to the liver.
HOURS EXPOSURE (HE): The number of hours the site is exposed to the fumigant.
HYDROFLUORIC ACID: A highly reactive chemical which can corrode or damage many household effects. This product can decompose into hydrofluoric acid and sulfur dioxide if exposed to high heat conditions present in gas, flames or glowing electric elements.
HYDROGEN FLUORIDE: A colorless liquid made by the action of sulfuric acid on calcium fluoride. The compound is an extremely strong fluorinating agent, which attacks glass.
HYDROLYSIS: A chemical reaction that causes chemical breakdown in the presence of water.
INSIDE DIAMETER (ID): The measurement of the interior width of the fumigant introduction and monitoring hoses.
INERT INGREDIENT: Other non-pesticidal or formulating ingredients in a pesticide formulation.
INTERSCAN GAS ANALYZER: A portable analyzer designed to measure low concentrations of this product for worker and bystander exposure and final clearing. The Interscan provides immediate and continuous readings of gas concentrations from 1 to 50 ppm.
LATENT HEAT OF VAPORIZATION: The number of calories per mole of substance needed to change a liquid at its boiling point to a gas. For this product, this is 4600 cal/mole. When liquid fumigants under pressure are released, available heat is "pulled" from the immediate surroundings as the liquid changes to a gas.
LATENT MORTALITY: The delayed kill of an organism receiving a toxic dose.
LEAK DETECTOR: Device used to detect leaks in the structure or seal during a fumigation. An example would be a TIF 5750 or XP-1 detector models.
LOAD FACTOR: The amount of material within the fumigated space. Sometimes fumigant is sorbed by materials and made unavailable for insect control.
MAXIMUM CONCENTRATION: The greatest concentration of chemical that can or is permitted to exist as a gas in a given space. The higher the maximum concentration of the fumigant, the more that can be applied in a given space.
MIRAN SapphIRe (mobile infrared analyzer): A type of clearance device used to clear a structure for re-occupancy after a fumigation. Uses infrared technology to measure down to ppm.
MOLECULAR WEIGHT: The sum of the weights of the constituent atoms of a molecule. For this product it is 102.07.
MONITORED FUMIGATION: Repeated observations of a fumigation during the exposure period to determine the concentration of gas at a specific location, detect gas loss over time, ensure the appropriate amount of fumigant and the exposure time, and/or to reduce potential problems or expenses.
MUTAGENICITY: Possessing the power, ability or tendency to produce genetic changes or mutations.
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH): The U.S. government agency responsible for research regarding occupational safety and health issues in the workplace. They also approve appropriate safety equipment, such as hard hats, respirators, eye protection, etc.
NON-FLAMMABLE: Not flammable or readily ignitable.
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA): Federal agency that regulates worker health and safety procedures and practices.
ODOR POTENTIAL: The possibility of malodor being generated due to the fumigant having been in contact with certain materials.
OUNCE-HOURS (OH) OR GRAM-HOURS: Dosage = concentration X hours exposure.
OVICIDAL: Possessing the ability to kill the egg stage of an insect.
PARTIAL PRESSURE (DALTON'S LAW): In any mixture of gases the total pressure is equal to the sum of the partial pressures each gas would exert were it present alone in the volume occupied by the mixture. The total pressure P is equal to the sum of the partial pressures of the individual gases.
PARTS PER MILLION (PPM): A measure of the concentration of a substance, e.g., 10 ppm = 10 drops of water in a million drops.
PERMISSIBLE EXPOSURE LIMIT (PEL): The eight-hour time weighted average acceptable inhalation exposure limit for any regulated substance in the workplace. This exposure limit is enforced by OSHA and is the law.
PENETRATION: The passage of fumigant into or through an object, such as flour, commodities, wood, tarps, soil, etc.
POST-EMBRYONIC: The larval, pupal and adult stages of insects.
POUNDS PER SQUARE INCH ABSOLUTE (PSIA): A measure of atmospheric pressure. PSIG is pounds per square inch as measured by a gauge.
PULMONARY: Pertaining to or affecting the lungs.
PULMONARY EDEMA: The presence of abnormally large amounts of fluids in the intercellular spaces of the lungs.
REACTIVITY: The ability of the fumigant to react with (combine with or change) other compounds in which it comes into contact.
RELATIVE HUMIDITY: The ratio of the amount of water present in the air relative to the amount it could hold at 100% saturation; usually expressed in percent.
RELEASE OF FUMIGANT: The actual introduction of fumigant into the fumigation space or site.
RENAL: Relating to the kidneys.
REVOLUTIONS PER MINUTE (RPM): A measure of fan speed.
RODENTS: Any animal from the order Rodentia, such as mice and rats.
SAFETY CAP: A covering that protects the cylinder valve from damage or accidental release of the fumigant.

672SPAM-0116(asterisk).indd 24 68 04/2016 3:25:38 PM

SAND SNAKES: Sand- or water-filled tubes made of material used to seal tarps to the ground to minimize release of the fumigant.
SCBA - POSITIVE PRESSURE: Self-contained breathing apparatus that maintains a slightly positive pressure of air inside the face piece at all times.
SECONDARY LOCKS: Securing mechanisms used during fumigation to prevent inadvertent or illegal entry to a structure under fumigation.
SHORT-TERM EXPOSURE LIMIT (STEL): The time-weighted average exposure limit for a particular compound which should not be exceeded at any time during a work day, even if the eight hour time-weighted average is within the threshold limit value (TLV). Exposures to this level of a compound should not be longer than 15 minutes and should not occur more than four times per day. There should be 60 minutes between exposures in this range.
SOLUBILITY: The capability of being dissolved in a solvent such as water.
SORPTION: The uptake of gaseous fumigant resulting from the attraction and retention by liquid and solid materials present. If great enough, there is a gradual reduction of fumigant available to kill the target pest. Sorption may also negatively affect the penetrability of the gas.
SPECIFIC GRAVITY: The ratio of the weight of a body to that of an equal volume of some standard substance — water in the case of solids and liquids, air in the case of gases. The ratio of the mass of a liquid to the mass of an equal volume of water at 4°C, water = 1.
SUBCHRONIC ORAL TOXICITY: The oral toxicity of a material determined for an exposure period between an acute (24 hours) and chronic (weeks to months) in length.
SULFURYL FLUORIDE: The active ingredient of this product, which is non-flammable, non-corrosive and does not cause undesirable odors, is a gas at temperatures above -55°C (-67°F).
TARPAULIN: Semi-permeable membranes used during fumigation to confine the fumigant in a specific area during the exposure period.
TEMPERATURE (°C OR °F): The pesticidal activity of a fumigant varies with temperature. The dosage requirements for this product are based on the mean temperature of the coldest potential pest infested site in the structure. This temperature is nearly always represented by that of the sub-area soil or slab. A probe or surface thermometer can be used to measure temperature. It is very important to accumulate the proper ounce-hours for the temperature that exists.
TERATOGENIC: The potential for an effect to cause congenital abnormality.
TERATOLOGY: The division of embryology and pathology that deals with abnormal development and congenital malformations.
THRESHOLD LIMIT VALUE (TLV): The time-weighted average concentration for a normal eight-hour day and 40-hour work week to which nearly all workers may be repeatedly exposed day-to-day without adverse effects.
VACUUM CHAMBER: Specially built steel chamber used for fumigation. After the material to be fumigated is placed in the chamber, air is evacuated by pumps. The fumigant is then admitted and rapidly fills all the air space previously occupied by air.
VALVE STEM: Opening at the top of the cylinder through which the fumigant is released.
VAPOR CORROSIVENESS: The tendency of the gas to corrode materials. When properly introduced, this product is not corrosive.
VAPOR DENSITY: The weight ratio of a gas to air.
VAPOR PRESSURE: The pressure exerted by a gas that is in equilibrium with its solid or liquid state. The higher the vapor pressure, the more easily and rapidly a fumigant will diffuse and penetrate to reach a gas-air equilibrium and the more rapidly it will aerate and desorb.
WATER SOLUBILITY: The ability of the fumigant to dissolve in water. The less soluble in water, the less that compound is attracted to and adsorbed on the surface of materials. It is also important when considering penetration of the fumigant into soil moisture.
WATER VAPOR: Water in the gaseous state.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

January 13, 2016

Luz G. Chan
Registration Manager
Drexel Chemical Company
1700 Channel Ave.,
P.O. Box 13327
Memphis, TN 38113-0327

Subject: Notification per PRN 98-10 – small changes to the container label and applicator's manual
Product Name: Drexel Master Fume AG
EPA Registration Number: 19713-672
Application Date: 12/16/2015
Decision Number: 512461

Dear Ms. Chan:

The Agency is in receipt of your Application for Pesticide Notification under Pesticide Registration Notice (PRN) 98-10 for the above referenced product. The Registration Division (RD) has conducted a review of this request for its applicability under PRN 98-10 and finds that the action requested falls within the scope of PRN 98-10.

The label submitted with the application has been stamped "Notification" and will be placed in our records.

Should you wish to add/retain a reference to the company's website on your label, then please be aware that the website becomes labeling under the Federal Insecticide Fungicide and Rodenticide Act and is subject to review by the Agency. If the website is false or misleading, the product would be misbranded and unlawful to sell or distribute under FIFRA section 12(a)(1)(E). 40 CFR 156.10(a)(5) list examples of statements EPA may consider false or misleading. In addition, regardless of whether a website is referenced on your product's label, claims made on the website may not substantially differ from those claims approved through the registration process. Therefore, should the Agency find or if it is brought to our attention that a website contains false or misleading statements or claims substantially differing from the EPA approved registration, the website will be referred to the EPA's Office of Enforcement and Compliance.

If you have any questions, you may contact Jacquelyn Marchese at 703-347-0559 or via email at marchese.jacquelyn@epa.gov.

Sincerely,

Jacquelyn Marchese for

Venus Eagle, Product Manager 01
Invertebrate-Vertebrate Branch 3
Registration Division (7505P)
Office of Pesticide Programs

Notification Label Acceptable v.20150904

RESTRICTED USE PESTICIDE

(Due To Acute Inhalation Toxicity Of Sulfuryl Fluoride)

FOR 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. AN APPLICATOR CERTIFIED BY THE STATE MUST BE PRESENT ON SITE AT ALL TIMES DURING INTRODUCTION OF FUMIGANT, RE-ENTRY PRIOR TO AERATION AND INITIATION OF THE AERATION PROCEDURE.

NOTIFICATION

19713-672

The applicant has certified that no changes, other than those reported to the Agency have been made to the labeling. The Agency acknowledges this notification by letter dated:

01/13/2016

Drexel

MASTER FUME® AG

Gas Fumigant

For control of rodent, insect and other listed invertebrate pests.

Use Sites: Stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.

Read the entire container label and Applicator's Manual before using this product. Refer to the Applicator's Manual for additional precautionary information and directions for use. The Applicator's Manual must be in the user's possession during fumigation. If the Applicator's Manual is lost, obtain a replacement copy from your distributor or Drexel Chemical Company.

APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

ACTIVE INGREDIENT:

Sulfuryl fluoride	99.8%
OTHER INGREDIENTS:	0.2%
TOTAL:	100.0%

KEEP OUT OF REACH OF CHILDREN

DANGER ☠ PELIGRO
POISON ☠ VENENO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See FIRST AID Below

EPA Reg. No. 19713-672 **Net Content:**
EPA Est. No. 19713-XX-XXX **125 Lbs. (56.70 Kg)**

FIRST AID

IF INHALED:
- Move person to fresh air.
- If person is not breathing, call 911 or ambulance, then give artificial respiration.
- **DO NOT** give mouth-to-mouth resuscitation.
- Call a poison control center or doctor for further treatment advice.

IF IN EYES:
- Hold eye open and rinse slowly and gently with water for 15 to 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

(Continued)

FIRST AID *(Cont.)*

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip glass of water if able to swallow.
- Do not induce vomiting unless told to by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15 to 20 minutes.
- Call a poison control center or doctor for treatment advice.

In all cases of overexposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also call CHEMTREC at 800-424-9300 for emergency.

Note to Physician: This product is a gas which has no warning properties such as odor or eye irritation. (However, chloropicrin is used as a warning agent and is a known lachrymator). Early symptoms of exposure to this product are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations of this product can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically. The liquid form of this product in the eye may cause damage due to refrigeration or freezing.

Manufactured By:
Drexel Chemical Company
P.O. Box 13327, Memphis, TN 38113-0327
SINCE 1972

MASTER FUME and the DREXEL logo are registered trademarks of Drexel Chemical Company. All other brand names, product names, or trademarks belong to their respective holders.

PRECAUTIONARY STATEMENTS

Hazards To Humans And Domestic Animals

DANGER: Corrosive. Extremely hazardous liquid and vapor under pressure. Fatal if inhaled. Causes irreversible eye damage. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Liquid may cause chemical burns, which may have a delayed onset, or may freeze exposed skin. May be fatal if swallowed. May be fatal if absorbed through skin. Sulfuryl fluoride is odorless. Exposure to toxic levels may occur without warning or detection by the user. This product is used with 0.25% 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.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles (goggles designed and made of material that allows no measurable movement of the liquid pesticide being used to pass through them during use) or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR™) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Before using any make or brand of SCBA, learn how to use it correctly. Determine that it has an adequate air supply for the job at hand, that it fits properly providing an adequate seal around the face and that it is in good working order. For more detailed information on the source and use of air monitoring devices and respirators, consult the Applicator's Manual of this product.

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read *"Warranty Disclaimer"*.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information, call Drexel Chemical Company at (901) 774-4370.

USER SAFETY RECOMMENDATIONS

Users should: 1) Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. 2) Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. 3) Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Sulfuryl fluoride is a highly toxic gas. Do not expose non-target organisms. This pesticide is toxic to fish and wildlife.

PHYSICAL OR CHEMICAL HAZARDS

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near heat or open flame. Exposures to temperatures above 158°F will cause a fusible plug to melt and the contents will be released. Under high heat conditions (temperatures above 752°F), this product can decompose into sulfur dioxide (SO_2), hydrofluoric acid (HF), and other decomposition products.
Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc., that represent a reasonable risk of a heat source that is at or near 752°F. Shut off automatic switch controls for appliances and lighting systems
that will be included in the space to be fumigated. Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Notice: Read the entire label. Use only according to label directions. Before using this product, read Warranty-Conditions of Sale, *"Inherent Risks of Use"*, and *"Limitation of Remedies"* elsewhere on the label. If terms are unacceptable, return at once unopened.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information call Drexel Chemical Company at (901) 774-4370.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: Store in dry, cool, well ventilated area under lock and key. Post as a pesticide storage area. If the storage area is in an occupied building, the storage area must have either 1) a forced air ventilation system that meets required local ordinances for the storage of hazardous materials and operates continuously; or 2) be equipped with a permanently mounted and properly maintained and functioning sulfuryl fluoride monitoring device designed to alert occupants of the building if sulfuryl fluoride in the air of the storage area is greater than 1 ppm. Store cylinders upright secured to a rack or wall to prevent tipping.

Pesticide Handling: Do not subject cylinders to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use ropes, 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 transport any cylinders in closed vehicles where they occupy the same common airspace as personnel. Transport securely only in an upright position. 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 supplier. Only the registrant is authorized to refill cylinders. Do not use cylinder for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.

Leak Procedures: Evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator, such as manufactured by Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant is determined to be 1 ppm or less in the breathing zone, as determined by a detection device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR. For more detailed information on the source and use of air monitoring devices or respirators, consult the Applicator's Manual of this product.

CYLINDER AND PRODUCT DISPOSAL: Promptly return all empty cylinders to your distributor of this product. Follow proper cylinder handling directions above. 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, consult your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

WARRANTY DISCLAIMER

Manufacturer warrants that this product conforms to the chemical description on the label and based upon tests believed reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. To the extent consistent with applicable law, Manufacturer makes no other expressed or implied warranty of merchantability or fitness for a particular purpose or any other express or implied warranty.

Use Risk

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable weather, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Manufacturer or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to one of the following, at Manufacturer's discretion:

1. Refund of purchase price paid by Buyer or use for product bought, or
2. Replacement of amount of product used.

To the extent consistent with applicable law, in no case shall Manufacturer or the Seller be liable for consequential, special or indirect damages or losses from the use, handling or storage of this product.

The terms of the *"Warranty Disclaimer"* above and this *"Limitation of Remedies"* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of the Manufacturer or the Seller is authorized to vary or exceed the terms of the *"Warranty Disclaimer"* or this *"Limitation of Remedies"* in any manner.

RESTRICTED USE PESTICIDE

(Due To Acute Inhalation Toxicity Of Sulfuryl Fluoride)

FOR 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. AN APPLICATOR CERTIFIED BY THE STATE MUST BE PRESENT ON SITE AT ALL TIMES DURING INTRODUCTION OF FUMIGANT, RE-ENTRY PRIOR TO AERATION AND INITIATION OF THE AERATION PROCEDURE.

APPLICATOR'S MANUAL

NOTIFICATION

19713-672

The applicant has certified that no changes, other than those reported to the Agency have been made to the labeling. The Agency acknowledges this notification by letter dated:

01/13/2016

Drexel

MASTER FUME® AG

Gas Fumigant

For control of rodent, insect and other listed invertebrate pests.

Use Sites: Stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.

Read the entire container label and Applicator's Manual before using this product. Refer to the Applicator's Manual for additional precautionary information and directions for use. The Applicator's Manual must be in the user's possession during fumigation. If the Applicator's Manual is lost, obtain a replacement copy from your distributor or Drexel Chemical Company.

APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

ACTIVE INGREDIENT:

Sulfuryl fluoride	99.8%
OTHER INGREDIENTS:	0.2%
TOTAL:	100.0%

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO
POISON VENENO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See FIRST AID Below

EPA Reg. No. 19713-672 **Net Content:**
EPA Est. No. 19713-XX-X **125 Lbs. (56.70 Kg)**

FIRST AID

IF INHALED:
- Move person to fresh air.
- If person is not breathing, call 911 or ambulance, then give artificial respiration.
- **DO NOT** give mouth-to-mouth resuscitation.
- Call a poison control center or doctor for further treatment advice.

IF IN EYES:
- Hold eye open and rinse slowly and gently with water for 15 to 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

(Continued)

FIRST AID *(Cont.)*

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip glass of water if able to swallow.
- Do not induce vomiting unless told to by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15 to 20 minutes.
- Call a poison control center or doctor for treatment advice.

In all cases of overexposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also call CHEMTREC at 800-424-9300 for emergency.

Note to Physician: This product is a gas which has no warning properties such as odor or eye irritation. (However, chloropicrin is used as a warning agent and is a known lachrymator). Early symptoms of exposure to this product are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations of this product can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically. The liquid form of this product in the eye may cause damage due to refrigeration or freezing.

Manufactured By:
Drexel Chemical Company
P.O. Box 13327, Memphis, TN 38113-0327
SINCE 1972

MASTER FUME and the DREXEL logo are registered trademarks of Drexel Chemical Company. All other brand names, product names, or trademarks belong to their respective holders.

672SPAM-1215*

PRECAUTIONARY STATEMENTS

Hazards To Humans And Domestic Animals

DANGER: Corrosive. Extremely hazardous liquid and vapor under pressure. Fatal if inhaled. Causes irreversible eye damage. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Liquid may cause chemical burns, which may have a delayed onset, or may freeze exposed skin. May be fatal if swallowed. May be fatal if absorbed through skin. Sulfuryl fluoride is odorless. Exposure to toxic levels may occur without warning or detection by the user.
This product is used with 0.25% 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.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles (goggles designed and made of material that allows no measurable movement of the liquid pesticide being used to pass through them during use) or full face shield for *eye protection during introduction of the fumigant.* Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR™) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Before using any make or brand of SCBA, learn how to use it correctly. Determine that it has an adequate air supply for the job at hand, that it fits properly providing an adequate seal around the face and that it is in good working order. For more detailed information on the source and use of air monitoring devices and respirators, consult the Applicator's Manual of this product.

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read *"Warranty Disclaimer"*.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information, call Drexel Chemical Company at (901) 774-4370.

USER SAFETY RECOMMENDATIONS

Users should: 1) Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. 2) Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. 3) Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Sulfuryl fluoride is a highly toxic gas. Do not expose non-target organisms. This pesticide is toxic to fish and wildlife.

PHYSICAL OR CHEMICAL HAZARDS

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near heat or open flame. Exposures to temperatures above 158°F will cause a fusible plug to melt and the contents will be released. Under high heat conditions (temperatures above 752°F), this product can decompose into sulfur dioxide (SO_2), hydrofluoric acid (HF), and other decomposition products.
Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc., that represent a reasonable risk of a heat source that is at or near 752°F. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated. Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Notice: Read the entire label. Use only according to label directions. Before using this product, read Warranty-Conditions of Sale, *"Inherent Risks of Use"*, and *"Limitation of Remedies"* elsewhere on the label. If terms are unacceptable, return at once unopened.
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information call Drexel Chemical Company at (901) 774-4370.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

TABLE OF CONTENTS

	Page
First Aid	1
Precautionary Statements	2
Environmental Hazards	2
Physical or Chemical Hazards	2
Table of Contents	3
Information	4
Compressed Gas Hazards	4
Product Information	4
Directions For Use	4
Chapter 1	4
Commodities That Can Be Fumigated	4
Use Restrictions and Precautions	5
Pest Controlled	5
Chapter 2	5
General Safety	5
Symptoms of Poisoning	5
First Aid	5
Notes to Physician	5
Personal Protective Equipment (PPE)	5
Fire Fighting	5
Preventing Static Electricity	6
Fumigant Introduction Hose and Fittings	6
Personal Safety	6
Material Safety	6
Chapter 3	6
Cylinder	6
Chapter 4	7
Equipment	7
Monitoring Equipment	7
Clearance Testing Equipment	7
Chapter 5	8
Fumigation Management Plan (FMP)	8
Guidance for Preparation of an FMP	8
Chapter 6	9
Preparations for Fumigation	9
Occupants/Customers Need to Know	9
What to Remove Prior to Fumigation	9
Flames or Heating Elements	10
Checking for Connected Areas	10
Distribution/Aeration Fan Use and Placement	10
Monitoring Hoses	10
Sealing the Structure	10
Placarding and Securing fumigated Areas	11
Chapter 7	12
Introduction and Distribution of this Product	12
Choosing Introduction Sites	12
Selection and Use of Equipment for Fumigant Introduction	12
Calculating Dosage	13
Fumigant Dosage Factors	13
Using Drexel Chemical's Master Fume Ag Calculator Program	14
Chapter 8	15
Monitoring this Product	15
Specific Guidelines for Monitoring a Typical Fumigation	15
Chapter 9	15
Aeration Clearing, and Re-entry	15
Aeration - Practices	16
Factors Influencing Aeration Time	16
Handling Unaerated Commodities	16
Clearance and Re-entry	16
Chapter 10	16
Site Specific Considerations	
Key Considerations for Fumigating Storage Facilities, Transport Vehicles and Processing Plants	16
Preparation for Chamber or Stack Fumigation	17
Stored Bulk Commodity Fumigation	19
Chapter 11	20
Troubleshooting	20
Cylinders	20
Corrosion of Metals	20
Glass Etching	20
Run Stains	20
Staining	20
Fumigant Introduction Hose Freezing	20
Plant and Turf Damage	20
Odor Problems	21
Poor Control of Pests	21
Storage and Disposal	21
Warranty Disclaimer	21
APPENDIX A	23
English-Metric Conversion Tables	23
APPENDIX B	23
Glossary of Terms	23

INFORMATION

APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

Carefully read the container label and this Applicator's Manual before using this product. Do not use this product without Drexel Chemical's Master Fume AG Calculator Program. Drexel Chemical's Master Fume AG Calculator Program is a computer program available to calculate safe and effective levels of this product for fumigating structures and commodities. Never allow untrained individuals to use this product.

Prior to fumigation, read the Applicator's Manual carefully. Notify appropriate owners, employees, and/or operators at the facility where the fumigation will occur, and provide relevant safety and health information to local fire and rescue officials for use in the event of an emergency.

Do not connect cylinders to introduction equipment until all fumigation warning signs have been posted and the space to be fumigated is clear of people, non-target animals and secured.

COMPRESSED GAS HAZARDS

The release of high pressure fumigant can be forceful and there is potential for personal injury. Care must be exercised when fumigating, especially tarped commodities, so that the fumigant is not released too rapidly and "balloons" the tarp off of the restraining sand or water snakes. A fog-out can also occur if the fumigant is released too rapidly, cooling the air temperature below the dew point. This is avoided by following the instructions in the Applicator's Manual.

The rapid discharge of this product through introduction equipment will result in cooling parts of the equipment and the cylinders. Contact with the cooled equipment can cause frostbite.

This product is a highly hazardous material and should be used only by individuals knowledgeable of its chemical hazards and trained in the use of required respiratory equipment, detection devices, emergency procedures and proper use.

Two persons trained in the use of this product (at least one person being an applicator certified by the State) must be present on site at all times during introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure and when testing for re-entry after aeration (if aerated in an enclosed space). It is essential that no occupant re-enter the fumigated space after fumigation until the fumigant has been aerated and the space has been fully tested and cleared for re-entry.

Only a detection device of sufficient sensitivity (LOD < 1 ppm), such as the INTERSCAN gas analyzer [Model CF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR can be used to confirm a concentration of 1 ppm or less of this product. The INTERSCAN gas analyzer [Model CF 1900] must be calibrated within one month prior to use as a detection device. All other approved detection devices must be calibrated according to manufacturer directions. The concentration of this product must be monitored throughout the structure. The structure or enclosure must remain posted for fumigation until cleared for re-entry.

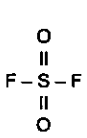
PRODUCT INFORMATION

MASTER FUME AG IS A RESTRICTED USE PESTICIDE DUE TO ACUTE INHALATION TOXICITY OF SULFURYL FLUORIDE.

PHYSICAL PROPERTIES

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near excessive heat or open flame. Exposures to temperatures of more than 158°F will cause a fusible plug to melt and the contents will be released. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Structural formula: SO_2F_2



Molecular Weight:	102.07 AMU
Color:	None
Active Ingredient:	10.8 pounds sulfuryl fluoride per gallon of the product
Specific Gravity:	1.35 at 20°C (68°F)
Vapor Density:	4.3 g/L at 20°C (68°F) air = 1
Vapor Pressure:	15.2 atm at 20°C (68°F)
Boiling Point:	-55.2°C (-67°F) at 760 mmHg

GAS SOLUBILITY (at 25°C (77°F) at 760 mm Hg): In water 0.075% (750 ppm) by weight, only slightly soluble in organic solvents and vegetable oils.

STABILITY: Stable to temperatures normally encountered in space fumigations. Non-flammable under normal conditions in all atmospheric concentrations. However, heaters and open flames must be extinguished as temperatures over 400°C (752°F) will cause decomposition products to be formed which can be corrosive and etch metal and glass.

HEAT OF VAPORIZATION: 81.1 BTU per pound at -55°C (-67°F) or 4600 cal./mol. 1 pound of sulfuryl fluoride = 4.45 moles. 1 pound of this product will lower 1000 cubic foot of dry air by 2.5°C (4.5°F).

VOLUME PER POUND: 1 pound of gas occupies 3.8 cubic foot at 25°C (77°F) and 760 mm Hg. 1 pound of gas per 1000 cubic foot of unoccupied space equals approximately 3850 ppm at room temperature and pressure (25°C at 760 mm Hg).

HYDROLYSIS: Slow in water; Rapid in basic solutions.

REACTIVITY: Sulfuryl fluoride is relatively non-reactive as a gas. No malodor or corrosive effects have been detected when the chemical has been used as directed. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

DIRECTIONS FOR USE

RESTRICTED USE PESTICIDE

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

When fumigating, all local, State, and Federal rules and regulations regarding use of detection devices, positive-pressure self-contained breathing apparatus, security requirements and placement of warning signs must be observed.

Read carefully all Directions for Use before using this product.

FUMIGATING WITH THIS PRODUCT

INTRODUCTION

MASTER FUME AG contains the active ingredient, sulfuryl fluoride, and is registered for use only by professional fumigators to control existing infestations of stored product insect pests in stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.

Read the entire label and this Applicator's Manual before using this product. If the Applicator's Manual is lost, obtain a replacement copy from your distributor of this product or your Drexel Chemical Company representative.

Each fumigator using this product is responsible for complying with all Federal, State and local regulations or codes regulating the use of this product. The fumigator should stay informed about State and local regulations in areas where they operate.

State and local government offices, distributors of this product or Drexel Chemical Company sales representatives responsible for your area can help identify the relevant agencies responsible for regulating fumigation practices in your area.

Chapter 1

COMMODITIES THAT CAN BE FUMIGATED

This product can be used on the following raw agricultural and processed food commodities:

Raw Agricultural* and Processed Commodities		
Barley	Rice	Triticale
Corn	Rice bran	Wheat
Corn flour	Rice flour	Wheat bran
Corn grits	Rice hull	Wheat flour
Corn meal	Rice (Polished)	Wheat germ
Millet	Rice (Wild)	Wheat milled by-products
Oat	Sorghum	Wheat shorts

*This product can be used to fumigate seeds of these commodities. Sites containing additional seed varieties may be fumigated as long as the fumigated seeds will not be part of the food chain for human consumption.

For a list of sites than can be fumigated with this product and site specific considerations for doing an effective and safe fumigation, see *"Chapter 10"*.

USE RESTRICTIONS AND PRECAUTIONS

- Do not exceed a maximum cumulative dosage of 1500 oz-h/1000 cubic foot for normal atmospheric pressure (NAP) fumigations.
- Do not exceed a maximum cumulative dosage of 200 oz-h/1000 cubic foot for vacuum fumigations.
- Do not exceed the maximum cumulative dosages of NAP and vacuum fumigations, respectively, for sequential fumigations.
- When fumigating storage tanks, silos, etc. containing bulk flour, empty or draw down Wheat flour to less than 3 feet deep. Minimize quantities of flour in the processing plant, structure or enclosure prior to fumigation to prevent excessive residues in Wheat flour.
- Use this product together with a dosage calculator called Drexel Chemical's Master Fume AG Calculator (*"Chapter 7"*). Drexel Chemical's Master Fume AG Calculator must be used to calculate the initial dosage required for treatment and for any additional quantities needed during the fumigation to improve efficacy and/or to rectify loss due to leakage.
- Special care should be taken to minimize quantities of processed foods prior to space fumigations. Processed food not practical to remove prior to fumigation may undergo incidental fumigation with this product. However, no direct fumigation of processed foods is permitted unless the processed food is found in *"COMMODITIES THAT CAN BE FUMIGATED"* section of this manual.

PEST CONTROLLED

This product is used to control the following pests including all its life stages (i.e., egg, larva, pupa and adult):

Common Name	Scientific Name
Codling moth	*Cydia pomonella*
Flour beetles	*Tribolium* spp.
Granary weevil	*Sitophilus granarius*
Indian meal moth	*Plodia interpunctella*
Mediterranean flour moth	*Ephestia kuehniella*
Navel Orange worm	*Amyelois transitella*
Rats and Mice	-
Rice weevil	*Sitophilus oryzae*
Saw toothed grain beetle	*Oryzaephilis suranamensis*
Warehouse beetle	*Trogoderma variable*

Chapter 2

GENERAL SAFETY

This product is colorless, odorless and non-irritating to mucous membranes at low concentrations. This product gives no warning of its presence.

This product is toxic and must be handled carefully. Ignoring the potential hazards of this product can result in serious illness or even death.

SYMPTOMS OF POISONING

Symptoms in humans from inhalation exposure to this product will depend on the concentration and the length of exposure experienced. The earliest sign of overexposure to this product is central nervous system (CNS) depression.

Exposure to progressively higher concentrations is expected to result in convulsions, tremors and/or strychnine-like muscular rigidity.

Humans exposed to high concentrations of this product may experience respiratory irritation, nausea, abdominal pain, CNS depression, slowing of movements and speech and numbness in the extremities.

Survival after exposure to high concentrations can occur even following convulsions, if exposure has been brief.

FIRST AID

Refer to the *"FIRST AID"* section of this manual or container label.

In all cases of overexposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility immediately. Have the product container or label with you when calling a poison control center or doctor or going for treatment. For information on this pesticide product (including health concerns, medical emergencies or pesticide incidents), call 1-877-208-2593 or CHEMTREC at 1-800-424-9300.

NOTES TO PHYSICIAN

Depending on the length of exposure, it is predicted that persons exposed to this product will probably show little evidence of intoxication at first unless the concentration was moderate to high (more than 500 ppm). Initial effects will probably be depression of the CNS with slow speech and body movement the first signs noted. Convulsions may ensue with respiratory arrest being a terminal event. Assisted respiration may be necessary.

Remove exposed patient to fresh air and put at rest. Keep exposed individual at bed rest and under observation for at least 24 hours. Clinical observation should be directed at the pulmonary, hepatic and renal systems. A post-mortem finding in a fatality attributed to sulfuryl fluoride was pulmonary edema. Death was attributed to cardiorespiratory failure.

Also see *"FIRST AID"* section of this manual for additional notes to physician.

There is no known antidote. Clinical observation is essential. Treatment is based on the clinical judgment of the physician and the individual reaction of the patient.

IN CASE OF EMERGENCY,
CALL 1-877-208-2593 OR 1-800-424-9300.

IN CASE OF ACCIDENTIAL EXPOSURE,
SEEK MEDICAL ATTENTION.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded, or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott, or MSA. Before using any make or brand of SCBA, learn how to use it correctly.

Determine that it has an adequate air supply for the job at hand, that it fits properly, providing an adequate seal around the face and that it is in good working order.

The INTERSCAN must be calibrated according to manufacturer specifications within one month prior to use as a clearance device. All other approved detection devices must be calibrated according to manufacturer specifications.

FIRE FIGHTING

Information

This product is not combustible. However, in temperatures exceeding approximately 400°C (752°F), this product will degrade to form hydrogen fluoride (HF) and sulfur dioxide. Theoretically, the number of ounces of HF per 1000 cubic feet produced during a fire in a structure containing this product would equal 0.4x number of ounces of this product per 1000 cubic feet {in temperatures exceeding approximately 752°F, each mole (102 gm) of sulfuryl fluoride will degrade to form 2 moles (40 gm) of hydrogen fluoride (HF)}. Nonetheless, amounts of HF actually produced during fires involving this product may be insignificant because this product rapidly diffuses from structures.

Use of Water

Evolution of hazardous materials can be minimized by use of water during a fire. Water will scrub out part of the HF and SO_2 formed by decomposition of this product in the flame. Water also can be used to cool cylinders of this product and prevent discharge of the product caused by melted fusible plugs. If possible, avoid runoff into waterways because HF is toxic to fish.

Protective Clothing

Self-contained breathing apparatus (SCBA) and normal "turn-out" gear must be worn when fighting fires in structures under fumigation with this product.

For Fires Involving Cylinders of this Product
When fighting fires in atmospheres containing potentially high concentrations of this product, self-contained breathing apparatus (SCBA) and encapsulating protective suits must be worn. Protective suit material must be compatible with exposure to hydrofluoric acid.

PREVENTING STATIC ELECTRICITY
The flow of liquid gas in the introduction hose may be a source of static electricity. To prevent the risk of static sparking, the introduction hose must be properly grounded using acceptable demonstrated methods (e.g., securely attaching a length of copper tubing with adequate fittings to the end of the introduction hose).
When using copper tubing as a ground, attach the copper tubing with a grounding wire to the fan cage frame or to a neutral ground. The copper tubing mounted at the end of the introduction hose must be securely attached to the fan or some other stable object.

FUMIGANT INTRODUCTION HOSE AND FITTINGS
- Use hose with minimum burst pressure of 3450 kPa (500 psi) that is compatible with liquid Master Fume. Polyethylene or polypropylene hoses have proven satisfactory.
- Use care not to kink or crush the hose. Reinforced hose helps prevent collapse.

PERSONAL SAFETY
- Always wear eye protection when introducing this product or repairing leaks on introduction manifolds or hoses.
- Proper respiratory protection (SCBA) must be on hand in case of required emergency entry into structure.
- Make a security check for personnel, structure preparation and persons in nearby buildings and grounds. Apply proper lock-outs and placarding.

MATERIAL SAFETY
- Use proper fumigant introduction techniques to help prevent corrosion or water stains on interior materials.
- To the extent possible, provide protection for nearby desirable plants.
- Use circuit breakers or fuses for fans.
- To the extent possible, place fans to minimize the risk of damage to equipment.

Chapter 3
CYLINDER

Cylinders of this Product
This product is packaged as a gas under pressure in cylinders. Cylinders contain both gas and liquid. Cylinders containing this product are designed not to explode in high temperatures. A fusible plug in the cylinder valve body melts at 158°F to 165°F (70°C to 73.8°C) releasing the contents of the cylinder.

Cylinder Information
This product is sold as a compressed liquid gas in a high-pressure cylinder and must be handled, stored and transported with precaution. Inspect every cylinder upon delivery for damage. If the cylinder is damaged, immediately return the cylinder to the distributor of this product.
No additional gas is used to pressurize the cylinder. Each full cylinder contains 57 kg (125 lbs.) of product normally under about 1380 to 2070 kPa (200 to 300 psi).

Cylinder Handling
- Avoid manhandling the cylinder when moving or weighing; e.g., use a hoist with a hanging bonnet.
- Protect the valve from damage by always replacing the valve cover and safety bonnet.
- Open valve slowly at first, then completely open it (one full turn) so the valve and the introduction hose do not frost. Use proper size adjustable wrench (25 to 30 cm). Keep wrench attached to valve while valve is open.
- Bear in mind that frosting of the outside cylinder surface when releasing the last 3 to 5 pounds of this product is likely.
- Close valve completely when fumigant introduction is finished or cylinder is "empty."

SEE *"STORAGE AND DISPOSAL"* SECTION AT THE END OF THIS MANUAL FOR STORAGE AND DISPOSAL OF THIS PRODUCT.

Cylinder Valve System
Cylinders of this product are fitted with special valves (see **Figure 1.**).

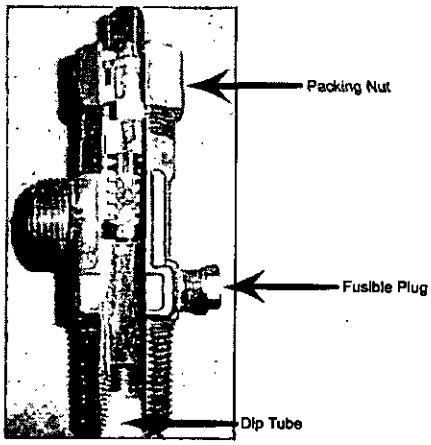


Figure 1. Cylinder Valve

The cylinder is equipped with both a safety cap and a covering called a "bonnet." The safety cap and bonnet must be securely in place at all times except when gas is to be released from the cylinder. This protects the valve system from being damaged and/or prevents accidental release of the fumigant.
Do not hang or lift cylinders by the valves. Use a proper sling to lift cylinders. Use a "hanging" bonnet or other device specifically designed for this purpose when weighing a cylinder on a hanging scale. (Hanging bonnet can be obtained from the fumigation supply distributor.)

Leaking Cylinders
If a cylinder is suspected of leaking fumigant, evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/ SCBA respirator, such as manufactured by Draeger, Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. The SCBA must be worn when exposure is more than 1 ppm or when the concentration is unknown.
Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant in the breathing zone is determined to be 1 part per million (ppm) or less as determined by a detection device with sufficient sensitivity such as an INTERSCAN gas analyzer [Model: GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR.
Often tightening the packing nut on the top of the valve to 35 to 40 N.m. (25 to 30 foot pounds) of torque with an adjustable wrench will stop the leak. Never use excessive force to open a stuck or improperly sealed valve. See valve stem adjustment procedures at the end of this chapter.
Once the cylinder is empty, contact your distributor for proper return instructions.

Frozen Valves and Hoses
If the cylinder valve is "just cracked" to reduce the rate of release, this product will expand from a liquid to a gas within the hose and frosting of the outside of the valve and hose may occur.
FROSTING CAN BE AVOIDED By ALLOWING FULL FLOW THROUGH THE VALVE AND LINES.
Do not control the rate of flow of this product by restricting flow through the cylinder valve.

Frozen Cylinders
If a break occurs on the dip tube in the cylinder, this product will be discharged in the gas phase when the liquid level falls below the break. As the liquid expands in the cylinder, heat will be taken from the surrounding area and the cylinder will frost or freeze at that point. This product will still be discharged, but at a much slower rate. If cylinder shows signs of a broken dip tube (a very rare occurrence), paint it red on the shoulder of the cylinder, put a red tag on it and return to the distributor so that the problem can be corrected before refilling.

Empty Cylinders
Handle, store and transport empty cylinders using the same precautions as previously discussed for full cylinders. The last 1.5 to 2 kg (3 to 5 lbs.) of gas in the cylinder which is the final pounds of this product in a cylinder generally are in a gaseous state and will not move out of the cylinder as rapidly as when it is a liquid. However, it will move through the introduction hose.
REMEMBER TO CLOSE VALVE COMPLETELY ON EMPTY CYLINDERS.

Cylinder Return Policy
When the cylinder is empty, fully close the valve and replace the safety cap and protection bonnet and return the empty cylinder to your distributor. Broken or defective cylinder must be returned to your Master Fume Ag distributor. Only Drexel is authorized to refill cylinders. Do not use cylinders of this product for any other purpose.

Transportation of Cylinders
Transport cylinders capped and secured in an upright position. Do not transport cylinders that are unsecured or laying on their side. These are requirements of the Department of Transportation (DOT) when transporting compressed air cylinders. Loose cylinders can become airborne and significant damage to dip tube may occur in an accident. Because of the toxicity of this product, do not transport cylinders in the same airspace as the driver or other occupants of vehicles, such as in vans or unpartitioned trucks.
Always store and transport cylinders in a secure upright position.
Do not transport cylinders of this product in the same airspace or breathing zone of any area occupied by the driver and other occupants of vehicles.
Consult your local distributor or Drexel Chemical Company for training resources for DOT regulations.

Air Transportation: Never transport cylinders of this product by aircraft.

Valve Stem Adjustments in the Field

Introduction
When cylinders are filled at the plant, a soap solution is applied to the valve stem (the square shaft area) and valve threads at the top of the cylinder. The cylinder is not released if leaks are present. Each time the valve is opened and closed, the stem works against the packing causing the packing to flow away from the valve stem. Over time this may allow product to escape past the valve stem when the valve is in the open position. This document describes how this situation can be safely corrected in the field.

Hazards and PPE
Operators performing the valve stem adjustment must follow all precautions on the product label section for *"Leak Procedures"*. This may include, but is not limited to, immediate evacuation followed by re-entry using positive pressure self-contained breathing apparatus.
Move cylinders outdoors or to a ventilated isolated location prior to adjusting the stem. Allow no unprotected persons in the area during the adjustment procedure until fumigant concentration is verified with sufficiently sensitive detection equipment to be below the levels of concern indicated on the product label.

Indications
This procedure is appropriate when a cylinder shows indication of product loss from around the valve stem. Loss may be indicated either by a sufficiently sensitive detection device or hissing/bubbling at the stem when the valve is open. This procedure may not be effective or appropriate for other valve problems.

Training
Only persons appropriately trained for Hazardous Material handling are permitted to perform this task. While operators who transport this product are required to receive Hazardous Material training, individuals have to check with their employer if they have any questions regarding required training.

Procedure
To stop a loss of this product from around the valve stem in the field, follow the following steps.
Follow directions in *"HAZARDS AND PPE"* section above prior to starting this procedure. Make sure all PPE and sufficiently sensitive detection devices are used.

1. If product loss is detected, immediately close the valve. This will stop this product from leaking out of the stem.
2. Secure the cylinder against a stationary object (rack, wall, etc.) to prevent tipping. Using the same wrench you use to remove the cap from the valve exit, tighten the packing nut on top of the valve. Turn the packing nut in a clockwise direction to tighten the packing nut. Do not overtighten this nut. The specification is 34 to 40 N.m. (25 to 30 foot pounds) of torque, which is easily reached with a 25 to 30 cm (10 to 12 inches) adjustable wrench.
3. Open the valve. If product is still leaking from around the valve stem, repeat steps 1 and 2. If product loss still persists, close the valve, red tag the cylinder and return it for credit. The valve will be replaced at the plant.

Chapter 4
EQUIPMENT

MONITORING EQUIPMENT: FUMISCOPE, REPORTIR™
The monitoring equipment is designed to measure the actual concentration of this product within the fumigation site to determine accumulated dosage. This equipment is not sensitive enough to use as a clearing device after the exposure period. This equipment also is used in conjunction with Drexel Chemical's Master Fume Calculator for determining actual HLTs.
Fumiscopes can be purchased through your distributor or from the manufacturer. For more information, contact:

Key Chemical and Equipment Co., Inc.
13195 49th Street N., Unit A
Clearwater, FL 34622
Phone: (727) 572-1159
Fax: (727) 572-4595

Note: Contact the manufacturer for Fumiscope calibration and repair procedures.
All companies with Master Fume AG must own 2 pieces of monitoring equipment and they must be calibrated and inspected yearly by Drexel and/or Master Fume AG distributor.

CLEARANCE TESTING EQUIPMENT
A. INTERSCAN GAS ANALYZER
Model GF1900 has an integral pump that draws the air sample through a pyrolyzer (furnace) where the product is converted to SO_2 which then passes through an SO_2 sensor. The unit is lightweight and is battery or AC powered for easy portability. For more information, contact the manufacturer or:

Key Chemical and Equipment Co. Inc.
13195 49th Street N., Unit A
Clearwater, FL 34622
Phone: (727) 572-1159
Fax: (727) 572-4595

B. MIRAN GAS ANALYZER
The Miran SapphIRe utilizes a single beam, infrared detection technology to directly measure low concentrations (0 to 5 ppm) of sulfuryl fluoride. For more information, contact:

Thermo Environmental Instruments
8 West Forge Parkway
Franklin, MA 02038
Phone: (508) 520-0430
www.thermo.com/AQI

C. SF-EXPLORIR GAS MONITOR
The SF-ExplorIR is a portable monitor that uses non-dispersive infrared (NDIR) technology. It features direct measurement of sulfuryl fluoride at 0 to 5 ppm. For more information, contact: Spectros Instruments, Inc. or their representatives.

D. OTHER UNITS
The listed detection and monitoring equipment in this label is not intended to be all inclusive. As new technology is developed, new devices may be evaluated by Drexel Chemical Company to detect this product. Contact your nearest representative from Drexel Chemical Company for the latest information on sufficiently sensitive detection devices.
Prior to using the above instruments to clear a structure, meters must be "zeroed." This must be done according to the manufacturer's

directions, away from the fumigation site and in an atmosphere that does not contain this product. Manufacturer's instructions also include information regarding appropriate and necessary calibration and maintenance. Manufacturer's specifications must be followed to ensure proper operation of these instruments.

Please refer to the manufacturer for the latest specifications and instructions for any equipment used with this product.

Chapter 5
FUMIGATION MANAGEMENT PLAN (FMP)

The certified applicator is responsible for working with the owners and/or responsible employees of the site to be fumigated to develop an FMP for this product. The FMP is intended to ensure a safe and effective fumigation. Critical components of a fumigation of this product include Drexel Chemical's Master Fume AG Calculator Program and the documentation it creates and the Precision Fumigation™ Techniques. The FMP must address characterization of the site and appropriate monitoring and notification requirements consistent with, but not limited to, the following:

1. Inspect the site to determine its suitability for fumigation.
2. When sealing is required, consult previous records for any changes to the structure, potential leaks and monitoring of occupied and adjacent buildings.
3. Consult with company officials (whose area or commodity is fumigated) and appropriate employees, prior to each fumigation, for any existing FMPs, SDS, Applicator's Manual and other relevant safety procedures.
4. Consult company officials in the development of procedures and appropriate safety measures for nearby workers and public personnel who will be in and around the area during fumigation and aeration.
5. Consult with company officials to develop an appropriate exterior monitoring plan that will confirm that nearby workers and bystanders are not exposed to levels above the allowed limits during application, fumigation and aeration. This plan must also demonstrate that nearby residents will not be exposed to concentrations above the allowable limits.
6. Consult with company officials to develop procedures for local authorities to notify nearby residents in the event of an emergency.
7. Confirm the placement of warning placards around the fumigation site as described in this Manual.
8. Confirm the required safety equipment (including that required for entry into an area under fumigation) is in place and the necessary manpower is available to complete a safe, effective fumigation.

GUIDANCE FOR PREPARATION OF AN FMP

An FMP is an organized, documented description of the steps involved to help ensure a safe, legal and effective fumigation. Drexel Chemical's Master Fume AG Calculator Program supports the creation of documentation needed to satisfy an FMP. Drexel Chemical's Master Fume AG Calculator Program and the FMP will assist you and others in complying with pesticide product label requirements. The guidance that follows is designed to help assist you in addressing all the necessary factors involved in preparing for and fumigating a site. This guidance is intended to help you organize any fumigation that you might perform prior to actual treatment. It is meant to be somewhat prescriptive, yet flexible enough to allow the experience and expertise of the fumigator to make changes based on circumstances which may exist in the field. Precision Fumigation techniques support this flexible and adaptive approach. By following a step-by-step procedure, yet allowing for flexibility, safe and effective fumigation can be performed. Before any fumigation begins, carefully read and review the label and the Applicator's Manual. This information must be given to the appropriate company officials (supervisors, foreman, safety officer, etc.) in charge of the site. Preparation is the key to any successful fumigation. If you do not find specific instructions for the type of fumigation that you are to perform listed in this guidance document, you will want to construct a similar set of procedures using this document as your guide or contact Drexel Chemical Company for assistance and/or additional resources. Finally, before any fumigation begins you must be familiar with and comply with all applicable Federal, State and local laws. The success and future of fumigation are not only dependent on your ability to do your job, but also by carefully following all rules, regulations, and procedures required by governmental agencies.

Checklist Guide for an FMP

This checklist is provided to help you take into account factors that must be addressed prior to performing all fumigations. It emphasizes safety steps to protect people and property. The checklist is general in nature and cannot be expected to apply to all types of fumigation situations. It is to be used as a guide to prepare the required plan. Each item must be considered. However, it is understood that each fumigation is different and not all items will be necessary for each fumigation.

A. PRELIMINARY PLANNING AND PREPARATION

1. Determine the purpose of the fumigation and record in Drexel Chemical's Master Fume AG Calculator.
   a. Control of insect infestation
   b. Control of rodent infestation
   c. Plant pest quarantine
2. Determine the type of fumigation and record in Drexel Chemical's Master Fume AG Calculator. For example:
   a. Space: tarp, mill, warehouse, food plant, railcar or ship (when fumigating vessels such as ships read the U.S. Coast Guard Regulations 46 CFR 147A, in addition to the Applicator's Manual)
   b. Commodity: raw agricultural or processed foods
3. Fully acquaint yourself with the site and commodity to be fumigated, and record the following in Drexel Chemical's Master Fume AG Calculator when necessary:
   a. In conjunction with the owner/operator/person in charge, take note of the general structure layout, structure construction (materials, design, age, maintenance), fire or combustibility hazards, connecting structures, other significant fumigant escape routes and other unique hazards or structure characteristics.
   b. The number and identification of persons who will routinely enter the proximate area fumigated (i.e., employees, visitors, customer, etc.).
   c. The specific commodity to be fumigated.
   d. The previous treatment history of the commodity, if available.
   e. Accessibility of utility service connections.
   f. Nearest telephone or other means of communication and note the location of these items.
   g. Emergency shut-off stations for electricity water and gas. Note the location of these items.
   h. Location and number of fans, introduction sites and monitoring lines.
   i. Current emergency telephone numbers of local health, fire, police, hospitals and physician responders.
   j. Name and phone number (both day and night) of appropriate company officials.
   k. Location of command center.
   l. Review labeling including the Applicator's Manual.
   m. Location of cylinders.
   n. Cylinder temperature or pressure.
   o. Introduction line: length, inside diameter, and burst pressure.
   p. Fan capacity (i.e., cu. ft/mm).
   q. Record and calculate dosage in Drexel Chemical's Master Fume AG Calculator.
      (1) Cubic footage or other appropriate space/location calculations
      (2) Estimated HLT
      (3) Temperature
      (4) Exposure time
      (5) Target pest
      (6) Whether the low, high or user-defined CT was used and the resultant CT target value
      (7) Initial, additional and total amount of fumigant used
      (8) Time of introduction and if any, times of introduction of add gas applied
      (9) Actual CT achieved

B. PERSONNEL

1. Confirm that all relevant personnel in and around the structure to be fumigated have been notified prior to application of the fumigant. Consider using a checklist that each employee initials indicating they have been notified.
2. Instruct all relevant fumigation personnel to read the Applicator's Manual about the hazards that may be encountered and about the selection of personal protection devices including sufficiently sensitive detection equipment.

3. Confirm that all personnel are aware of and know how to proceed in case of an emergency situation.
4. Instruct all relevant personnel on how to report any accident and/or incidents related to fumigant exposure. Provide a telephone number for emergency response reporting.
5. Instruct all personnel to report to proper authorities any theft of fumigant and/or equipment related to fumigation.
6. Establish a meeting area for all personnel in case of emergency.

C. MONITORING
1. Safety
   a. Monitoring of conditions of this product must be conducted in areas to prevent excessive exposure and bystander exposure.
   b. Keep a log or manual of monitoring records for each fumigation site. This log must at a minimum contain the timing, number of readings taken, location, and level of concentrations found.
   c. When monitoring, document even if there is no fumigant present above the safe levels. In such cases, subsequent monitoring is not routinely required. However, spot checks must be made occasionally, especially if conditions significantly change.
   d. Monitoring must be conducted during aeration and corrective action taken if gas levels exceed the allowed levels in an area where bystanders and/or nearby residents or domestic animals may be exposed.
2. Efficacy
   a. Readings of this product should be taken from within the fumigated structure to insure proper gas concentrations. Drexel Chemical's Master Fume AG Calculator analysis of these readings must be used as a basis for any decisions to add gas and the determination of subsequent amounts needed.
   b. All readings of this product must be recorded in Drexel Chemical's Master Fume AG Calculator.
   c. Readings should be of sufficient nature to reasonably determine HLT and, thus, identify whether any significant unforeseen leaks are occurring.

D. NOTIFICATION
1. Confirm the appropriate local authorities (fire departments, police departments, etc.) have been notified as per label instructions, local ordinances or instructions of the client.
2. Prepare written procedure ("Emergency Response Plant") that contains explicit instructions, names and telephone numbers so as to be able to notify local authorities if levels of this product are exceeded in an area that could be dangerous to bystanders and/or domestic animals.

E. SEALING PROCEDURES
1. Sealing must be adequate to control the pests. Care should be taken to ensure that sealing materials will remain adequately intact until the fumigation is complete.
2. If the site has been fumigated before, review the previous FMP and/or Drexel Chemical's Master Fume AG Calculator files for previous sealing and HLT information.
3. Make sure that construction/remodeling has not changed the building in a manner that will materially affect the fumigation.
4. Warning placards must be placed on all entrances and all sides of the fumigation site.

F. APPLICATION PROCEDURES AND FUMIGATION PERIOD
1. Plan carefully and apply the product in accordance with the label requirements.
2. Two persons trained in the use of the product, at least one being an applicator certified by the State, must be present on site at all times during the introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure, when testing for re-entry after aeration (if aerated in an enclosed space) and during re-entry.
3. Apply fumigant from the outside when and where appropriate.
4. Provide watchmen when entry into the fumigation site by unauthorized persons cannot otherwise be assured (e.g., by secondary locks, barricades, etc.).
5. When entering structures, always follow OSHA rules for confined spaces.
6. Keep the flexibility and record keeping function of Drexel Chemical's Master Fume AG Calculator in mind - it will provide a basis for improved understanding and thus, safer fumigation application in the future.
   a. If Drexel Chemical's Master Fume AG Calculator calculated CT is achieved early, the fumigation can be ended early.
   b. If additional time is necessary, use Drexel Chemical's Master Fume AG Calculator to calculate how much time is needed.
   c. If it is necessary to add gas, use Drexel Chemical's Master Fume AG Calculator to calculate how much additional gas is required.

G. POST-APPLICATION OPERATIONS
1. Provide watchmen when you cannot otherwise secure the fumigation site from entry (e.g., by secondary locks, barricades, etc.) by unauthorized persons during the aeration process.
2. Determine gas concentration in the fumigated environment from outside if possible. Use a sufficiently sensitive gas detector before re-entry into a fumigated structure to determine fumigant concentration.
3. Turn on ventilating or aerating fans where appropriate.
4. Ventilate and aerate in accordance with structural limitations and nearby occupied areas so as to minimize bystander exposure.
5. Consider temperature when aerating.
6. Determine gas concentration in the surrounding area if required.
7. Remove warning placards when aeration is complete and the fumigated space has been cleared for re-entry using a detection device of sufficient sensitivity.
8. Inform business/client that employees/other persons may return to work or otherwise be allowed to re-enter the aerated structure.
9. Keep records of monitoring of gas concentration inside (efficacy readings) and outside (safety readings) the fumigation environment to document completion of aeration.

Chapter 6
PREPARATIONS FOR FUMIGATION

Prior to fumigation, read the Applicator's Manual carefully. Notify appropriate owners, employees, and/or operators at the facility where the fumigation will occur and provide relevant safety and health information to local fire and rescue officials for use in the event of an emergency.

Best practice is to notify local police, fire department and emergency responders of impending start and finish times for the fumigation.

Property Owner/Customer Checklist: The owners of buildings to be fumigated need to be informed of circumstances and conditions associated with the fumigation process and of their involvement in preparation, vacancy and re-occupancy. Some States require the fumigator to provide the customer with a list of preparations required for the fumigation. The customer may also be required to acknowledge in writing certain liabilities.

The responsibility for proper fumigation procedures lies with the certified fumigator regardless of who does the work.

OCCUPANTS/CUSTOMERS NEED TO KNOW:
1. Qualifications of the certified applicator who will be doing the fumigation.
2. Their specific role in preparation for fumigation - what to prepare, turn off, remove, etc.
3. What the fumigation process (introduction, exposure, aeration and clearance) entails so that there can be absolutely NO ENTRY by unauthorized personnel into the structure until it is certified clear for re-entry by the fumigator.
4. The specific times to leave the structure and when re-occupancy may occur.
5. That the fumigator often requires that the property owners surrender keys to the structure to be fumigated. The fumigator should have access to all areas of the fumigation site during the whole period that the site is under their control.
6. This product has no residual effectiveness and so does not control future infestations of pests.
7. To reveal to the fumigator known or potential connections to adjacent/other buildings.

WHAT TO REMOVE PRIOR TO FUMIGATION

Remove from the structure to be fumigated all persons, non-target animals and desirable growing plants. All drugs (including tobacco

products) and medicinals (including those items in refrigerators and freezers) need to be removed prior to fumigation.

FLAMES OR HEATING ELEMENTS

This product is a very stable compound that is relatively non-reactive and non-flammable. However, under high heat conditions present in gas flames or glowing electric elements, this product can decompose into sulfur dioxide SO_2, hydrofluoric acid HF, and other decomposition products. Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Therefore, extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated.

Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. When a single gas meter serves more than one structure, gas service to all sources may be interrupted. The gas lines should be cleared. Fumigation companies may request that customers have the local gas company turn off the gas prior to fumigation. The local gas company will always need to turn gas service on after it has been turned off to determine that the gas flow rate and pressure are appropriate.

Important: Before fumigating, ALL pilot lights must be turned off. The heat of gas flames, pilot light flames, or the glowing wires or hot surfaces of electric heaters can cause this product to break down to form a corrosive material. Make sure the gas flames and pilot flames of furnaces, gas refrigerators and kitchen ranges are extinguished and that glowing electric heaters that represent a reasonable risk of a heat source that is at or near 752°F are turned off.

CHLORINE GAS: Damage to metals can also occur from the inclusion of chlorine gas for bleaching or chlorination processes. Ensure this equipment is turned off with no leaks or excluded from the fumigation.

CHECKING FOR CONNECTED AREAS

Prior to fumigation, the certified applicator is required to check for connected areas. A connected area is defined as any area connected with the space to be fumigated by construction elements (e.g., pipes, conduits, ducts, etc.) that may allow the passage of fumigant between the spaces.

Any connected areas must be vacated during the fumigation process unless it is isolated from the space to be fumigated by methods that will prevent passage of the fumigant from the space to be fumigated into the connected area. When it is necessary to vacate areas that have been isolated, that area shall be considered as a fumigated space and all applicable rules, regulations and label instructions apply such as preparation, placarding, securing and aeration.

Concentrations of this product must be continually measured during the fumigation of a structure in any occupied isolated connected structures to verify concentrations are less than 1 ppm to confirm that individuals in the isolated areas are not exposed to unacceptable levels of this product.

Use only a detection device of sufficient sensitivity such as the INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR to confirm a concentration of 1 ppm or less. If concentrations of this product is more than 1 ppm, then the sealing of the isolated space from the fumigated area is probably not working and the immediate space must be evacuated unless the concentration is continuously monitored to prevent exposure greater than 1 ppm. SCBA must be worn by the applicator if the concentration is more than 1 ppm. **Important:** All connected/adjoining areas must be vacated if required by State or local laws or regulations.

DISTRIBUTION / AERATION FAN USE AND PLACEMENT

Purpose of Fans

The purposes for fans in a structural fumigation are:

1. Fumigant introduction
2. Equilibrium and circulation
3. Aeration

Positioning Fans

- There is no set pattern established for the positioning or the number of fans to use.
- Fans should be strategically placed in order to mix the fumigant and rapidly reach equilibrium.
- At least one fan for each level of the structure.
- It is good fumigation practice to use more fans in structures that are divided into numerous smaller compartments or rooms.

A rule of thumb is to use one fan for each 75,000 ft^3 and at least one fan for each area or level of the fumigation.

In structures frequently used or dedicated to fumigation, air circulation equipment and fans can be built into the structure. Examples of some systems include air-handling systems that provide for the fumigant introduction, continuous circulation, and also aid in the quick, effective aeration of the structure.

Reaching Equilibrium

When the liquid form of this product is released from the introduction hose, it extracts a substantial amount of heat from the surrounding air as it expands to form a gas. A pound of the liquid form of this product changing to the gas phase will drop the temperature of 1000 cubic foot of dry air 4.5°F (28.3 cubic meters of air 2.5°C).

The chilling causes the formation of a cloud of condensed water (fog) that must be dissipated before it collects on a surface. The rate of dissipation depends upon the release rate, atmospheric conditions and mixing rate. The fan capacity, quantity, and placement determine the mixing rate. The chilled gas of this product is much denser than the surrounding air and can settle to the bottom of the fumigation space unless mechanically mixed with the surrounding air.

All gases tend to move from an area of high concentration to low concentration and will eventually come to equilibrium in a confined space. This product will do the same when it is introduced into a fumigation space, regardless of the fact that molecules of this product are heavier than air molecules. However, the rate of passive diffusion may be too slow to achieve equilibrium within a practical period. Thus, mechanical mixing by fans is essential.

Important: High capacity fans are needed when introducing this product into a space to prevent stratification, to aid in proper dispersion and to assist temperature distribution.

Continuous Circulation with Fans

A significant benefit of continuous circulation is the movement of this product from areas of high concentration to areas of lower concentration. This continuous circulation maintains a more equal concentration within the fumigation space and helps ensure that this product will penetrate all areas where infestation may exist.

It is next to impossible to seal a structure so that there are no leaks. Unless there are abnormally large leaks, continuous circulation during the entire exposure period will not appreciably affect the loss rate for this product. Obviously, the air stream should not flow directly against "leaky" areas because excessive fumigant loss can occur.

Preparing for Aeration

When first preparing the fumigation, plan ahead for the aeration period and take steps to aid aeration by strategic placement of fans and other aeration tools. Just as fans are useful in achieving equilibrium of fumigants, they are excellent aids in attaining rapid aeration and are essential where cross ventilation is poor. Have a detailed plan in place for safe, effective aeration of the structure. Be sure to consult local regulations for more restrictive aeration procedures.

MONITORING HOSES

Arrangements should be made to place sampling hoses in the structure prior to fumigant introduction. Semi-rigid vinyl hoses (3 to 6 mm or 1/8 to 1/2" ID) should be placed to allow sample representative concentrations with a Fumiscope or similar device. Monitoring hoses larger than 6 mm ID may take a longer time to pull the sample from the fumigated space to the monitoring device because of the larger volume of air needed to be moved.

Ideally, monitoring lines should be placed on all levels of the fumigated structure. If the structure is compartmentalized into separate rooms or other sub-units, place lines in areas representative of the different units.

SEALING THE STRUCTURE

No two fumigations are exactly alike. Each job requires the fumigator to establish and maintain an effective fumigation environment. The fumigation must be conducted in a manner that will effectively control the pests without causing undue risk to people or property. The fumigator must conform to the label for this product and the Applicator's Manual, as well as to Federal, State and local regulations. When in doubt, a fumigator should seek assistance from suppliers,

regulators, Drexel Chemical Company representatives or other educational sources.

The quality of the seal has a huge influence on the effectiveness of the fumigation. Increasing the seal of the fumigation site is one of the most effective ways to ensure a quality fumigation and reduce the total amount of fumigant needed.

There are several approaches to the challenges of confining the fumigant. The fumigator needs to make field judgments how to best seal a space. Pay special attention to drains, vents, conduits, wiring, electrical junction boxes, floor cracks, wall/floor or wall/ceiling joints and damage to outside walls from equipment. When sealing, keep in mind a few basic thoughts:

1. Identify and address key leakage areas. Careful inspection of the structure will help identify leaky areas. Be sure to carefully seal protruding equipment on the top floors and roofs. Building eaves also can be very leaky.
2. To the extent necessary and possible, close off all connected structures and install an "air break" to stop gas moving to connected structures.

Tape and Seal

For fumigation structures that can be appropriately sealed with materials such as plastic or tape, seal adequately around doors, windows, vents and other openings. When necessary to minimize escape of fumigant through the soil and to avoid injury to nearby plants, wet soil (if not sufficiently moist) around the structure to act as a barrier for the fumigant. Often, structures are too large to be completely tarped for fumigant confinement. The most common practices are to use polyethylene sheeting, non-porous panels, fumigation tape, spray adhesives, foams and insulation materials to seal the structure for fumigation. These techniques are usually used around doors, windows, roof eaves, loading docks, pipes, augers, conveyers, vents, etc. If properly used, these materials can do an ample job of confining the fumigant within the structure.

Stucco or masonry block buildings may be sealed by taping laminated paper or plastic film over outside doorways, windows and vents. This sealing method is recommended for structures in which any wooden section, including roofing, is exposed to the outside.

However, even with an excellent job of tape and seal around windows, doors, etc., if the building walls, roof or basement have holes that are not sealed, the structure may not hold fumigant satisfactorily.

Always monitor with a Fumiscope or similar device when necessary.

Foam Sealing

The use of expandable spray foams have been effectively used to help seal structures. Expandable foam is economical and can be used for both permanent and temporary seals. Refer to the foam product directions for proper use and compatibility issues.

Tarping

Good sealing is necessary for an effective fumigation. Tarpaulins (tarps) can be used in the sealing process with tapes/adhesives to help seal leaky areas or to envelop the entire area to be fumigated. This method is effective on almost any size or type of space/site. The ability of a tarp to contain a gas depends on the condition of the tarp, the material of construction and its thickness.

One of the most critical operations in tarping a space is achieving a tight seal at the ground where protrusions, debris or rough-textured soil or concrete may provide an opening for gas to escape. The edges of the cover that contact the floor or soil must be sealed by techniques such as taping the tarp to the floor or placing sand or water snakes over the edges of the tarp. Sand or water snakes may be used effectively if the ground surface is very smooth. One method of improving the seal with a sand or water snake is to run a trough of water on the tarps along with the snakes. Vinyl/nylon snake covers do not deteriorate readily. To minimize escape of fumigant through the soil and to avoid injury to nearby plants, wet soil (if not sufficiently moist) around the structure to act as a barrier for the fumigant. When possible, avoid walking on tarped, fumigated material to maintain seal during the exposure period. To achieve an adequate ground seal, allow at least 2 feet of tarp to clear the ground snakes. This will accommodate movement of the tarps from wind movement.

TARP MATERIAL: Plastic tarps are semi-permeable membranes that permit different fumigants to pass through them at different rates. The passage of this product through most plastic sheeting of sufficient thickness is very slow (see **TABLE 1.**).

Use only tarps made of materials that will adequately confine this product for the required time. Tarps are sold in many sizes. Experience has shown that the following have proven satisfactory:

1. 4 to 6 mil polyethylene for "single use" tarps
2. Laminated (several layers) polyethylene
3. Vinyl coated nylon
4. Neoprene coated nylon
5. PVC (polyvinyl chloride) coated nylon

THICKNESS: As a minimum, 4 to 6 mil (160 to 240 microns) thickness of the above materials adequately confines this product. A tarp of 100 microns is equivalent to a 400 gauge material. Polyethylene tarps less than 4 mil (160 microns) are not of an adequate thickness to confine this product because they do not possess the strength and weight needed for the handling, wind resistance and abrasion encountered in most fumigations.

TABLE 1. Percent permeation loss and adsorption of 8 oz./1000 ft.^{3} sulfuryl fluoride after 24 hours from 11 ounce glass bell jar with lid made of tarp materials.

	% Permeation Loss	% Adsorption*
	Sulfuryl fluoride	Sulfuryl fluoride
Polyethylene 4 mil	0.0	1.3
Tarp A, 10.3 oz/yd^2	3.3	6.1
Tarp B, 7.2 oz/yd^2	5.5	3.1
Tarp C, 9.6 oz/yd^2	0.2	3.3
Used tarp**	100.0	8.8

* Values reflect subtraction of fumigant loss due to glass container adsorption (2.2% for sulfuryl fluoride). (n=4)

** A used tarp is a tarp which has abrasions of the vinyl coating causing the nylon fabric to be exposed in a few spots.

Source: Scheffrahn, R.H. and E.M. Thomas (1993) "Penetration of Sulfuryl Fluoride and Methyl Bromide Through Substrates During Fumigation." DOWN TO EARTH 48 (1) pp. 15-19.

PLACARDING AND SECURING FUMIGATED AREAS

Placarding of Fumigated Areas

This product is a toxic gas without a warning agent.

All entrances and all sides of the fumigated environment and any connected area not monitored must have warning signs. Do not connect cylinders to introduction equipment until all fumigation warning signs have been posted, the space to be fumigated is clear of people and non-target animals, and it is secured. Warning signs must be of weather resistant material and should be securely affixed to the structure. Do not allow entry by unprotected persons into fumigated area until the signs are removed. Signs must remain legible during the entire posting period. Warning signs should be placed in advance of the fumigation in order to keep unauthorized persons away. The warning signs must be printed in English and Spanish with:

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 and time.
4) Name of fumigant used and EPA Reg. No.
5) Name, address and telephone number of the applicator.

Only a certified applicator may authorize removal of placards and only when concentration of this product in the breathing zone of the treated site is 1 ppm or less.

Use the following considerations when posting warning signs:

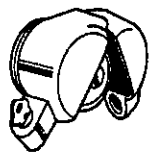
- Follow local, State and Federal regulations for sign format, size, durability or additional information requirements.
- Use materials that will allow information to remain legible when posted.
- Use information that allows for 24 hour communication with the certified applicator in the event of an emergency.

Transfer of incompletely aerated commodity to a new storage site within a facility is permissible. However, the new storage site must have placarding and security similar to the fumigation site if concentration of this product is equal to or greater than 1 ppm. Workers who handle incompletely aerated commodity must be informed and appropriate

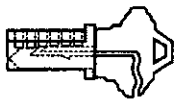
measures must be taken (ventilation and wearing of SCBA) to prevent any exposure greater than 1 ppm.

Securing Structures

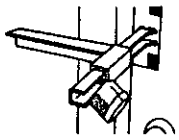
In order to secure against unauthorized entry during the fumigation exposure period, a locking device or barricade must be used on all exterior doors or doorways. A locking device or barricade must be effective in preventing entry of any exterior door or doorway using normal opening or entering processes by anyone other than the certified applicator in charge of the fumigation or persons in his/her on-site direct supervision. Consult State and local regulations for any supplementary instructions and local restrictions on securing against entry. Several additional security options to consider might include:



CLAM SHELL LOCKS:
CLAM SHELL LOCKS are designed to prevent use of the door or occupant's keys to unlock entrance doors.



KEY-WAY LOCKS:
KEY-WAY LOCKS are designed to prevent use of the occupant's keys to unlock entrance doors. These function by inserting a two-part locking key into the door keyhole and removing only half of the key. The other half of the locking key remaining in the door prevent insertion of the occupant's key.



J-SAFE LOCKS:
J-SAFE LOCKS or chains can also be used on certain structures.

GUARDS:
Guards may be considered in some circumstances and may be required in some locations. Consult local regulations. Best practice is to notify local police, fire department and emergency responders of impending start and finish times for the fumigation.

RAILCARS, TRAILERS OR SHIPS:
Railcars, trailers or ships must be secured against unauthorized entry during the fumigation exposure period.

Chapter 7
INTRODUCTION AND DISTRIBUTION OF THIS PRODUCT

CHOOSING INTRODUCTION SITES

The specific site(s) of release of this product is (are) very important to the success of the fumigation. This product should be introduced in a manner to achieve rapid equilibrium, avoid excessive loss, prevent fog-out and ensure safety to personnel and materials.

Site selection should be made using good judgment. Ask, "If this product was introduced in this location, how and when will it get to the most remote locations in the commodity or structure?" The size and configuration of the space and the adequacy of the circulation typically dictate the number of release sites for this product. Therefore, for many applications, it is often appropriate to use multiple introduction sites to rapidly attain equilibrium.

In structures that are frequently used for fumigation, permanent introduction systems can be built into the structure to ensure safe, effective and adequate fumigant introduction. Be sure to inspect all components of introduction systems prior to each use.

The proper introduction of this product (release from the cylinder) is essential to the success, safety and economy of a fumigation. It is imperative that the fumigator understands the principles involved and the conditions that exist for introducing the fumigant on each job.

Below are points that are considered when introducing this product:

1. The introduction methods used will practically achieve the target dosage (sufficient ounce-hours for the working temperature to control the target pest).
2. This product must be introduced in a manner that is safe to personnel and property inside and outside of the fumigation space.
3. The goal is to reach concentration equilibrium of this product throughout the fumigated space as quickly as is safe and practical.

Important: Prior to release of this product, make sure a thorough check of the structure and surroundings is conducted and all safety precautions have been taken.

Do not apply for insect control when temperature at the site of the pest is below 40°F. This temperature may be measured wherever the infestation may be. This restriction does not apply when fumigating for rodents. To prevent damage, do not apply liquid fumigant directly to any surface within the fumigation area.

This product is packaged as a liquid under pressure and requires a heat source for conversion of the liquid to a gas during introduction. The heat source can be the air around the introduction site or mechanical heat exchanging systems.

The introduction system must:

- Prevent breakdown or contamination of this product.
- Confine this product until it is released into the fumigation area.
- Prevent liquid sulfuryl fluoride from contacting surfaces which could be damaged or the commodity within the fumigation area.
- Prevent a fog-out in the fumigation area. A fog-out is substantial condensation of moisture inside a fumigated structure that is caused by the air temperature dropping below the dew point.

Damage to materials can occur if the rate of release of this product exceeds fan capacity. Use electric fan(s) to facilitate forced distribution and aeration of other dead air spaces and rapid dispersion of the gas.

This product must be introduced from the cylinder through a suitable leak-proof delivery system (hoses, connectors, gauges, solenoids, etc.) with a minimum burst pressure of 500 psi. It is recommended to:

- Release the fumigant into a large open space.
- Direct the fumigant into the blast of air from a fan(s) having a capacity of at least 1000 cubic foot per minute per pound of this product released per minute.
- Introduce no more than 4 cylinders per introduction site.
- Have one introduction site per every 75,000 cubic foot.

SELECTION AND USE OF EQUIPMENT FOR FUMIGANT INTRODUCTION

Weighing the Fumigant

Either platform or hanging scales can be used to weigh the cylinder during fumigant introduction. If hanging scales are used, hanging bonnets or cylinder slings must be used to hang the cylinder from the scale.

Consult your distributor or Drexel Chemical Company for a source of hanging bonnets. Scales should be routinely calibrated to assure correct readings. Refer to the scale manufacturer for calibration and maintenance details.

THE CYLINDER SHOULD NEVER BE SUSPENDED BY THE VALVE!

Hoses

Release the fumigant through a suitable leak-proof hose with a minimum burst pressure of 3450 kPa (500 psi). The hose should be flexible, kink-resistant, durable and compatible with the liquid form of this product.

Prior to use, confirm with distributor or manufacturer that the introduction hose meets the above requirements.

The introduction rate of this product is mostly controlled by the inside diameter and the length (resistance) of the fumigant introduction hose. Flow rates can be easily calculated using Drexel Chemical's Master Fume AG Calculator.

Protective Sheeting

Protective sheeting, such as polyethylene plastic, can be placed under the hose and fan to further protect floors and other materials during application from potential moisture condensation.

Securing Introduction Hose

A widely used method is to securely attach the introduction hose to a tarp clamp and then use the tarp clamp to attach the hose to the fan cage. The fan cage is angled upward at about 45°. Another option is to attach the fumigant introduction hose to a solid heavy object in front of a fan angled upward at 45°. If the introduction hoses are part of a permanent introduction system, be sure to inspect the hoses prior to each use to ensure they are securely mounted and still in required working order.

Fog-Outs
A cloud of fine droplets suspended in air near the ground is called fog. It is very important when introducing this product to prevent excessive fog and dew formation. Releasing this product will cause some condensation near the release point - slow release rate and low humidity will cause less and a fast release rate and high humidity will cause more. After the condensation forms, it will evaporate at a rate that is dependent on the relative humidity, the temperature of the fumigation atmosphere and the air mixing rate controlled by the introduction fans.
Condensation forming on the photoelectric eye of a smoke detector or motion detector can cause the alarm to activate. It is very important to use proper fans to help mix the heat of the building and fumigation atmosphere to evaporate the condensation. Liquid water absorbs the very small amount of impurities in this product and can result in corrosion.

Fog-Out Prevention
There are several options to reduce the incidence of moisture condensation when fumigating air-conditioned structures in hot, humid weather:
1. Let structure warm a day or two before fumigation to equalize inside and outside temperature and stabilize the Relative Humidity (RH).
2. Reduce the introduction rate with a smaller diameter hose, longer hose or pulsed (interrupted) introduction.
3. Reduce the amount of this product introduced into one area by using multiple introduction sites. This would be most important in high-dosage fumigations.
4. Use multiple fans or larger fans to hasten the mixing of air and heat exchange.
5. Monitor the fumigation or extend the exposure period to reduce the overall fumigant requirements, if practical.
6. When necessary, use a combination of several of these techniques to reduce the release rate and relative humidity, and increase the heat exchange of the structure to the fumigation atmosphere. Drexel Chemical's Master Fume AG Calculator takes into consideration fan capacity to recommend the fumigant introduction rate.
7. Do not tarp or seal a space that is excessively wet.

Fumigated Space Leak Detection and Mitigation
During release of this product, the fumigator must monitor around the perimeter of the fumigation area (especially downwind) with a leak detector with sufficient sensitivity to ensure a good seal so that concentrations of this product are kept within 1 ppm or less outside of the fumigation area. An SCBA must be readily available during the fumigant introduction period in case of leaks.
Detectors such as TIF 5750 and XP-1 manufactured by TIF Instruments, Inc., Miami, Florida, can detect concentrations of this product over 50 ppm. These devices can only be used to check cylinders for significant leaks. A device capable of measuring to 1 ppm of this product must be used for all other tasks.
If more than 1 ppm of this product is detected, then clear the area of all personnel. Only persons wearing a self-contained breathing apparatus (SCBA) with full facemask and operating in pressure demand mode or its equivalent are permitted in the area to address the leak. Only after levels of this product are 1 ppm or less, are unprotected personnel permitted in the area.
Large leaks must be minimized as quickly as possible to help avoid risk of exposure to bystanders and/or occupants of nearby structures and to minimize loss of fumigant. This involves walking around the structure or fumigated area with a monitoring device to determine if excessive amounts of fumigant are escaping. Proper respiratory protection must be worn when sealing leaks. Seal leaks from the exterior of the structure whenever possible. If it is necessary to seal a leak from the interior of the structure, the applicator must follow all proper re-entry procedures.

Re-entry Procedures
If re-entry into a fumigated area is necessary after introduction of the fumigant, but before complete aeration, to troubleshoot distribution of the fumigant or repair leaks, follow the re-entry procedures specified in *"Chapter 9"*.

CALCULATING DOSAGE
Establishing the Required Dosage
The fumigator is challenged with the task of distributing and maintaining a concentration of fumigant over the fumigation period to achieve the target dosage. Because of the multitude of factors, no two fumigations are identical. To specify a single dosage rate for all conditions would seldom be correct — usually it would be either excessive or insufficient for expected pest control.

Drexel Chemical's Master Fume AG Calculator Program
Drexel Chemical's Master Fume AG Calculator is used for all fumigations using this product. See directions for details and specific use. Do not use this product without the Drexel Chemical's Master Fume AG Calculator. Drexel Chemical's Master Fume AG Calculator must be used to calculate the dosage. Drexel Chemical's Master Fume AG Calculator Program may be modified and updated from time to time; please contact your Drexel Chemical Company representative for current information.

Precision Fumigation Defined
Precision Fumigation is not a new concept; however, most fumigators have lacked the tools to consistently plan and conduct precision fumigations. Precision Fumigation can be defined as "Optimizing fumigant use to maximize efficiency and minimize risk."

Precision Fumigation Concepts
Use of this product allows fumigators to use their skills, knowledge and experience to create and implement successful, flexible fumigations. Precision Fumigation methods: a) allow fumigation when/how necessary, b) capitalize on enhanced sealing methods, c) maximize exposure time, and d) utilize temperature modification.

Fumigant Dosage
All fumigants utilize some form of the dosage relationship which is often referred to as the "CT Concept":

Dosage = Concentration (C) X Time (T)
or
D = C x T (CT)

Therefore, the dosage required to kill the target pest(s) is accumulated over a period of time and is measured in ounce-hours or gram-hours.
CT = oz-h/1000 cu. ft.

The concentration in ounce per 1000 cubic foot of fumigant multiplied by the exposure time in hours

The maximum target concentration in Drexel Chemical's Master Fume AG Calculator is 128 ounces per 1000 cubic foot.

The maximum target dosage for all normal atmospheric pressure (NAP) fumigations is 1500 CT (1500 ounce-hours per 1000 cubic foot).

For vacuum chamber fumigations, the maximum target concentration is 128 ounces per 1000 cubic foot, and the maximum target dosage is 200 CT (200 ounce-hours per 1000 cubic foot).

Concentration Units of this Product
1 ounce per 1000 cubic foot = 240 ppm

FUMIGANT DOSAGE FACTORS
The proper dosage for efficacy and the total amount of this product needed for a fumigation is determined by four interrelated factors:
1. Pest species and life stages
2. Temperature at the site of infestation
3. Exposure time
4. Half-Loss Time (HLT)

Pest Factor
This product is effective on all key stored product insect pest species and can control all life stages of insects. However, different pest species and life stages require different dosages for effective control. Adult, larval and pupal stages are controlled with relatively low dosages of this product, while the egg stage requires higher dosages. Several rodent pests such as rats and mice may infest commodities and sites, and damage materials within facilities. The temperature restriction of 40°F for insect fumigation does not apply to rodents because they are warm blooded. The target dosage for rodents is 36 ounces-hour per 1000 cubic foot.

Temperature Factor
Temperature is an important factor for successful fumigation. Insects are ectothermic, so increasing temperature increases insect metabolism. Increasing insect metabolism greatly improves the efficacy of this product. Increasing temperature can decrease

exposure time and/or gas needed. Relatively large changes in temperature are generally not required. Achieving temperatures of 25 to 30°C (78 to 86°F), for example, can have a very positive effect on fumigation efficacy and efficiency.

Fumigators can use the following methods for increasing temperature of the fumigated space. Permanent/built-in systems utilizing hot water, steam, electric, fossil, solar heat sources. Temporary/leased units operating on propane or natural gas, electric or other fuels can be used. Fans, heater fans and other electrical equipment should be grounded and have a good protective fusable or breaker system. Planning fumigations during the warmer seasons or even during the warmer periods of the day can positively affect temperature factor.

Do not apply this product for insect control when the temperature of the site of the pests is below 40°F.

The measured minimum temperature at the site of the insect pest should be used for dosage calculations.

For rodents, temperature does not affect dosage because they are warm blooded.

Time Factor (T)

The time factor is a key component of C x T = Dosage formula. The exposure time is defined as the number of hours the target insect is exposed to the fumigant. If the structure has good gas confinement, increasing the exposure period is one of the most cost effective practices available to the fumigator. Doubling exposure time in a well-sealed structure can decrease gas needed by up to 50%. The fumigator should work with the customer to plan and optimize exposure time to minimize the fumigant needed.

Increase time = Decrease gas needed
Decrease time = Increase gas needed

Half Loss Time (HLT)

HLT is the measurement of how well a fumigated space or area holds fumigant from loss. HLT is defined as the time in hours during which 50% of the initial concentration of fumigant is lost. Research has shown fumigant retention is often extremely variable between and even among areas within a structure. Results from numerous measurements for this product indicate the main influencing factors are:

1. Condition of seal (wall construction, number and size of leaks, etc.).
2. Type of underseal (slab, soil, wood).
3. Volume of structure (ratio of surface area to volume).
4. Wind velocity.
5. Number of windows and doors and other openings such as pipes, vents, racks, etc.

If HLT is more than 20 hours for structures, the seal is considered very good. HLT is calculated by actively monitoring the fumigation with a Fumiscope or similar device over a period of time and determining the specific loss of gas in that time period. To get a reasonably accurate picture of the HLT in a large structure, monitoring points should be established throughout the building. This ensures that each area or compartment of the structure will achieve the required dosage. Drexel Chemical's Master Fume AG Calculator will calculate an HLT by area using the collected monitoring data.

Under conditions of rapid fumigant loss (low HLT), only the initial hours of exposure significantly accumulate dosage. If the HLT is significantly shorter than expected (fumigant leaking drastically faster than planned), to achieve the required dosage, the fumigator must take additional steps. These steps include, but are not limited to, stopping the addition of fumigant and addressing the leak (following re-entry procedures if there is a need to reenter or wearing SCBA if working from outside), before increasing gas concentration of this product, increasing the time of exposure or utilizing a combination of the two methods.

Best practice is to use monitoring data, from previous fumigations for this or similar sites and conditions to estimate the HLT, and then monitor to confirm the true HLT. When a reasonable estimate of HLT is not available prior to the initiation of exposure, the following Precision Fumigation method should be used. Introduce part of the calculated dosage of this product, monitoring to determine the actual HLT and then introduce additional parts of the calculated dosage and/or increase exposure time to achieve the target dosage.

USING DREXEL CHEMICAL'S MASTER FUME AG CALCULATOR PROGRAM

Drexel Chemical's Master Fume AG Calculator is a computer-based program that requires entry of key information to determine the dosage and amount of this product to be used. Before Drexel Chemical's Master Fume AG Calculator Program can be used, contact your Drexel Chemical Company representative on how to activate the computer program for calculating dosage. Drexel Chemical's Master Fume AG Calculator Program may be modified and updated from time to time; please contact your Drexel Chemical Company representative for more information.

Drexel Chemical's Master Fume AG Calculator Program has been developed to allow fumigators to calculate the correct dosage over a broad range of pest species, life stages, temperatures and exposure times. Drexel Chemical's Master Fume AG Calculator determines the necessary dosage (gram-hours or ounce hours), converts this to pounds of this product per 1000 cubic feet (or cubic meter) based on volume of fumigated space for all target pests referenced in this Manual. The program also can calculate the necessary adjustments to the exposure period or pounds of this product required to reach the target dosage based on fumigation monitoring data.

- The maximum target concentration in Drexel Chemical's Master Fume AG Calculator is 128 ounces per 1000 cubic foot.
- The maximum target dosage for NAP fumigation in Drexel Chemical's Master Fume AG Calculator is 1500 CT (ounces-hour per 1000 cu. ft.).

Drexel Chemical's Master Fume AG Calculator Temperature Range

This Manual states that the lower fumigation temperature limit is 40°F for insects. At present, however, Drexel Chemical's Master Fume AG Calculator calculates specific dosages for temperatures between 68°F (20°C) and 86°F (30°C). Drexel Chemical's Master Fume AG Calculator allows the user to input temperatures higher than 86°F, but will calculate the dosage based on 86°F. Since the efficacy of this product increases with temperature, Drexel Chemical's Master Fume AG Calculator dosages for temperatures higher than 86°F are conservative.

Drexel Chemical's Master Fume AG Calculator allows the user to input temperatures below 68°F, but will calculate the dosage based on 68°F and provide a warning message that insect control may be less than optimal due to the cooler temperature and decreased insect metabolism. Following the fumigation, monitoring the pest population is recommended to assess control.

Drexel Chemical's Master Fume AG Calculator Exposure Time Range

Drexel Chemical's Master Fume AG Calculator allows the user to input exposure times between 1 and 168 hours. Short exposures of a few hours are best suited for vacuum fumigations, while exposure periods of several days can be appropriate for reasonably sealed structures. Fumigations will commonly be 24 hours due to the need to limit shutdown time, but extending the exposure time can decrease the amount of fumigant necessary. Use Drexel Chemical's Master Fume AG Calculator to determine the most appropriate exposure time to meet both the customer's and fumigator's needs.

Drexel Chemical's Master Fume AG Calculator HLT Range

Drexel Chemical's Master Fume AG Calculator accepts HLTs from 1 to 1000 hours. The fumigator estimates this value prior to the fumigation preferably based on results of monitoring previous fumigations of this structure or of fumigations conducted under similar conditions. HLTs of greater than 50 hours are normally achieved only in chambers and other tightly sealed silos. Change HLTs in Drexel Chemical's Master Fume AG Calculator to see the impact of HLT on the amount of fumigant needed for a fumigation.

Drexel Chemical's Master Fume AG Calculator Area Volume Range

Drexel Chemical's Master Fume AG Calculator calculates fumigant dosages for structures ranging in volume from 35 to 10,000,000 cubic foot. Errors in measuring the volume can lead to under-dosing and not achieving the target dosage or using more fumigant than is needed to achieve the target dosage.

Drexel Chemical's Master Fume AG Calculator Ranges

Temperature:	68 to 86°F
HLT:	1 to 1000 hours
Exposure Time:	1 to 168 hours
Volume:	35 to 10,000,000 cu. ft.
Dosage:	"Low" or "High"
Fumigation Type:	"Space" or "Commodity"
Pressure Type:	"Normal Atmospheric" or "Vacuum"

Limits

Dosage (CT):	1500 oz-h/1000 cu. ft. (NAP)
	200 oz-h/1000 cu. ft. (vacuum)
Concentration:	128 oz/1000 cu. ft.

Drexel Chemical's Master Fume AG Calculator Example

INPUT	
Species:	Red Flour Beetle
Temperature:	86°F
HLT:	15 hours
Exposure Time:	24 hours
Volume:	800,000 cu. ft.
Dosage:	Low
Fumigation Type:	Space
Pressure Type:	Normal Atmospheric
OUTPUT	
Dosage (CT):	338 oz-h/1000 cu. ft.
Concentration:	23.3 oz/1000 cu. ft.
Quantity:	1164 lbs.

Steps of Operation

Preparation prior to fumigant release:

1. Determine pest species and life stages to be controlled.
2. Measure temperature at pest location with a thermometer. (Drexel Chemical's Master Fume AG Calculator operates in both English (°F) and metric (°C) units.)
3. Calculate volume of fumigation space.
4. Determine the targeted exposure period.
5. Estimate the HLT based on previous experience or estimation.
6. In Drexel Chemical's Master Fume AG Calculator, calculate dosage of this product in ounce per 1000 cubic foot (or gm/m³) and get pound (or kg) of this product needed for the job.

Sequential Fumigations

Sequential fumigations are an alternative dosage strategy that may be used to control insect infestations. Fumigate once at the low dosage, which is sufficient for control of the post-embryonic (larva, pupa, adult) stages, plus a significant portion of the eggs. If there are any surviving insect eggs, then after they have hatched, but prior to their maturation and deposition of new eggs, fumigate a second time, again at the low dosage. When sequential fumigations are done, do not exceed the maximum cumulative target dosage of 1500 CT (1500 oz-h/1000 cu. ft.) for the target commodity.

Using Drexel Chemical's Master Fume AG Calculator When Monitoring

During the exposure period, the concentration of this product can be measured by a Fumiscope or similar device. After the fumigant concentration has reached equilibrium, measurements taken over an interval of time will give the actual loss rate from which the HLT can be determined. Use of Drexel Chemical's Master Fume AG Calculator during monitored fumigations has shown that significant quantities of this product can be saved compared to unmonitored fumigations and better control achieved. Refer to Drexel Chemical's Master Fume AG Calculator help file for specific directions on how to use this program. Drexel Chemical's Master Fume AG Calculator is designed to determine actual HLT based on measurements of concentrations of this product during fumigation.

Monitoring to Determine Status and Updated Dosing Directions

1. Measure (with a gas measuring instrument such as a Fumiscope or similar device) concentration of this product ounce per 1000 cubic foot (gm/m³).
2. After one or more hours, take a second measurement of concentration of this product. Accuracy of HLT increases as time between monitoring intervals is increased.
3. Drexel Chemical's Master Fume AG Calculator will calculate the actual measured HLT.
4. If the HLT is shorter than estimated (more rapid loss of fumigant), then either more of this product needs to be added to finish on time or the exposure time may be extended if sufficient product is present. Drexel Chemical's Master Fume AG Calculator will provide the time and "add gas" directions.

Chapter 8
MONITORING THIS PRODUCT

Monitoring discussed within this chapter refers to measuring accumulated dosage and does not refer to required monitoring for worker and bystander exposure.

Monitoring fumigant concentration at key places in the fumigated environment is directed because it can provide important information to the fumigator regarding the placement of fumigant introduction sites that will assist in the efficiency and success of future fumigations.

Thus, in addition to helping maximize efficiency of a large fumigation, monitoring fumigant concentration can serve as a learning experience for the fumigator. For instance, if equilibrium is not achieved quickly, the fumigator can consider placing additional introduction sites or fans in the next fumigation.

Measurement of the accumulated concentration of this product while the fumigation is in progress becomes increasingly valuable as the structure size, complexity and the repercussions of poor pest control increase.

THE OBJECTIVES OF MONITORING FUMIGANT CONCENTRATION OF THIS PRODUCT ARE:

1. To allow Drexel Chemical's Master Fume AG Calculator to determine the optimal amount of this product needed to control the target pests under the actual fumigation conditions.
2. To allow Drexel Chemical's Master Fume AG Calculator to calculate CT (dosage) needed and achieved to ensure a successful fumigation.
3. To allow Drexel Chemical's Master Fume AG Calculator to calculate the actual HLT vs. just estimating the HLT.
4. To create a reasonable history of Drexel Chemical's Master Fume AG Calculator file records so that enhanced Precision Fumigation techniques can be built upon in subsequent fumigations.

SPECIFIC GUIDELINES FOR MONITORING A TYPICAL FUMIGATION

This product should be circulated so as to reach equilibrium rapidly, ideally within an hour of introduction. The time for HLT determination starts only after equilibrium of this product has been established.

1. Monitor this product in spaces most representative of the atmosphere in which insects will be located within the structure. In larger jobs, more sampling points may be necessary.
2. In structures with partitions or poor air circulation, samples should be taken from the separate sections, such as each floor of multiple story structures or each room in a partitioned building.
3. Measurements should be as dependable and accurate as possible, especially when low concentrations are involved.
4. The time required between measurements to determine the HLT will depend on the estimated HLT or past history of the structure.

Monitoring Hoses

Arrangements should be made to place sampling hoses in the structure prior to fumigant introduction. Semi-rigid vinyl hoses (3 to 6 mm or 1/8 inch to ½ inch ID) should be placed so as to sample representative concentrations with a Fumiscope or similar device. Monitoring hoses larger than 6 mm ID may take a longer time to pull the sample from the fumigated space to the monitoring device because of the larger volume of air needed to be moved.

Adequate tubing must be connected to the Fumiscope or similar device to direct all of the fumigant exhausted from the unit back into the enclosure or structure to prevent exposure to the fumigant.

Chapter 9
AERATION, CLEARING, AND RE-ENTRY

Two persons trained in the use of this product, at least one being an applicator certified by the State, must be present on site at all times during introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure, when testing for re-entry after aeration (if aerated in an enclosed space) and during re-entry.

It is essential that no occupant reenter the structure after fumigation until the fumigant has been aerated and the space has been fully tested and cleared for re-entry.

One of the features of this product for structural fumigation is its capacity to rapidly diffuse into the sites of the pests. Then, when the confinement seals are removed, aeration is also typically rapid. Fans are excellent aids in attaining quick aeration and are essential where cross ventilation is poor. The "opening" of a fumigation should be carried out with care to minimize crew and bystander exposure to this product.

PRECAUTION: Prior to aeration, fumigators need to take into account the proximity to bystanders, location of other structures, wind speed and direction.

AERATION — PRACTICES

Successful, timely, and safe aerations following fumigations must be planned. The following five practices should always be factored into the fumigation prior to fumigant introduction:

1. MINIMIZE CONCENTRATIONS AT END OF EXPOSURE PERIOD: The lower the concentration of fumigant at the end of the exposure period, the easier and more timely the aeration process will be. By using Precision Fumigation techniques, the fumigator can minimize the amount of fumigant introduced, maximize its efficiency and maximize the accumulated dosage (CT).
2. AERATE AT THE HIGHEST POINT PRACTICAL: By aerating at the highest point on the structure, the highest concentrations of fumigant are directed away from workers and bystanders and are allowed to quickly dilute to less than 1 ppm levels.
3. DIRECT AERATION GASES UPWARD: Aeration in an upward manner also directs fumigant away from workers and bystanders and by using additional fans, acts to further dilute the fumigant to safe levels. In many cases, a permanent exhaust system that forcefully directs the air column upward or emits it through a stack would aid in the efficiency and safety of the aeration process.
4. CONTROL THE EXHAUST RATE: The exhaust rate during the aeration process should be controlled to ensure large volumes of fumigant laden air have time to disperse, thus minimizing the risk of bystander exposure to concentrations greater than 1 ppm. Many structures have air handling systems that can easily achieve a total air exchange within the facility in a very short period of time.
5. MONITOR TO ENSURE WORKER AND BYSTANDER EXPOSURE LEVELS ARE NOT EXCEEDED: The perimeter of the fumigation area, especially downwind, must be monitored to ensure that concentrations of this product are kept within acceptable levels outside the fumigation area.

FACTORS INFLUENCING AERATION TIME

Five factors affect the time needed for aeration:

1. Rate of air exchange
2. Terminal fumigant concentration
3. Load factor - sorption/desorption and diffusion rate
4. Temperature
5. Interior layout of the structure

Rate of Air Exchange

The most important factor in aeration is the rate of air exchange in a structure. The air exchange rate will be influenced by openings in the external walls (windows, vents, door, etc.), wind velocity, size and arrangement of the structure. The most effective, practical method to increase the rate of aeration is to increase cross ventilation by opening doors and windows. Fans are also useful for this purpose as a means of establishing a directed airflow through the structure in which fresh air is introduced and air inside the structure is exhausted/ventilated as efficiently as possible.

Terminal Fumigant Concentration

The amount of fumigant left in a structure at the end of the fumigation period can vary greatly. All other factors being equal, the greater the terminal concentration, the longer the time required to complete aeration. Thus, good planning and monitoring to ensure only the necessary amount of this product is introduced can decrease the aeration period.

Load Factor — Sorption, Desorption and Diffusion

The "load factor" can be expressed as the amount of materials fumigated that will adsorb or absorb the fumigant. This product has relatively low sorptive characteristics, meaning it has a low potential to stick to or react with fumigated materials.

The sorption that does occur, however, can affect aeration in some situations. Desorbing fumigant can slow the time to reach safe re-entry levels of 1 ppm or less. Often, the greatest amount of this product to be desorbed is associated with the commodities.

The sorption/desorption phenomenon is a function of fumigant concentration and temperature — the higher the concentration throughout the fumigation, the greater the driving force for sorption and, therefore, the higher the quantity to be desorbed. As with sorption, desorption initially occurs very rapidly. Most of the fumigant will desorb during the initial part of the aeration period in response to the immediate lowered concentration inside the structure when seal is broken.

Temperature

Temperature has a direct effect on the clearance rate of a fumigant. The higher the temperature, the faster the rate of gas diffusion and desorption.

HANDLING UNAERATED COMMODITIES

Transfer of an unaerated commodity to a new storage site within a facility prior to complete aeration is permissible; however, transfer of unaerated containers or truck trailers over public roads is prohibited. Also, railcars cannot be moved off site until aerated.

While handling unaerated commodities, people must not be exposed to this product in excess of permitted exposure levels.

Transfer of incompletely aerated commodity via bulk handling equipment such as augers, drag conveyors and conveyor belts to a new site is permissible. However, the new storage must have proper placarding and adequate security if it contains greater than 1 ppm of this product. Workers who handle incompletely aerated commodity must be informed and appropriate safety measures must be taken (i.e., ventilation and respiratory protection) to prevent exposures from exceeding 1 ppm.

CLEARANCE AND RE-ENTRY

Re-entry Procedures

Before aeration, if re-entry into an area under fumigation is required for any reason, the following procedures must be strictly adhered to:

1. Before re-entry, measure the concentration of this product using a sufficiently sensitive device to adequately prepare for worker safety.
2. A minimum of two persons, one an applicator certified by the State and others being trained in the use of this product, must be present on site to reenter an area under fumigation for initiating aeration or trouble shooting and testing for concentration of the fumigant after aeration before releasing for reoccupation.
3. The person before entering must be wearing a self-contained breathing apparatus (SCBA) with full facemask and operating in pressure demand mode or its equivalent.
4. Other appropriate worker protective equipment must be worn by all workers at the site depending upon the site and the type of work being done.
5. Notify authorities, emergency personnel and other required personnel if re-entry is done under emergency conditions (see *"Chapter 9"*).

No one shall be in fumigated areas if the level of this product is more than 1 ppm unless wearing a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air supplied/SCBA respirator, such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Only a detection device of sufficient sensitivity, such as the INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR can be used to confirm a concentration of 1 ppm or less of this product.

Re-occupancy

Do not allow re-occupancy of any fumigated area until the aeration and clearing process is complete according to directions and levels of this product do not exceed 1 ppm as determined by the use of a detection device with sufficient sensitivity.

Following the aeration period, the fumigator must test the breathing spaces in the space or structure to make certain that the concentration of this product is 1 ppm or less before allowing re-occupation of the structure.

Follow all Federal, State, and local requirements for re-occupancy.

Chapter 10

SITE SPECIFIC CONSIDERATIONS

KEY CONSIDERATIONS FOR FUMIGATING STORAGE FACILITIES, TRANSPORT VEHICLES AND PROCESSING PLANTS

Follow all local, State and Federal regulations covering the fumigation of vehicles and processing plants.

Stationary vs. In-Transit
Empty and loaded containers, trucks, railcars, surface ships and other transport vehicles or vessels may be fumigated in essentially the same way as other storage facilities. However, in-transit fumigation (including aeration) of any vehicle is prohibited on public roads or waterways. Nevertheless, stationary vehicles under fumigation may be moved within the confines of the fumigation site if necessary. Special care must be given while moving a stationary vehicle or vessel under fumigation so as to prevent exposure to bystanders or workers to levels of 1 ppm or more of this product. Vehicles and vessels successfully moved must have proper placarding and adequate security. Workers who handle incompletely aerated commodity must be informed and appropriate safety measures must be taken (i.e., ventilation and respiratory protection) to prevent exposures from exceeding 1 ppm. Moving vehicles while under fumigation on the fumigation site may result in loss of fumigant and, therefore, potentially less effective fumigation.

Selection of Fumigation Location
The size and configuration of the space and the adequacy of the circulation will dictate the placement and number of release sites for this product in a stationary vehicle or vessel. Careful planning must be made for fumigant introduction in railcars, shipping containers and trailers. Prevent the liquid form of this product from contacting any part of the vehicle or contents as it can damage paint or tarnish metals. Railcars, shipping containers and trailers must be placed in a location appropriate for conducting fumigation. The location should be away from other work areas in a secured place.

Sealing the Vehicle or Vessel
Stationary vehicles should be prepared and sealed following general fumigation using tarpaulin and tape.
Seal vessels using tarping, taping, and other methods specific for ships to confine this product to the fumigation area.

Securing the Vehicle or Vessel
After the fumigation site has been selected, railcars and trailers should be moved into position and secured by setting the brakes and blocking the wheels so that the vehicle will not move during the fumigation and aeration periods.
When fumigating vessels, place warning signs at all entrances and secure the fumigated space. Only certified applicator and trained workers involved in the fumigation, wearing appropriate personal protective equipment, may be at the site during fumigation and aeration.
Follow label instructions for securing entrances and posting warning signs on fumigated spaces and structures.

Fumigation of Surface Ships and Vessels in Port
Because of its physical properties, this product is ideally suited to control pest infestations in surface ships. Its high volatility allows the gas to penetrate into all areas of the vessel very quickly, control the pest and aerate rapidly. However, due to its lack of warning properties and high inhalation toxicity, this product must not be used to fumigate ships or other vessels while they are in use. People and desirable plants or pets must not remain on board during the fumigation.
Surface ships and barges may be fumigated with this product, but all aeration procedures must be completed before these vessels are allowed to sail. The vessel must not be moved during the fumigation and aeration periods. If re-entry is necessary before aeration is completed, strictly follow re-entry procedures (see *"Chapter 9"*). Only those persons involved in the fumigation may be at the fumigation site, including during the aeration process.

Important: Submarines and other below-the-surface ships must not be treated with this product.
Except for those persons involved in the fumigation, no people, desirable plants, or pets may be on board during fumigation. The professional fumigator and the ship's captain (or owner) shall follow all applicable regulations including those listed in the Coast Guard, DOT, Title 46, Shipping, section Parts 147A.1-147A.43. Since the codes listed are for fumigants in general, do not use procedures that are not permissible for this product as directed by label instructions and regulations.
If conditions of high relative humidity exist in the vessel during fumigation, great care should be exercised to use the proper sized fan and shooting hose to avoid overshooting the fan capacity, thereby causing a "fog out" in the vessel and possibly tarnishing and staining.

Vehicle (Containers, Railcars, Trailers, etc.) Aeration
Aerate the vehicle using active ventilation methods. To help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry, to the extent possible, control the ventilation process using the best practices procedures described in this Manual (*"Chapter 7"*), monitor concentrations of this product around the fumigated ship and/or prohibit entry into the area in question. At the end of the aeration time when the vehicle has been cleared for re-entry, the warning signs should be removed, the chocks removed from the wheels, and the vehicle put back into service. In-transit fumigation and aeration of railcars and other transportation vehicles are not permitted.

Surface Ship Aeration
Only those persons involved in the fumigation may be at the present fumigation site until the site is cleared for re-occupancy. In-transit aeration of ships is not permitted. Ships must be aerated and cleared for re-entry prior to being reoccupied. Aerate the ship using active ventilation methods to ventilate the bulk of the fumigant from the ship. To help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry, to the extent possible, control the ventilation process using the best practices procedures in this Manual (*"Chapter 7"*), monitor concentrations of this product around the fumigated ship and/or prohibit entry into the area in question.

PREPARATION FOR CHAMBER OR STACK FUMIGATION
Safety precautions and fumigation procedures vary by whether the chamber or stack is outside or within another structure. Before any chamber or stack is fumigated, it is appropriate to:

1. Determine the correct dosage (concentration x time = ounce-hours) to control the designated pest under the specific treatment conditions.
2. Confirm that the chamber or stack and any accessory equipment perform as intended.
3. Determine that this product will be confined within the chamber or stack by making a test run and monitoring for leaks with appropriate equipment. Pressure testing can also indicate the gas confinement capabilities of the chamber.
4. Have on hand proper respiratory protection equipment (SCBA) and personnel trained in how to properly use it.
5. Train personnel in the proper handling of the cylinders.
6. Educate personnel in first aid procedures to be followed should an accident occur and personnel be exposed to this product.
7. Notify other appropriate individuals that fumigations of this product will be taking place: Company employees other than those performing the fumigations such as security patrols, janitors, etc., police and fire department personnel and others required by local, State and Federal laws.

A. CHAMBERS AND STACKS WITHIN STRUCTURES
Permanent Chambers
Fumigations with this product may be conducted in permanent fumigation chambers enclosed within a larger structure. A permanent chamber is defined as a durable hard-walled structure engineered specifically for fumigation that effectively confines this product.
Monitor indoor areas around the permanent fumigation chamber for concentrations of this product during the fumigation, especially during introduction. No one is permitted to be in an area where the concentration of this product is more than 1 ppm without proper respiratory protection (SCBA). It is advisable to position the chamber away from work areas.

LOADING: Chambers and stacks should be loaded so that adequate air movement can occur around commodities to allow even distribution of the gas.

CIRCULATION FAN(S): A shooting fan/circulation fan is recommended when introducing this product. A small circulating fan inside the chamber will provide a gentle movement of air adequate to achieve even gas distribution throughout the chamber. However, if a large open space is not available or if use of an introduction fan is dangerous or impractical, an introduction/circulation fan is not required. If a fan is not used, ensure introduction will not result in a fog-out within the fumigation chamber. Slow introduction rates (1 to 4 pounds per minute) are recommended to prevent excessive cooling of air near the introduction site. Do not apply liquid fumigant directly onto food commodities. Another recommendation is to increase the number of

introduction sites. Without circulation fans, reaching equilibrium will be delayed or may not be achieved. Thus, insect control may not be achieved throughout the chamber and aeration will be slowed since ventilation will be lessened.

TESTING SEAL EFFECTIVENESS: Fittings for conducting pressure tests and for monitoring lines during fumigation should be incorporated in the chamber.

Vacuum Chambers
Vacuum fumigations often require a lower use rate than normal atmospheric fumigations. Do not exceed 200 ounces-hour per 1000 cubic foot. Vacuum fumigations can be conducted in vacuum chambers located within an enclosed structure without considering the entire structure as being under fumigation.

PLACARDING: Post warning signs at all entrances to the vacuum chamber.

INTRODUCTION: This product should be released from outside the building. If this product is released into the vacuum chamber from within the enclosing structure, then the occupied area must be monitored to ensure the concentration of this product does not exceed 1 ppm.

WORKER EXPOSURE MONITORING: The area surrounding the vacuum chamber should be frequently monitored for concentrations of this product to ensure that occupants and workers are not exposed above 1 ppm. Special care should be taken to monitor during introduction to ensure that the introduction lines and cylinder connections are not leaking. If any leak resulting in detectable levels greater than 1 ppm is encountered during application, immediately clear the area of all personnel not wearing an SCBA. Only persons who are wearing an SCBA are permitted in the area to address the leak. Only after the level of this product has dropped to 1 ppm or less are unprotected personnel permitted to enter the area.

AERATION: Aerate the vacuum chamber following instructions above for vacuum chamber fumigations outside structures.
If re-entry is necessary before aeration is completed, strictly follow re-entry procedures (see *"Chapter 9"*).

Tarped-Stacks
This product may be used to fumigate stacked commodities by covering the commodity with highly fumigant-resistant tarpaulins and then sealing them to the subsurface to create a temporary fumigation chamber (tarped-stack).
All personnel not trained or not involved in the fumigation must be vacated from the immediate area in which the tarped-stack fumigation is occurring until the fumigation is completed and the immediate area has been cleared for re-entry.
The indoor areas around the tarped-stack must be monitored for concentrations of this product when fumigation workers, without proper respiratory protection (SCBA) are present within the structure. Perform air monitoring by utilizing a detection device with sufficient sensitivity such as an INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR to ensure that workers are not exposed to concentrations of this product exceeding 1 ppm. No one is permitted to be in an area where the concentration of this product is above 1 ppm without proper respiratory protection (SCBA).

PLACARDING: Post warning signs to all sides of the structure that encloses the stack. For a tarped-stack, post all sides of the stack as well as all entrances and sides of the building.

OCCUPANCY: All personnel not trained or involved in execution of the fumigation are not permitted within the immediate area of the tarped-stack during the fumigation.

SECURING THE ENCLOSING STRUCTURE: When the fumigation workers are not present at the fumigation site, the enclosing structure must be secured from entry by anyone other than the certified fumigator or persons under his/her direct supervision.

WORKER EXPOSURE MONITORING: Workers and bystanders should not be exposed above 1 ppm of this product. When fumigation workers are present within the enclosing structure during the fumigation, frequently monitor with a detection device of sufficient sensitivity to measure at the 1 ppm level. Immediately vacate the area or use proper respiratory protection (SCBA) if the concentration of this product exceeds 1 ppm. Utilize ventilation procedures to reduce this product below 1 ppm prior to allowing re-entry without an SCBA.

INTRODUCTION: This product should be released from outside the building. If this product is released into the tarped-stack from within the enclosing structure, then the occupied area must be monitored to ensure the concentration of this product does not exceed 1 ppm.
If any leak resulting in detectable levels above 1 ppm is encountered during application, immediately clear the area of all personnel not wearing an SCBA. Only persons who are wearing an SCBA are permitted in the area to address the leak. Only after the level of this product has dropped below 1 ppm are unprotected personnel permitted to enter the area.

AERATION: Aeration should be designed to exhaust fumigant from the enclosing structure to ensure that workers and bystanders are not exposed to levels above 1 ppm.

B. CHAMBERS AND STACKS OUTSIDE OF STRUCTURES

Atmospheric Pressure Chambers
DESIGN AND CONSTRUCTION: A suitable atmospheric fumigation chamber consists of a sufficiently gas-tight room with an appropriate door. An application system, exhaust blower and a small fan for even gas distribution are recommended.

PLACARDING: The applicator must post all entrances and all sides of the chamber (if accessible) to be fumigated with warning signs.

INTRODUCING FUMIGANT: Release this product from the cylinder placed outside the chamber through an introduction system (introduction lines, connectors, etc.) with a minimum 500 psi burst pressure rating. A small fan should be used to distribute the gas uniformly within the chamber. Monitoring gas concentrations within the chamber can confirm the distribution of gas within the chamber.

DOSAGE MONITORING: Monitoring gas concentrations within the chamber during the exposure period with a Fumiscope or similar device is recommended to confirm HLT, describe gas distribution throughout the chamber, and ensure the target dosage is achieved. Recommended monitoring site locations include one at high, medium, and low heights and in the front, middle and back of the chamber.

EXHAUST FAN(S): The size of the exhaust blower will depend on the size of the fumigation chamber and the aeration time requirements. Generally, a fan capable of changing the air in the chamber in 5 to 10 minutes is recommended. The chamber must exhaust this product outside the building and away from adjoining buildings or work areas. Consult your State agency for emission control requirements.

Vacuum Chambers
Vacuum chambers require special designs which take into account the vacuum pressure exerted on the materials of construction. For this reason, it is recommended that trained engineers be consulted before constructing a vacuum chamber. Follow all directions given by the manufacturer or design engineer.
Vacuum fumigations often require a lower use rate than normal atmospheric fumigations. Do not exceed 200 oz-h/1000 cubic foot.
Specially built steel chambers for vacuum fumigations provide the fastest and most effective fumigation. After the commodity is placed in the chamber, pumps evacuate air. This product is introduced and rapidly penetrates all space previously occupied by air. A lethal dosage of this product results when the proper concentration is maintained for the required fumigation period. With the sustained concentration (no leakage) and a vacuum of 25 to 27 inches Hg, the time of exposure and the dosage may be reduced for some insects and life stages.

PLACARDING: The applicator must post all entrances and all sides of the chamber (if accessible) to be fumigated with warning signs.

DRAWING A VACUUM: A vacuum of 25 to 27 inches of mercury is commonly drawn for vacuum fumigations. Check to ensure that the vacuum is maintained according to plan. Unplanned vacuum release indicates leakage. Note that some vacuum fumigations are planned to allow release of the vacuum during exposure with the objective of improving penetration of the commodity as air enters the chamber.

INTRODUCING FUMIGANT: Because of the special design of vacuum chambers, the manufacturer or design engineer's operation procedure be followed. Release this product from the cylinder placed outside the chamber through an introduction system (introduction lines, connectors, etc.) with a minimum 500 psi burst pressure rating. A small fan can be used to distribute the gas uniformly in the chamber if the vacuum is to be maintained throughout the exposure period.

DOSAGE MONITORING: The Fumiscope or similar device cannot be used to measure this product during a vacuum fumigation unless the vacuum is released. If the vacuum is maintained, and thus no gas is leaking from chamber, the achieved dosage (CT) can be calculated by using the simple Concentration x Time formula.

AERATION PROCEDURES: At the end of the exposure, release the vacuum, ensuring any exhaust does not expose workers or bystanders above the permissible exposure limit. Purge the chamber of air/fumigant 2 times by pulling a partial vacuum prior to checking the gas concentration for re-entry purposes. Aeration of this product is very rapid, but desorption can occur for a longer period of time.
Manage the aeration process (location, exhaust rate and direction) to ensure that workers and bystanders are not exposed to levels above 1 ppm.
Always check for the concentration of this product with a suitable detector before entering the chamber without proper respiratory protection (SCBA). Keep the exhaust fans running during the aeration period and also while unloading the chamber. Remove the warning signs when aeration has been completed and it has been determined that the area is safe to enter.

Tarped-Stacks
Fumigations may be conducted in temporary chambers created using tarpaulins or other gas impermeable sheeting as the "walls" to hold in the fumigant. These are sometimes called "stack fumigations." The following instructions pertain to fumigation of tarped-stacks located outside other structures.
The items should be placed on a sufficiently airtight foundation, such as another tarp or on concrete, and covered with a fumigation tarp to ensure a tight seal. The tarp over the items should be supported so as to create a gas expansion dome. The edge of the tarp on the foundation must be sealed either by weighting the edges with sand or water "snakes" or equivalent.

PRECAUTION: Tarp fumigations should be conducted out of doors or in a building that will not be occupied during fumigation and aeration periods.

PLACARDING: All entrances and all sides of the fumigated environment and any connected area not monitored must have warning signs.

DOSAGE MONITORING: Monitoring gas concentrations within the tarped-stack during the exposure period with a Fumiscope or similar device is recommended to confirm HLT, describe gas distribution throughout the stack, and ensure the target dosage is achieved. Monitoring site locations include one at high, medium, and low heights and in the front, middle and back of the stack.

AERATION: Best practices for aeration of tarped-stacks involves setting up a chimney system that will ventilate from the highest point of the stack in an upward direction at a rate that will not lead to workers or bystanders being exposed to levels above 1 ppm.

STORED BULK COMMODITY FUMIGATION (e.g., Silos, etc.)
In many commodity storage situations, the amount of open space for introducing this product is limited compared to the total volume of the structure. It may not be possible to use shooting fans and release methods that are recommended for space fumigations.
Because of limited free air volume and lower air movement, fumigators can best adjust by slowing the introduction rate by using smaller diameter shooting hoses and/or extending the hose length. If the fumigant is released directly into the headspace of a storage structure, care should be taken to avoid contact of liquid fumigant and the commodity. Sufficient air circulation should be provided to prevent moisture condensation in the introduction area.
It is strongly recommended that recirculation systems (portable or built-in) be used to rapidly and evenly distribute this product throughout the space being treated. Existing aeration blowers that are vented to the outside should not be used.

Procedures for Fumigating Bulk Commodities
1. Follow instructions in this Manual regarding sealing, securing, placarding, and aeration/clearing.
2. Seal and secure the storage structure.
3. Determine the target dosage and quantity of fumigant needed using Drexel Chemical's Master Fume AG Calculator.
4. Make adjustments to the dosage based on the fumigant monitoring results and Drexel Chemical's Master Fume AG Calculator recommendations for achieving target dosages.
5. Determine where the fumigant will be released.
6. Best practice is to introduce fumigant directly into the air stream of a recirculation system. This may either be inside the storage structure or directly into the ducting of the system. If the fumigant is released into the recirculation system, it should be down stream of the fan itself.
7. In almost all cases fumigant introduction rates should be slower than for space fumigations of similar volumes to provide time for the fumigant to penetrate the grain mass and not establish high fumigant concentrations in the introduction space.
8. In the event that a recirculation system is not available, the fumigant should be released into the headspace above the commodity. Care should be taken to prevent contact of liquid fumigant with the commodity.
9. Air circulation should be started prior to fumigant introduction and continued during introduction to aid in the penetration of this product into the commodity mass. High concentrations in the introduction space can result in excessive fumigant loss via leakage before the fumigant penetrates evenly into commodity mass.
10. After introducing the initial amount of fumigant to reach the targeted dosage, gas concentrations should be monitored periodically. Any adjustments in terms of amount of fumigant or exposure time should be made based on Drexel Chemical's Master Fume AG Calculator status recommendations.

Bulk Commodity Aeration
1. Prior to the initiation of fumigation procedures, equipment should be put in place for a safe aeration.
2. The fumigant laden air should be vented from the highest practical point of the storage structure slow enough to not exceed exposure limits.
3. If available, aeration blowers can be used to rapidly exhaust remaining fumigant so long as these do not vent in areas where workers or bystanders might be affected.
4. SCBA equipment must be worn if workers must enter the fumigated space to initiate aeration or levels exceed 1 ppm.
5. The storage facility should be finally aerated to 1 ppm or less.
6. The area or site must be monitored to ensure that liberation of fumigant from the treated commodity does not result in the development of unacceptable levels of this product. Do not allow re-entry into treated areas by any person before this time without proper respiratory protection.
7. Actively aerate commodity a minimum of 24 hours prior to offering to consumers.

Mills and Food Processing Facilities
For mills and food processing facilities, special consideration should be given to help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry. To the extent possible, control the ventilation process using the best practices procedures described in this Manual (*"Chapter 7"*), monitor concentrations of this product around the fumigated site, and/or prohibit entry into the area in question.
Precautions to help protect accidental bystander exposure to this product in excess of 1 ppm can be of particular importance because of the sometimes proximate location of residential structures and bystanders that can occasionally occur around mills and food processing facilities.

Special care should be taken to minimize quantities of processed foods prior to space fumigations. Processed food not practical to remove prior to fumigation may undergo incidental fumigation with this product. However, no direct fumigation of processed foods is permitted unless the processed food is specifically listed in the section *"COMMODITIES THAT CAN BE FUMIGATED"*.

Chapter 11
TROUBLESHOOTING

This product in the gaseous phase is a very slightly reactive chemical compared to other fumigants such as methyl bromide, hydrocyanic acid (HCN) or acrylonitrile.

CYLINDERS

Valve Problems

Cylinders of this product are fitted with special valves that are appropriate for use with this product. These valves can be damaged if the wrong size wrench is used. A 25 to 30 cm adjustable wrench should be used to open or close these valves.

STUCK VALVE: Never use excessive force to open a stuck valve. If a valve will not open using normal force, return the cylinder to your distributor.

LEAKING VALVE: Make sure the valve is completely shut off; however, do not use excessive force. Reopening and then closing can usually properly seal the valve and stop the leak. If the valve continues to leak, often tightening the packing nut on the top of the valve to 25 to 30 foot pounds of torque with an adjustable wrench will stop the leak. If the valve still leaks, move the cylinder to an isolated, secured area and allow the cylinder to continue to vent to the air. Be sure to keep people away from the area. When all the gas has escaped, replace the bonnet and identify faulty cylinders by painting the cylinder shoulders red and tagging the cylinder describing the problem in detail. Return the cylinder to your distributor so it may be sent to Drexel Chemical Company for repairs.

Dip Tubes

A broken dip tube rarely is the reason the liquid form of this product cannot be moved out of the cylinder when the valve is wide open. Sharp blows to the cylinder, rough handling, or dropping the cylinder can break off the dip tube from the bottom of the valve. If the dip tube is broken, this product will be released from the cylinder, but at a much slower rate. Either introduce this product slowly or replace the bonnet and call your distributor for instructions on cylinder return procedures.

Leaking Cylinders

Leaking may occur if cylinders receive rough handling. Abrasion on the side of the cylinder may produce pinholes in the metal.

Always identify faulty cylinders, valves and dip tube by painting the cylinder shoulders red. Attach a red tag describing the problem in detail. Return cylinders to your distributor.

CORROSION OF METALS

This product is not known to cause any corrosion when it is in the vapor (gaseous) phase under normal temperatures. Every batch of this product is tested for metal corrosion before being released for sale.

Metal surfaces of copper, silver, steel, stainless steel, brass, aluminum, etc., may become corroded or rusted if this product is released incorrectly. If this product is introduced too rapidly, the temperature of the air will drop below the dew point resulting in the formation of condensation.

Condensation generally occurs in or near the area of introduction of this product. Minute quantities of acids (by-products of the manufacturing process) are soluble in water condensation and can etch metal surfaces. The fumigant introduction rate should not exceed the fan capacity (1 kg of this product per 60 cubic meters per minute of fan capacity) to thoroughly mix the colder air when this product is introduced into the warmer air in the structure.

Metal tarnishing/corrosion can also occur if heat sources are left on during fumigation. This product is decomposed by heat from flames such as pilot lights in furnaces, stoves, dryers or refrigerators and such glowing heat sources as electric heaters. Heat sources above 400°C (752°F) decompose this product to corrosive materials (mainly HF). Therefore, it is imperative that pilot lights and other heat sources which pose this risk be eliminated or turned off during fumigations.

Damage to metals can also occur from the inclusion in the fumigated space of chlorine generators. These pieces of equipment should either be turned off or excluded from the fumigation.

Damage to metals can usually be corrected by cleaning the metal items with a good metal cleanser or polish. The corrosion or rust is usually only on the surface.

GLASS ETCHING

This product in the gaseous phase is not known to cause etching of glass. HF, the decomposition product of this product, may react with ceramic material such as window glass, china, glazed tile, etc., creating a condition referred to as "etching" or "frosting." Therefore, it is imperative that all heat sources which produce temperatures at or near 752°F and pilot lights be turned off during fumigation. Fog-outs can also cause etching of glass and ceramic tile. Each batch of this product is also tested for glass etching before it leaves the production plant.

RUN STAINS

This product in the gaseous phase is not known to cause staining of fabrics, walls, paintings, etc. Staining, however, can be caused by the presence of liquid water (dew or fog) caused by exceeding the capacity of the fan to mix cold air when this product is introduced with the air in the structure. A condition can occur when condensation forms on the interior and/or exterior surfaces of the structures and a "sticky" light to dark brown liquid (from grease, dirt, and smoke) runs down wall surfaces. This may have the appearance in color and consistency of cola. Spots also may form on the bottom side of horizontal surfaces. Most stains can be removed by washing.

Condensation forming and running down vertical surfaces can occur even without the introduction of this product. A structure that is air conditioned to a much lower temperature than the air temperature and then opened to introduce hot humid outside air will form condensation on cold surfaces such as heavy brass. This condition can be avoided by either warming the structure slowly prior to sealing or waiting until all seals are in place before opening windows and doors to avoid introducing outside air.

STAINING

This product in the vapor phase does not cause staining or discoloration of fabric or other materials normally found in a structure under fumigation. Fabric staining or color changes can occur when a high heat source (i.e., pilot light) converts this product to SO_2 and other corrosive materials. Many fabric dyes are acid or base indicators and will change color in the presence of acids or bases. For staining caused by frosting of the fumigant introduction hose, see *"FUMIGANT INTRODUCTION HOSE FREEZING"* section below.

FUMIGANT INTRODUCTION HOSE FREEZING

When this product is introduced according to label directions, the introduction hose will not freeze and the liquid will change to a gas at the end of the hose. The use of the proper size fumigant introduction hose is important. Initially, slowly open the valve a quarter to one-half turn to begin the liquid flow of this product. Then, open valve to one full turn or full flow through the hose. If the liquid changes to a gas within the hose, frost will collect along the length of the hose and water damage can occur to floors, furniture, etc., where the hose rests. Also, this product may change from a liquid to a gas in a hose with kinks. This can cause freeze damage from either frost accumulating on the outside of the hose or the hose becoming brittle, breaking and splashing the liquid form of this product on surfaces. Replace kinked or damaged hoses. Use mesh-reinforced, flexible hosing of proper specifications to avoid this problem.

During release of this product from the cylinder, some chilling of the valves, cylinder, and fumigant introduction hoses can occur under normal circumstances. Valves can freeze if this product is allowed to change from a liquid to a gas within the valve area. Valve freezing is usually caused by using an improper fumigant introduction hose connector. Carpeting and floors can be damaged if cylinders, fans and hoses are allowed to rest upon them. When this could pose a problem, plastic or other protective material should be placed under the fumigant introduction hoses and fans.

PLANT AND TURF DAMAGE

This product is quite toxic to most plants and they should be protected from the fumigant; however, plants should not be used as an indicator of the success or failure of a fumigation. Plants should be removed from inside the fumigation site. Structural foundation plantings of ornamental shrubs and trees can be protected to a certain degree from the gas by wetting the soil, thereby sealing off the gas from the plant root system. Water is an excellent barrier and this product will not readily move through moist soil.

Certain plants have been found to be more sensitive to this product than others. These include junipers, some dwarf palms, springeri fern,

orchids and Lily grasses (*Liriope* spp. and *Ophiopogon* spp.) which are commonly used as border plantings. Special attention should be given to these plants during fumigation and the initiation of aeration to reduce the exposure to this product. Plants that have been moved should be placed in a similar environment to that where they were being grown — same temperature, light, humidity, etc.

ODOR PROBLEMS

Odors can also be caused by the decomposition of dead animals. Occasionally, animals such as rats or mice are trapped inside the fumigation site and killed during the fumigation. Many times they die in inaccessible areas within the structure and cannot be easily removed.

POOR CONTROL OF PESTS

Poor control of the target pest is caused by not generating the target CT (Concentration x Time) for the temperature to kill the pest. Accumulation of target CT does not begin until the fumigant has reached equilibrium in the site. Many factors may contribute to insufficient CT accumulation.

1. Confinement of fumigant, primarily ground seal or tarps is worse than estimated.
2. Inaccurate monitoring device.
3. Too short an exposure period (insufficient CT).
4. Using the wrong dosage (insufficient ounces per hour).
5. Not using adequate fans to distribute the gas properly within the site.
6. Not accurately determining the temperature of the pest site.
7. Error in calculating volume to be fumigated.
8. High winds which can cause excessive loss of gas.
9. Target pest excluded from exposure to fumigant by some gas inhibiting barrier.

Latent Mortality

Sometimes live insects may be found immediately after fumigation. Under optimum or favorable conditions, the target pest will be dead or obviously dying by the end of the fumigation period. Researchers have evaluated eventual mortality of several stages of key postharvest pests following exposure to this product. Latent mortality in insects occurs for exposures very near mortality threshold levels. Within a species, the latent mortality period for the egg stage is generally longer and more variable than other life stages.

Non-target Organisms

Signs of activity of live non-target organisms (organisms which are not specific targets of the fumigation) found within the fumigated space does not mean the fumigation failed to control the target pests. Consider the following:

- Lethal dosage requirements vary for different organisms and may be higher for non-target organisms than for the target pest.
- The organism may have received a toxic dosage and will eventually die (latent mortality).
- The non-target organism may have entered the structure during the aeration period.

Therefore, judgment of the success or failure of the fumigation should not be made on the presence of live organisms immediately following the fumigation.

PLASTICS

Liquid form of this product can be a solvent of some plastic materials. This product should not be introduced directly onto plastic surfaces, such as windows, as liquid droplets may discolor or etch the material.

MISCELLANEOUS

WHITE POWDER LEFT AS RESIDUE: A white powder substance found on windows, tile, glass, lamps, etc., indicates that a source of heat (pilot lights, etc.) was left on during the fumigation.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: Store in dry, cool, well ventilated area under lock and key. Post as a pesticide storage area. If the storage area is in an occupied building, the storage area must have either 1) a forced air ventilation system that meets required local ordinances for the storage of hazardous materials and operates continuously; or 2) be equipped with a permanently mounted and properly maintained and functioning sulfuryl fluoride monitoring device designed to alert occupants of the building if sulfuryl fluoride in the air of the storage area is greater than 1 ppm. Store cylinders upright secured to a rack or wall to prevent tipping.

Pesticide Handling: Do not subject cylinders to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use ropes, 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 transport any cylinders in closed vehicles where they occupy the same common airspace as personnel. Transport securely only in an upright position. 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 supplier. Only the registrant is authorized to refill cylinders. Do not use cylinder for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.

Leak Procedures: Evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator, such as manufactured by Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant is determined to be 1 ppm or less in the breathing zone, as determined by a detection device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR.

CYLINDER AND PRODUCT DISPOSAL:

Promptly return all empty cylinders to your distributor of this product. Follow proper cylinder handling directions above. 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, consult your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

WARRANTY DISCLAIMER

Manufacturer warrants that this product conforms to the chemical description on the label and based upon tests believed reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. To the extent consistent with applicable law, Manufacturer makes no other expressed or implied warranty of merchantability or fitness for a particular purpose or any other express or implied warranty.

Use Risk

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable weather, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Manufacturer or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to one of the following, at Manufacturer's discretion:

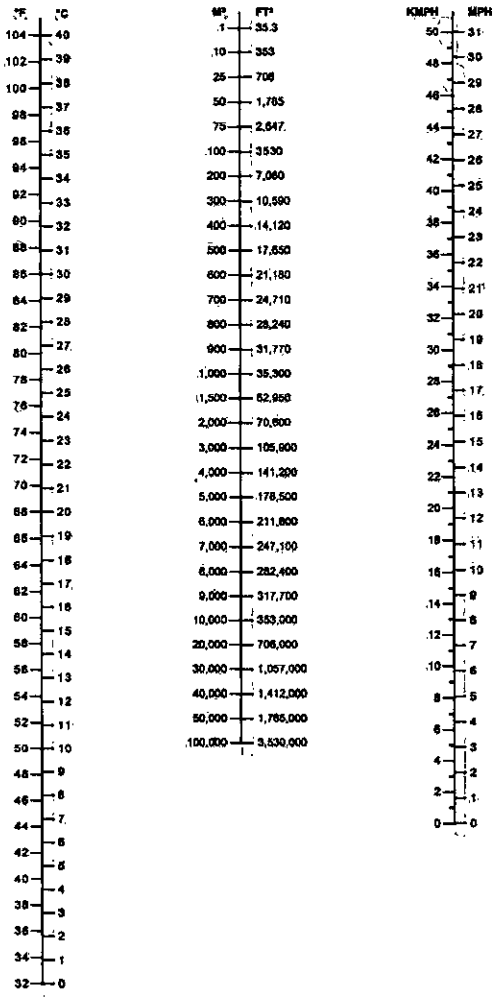
1. Refund of purchase price paid by Buyer or use for product bought, or
2. Replacement of amount of product used.

To the extent consistent with applicable law, in no case shall Manufacturer or the Seller be liable for consequential, special or indirect damages or losses from the use, handling or storage of this product.

The terms of the *"Warranty Disclaimer"* above and this *"Limitation of Remedies"* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of the Manufacturer or the Seller is authorized to vary or exceed the terms of the *"Warranty Disclaimer"* or this *"Limitation of Remedies"* in any manner.

APPENDIX A
ENGLISH-METRIC CONVERSION TABLES

Temperature	Volume	Wind Speed
(°C x 1.8) + 32 = °F	1 ft³ = 0.0283 m³	1.609 kph = 1 mph
(°F - 32) ÷ 1.8 = °C	1 m³ = 35.31 ft³	0.621 = 1 kph



DOSAGE: oz-hr/1000 ft³ ~~ gm-hr/m³
PRESSURE: 1 PSI ~~ 6.9Kpa~~ 0.689 bar
1 bar ~~ 100 Kpa ~~ 14.50 PSI

APPENDIX B
GLOSSARY TERMS

ACTIVE AERATION: Aeration that is not passive. Any increased aeration as a result of human intervention or process.
ACTIVE INGREDIENT: Components of a pesticide that control the target pest and is responsible for the pesticidal effect.
ACUTE INHALATION TOXICITY: Immediate poisoning from a single elevated inhalation exposure to a substance; causes injury or death from a single exposure.
ACUTE ORAL TOXICITY: Immediate poisoning from a single oral elevated ingestion exposure to a substance; causes injury or death from a single exposure.
ACUTE TOXICITY: A rapid response, often within minutes or hours to a single exposure or dose of a chemical.
ADSORBTION/ABSORBTION = SORPTION: The action of a material in holding a gas or substance. The opposite of desorption.
AERATE: Exchange fumigant-laden air with fresh air until the concentration of fumigant has reached the permitted entry level.
AERATION: The final step of a fumigation that involves proper ventilation and clearance of this product from the structure.
AMERICAN CONFERENCE FOR GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH): The professional organization of governmental industrial hygienists which establishes annual recommended guideline threshold limit values (TLVs) for lifetime noise, radiation and chemical occupational exposures for eight hours per day, 40 hours per week.
ANTIDOTE: A remedy that counteracts the effects of a poison.
ARTHROPOD: Any segmented invertebrate of the phylum Arthropoda having jointed legs.
ATMOSPHERE: A mass or body of gases that are present in a region or place.
AXIAL FLOW FAN: A fan in which the air flows through the impeller and casing is primarily axial. The impeller is contained within a cylinder housing (AMCA Publication 211).
BOILING POINT (BP): The temperature at which a liquid converts from liquid phase into a gas (the temperature at which the vapor pressure in a liquid equals the external pressure).
BONNET: The cap that covers the valve and safety cap on the fumigant cylinder to protect the valving system from damage and prevent accidental release of the fumigant.
CARCINOGENICITY: Possessing the power, ability or tendency to produce or incite cancer in a living tissue.
CENTRAL NERVOUS SYSTEM (CNS) DEPRESSION: An alteration of level of consciousness that proceeds other changes in vital and neurologic signs.
CERTIFIED APPLICATOR: Member of a fumigation crew who has successfully completed the proper training and is approved by the State and the manufacturer to release the fumigant.
CIRCULATION: Mechanically stir or circulate the fumigation atmosphere.
CLAMPS: Devices used to attach tarps together and hold them in place during a fumigation.
CLEARING: The procedure following the aeration period when the fumigator tests the breathing space in the structure with sensitive equipment to make certain the concentration of this product is 1 ppm or less before allowing re-occupancy.
CONCENTRATION: Amount of fumigant per unit area within the fumigated space during exposure period. Usually measured in ounces per 1000 cubic feet or grams per cubic meter.
CONDENSATION: The change of a vapor or gas into a liquid.
CUBIC FEET PER MINUTE (CFM): Often used as a rating system for the amount of air a fan can move.
CYLINDER SLING: A type of holster or suspension ring used to suspend a fumigant cylinder.
DESORPTION: The liberation or removal of a fumigant substance from other substances.
DEW POINT: The temperature at which water will condense from air (the temperature at which dew forms).
DEW POINT DEPRESSION: The number of degrees the temperature must be lowered for dew (water condensation form air) to form.
DIP TUBE: A PVC tube that extends from the bottom of the cylinder to the valve on the top that releases liquid Master Fume.
DISPERSE: Distribute the fumigant throughout the fumigation site.
DIFFUSION: The spontaneous process whereby a fumigant moves from an area of high concentration toward an area of lower concentration.

DOSAGE: The number of ounce-hours (gram-hours) accumulated during the exposure period. Target dosage is the ounce-hours targeted during the planning phase.
DOSE: The amount of fumigant introduced into the fumigation space — oz/1000 cubic feet (gm/cubic meter). Often confused with dosage.
DRIERITE: The hygroscopic material used in the Fumiscope unit to remove moisture from the air. Drierite in good condition is normally blue in color.
EQUILIBRIUM: The state when all the sulfuryl fluoride molecules are at equal concentrations from each other in a confined area.
EXPOSURE TIME: The amount of time a fumigant is confined in a structure to kill the target pest.
°F/°C: Working temperature. Usually the temperature of the closest spots insect pests are located. Usually expressed in degrees Fahrenheit or Celsius. In the case of chamber fumigations, the internal temperature of the commodities to be fumigated (i.e., site of pest).
FACE SHIELD: One of two pieces of safety equipment permitted to protect the eyes required when releasing the fumigant (see goggles).
FLASH POINT: The temperature at which vapor explodes.
FLUOROSIS: A mottling or blackening of the teeth caused by an overexposure to fluorine.
FOG: Very fine droplets of liquid moisture in air.
FOG-OUT: The condensation of moisture inside a fumigated structure which is caused by a large drop in air temperature. Methods to prevent a fog-out include: (1) using the proper inside diameter and length of the introduction hose, and (2) using appropriate fans with sufficient velocity to effectively mix the warmer air inside the structure with the colder Master Fume gas.
FUMIGANT INTRODUCTION: Release of the fumigant from its containers into the fumigation space.
FUMISCOPE: A thermal conductivity analyzer used to monitor the concentration of this product during a fumigation. Measures in ounces per 1000 cubic feet or gm per cubic meter. The Fumiscope is not for monitoring for human exposure.
GAS: Matter in vapor state. That fluid form of matter which is compressible with limits and, which owing to the relatively free movement of its molecules, diffuses readily in other like forms of matter and is capable of indefinite expansion in all directions.
GOGGLES: One of two pieces of approved safety equipment to protect the eyes required when releasing the fumigant (see face shield).
GROUND SEAL: The sealing of tarps to the ground to prevent fumigant loss during a fumigation.
HALF-LOSS TIME (HLT): The relative measure of how well a structure holds fumigant. Actual time required to lose one-half of the fumigant concentration, measured in hours. The fumigant loss rate depends on the building construction, sealing practices, wind, and fumigant distribution influences. The *actual/HLT* can be established only by measuring the fumigant concentration during the exposure period with a gas measuring measuring instrument and using Drexel Chemical's MasteRate program.
HANGING BONNET: A type of cap or ring used to suspend the fumigant cylinder.
HEAT OF VAPORIZATION: The amount of heat necessary to change a liquid state to a gaseous state. This is usually measured in British Thermal Units (BTUs).
HEPATIC: Pertaining to the liver.
HOURS EXPOSURE (HE): The number of hours the site is exposed to the fumigant.
HYDROFLUORIC ACID: A highly reactive chemical which can corrode or damage many household effects. This product can decompose into hydrofluoric acid and sulfur dioxide if exposed to high heat conditions present in gas, flames or glowing electric elements.
HYDROGEN FLUORIDE: A colorless liquid made by the action of sulfuric acid on calcium fluoride. The compound is an extremely strong fluorinating agent, which attacks glass.
HYDROLYSIS: A chemical reaction that causes chemical breakdown in the presence of water.
INSIDE DIAMETER (ID): The measurement of the interior width of the fumigant introduction and monitoring hoses.
INERT INGREDIENT: Other non-pesticidal or formulating ingredients in a pesticide formulation.
INTERSCAN GAS ANALYZER: A portable analyzer designed to measure low concentrations of this product for worker and bystander exposure and final clearing. The Interscan provides immediate and continuous readings of gas concentrations from 1 to 50 ppm.
LATENT HEAT OF VAPORIZATION: The number of calories per mole of substance needed to change a liquid at its boiling point to a gas. For this product, this is 4600 cal/mole. When liquid fumigants under pressure are released, available heat is "pulled" from the immediate surroundings as the liquid changes to a gas.
LATENT MORTALITY: The delayed kill of an organism receiving a toxic dose.
LEAK DETECTOR: Device used to detect leaks in the structure or seal during a fumigation. An example would be a TIF 5750 or XP-1 detector models.
LOAD FACTOR: The amount of material within the fumigated space. Sometimes fumigant is sorbed by materials and made unavailable for insect control.
MAXIMUM CONCENTRATION: The greatest concentration of chemical that can or is permitted to exist as a gas in a given space. The higher the maximum concentration of the fumigant, the more that can be applied in a given space.
MIRAN SapphIRe (mobile infrared analyzer): A type of clearance device used to clear a structure for re-occupancy after a fumigation. Uses infrared technology to measure down to ppm.
MOLECULAR WEIGHT: The sum of the weights of the constituent atoms of a molecule. For this product it is 102.07.
MONITORED FUMIGATION: Repeated observations of a fumigation during the exposure period to determine the concentration of gas at a specific location, detect gas loss over time, ensure the appropriate amount of fumigant and the exposure time, and/or to reduce potential problems or expenses.
MUTAGENICITY: Possessing the power, ability or tendency to produce genetic changes or mutations.
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH): The U.S. government agency responsible for research regarding occupational safety and health issues in the workplace. They also approve appropriate safety equipment, such as hard hats, respirators, eye protection, etc.
NON-FLAMMABLE: Not flammable or readily ignitable.
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA): Federal agency that regulates worker health and safety procedures and practices.
ODOR POTENTIAL: The possibility of malodor being generated due to the fumigant having been in contact with certain materials.
OUNCE-HOURS (OH) OR GRAM-HOURS: Dosage = concentration X hours exposure.
OVICIDAL: Possessing the ability to kill the egg stage of an insect.
PARTIAL PRESSURE (DALTON'S LAW): In any mixture of gases the total pressure is equal to the sum of the partial pressures each gas would exert were it present alone in the volume occupied by the mixture. The total pressure P is equal to the sum of the partial pressures of the individual gases.
PARTS PER MILLION (PPM): A measure of the concentration of a substance, e.g., 10 ppm = 10 drops of water in a million drops.
PERMISSIBLE EXPOSURE LIMIT (PEL): The eight-hour time weighted average acceptable inhalation exposure limit for any regulated substance in the workplace. This exposure limit is enforced by OSHA and is the law.
PENETRATION: The passage of fumigant into or through an object, such as flour, commodities, wood, tarps, soil, etc.
POST-EMBRYONIC: The larval, pupal and adult stages of insects.
POUNDS PER SQUARE INCH ABSOLUTE (PSIA): A measure of atmospheric pressure. PSIG is pounds per square inch as measured by a gauge.
PULMONARY: Pertaining to or affecting the lungs.
PULMONARY EDEMA: The presence of abnormally large amounts of fluids in the intercellular spaces of the lungs.
REACTIVITY: The ability of the fumigant to react with (combine with or change) other compounds in which it comes into contact.
RELATIVE HUMIDITY: The ratio of the amount of water present in the air relative to the amount it could hold at 100% saturation; usually expressed in percent.
RELEASE OF FUMIGANT: The actual introduction of fumigant into the fumigation space or site.
RENAL: Relating to the kidneys.
REVOLUTIONS PER MINUTE (RPM): A measure of fan speed.
RODENTS: Any animal from the order Rodentia, such as mice and rats.
SAFETY CAP: A covering that protects the cylinder valve from damage or accidental release of the fumigant.

672SPAM-1215(asterisk).indd 24 12/16/2015 4:31:20 PM

SAND SNAKES: Sand- or water-filled tubes made of material used to seal tarps to the ground to minimize release of the fumigant.
SCBA - POSITIVE PRESSURE: Self-contained breathing apparatus that maintains a slightly positive pressure of air inside the face piece at all times.
SECONDARY LOCKS: Securing mechanisms used during fumigation to prevent inadvertent or illegal entry to a structure under fumigation.
SHORT-TERM EXPOSURE LIMIT (STEL): The time-weighted average exposure limit for a particular compound which should not be exceeded at any time during a work day, even if the eight hour time-weighted average is within the threshold limit value (TLV). Exposures to this level of a compound should not be longer than 15 minutes and should not occur more than four times per day. There should be 60 minutes between exposures in this range.
SOLUBILITY: The capability of being dissolved in a solvent such as water.
SORPTION: The uptake of gaseous fumigant resulting from the attraction and retention by liquid and solid materials present. If great enough, there is a gradual reduction of fumigant available to kill the target pest. Sorption may also negatively affect the penetrability of the gas.
SPECIFIC GRAVITY: The ratio of the weight of a body to that of an equal volume of some standard substance — water in the case of solids and liquids, air in the case of gases. The ratio of the mass of a liquid to the mass of an equal volume of water at 4°C, water = 1.
SUBCHRONIC ORAL TOXICITY: The oral toxicity of a material determined for an exposure period between an acute (24 hours) and chronic (weeks to months) in length.
SULFURYL FLUORIDE: The active ingredient of this product, which is non-flammable, non-corrosive and does not cause undesirable odors, is a gas at temperatures above -55°C (-67°F).
TARPAULIN: Semi-permeable membranes used during fumigation to confine the fumigant in a specific area during the exposure period.
TEMPERATURE (°C OR °F): The pesticidal activity of a fumigant varies with temperature. The dosage requirements for this product are based on the mean temperature of the coldest potential pest infested site in the structure. This temperature is nearly always represented by that of the sub-area soil or slab. A probe or surface thermometer can be used to measure temperature. It is very important to accumulate the proper ounce-hours for the temperature that exists.
TERATOGENIC: The potential for an effect to cause congenital abnormality.
TERATOLOGY: The division of embryology and pathology that deals with abnormal development and congenital malformations.
THRESHOLD LIMIT VALUE (TLV): The time-weighted average concentration for a normal eight-hour day and 40-hour work week to which nearly all workers may be repeatedly exposed day-to-day without adverse effects.
VACUUM CHAMBER: Specially built steel chamber used for fumigation. After the material to be fumigated is placed in the chamber, air is evacuated by pumps. The fumigant is then admitted and rapidly fills all the air space previously occupied by air.
VALVE STEM: Opening at the top of the cylinder through which the fumigant is released.
VAPOR CORROSIVENESS: The tendency of the gas to corrode materials. When properly introduced, this product is not corrosive.
VAPOR DENSITY: The weight ratio of a gas to air.
VAPOR PRESSURE: The pressure exerted by a gas that is in equilibrium with its solid or liquid state. The higher the vapor pressure, the more easily and rapidly a fumigant will diffuse and penetrate to reach a gas-air equilibrium and the more rapidly it will aerate and desorb.
WATER SOLUBILITY: The ability of the fumigant to dissolve in water. The less soluble in water, the less that compound is attracted to and adsorbed on the surface of materials. It is also important when considering penetration of the fumigant into soil moisture.
WATER VAPOR: Water in the gaseous state.

Drexel Chemical Company

December 16, 2015

Document Processing Desk **(NOTIF)**
OPP (7504P), U.S. EPA
Rm S-4900, One Potomac Yard
2777 South Crystal Drive
Arlington, VA 22202

Re: Submission of Revised Label by Notification per PR Notice 98-10
DREXEL MASTER FUME AG (EPA Reg. No. 19713-672)

Sir/Madam:

Please find:

1. Completed EPA Form 8570-1

2. Two copies (marked and clean) of the applicator's manual (672SPAM-1215*) and container label (672SPCL-1215*) with the following changes:

   Applicator's Manual (672SPAM-1215*)
   i) On page 1, the net weight metric equivalent was added.
   ii) On page 2, for consistency, the CHEMTREC contact number was changed to the same Tel. No. appearing on the statement above the "User Safety Recommendations" box.
   iii) Added the information in the "Table of Contents" on page 3.
   iv) Added the picture of the Cylinder Valve (Figure 1), picture of the locks and the English-Metric Conversion Tables on pages 6, 12 and 22 of the label, respectively.
   v) On page 18, added "SF-ExplorIR" under the "Tarped-Stacks" section.
   vi) On page 21, in the "Storage and Disposal" under "Leak Procedures", the referral statement, "For more detailed information.....consult the Applicator's Manual of this product.", was deleted as this sentence is not necessary. This referral statement applies more to the container label.

   Container Label (672SPCL-1215*)
   i) On page 1, the net weight metric equivalent was added.
   ii) On page 2, for consistency, the CHEMTREC contact number was changed to the same Tel. No. appearing on the statement above the "User Safety Recommendations" box.

If you have questions/clarification regarding this submission or need anything further, I can be reached at (901) 774-4370 or e-mail Lchan@drexchem.com. Thank you.

Respectfully yours,
FOR DREXEL CHEMICAL COMPANY
Luz G Chan
Registration Manager

1700 Channel Avenue • Post Office Box 13327 • Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 • Fax: (901) 774-4666 • E-Mail: info@drexchem.com • www.DrexChem.com
SINCE 1972

Please read instructions on reverse before completing form. Form Approved. OMB No. 2070-0060. Approval expires 2-28-95

EPA

United States
Environmental Protection Agency
Washington, DC 20460

☐ Registration
☐ Amendment
☑ Other

OPP Identifier Number

Application for Pesticide - Section I

1. Company/Product Number 19713-672	2. EPA Product Manager Venus Eagle	3. Proposed Classification ☐ None ☑ Restricted
4. Company/Product (Name) DREXEL MASTER FUME AG	PM# 001	
5. Name and Address of Applicant *(Include ZIP Code)* Drexel Chemical Company P.O. Box 13327 Memphis, TN 38113-0327 ☐ *Check if this is a new address*	6. **Expedited Reveiw.** In accordance with FIFRA Section 3(c)(3)(b)(i), my product is similar or identical in composition and labeling to: EPA Reg. No. _____ Product Name _____	

Section - II

☐ Amendment - Explain below.
☐ Resubmission in response to Agency letter dated _____
☑ Notification - Explain below.
☐ Final printed labels in repsonse to Agency letter dated _____
☐ "Me Too" Application.
☐ Other - Explain below.

Explanation: Use additional page(s) if necessary. (For section I and Section II.)

Submission of revised label. Details are in the cover letter accompanying this submission.

This notification is consistent with the provisions of PR Notice 98-10 and EPA Regulations at 40 CFR 152.46, and no other changes have been made to the labeling or the Confidential Statement of Formula of this product. I understand that it is a violation of 18 U.S.C. Sec. 1001 to willfully make any false statement to EPA. I further understand that if this notification is not consistent with the terms of PR Notice 98-10 and 40 CFR 152.46, this product may be in violation of FIFRA and I may be subject to enforcement action and penalties under Sections 12 and 14 of FIFRA.

Section - III

1. Material This Product Will Be Packaged In:

Child-Resistant Packaging	Unit Packaging	Water Soluble Packaging	2. Type of Container
☐ Yes ☑ No	☐ Yes ☑ No	☐ Yes ☐ No	☐ Metal ☐ Plastic ☐ Glass ☐ Paper ☑ Other (Specify) Pressurized cylinder
Certification must be submitted	If "Yes" Unit Packaging wgt. / No. per container	If "Yes" Package wgt / No. per container	

3. Location of Net Contents Information	4. Size(s) Retail Container	5. Location of Label Directions
☑ Label ☐ Container	125 pounds	☐ On the label

6. Manner in Which Label is Affixed to Product ☐ Lithograph ☑ Paper glued ☐ Stenciled ☐ Other _____

Section - IV

1. Contact Point *(Complete items directly below for identification of individual to be contacted, if necessary, to process this application.)*

Name	Title	Telephone No. (Include Area Code)
Luz G Chan	Registration Manager	(901) 774-4679

Certification

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowlingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law.

6. Date Application Received (Stamped)

2. Signature: Luz G. Chan	3. Title: Registration Manager
4. Typed Name: Luz G Chan	5. Date: 12/16/2015

EPA Form 8570-1 (Rev. 3-94) Previous editions are obsolete. White - EPA File Copy (original) Yellow - Applicant Copy

Receipt for Section 3

S: 978809 Milestone Email:

Regulatory Type: Product Registration - Section 3

Resubmission: Yes No

Fee For Service: Yes No

Application Type: Notification

Print Letter

Enter More Information

Tracking

Company: 19713 DREXEL CHEMICAL COMPANY

Risk Manager: Registration Division, Risk Management Team 1

Product #: 19713-672 Product Name: MASTER FUME AG

Override#:

Me Too Section3: 1015-79 Me Too Product Name: PROFUME GAS FUMIGANT

Application Date: 16-Dec-2015 OPP Rec'vd Date: 18-Dec-2015

Front End Date: 18-Dec-2015 Risk Manager Send Date: 18-Dec-2015

FFS Due Date: Negotiated Due Date:

OPP Target Date:

Receipt Content | Des

Paper Label

View/Edit

Fast Track: New Ingredient:

Receipt Description:

Label Notification to revise: Applicator's Manual by making changes on pgs. 1, 2, 3, 6, 12 & 22; 18 & 21 and Container Label: pgs 1 & 2

New Ingredient Request Date

New Ingredient Received Date

Form A: Signature Date: Form B: Signature Date

Venus, should this be a notification or fast track?

notification ✓

sent email to registrant requesting electronic label.

waiting for gatekeeper review.

PROCESSING REQUEST

Reg #19713-672 **Decision # 506852**

Description: new registration

Electronic Label & Letter (see PPLS):	**OR**	**Non Electronic Label & Letter** (Scanning required):

X Dated: 12/2/2015 ☐ Dated:

Only one label type should be selected

Other Materials Sent (see jacket):

X New CSF(s) Dated: 8/28/2015

☐ Other:

File this coversheet and attached materials in the jacket. It must be well organized and clipped together, NOT STAPLED. Then give the jacket with the coversheet and materials to staff in the Information Services Center (ISC) (Room S-4900). If a jacket is full or only available as an image, please file materials in a new jacket and bring it down to the (ISC). For further information please call 703-605-0716.

Reviewer: Jacquelyn Marchese

Division: RD

Phone: 703-347-0559 **Date: 12/4/2015**

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Pesticide Programs
Registration Division (7505P)
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460

NOTICE OF PESTICIDE:
_X_ Registration
___ Reregistration
(under FIFRA, as amended)

EPA Reg. Number:	Date of Issuance:
19713-672	12/2/15

Term of Issuance: Conditional

Name of Pesticide Product: Master Fume AG

Name and Address of Registrant (include ZIP Code):

Luz G. Chan
Drexel Chemical Company
1700 Channel Avenue
P.O. Box 13327, Memphis, TN 38113

Note: Changes in labeling differing in substance from that accepted in connection with this registration must be submitted to and accepted by the Registration Division prior to use of the label in commerce. In any correspondence on this product always refer to the above EPA registration number.

On the basis of information furnished by the registrant, the above named pesticide is hereby registered under the Federal Insecticide, Fungicide and Rodenticide Act.

Registration is in no way to be construed as an endorsement or recommendation of this product by the Agency. In order to protect health and the environment, the Administrator, on his motion, may at any time suspend or cancel the registration of a pesticide in accordance with the Act. The acceptance of any name in connection with the registration of a product under this Act is not to be construed as giving the registrant a right to exclusive use of the name or to its use if it has been covered by others.

This product is conditionally registered in accordance with FIFRA section 3(c)(7)(A). You must comply with the following conditions:

1. Submit and/or cite all data required for registration/reregistration/registration review of your product under FIFRA when the Agency requires all registrants of similar products to submit such data.

Signature of Approving Official:

Venus Eagle, Product Manager 01
Invertebrate-Vertebrate Branch 3, Registration Division (7505P)

Date: 12/2/15

EPA Form 8570-6

Registration Notice Conditional v 20150320

2. You are required to comply with the data requirements described in the DCI identified below:

    - Sulfuryl Fluoride GDCI-078003-964

    You must comply with all of the data requirements within the established deadlines. If you have questions about the Generic DCI listed above, you may contact the Chemical Review Manager in the Pesticide Reevaluation Division: http://www.epa.gov/oppsrrd1/contacts_prd.htm

3. The container label and Applicator's Manual constitute the entire master label for this product. In addition to this label, the Drexel Chemical Master Fume® AG Product Stewardship Program was submitted and must be maintained with this registration.

4. Make the following label changes before you release the product for shipment:

    - Revise the EPA Registration Number to read, "EPA Reg. No. 19713-672."

5. Submit one copy of the final printed label for the record before you release the product for shipment.

Should you wish to add/retain a reference to the company's website on your label, then please be aware that the website becomes labeling under the Federal Insecticide Fungicide and Rodenticide Act and is subject to review by the Agency. If the website is false or misleading, the product would be misbranded and unlawful to sell or distribute under FIFRA section 12(a)(1)(E). 40 CFR 156.10(a)(5) list examples of statements EPA may consider false or misleading. In addition, regardless of whether a website is referenced on your product's label, claims made on the website may not substantially differ from those claims approved through the registration process. Therefore, should the Agency find or if it is brought to our attention that a website contains false or misleading statements or claims substantially differing from the EPA approved registration, the website will be referred to the EPA's Office of Enforcement and Compliance.

If you fail to satisfy these data requirements, EPA will consider appropriate regulatory action including, among other things, cancellation under FIFRA section 6(e). Your release for shipment of the product constitutes acceptance of these conditions. A stamped copy of the label is enclosed for your records. Please also note that the record for this product currently contains the following CSFs:

- Basic CSF dated 08/28/2015

If you have any questions, please contact Jacquelyn Marchese by phone at 703-347-0559, or via email at marchese.jacquelyn@epa.gov.

Enclosure

RESTRICTED USE PESTICIDE
(Due To Acute Inhalation Toxicity Of Sulfuryl Fluoride)
FOR 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. AN APPLICATOR CERTIFIED BY THE STATE MUST BE PRESENT ON SITE AT ALL TIMES DURING INTRODUCTION OF FUMIGANT, REENTRY PRIOR TO AERATION AND INITIATION OF THE AERATION PROCEDURE.

Drexel

Master Fume® AG

Gas Fumigant

For control of rodent, insect and other listed invertebrate pests.
Use Sites: Stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.
Read the entire container label and Applicator's Manual before using this product. Refer to the Applicator's Manual for additional precautionary information and directions for use. The Applicator's Manual must be in the user's possession during fumigation. If the Applicator's Manual is lost, obtain a replacement copy from your distributor or Drexel Chemical Company.
APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

ACTIVE INGREDIENT:
Sulfuryl fluoride..... 99.8%
OTHER INGREDIENTS: 0.2%
TOTAL: 100.0%

ACCEPTED
Dec 02, 2015
Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 19713-672

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO

POISON VENENO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See FIRST AID on Page 2

EPA Reg. No. 19713-ATE
EPA Est. No. 19713-XX-X

Net Content: 125 LBS.

Manufactured By:
Drexel Chemical Company
P.O. BOX 13327, MEMPHIS, TN 38113-0327
SINCE 1972

672SPCL-1115*P

FIRST AID

IF INHALED:

- Move person to fresh air.
- If person is not breathing, call 911 or ambulance, then give artificial respiration.
- **DO NOT** give mouth-to-mouth resuscitation.
- Call a poison control center or doctor for further treatment advice.

IF IN EYES:

- Hold eye open and rinse slowly and gently with water for 15 to 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

IF SWALLOWED:

- Call a poison control center or doctor immediately for treatment advice.
- Have person sip glass of water if able to swallow.
- Do not induce vomiting unless told to by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING:

- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

In all cases of overexposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also call CHEMTREC at 800-424-9300 for emergency.

Note to Physician: This product is a gas which has no warning properties such as odor or eye irritation. (However, chloropicrin is used as a warning agent and is a known lachrymator). Early symptoms of exposure to this product are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations of this product can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically. The liquid form of this product in the eye may cause damage due to refrigeration or freezing.

PRECAUTIONARY STATEMENTS

Hazards To Humans And Domestic Animals

DANGER: Corrosive. Extremely hazardous liquid and vapor under pressure. Fatal if inhaled. Causes irreversible eye damage. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Liquid may cause chemical burns, which may have a delayed onset, or may freeze exposed skin. May be fatal if swallowed. May be fatal if absorbed through skin. Sulfuryl fluoride is odorless. Exposure to toxic levels may occur without warning or detection by the user.

This product is used with 0.25% 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.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles (goggles designed and made of material that allows no measurable movement of the liquid pesticide being used to pass through them during use) or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR™) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Before using any make or brand of SCBA, learn how to use it correctly. Determine that it has an adequate air supply for the job at hand, that it fits properly providing an adequate seal around the face and that it is in good working order. For more detailed information on the source and use of air monitoring devices and respirators, consult the Applicator's Manual of this product.

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read "*Warranty Disclaimer*".
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information, call Drexel Chemical Company at (901) 774-4370.

USER SAFETY RECOMMENDATIONS

Users should: 1) Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. 2) Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. 3) Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Sulfuryl fluoride is a highly toxic gas. Do not expose non-target organisms. This pesticide is toxic to fish and wildlife.

PHYSICAL OR CHEMICAL HAZARDS

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near heat or open flame. Exposures to temperatures above 158°F will cause a fusible plug to melt and the contents will be released. Under high heat conditions (temperatures above 752°F), this product can decompose into sulfur dioxide (SO_2), hydrofluoric acid (HF), and other decomposition products.
Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc., that represent a reasonable risk of a heat source that is at or near 752°F. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated. Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Notice: Read the entire label. Use only according to label directions. Before using this product, read Warranty-Conditions of Sale, Inherent Risks of Use, and Limitation of Remedies elsewhere on the label. If terms are unacceptable, return at once unopened.
In case of emergency endangering health or the environment involving this product, call 1-800-CHEMTREC. If you wish to obtain additional product information call Drexel Chemical Company at (901) 774-4370. .

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: Store in dry, cool, well ventilated area under lock and key. Post as a pesticide storage area. If the storage area is in an occupied building, the storage area must have either 1) a forced air ventilation system that meets required local ordinances for the storage of hazardous materials and operates continuously; or 2) be equipped with a permanently mounted and properly maintained and functioning sulfuryl fluoride monitoring device designed to alert occupants of the building if sulfuryl fluoride in the air of the storage area is greater than 1 ppm. Store cylinders upright secured to a rack or wall to prevent tipping.

Pesticide Handling: Do not subject cylinders to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use ropes, 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 transport any cylinders in closed vehicles where they occupy the same common airspace as personnel. Transport securely only in an upright position. 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 supplier. Only the registrant is authorized to refill cylinders. Do not use cylinder for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.

Leak Procedures: Evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator, such as manufactured by Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant is determined to be 1 ppm or less in the breathing zone, as determined by a detection device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR. For more detailed information on the source and use of air monitoring devices or respirators, consult the Applicator's Manual of this product.

CYLINDER AND PRODUCT DISPOSAL:

Promptly return all empty cylinders to your distributor of this product. Follow proper cylinder handling directions above. 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, consult your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

WARRANTY DISCLAIMER

Manufacturer warrants that this product conforms to the chemical description on the label and based upon tests believed reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. To the extent consistent with applicable law, Manufacturer makes no other expressed or implied warranty of merchantability or fitness for a particular purpose or any other express or implied warranty.

Use Risk

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable weather, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Manufacturer or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to one of the following, at Manufacturer's discretion:

1. Refund of purchase price paid by Buyer or use for product bought, or
2. Replacement of amount of product used.

To the extent consistent with applicable law, in no case shall Manufacturer or the Seller be liable for consequential, special or indirect damages or losses from the use, handling or storage of this product.

The terms of the *"Warranty Disclaimer"* above and this *"Limitation of Remedies"* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of the Manufacturer or the Seller is authorized to vary or exceed the terms of the *"Warranty Disclaimer"* or this *"Limitation of Remedies"* in any manner.

MASTER FUME and the Drexel logo are registered trademarks of Drexel Chemical Company. All other brand names, product names, or trademarks belong to their respective holders.

RESTRICTED USE PESTICIDE
(Due To Acute Inhalation Toxicity Of Sulfuryl Fluoride)
FOR 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. AN APPLICATOR CERTIFIED BY THE STATE MUST BE PRESENT ON SITE AT ALL TIMES DURING INTRODUCTION OF FUMIGANT, RE-ENTRY PRIOR TO AERATION AND INITIATION OF THE AERATION PROCEDURE.

APPLICATOR'S MANUAL

Drexel

Master Fume® AG

Gas Fumigant

For control of rodent, insect and other listed invertebrate pests.
Use Sites: Stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.
Read the entire container label and Applicator's Manual before using this product. Refer to the Applicator's Manual for additional precautionary information and directions for use. The Applicator's Manual must be in the user's possession during fumigation. If the Applicator's Manual is lost, obtain a replacement copy from your distributor or Drexel Chemical Company.
APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

ACTIVE INGREDIENT:
Sulfuryl fluoride 99.8%
OTHER INGREDIENTS: 0.2%
TOTAL: 100.0%

ACCEPTED
Dec 02, 2015
Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 19713-672

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO

POISON VENENO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See FIRST AID on Page 2

EPA Reg. No. 19713-ATE
EPA Est. No. 19713-XX-X

Net Content: _____

Manufactured By:
Drexel Chemical Company
P.O. BOX 13327, MEMPHIS, TN 38113-0327
SINCE 1972

672SPAM-1115*P

FIRST AID

IF INHALED:
- Move person to fresh air.
- If person is not breathing, call 911 or ambulance, then give artificial respiration.
- **DO NOT** give mouth-to-mouth resuscitation.
- Call a poison control center or doctor for further treatment advice.

IF IN EYES:
- Hold eye open and rinse slowly and gently with water for 15 to 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

IF SWALLOWED:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip glass of water if able to swallow.
- Do not induce vomiting unless told to by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

In all cases of overexposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also call CHEMTREC at 800-424-9300 for emergency.

Note to Physician: This product is a gas which has no warning properties such as odor or eye irritation. (However, chloropicrin is used as a warning agent and is a known lachrymator). Early symptoms of exposure to this product are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations of this product can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically. The liquid form of this product in the eye may cause damage due to refrigeration or freezing.

PRECAUTIONARY STATEMENTS

Hazards To Humans And Domestic Animals

DANGER: Corrosive. Extremely hazardous liquid and vapor under pressure. Fatal if inhaled. Causes irreversible eye damage. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Liquid may cause chemical burns, which may have a delayed onset, or may freeze exposed skin. May be fatal if swallowed. May be fatal if absorbed through skin. Sulfuryl fluoride is odorless. Exposure to toxic levels may occur without warning or detection by the user.

This product is used with 0.25% 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.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles (goggles designed and made of material that allows no measurable movement of the liquid pesticide being used to pass through them during use) or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR™) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Before using any make or brand of SCBA, learn how to use it correctly. Determine that it has an adequate air supply for the job at hand, that it fits properly providing an adequate seal around the face and that it is in good working order. For more detailed information on the source and use of air monitoring devices and respirators, consult the Applicator's Manual of this product.

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read "*Warranty Disclaimer*".
In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information, call Drexel Chemical Company at (901) 774-4370.

USER SAFETY RECOMMENDATIONS

Users should: 1) Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. 2) Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. 3) Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Sulfuryl fluoride is a highly toxic gas. Do not expose non-target organisms. This pesticide is toxic to fish and wildlife.

PHYSICAL OR CHEMICAL HAZARDS

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near heat or open flame. Exposures to temperatures above 158°F will cause a fusible plug to melt and the contents will be released. Under high heat conditions (temperatures above 752°F), this product can decompose into sulfur dioxide (SO_2), hydrofluoric acid (HF), and other decomposition products.
Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc., that represent a reasonable risk of a heat source that is at or near 752°F. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated. Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Notice: Read the entire label. Use only according to label directions. Before using this product, read Warranty-Conditions of Sale, Inherent Risks of Use, and Limitation of Remedies elsewhere on the label. If terms are unacceptable, return at once unopened.
In case of emergency endangering health or the environment involving this product, call 1-800-CHEMTREC. If you wish to obtain additional product information call Drexel Chemical Company at (901) 774-4370.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

TABLE OF CONTENTS

INFORMATION

APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

Carefully read the container label and this Applicator's Manual before using this product. Do not use this product without Drexel Chemical's Master Fume AG Calculator Program. Drexel Chemical's Master Fume AG Calculator Program is a computer program available to calculate safe and effective levels of this product for fumigating structures and commodities. Never allow untrained individuals to use this product.

Prior to fumigation, read the Applicator's Manual carefully. Notify appropriate owners, employees, and/or operators at the facility where the fumigation will occur, and provide relevant safety and health information to local fire and rescue officials for use in the event of an emergency.

Do not connect cylinders to introduction equipment until all fumigation warning signs have been posted and the space to be fumigated is clear of people, non-target animals and secured.

COMPRESSED GAS HAZARDS

The release of high pressure fumigant can be forceful and there is potential for personal injury. Care must be exercised when fumigating, especially tarped commodities, so that the fumigant is not released too rapidly and "balloons" the tarp off of the restraining sand or water snakes. A fog-out can also occur if the fumigant is released too rapidly, cooling the air temperature below the dew point. This is avoided by following the instructions in the Applicator's Manual.

The rapid discharge of this product through introduction equipment will result in cooling parts of the equipment and the cylinders. Contact with the cooled equipment can cause frostbite.

This product is a highly hazardous material and should be used only by individuals knowledgeable of its chemical hazards and trained in the use of required respiratory equipment, detection devices, emergency procedures and proper use.

Two persons trained in the use of this product (at least one person being an applicator certified by the state) must be present on site at all times during introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure and when testing for re-entry after aeration (if aerated in an enclosed space). It is essential that no occupant re-enter the fumigated space after fumigation until the fumigant has been aerated and the space has been fully tested and cleared for re-entry.

Only a detection device of sufficient sensitivity (LOD < 1 ppm), such as the INTERSCAN gas analyzer [Model CF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR can be used to confirm a concentration of 1 ppm or less of this product. The INTERSCAN gas analyzer [Model CF 1900] must be calibrated within one month prior to use as a detection device. All other approved detection devices must be calibrated according to manufacturer directions. The concentration of this product must be monitored throughout the structure. The structure or enclosure must remain posted for fumigation until cleared for re-entry.

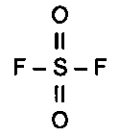
PRODUCT INFORMATION

MASTER FUME AG IS A RESTRICTED USE PESTICIDE DUE TO ACUTE INHALATION TOXICITY OF SULFURYL FLUORIDE.

PHYSICAL PROPERTIES

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near excessive heat or open flame. Exposures to temperatures of more than 158°F will cause a fusible plug to melt and the contents will be released. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Structural formula: SO_2F_2



Molecular Weight :	102.07 AMU
Color:	None
Active Ingredient :	10.8 pounds sulfuryl fluoride per gallon of the product
Specific Gravity :	1.35 at 20°C (68°F)
Vapor Density :	4.3 g/L at 20°C (68°F) air = 1
Vapor Pressure :	15.2 atm at 20°C (68°F)
Boiling Point :	-55.2°C (-67°F) at 760 mmHg

GAS SOLUBILITY (at 25°C (77°F) at 760 mm Hg): In water 0.075% (750 ppm) by weight, only slightly soluble in organic solvents and vegetable oils.
STABILITY: Stable to temperatures normally encountered in space fumigations. Non-flammable under normal conditions in all atmospheric concentrations. However, heaters and open flames must be extinguished as temperatures over 400°C (752°F) will cause decomposition products to be formed which can be corrosive and etch metal and glass.
HEAT OF VAPORIZATION: 81.1 BTU per pound at -55°C (-67°F) or 4600 cal./mol. 1 pound of sulfuryl fluoride = 4.45 moles. 1 pound of this product will lower 1000 cubic foot of dry air by 2.5°C (4.5°F).
VOLUME PER POUND: 1 pound of gas occupies 3.8 cubic foot at 25°C (77°F) and 760 mm Hg. 1 pound of gas per 1000 cubic foot of unoccupied space equals approximately 3850 ppm at room temperature and pressure (25°C at 760 mm Hg).
HYDROLYSIS: Slow in water; Rapid in basic solutions.
REACTIVITY: Sulfuryl fluoride is relatively non-reactive as a gas. No malodor or corrosive effects have been detected when the chemical has been used as directed. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

DIRECTIONS FOR USE

RESTRICTED USE PESTICIDE
It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
When fumigating, all local, state, and federal rules and regulations regarding use of detection devices, positive-pressure self-contained breathing apparatus, security requirements and placement of warning signs must be observed.
Read carefully all Directions for Use before using this product.

FUMIGATING WITH THIS PRODUCT

INTRODUCTION

MASTER FUME AG contains the active ingredient, sulfuryl fluoride, and is registered for use only by professional fumigators to control existing infestations of stored product insect pests in stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.
Read the entire label and this Applicator's Manual before using this product. If the Applicator's Manual is lost, obtain a replacement copy from your distributor of this product or your Drexel Chemical Company representative.
Each fumigator using this product is responsible for complying with all federal, state and local regulations or codes regulating the use of this product. The fumigator should stay informed about state and local regulations in areas where they operate.
State and local government offices, distributors of this product or Drexel Chemical Company sales representatives responsible for your area can help identify the relevant agencies responsible for regulating fumigation practices in your area.

Chapter 1

COMMODITIES THAT CAN BE FUMIGATED

This product can be used on the following raw agricultural and processed food commodities:

Raw Agricultural* and Processed Commodities		
Barley	Rice	Triticale
Corn	Rice bran	Wheat
Corn flour	Rice flour	Wheat bran
Corn grits	Rice hull	Wheat flour
Corn meal	Rice (Polished)	Wheat germ
Millet	Rice (Wild)	Wheat milled by-products
Oat	Sorghum	Wheat shorts
*This product can be used to fumigate seeds of these commodities. Sites containing additional seed varieties may be fumigated as long as the fumigated seeds will not be part of the food chain for human consumption.		

For a list of sites than can be fumigated with this product and site specific considerations for doing an effective and safe fumigation, see Chapter 10.

USE RESTRICTIONS AND PRECAUTIONS

- Do not exceed a maximum cumulative dosage of 1500 oz-h/1000 cubic foot for normal atmospheric pressure (NAP) fumigations.
- Do not exceed a maximum cumulative dosage of 200 oz-h/1000 cubic foot for vacuum fumigations.
- Do not exceed the maximum cumulative dosages of NAP and vacuum fumigations, respectively, for sequential fumigations.
- When fumigating storage tanks, silos, etc. containing bulk flour, empty or draw down Wheat flour to less than 3 feet deep. Minimize quantities of flour in the processing plant, structure or enclosure prior to fumigation to prevent excessive residues in Wheat flour.

- Use this product together with a dosage calculator called Drexel Chemical's Master Fume AG Calculator (Chapter 7). Drexel Chemical's Master Fume AG Calculator must be used to calculate the initial dosage required for treatment and for any additional quantities needed during the fumigation to improve efficacy and/or to rectify loss due to leakage.
- Special care should be taken to minimize quantities of processed foods prior to space fumigations. Processed food not practical to remove prior to fumigation may undergo incidental fumigation with this product. However, no direct fumigation of processed foods is permitted unless the processed food is found in *"COMMODITIES THAT CAN BE FUMIGATED"* section of this manual.

PEST CONTROLLED

This product is used to control the following pests including all its life stages (i.e., egg, larva, pupa and adult):

Common Name	Scientific Name
Codling moth	*Cydia pomonella*
Flour beetles	*Tribolium* spp.
Granary weevil	*Sitophilus granarius*
Indian meal moth	*Plodia interpunctella*
Mediterranean flour moth	*Ephestia kuehniella*
Navel Orange worm	*Amyelois transitella*
Rats and Mice	-
Rice weevil	*Sitophilus oryzae*
Saw toothed grain beetle	*Oryzaephilis suranamensis*
Warehouse beetle	*Trogoderma variable*

Chapter 2
GENERAL SAFETY

This product is colorless, odorless and non-irritating to mucous membranes at low concentrations. This product gives no warning of its presence.
This product is toxic and must be handled carefully. Ignoring the potential hazards of this product can result in serious illness or even death.

SYMPTOMS OF POISONING

Symptoms in humans from inhalation exposure to this product will depend on the concentration and the length of exposure experienced. The earliest sign of overexposure to this product is central nervous system (CNS) depression.
Exposure to progressively higher concentrations is expected to result in convulsions, tremors and/or strychnine-like muscular rigidity.
Humans exposed to high concentrations of this product may experience respiratory irritation, nausea, abdominal pain, CNS depression, slowing of movements and speech and numbness in the extremities.
Survival after exposure to high concentrations can occur even following convulsions, if exposure has been brief.

FIRST AID

Refer to the *"FIRST AID"* section of this manual or container label.
In all cases of overexposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility immediately. Have the product container or label with you when calling a poison control center or doctor or going for treatment. For information on this pesticide product (including health concerns, medical emergencies or pesticide incidents), call 1-877-208-2593 or CHEMTREC at 1-800-424-9300.

NOTES TO PHYSICIAN

Depending on the length of exposure, it is predicted that persons exposed to this product will probably show little evidence of intoxication at first unless the concentration was moderate to high (more than 500 ppm). Initial effects will probably be depression of the CNS with slow speech and body movement the first signs noted. Convulsions may ensue with respiratory arrest being a terminal event. Assisted respiration may be necessary.
Remove exposed patient to fresh air and put at rest. Keep exposed individual at bed rest and under observation for at least 24 hours. Clinical observation should be directed at the pulmonary, hepatic and renal systems. A post-mortem finding in a fatality attributed to sulfuryl fluoride was pulmonary edema. Death was attributed to cardiorespiratory failure.
Also see *"FIRST AID"* section of this manual for additional notes to physician.
There is no known antidote. Clinical observation is essential. Treatment is based on the clinical judgment of the physician and the individual reaction of the patient.

IN CASE OF EMERGENCY, CALL 1-877-208-2593 OR 1-800-424-9300.

IN CASE OF ACCIDENTIAL EXPOSURE, SEEK MEDICAL ATTENTION.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded, or when concentration is unknown, all persons in the exposed area must wear a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott, or MSA. Before using any make or brand of SCBA, learn how to use it correctly.

Determine that it has an adequate air supply for the job at hand, that it fits properly, providing an adequate seal around the face and that it is in good working order.

The INTERSCAN must be calibrated according to manufacturer specifications within one month prior to use as a clearance device. All other approved detection devices must be calibrated according to manufacturer specifications.

FIRE FIGHTING

Information

This product is not combustible. However, in temperatures exceeding approximately 400°C (752°F), this product will degrade to form hydrogen fluoride (HF) and sulfur dioxide. Theoretically, the number of ounces of HF per 1000 cubic feet produced during a fire in a structure containing this product would equal 0.4x number of ounces of this product per 1000 cubic feet {in temperatures exceeding approximately 752°F, each mole (102 gm) of sulfuryl fluoride will degrade to form 2 moles (40 gm) of hydrogen fluoride (HF)}. Nonetheless, amounts of HF actually produced during fires involving this product may be insignificant because this product rapidly diffuses from structures.

Use of Water

Evolution of hazardous materials can be minimized by use of water during a fire. Water will scrub out part of the HF and SO_2 formed by decomposition of this product in the flame. Water also can be used to cool cylinders of this product and prevent discharge of the product caused by melted fusible plugs. If possible, avoid runoff into waterways because HF is toxic to fish.

Protective Clothing

Self-contained breathing apparatus (SCBA) and normal "turn-out" gear must be worn when fighting fires in structures under fumigation with this product.

For Fires Involving Cylinders of this Product

When fighting fires in atmospheres containing potentially high concentrations of this product, self-contained breathing apparatus (SCBA) and encapsulating protective suits must be worn. Protective suit material must be compatible with exposure to hydrofluoric acid.

PREVENTING STATIC ELECTRICITY

The flow of liquid gas in the introduction hose may be a source of static electricity. To prevent the risk of static sparking, the introduction hose must be properly grounded using acceptable demonstrated methods (e.g., securely attaching a length of copper tubing with adequate fittings to the end of the introduction hose).

When using copper tubing as a ground, attach the copper tubing with a grounding wire to the fan cage frame or to a neutral ground. The copper tubing mounted at the end of the introduction hose must be securely attached to the fan or some other stable object.

FUMIGANT INTRODUCTION HOSE AND FITTINGS

- Use hose with minimum burst pressure of 3450 kPa (500 psi) that is compatible with liquid Master Fume. Polyethylene or polypropylene hoses have proven satisfactory.
- Use care not to kink or crush the hose. Reinforced hose helps prevent collapse.

PERSONAL SAFETY
- Always wear eye protection when introducing this product or repairing leaks on introduction manifolds or hoses.
- Proper respiratory protection (SCBA) must be on hand in case of required emergency entry into structure.
- Make a security check for personnel, structure preparation and persons in nearby buildings and grounds. Apply proper lock-outs and placarding.

MATERIAL SAFETY
- Use proper fumigant introduction techniques to help prevent corrosion or water stains on interior materials.
- To the extent possible, provide protection for nearby desirable plants.
- Use circuit breakers or fuses for fans.
- To the extent possible, place fans to minimize the risk of damage to equipment.

Chapter 3
CYLINDER
Cylinders of this Product
This product is packaged as a gas under pressure in cylinders. Cylinders contain both gas and liquid. Cylinders containing this product are designed not to explode in high temperatures. A fusible plug in the cylinder valve body melts at 158°F to 165°F (70°C to 73.8°C) releasing the contents of the cylinder.

Cylinder Information
This product is sold as a compressed liquid gas in a high-pressure cylinder and must be handled, stored and transported with precaution. Inspect every cylinder upon delivery for damage. If the cylinder is damaged, immediately return the cylinder to the distributor of this product.
No additional gas is used to pressurize the cylinder. Each full cylinder contains 57 kg (125 lbs.) of product normally under about 1380 to 2070 kPa (200 to 300 psi).

Cylinder Handling
- Avoid manhandling the cylinder when moving or weighing; e.g., use a hoist with a hanging bonnet.
- Protect the valve from damage by always replacing the valve cover and safety bonnet.
- Open valve slowly at first, then completely open it (one full turn) so the valve and the introduction hose do not frost. Use proper size adjustable wrench (25 to 30 cm). Keep wrench attached to valve while valve is open.
- Bear in mind that frosting of the outside cylinder surface when releasing the last 3 to 5 pounds of this product is likely.
- Close valve completely when fumigant introduction is finished or cylinder is "empty."

SEE *"STORAGE AND DISPOSAL"* SECTION AT THE END OF THIS MANUAL FOR STORAGE AND DISPOSAL OF THIS PRODUCT.

Cylinder Valve System
Cylinders of this product are fitted with special valves (see Figure 1).

(PICTURE OF CYLINDER VALVE TO BE INSERTED HERE)

Figure 1. Cylinder Valve

The cylinder is equipped with both a safety cap and a covering called a "bonnet." The safety cap and bonnet must be securely in place at all times except when gas is to be released from the cylinder. This protects the valve system from being damaged and/or prevents accidental release of the fumigant.
Do not hang or lift cylinders by the valves. Use a proper sling to lift cylinders. Use a "hanging" bonnet or other device specifically designed for this purpose when weighing a cylinder on a hanging scale. (Hanging bonnet can be obtained from the fumigation supply distributor.)

Leaking Cylinders
If a cylinder is suspected of leaking fumigant, evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator, such as manufactured by Draeger, Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. The SCBA must be worn when exposure is more than 1 ppm or when the concentration is unknown.
Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant in the breathing zone

is determined to be 1 part per million (ppm) or less as determined by a detection device with sufficient sensitivity such as an INTERSCAN gas analyzer [Model: GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR.
Often tightening the packing nut on the top of the valve to 35 to 40 N.m. (25 to 30 foot pounds) of torque with an adjustable wrench will stop the leak. Never use excessive force to open a stuck or improperly sealed valve. See valve stem adjustment procedures at the end of this chapter.
Once the cylinder is empty, contact your distributor for proper return instructions.

Frozen Valves and Hoses
If the cylinder valve is "just cracked" to reduce the rate of release, this product will expand from a liquid to a gas within the hose and frosting of the outside of the valve and hose may occur.
FROSTING CAN BE AVOIDED By ALLOWING FULL FLOW THROUGH THE VALVE AND LINES.
Do not control the rate of flow of this product by restricting flow through the cylinder valve.

Frozen Cylinders
If a break occurs on the dip tube in the cylinder, this product will be discharged in the gas phase when the liquid level falls below the break. As the liquid expands in the cylinder, heat will be taken from the surrounding area and the cylinder will frost or freeze at that point. This product will still be discharged, but at a much slower rate. If cylinder shows signs of a broken dip tube (a very rare occurrence), paint it red on the shoulder of the cylinder, put a red tag on it and return to the distributor so that the problem can be corrected before refilling.

Empty Cylinders
Handle, store and transport empty cylinders using the same precautions as previously discussed for full cylinders. The last 1.5 to 2 kg (3 to 5 lbs.) of gas in the cylinder which is the final pounds of this product in a cylinder generally are in a gaseous state and will not move out of the cylinder as rapidly as when it is a liquid. However, it will move through the introduction hose. REMEMBER TO CLOSE VALVE COMPLETELY ON EMPTY CYLINDERS.

Cylinder Return Policy
When the cylinder is empty, fully close the valve and replace the safety cap and protection bonnet and return the empty cylinder to your distributor. Broken or defective cylinder must be returned to your Master Fume Ag distributor. Only Drexel is authorized to refill cylinders. Do not use cylinders of this product for any other purpose.

Transportation of Cylinders
Transport cylinders capped and secured in an upright position. Do not transport cylinders that are unsecured or laying on their side. These are requirements of the Department of Transportation (DOT) when transporting compressed air cylinders. Loose cylinders can become airborne and significant damage to dip tube may occur in an accident.
Because of the toxicity of this product, do not transport cylinders in the same airspace as the driver or other occupants of vehicles, such as in vans or unpartitioned trucks.
Always store and transport cylinders in a secure upright position.
Do not transport cylinders of this product in the same airspace or breathing zone of any area occupied by the driver and other occupants of vehicles.
Consult your local distributor or Drexel Chemical Company for training resources for DOT regulations.

Air Transportation: Never transport cylinders of this product by aircraft.

Valve Stem Adjustments in the Field

Introduction
When cylinders are filled at the plant, a soap solution is applied to the valve stem (the square shaft area) and valve threads at the top of the cylinder. The cylinder is not released if leaks are present. Each time the valve is opened and closed, the stem works against the packing causing the packing to flow away from the valve stem. Over time this may allow product to escape past the valve stem when the valve is in the open position. This document describes how this situation can be safely corrected in the field.

Hazards and PPE
Operators performing the valve stem adjustment must follow all precautions on the product label section for *"Leak Procedures"*. This may include, but is not limited to, immediate evacuation followed by re-entry using positive pressure self-contained breathing apparatus.
Move cylinders outdoors or to a ventilated isolated location prior to adjusting the stem. Allow no unprotected persons in the area during the adjustment procedure until fumigant concentration is verified with sufficiently sensitive detection equipment to be below the levels of concern indicated on the product label.

Indications
This procedure is appropriate when a cylinder shows indication of product loss from around the valve stem. Loss may be indicated either by a sufficiently sensitive detection device or hissing/bubbling at the stem when the valve is open. This procedure may not be effective or appropriate for other valve problems.

Training
Only persons appropriately trained for Hazardous Material handling are permitted to perform this task. While operators who transport this product are required to receive Hazardous Material training, individuals have to check with their employer if they have any questions regarding required training.

Procedure
To stop a loss of this product from around the valve stem in the field, follow the following steps.
Follow directions in *"HAZARDS AND PPE"* section above prior to starting this procedure. Make sure all PPE and sufficiently sensitive detection devices are used.

1. If product loss is detected, immediately close the valve. This will stop this product from leaking out of the stem.
2. Secure the cylinder against a stationary object (rack, wall, etc.) to prevent tipping. Using the same wrench you use to remove the cap from the valve exit, tighten the packing nut on top of the valve. Turn the packing nut in a clockwise direction to tighten the packing nut. Do not overtighten this nut. The specification is 34 to 40 N.m. (25 to 30 foot pounds) of torque, which is easily reached with a 25 to 30 cm (10 to 12 inches) adjustable wrench.
3. Open the valve. If product is still leaking from around the valve stem, repeat steps 1 and 2. If product loss still persists, close the valve, red tag the cylinder and return it for credit. The valve will be replaced at the plant.

Chapter 4
EQUIPMENT
MONITORING EQUIPMENT: FUMISCOPE, REPORTIR™
The monitoring equipment is designed to measure the actual concentration of this product within the fumigation site to determine accumulated dosage. This equipment is not sensitive enough to use as a clearing device after the exposure period. This equipment also is used in conjunction with Drexel Chemical's Master Fume Calculator for determining actual HLTs. Fumiscopes can be purchased through your distributor or from the manufacturer. For more information, contact:

Key Chemical and Equipment Co., Inc.
13195 49th Street N., Unit A
Clearwater, FL 34622
Phone: (727) 572-1159
Fax: (727) 572-4595

Note: Contact the manufacturer for Fumiscope calibration and repair procedures.
All companies with Master Fume AG must own 2 pieces of monitoring equipment and they must be calibrated and inspected yearly by Drexel and/or Master Fume AG distributor.

CLEARANCE TESTING EQUIPMENT
A. INTERSCAN GAS ANALYZER
Model GF1900 has an integral pump that draws the air sample through a pyrolyzer (furnace) where the product is converted to SO_2 which then passes through an SO_2 sensor. The unit is lightweight and is battery or AC powered for easy portability. For more information, contact the manufacturer or:

Key Chemical and Equipment Co. Inc.
13195 49th Street N., Unit A
Clearwater, FL 34622
Phone: (727) 572-1159
Fax: (727) 572-4595

B. MIRAN GAS ANALYZER
The Miran SapphIRe utilizes a single beam, infrared detection technology to directly measure low concentrations (0 to 5 ppm) of sulfuryl fluoride. For more information, contact:

Thermo Environmental Instruments
8 West Forge Parkway
Franklin, MA 02038
Phone: (508) 520-0430
www.thermo.com/AQI

C. SF-EXPLORIR GAS MONITOR
The SF-ExplorIR is a portable monitor that uses non-dispersive infrared (NDIR) technology. It features direct measurement of sulfuryl fluoride at 0 to 5 ppm. For more information, contact: Spectros Instruments, Inc. or their representatives.

D. OTHER UNITS
The listed detection and monitoring equipment in this label is not intended to be all inclusive. As new technology is developed, new devices may be evaluated by Drexel Chemical Company to detect this product. Contact your nearest representative from Drexel Chemical Company for the latest information on sufficiently sensitive detection devices.
Prior to using the above instruments to clear a structure, meters must be "zeroed." This must be done according to the manufacturer's directions, away from the fumigation site and in an atmosphere that does not contain this product. Manufacturer's instructions also include information regarding appropriate and necessary calibration and maintenance. Manufacturer's specifications must be followed to ensure proper operation of these instruments.
Please refer to the manufacturer for the latest specifications and instructions for any equipment used with this product.

Chapter 5
FUMIGATION MANAGEMENT PLAN (FMP)
The certified applicator is responsible for working with the owners and/or responsible employees of the site to be fumigated to develop an FMP for this product. The FMP is intended to ensure a safe and effective fumigation. Critical components of a fumigation of this product include Drexel Chemical's Master Fume AG Calculator Program and the documentation it creates and the Precision Fumigation™ Techniques. The FMP must address characterization of the site and appropriate monitoring and notification requirements consistent with, but not limited to, the following:

1. Inspect the site to determine its suitability for fumigation.
2. When sealing is required, consult previous records for any changes to the structure, potential leaks and monitoring of occupied and adjacent buildings.
3. Consult with company officials (whose area or commodity is fumigated) and appropriate employees, prior to each fumigation, for any existing FMPs, SDS, Applicator's Manual and other relevant safety procedures.
4. Consult company officials in the development of procedures and appropriate safety measures for nearby workers and public personnel who will be in and around the area during fumigation and aeration.
5. Consult with company officials to develop an appropriate exterior monitoring plan that will confirm that nearby workers and bystanders are not exposed to levels above the allowed limits during application, fumigation and aeration. This plan must also demonstrate that nearby residents will not be exposed to concentrations above the allowable limits.
6. Consult with company officials to develop procedures for local authorities to notify nearby residents in the event of an emergency.
7. Confirm the placement of warning placards around the fumigation site as described in this Manual.
8. Confirm the required safety equipment (including that required for entry into an area under fumigation) is in place and the necessary manpower is available to complete a safe, effective fumigation.

GUIDANCE FOR PREPARATION OF AN FMP
An FMP is an organized, documented description of the steps involved to help ensure a safe, legal and effective fumigation. Drexel Chemical's Master Fume AG Calculator Program supports the creation of documentation needed to satisfy an FMP. Drexel Chemical's Master Fume AG Calculator Program and the FMP will assist you and others in complying with pesticide product label requirements. The guidance that follows is designed to help assist you in addressing all the necessary factors involved in preparing for and fumigating a site. This guidance is intended to help you organize any fumigation that you might perform prior to actual treatment. It is meant to be somewhat prescriptive, yet flexible enough to allow the experience and expertise of the fumigator to make changes based on circumstances which may exist in the field. Precision Fumigation techniques support this flexible and adaptive approach. By following a step-by-step procedure, yet allowing for flexibility, safe and effective fumigation can be performed. Before any fumigation begins, carefully read and review the label and the Applicator's Manual. This information must be given to the appropriate company officials (supervisors, foreman, safety officer, etc.) in charge of the site. Preparation is the key to any successful fumigation. If you do not find specific instructions for the type of fumigation that you are to perform listed in this guidance document, you will want to construct a similar set of procedures using this document as your guide or contact Drexel Chemical Company for assistance and/or additional resources. Finally, before any fumigation begins you must be familiar with and comply with all applicable federal, state and local laws. The success and future of fumigation are not only dependent on your ability to do your job, but also by carefully following all rules, regulations, and procedures required by governmental agencies.

Checklist Guide for an FMP
This checklist is provided to help you take into account factors that must be addressed prior to performing all fumigations. It emphasizes safety steps to protect people and property. The checklist is general in nature and cannot be expected to apply to all types of fumigation situations. It is to be used as a guide to prepare the required plan. Each item must be considered. However, it is understood that each fumigation is different and not all items will be necessary for each fumigation.

A. PRELIMINARY PLANNING AND PREPARATION

1. Determine the purpose of the fumigation and record in Drexel Chemical's Master Fume AG Calculator.
   a. Control of insect infestation
   b. Control of rodent infestation
   c. Plant pest quarantine
2. Determine the type of fumigation and record in Drexel Chemical's Master Fume AG Calculator. For example:
   a. Space: tarp, mill, warehouse, food plant, railcar or ship (when fumigating vessels such as ships read the U.S. Coast Guard Regulations 46 CFR 147A, in addition to the Applicator's Manual)
   b. Commodity: raw agricultural or processed foods
3. Fully acquaint yourself with the site and commodity to be fumigated, and record the following in Drexel Chemical's Master Fume AG Calculator when necessary a. In conjunction with the owner/operator/person in charge, take not of the general structure layout, structure construction (materials, design, age, maintenance), fire or combustibility hazards, connecting structures, other significant fumigant escape routes and other unique hazards or structure characteristics.

b. The number and identification of persons who will routinely enter the proximate area fumigated (i.e., employees, visitors, customer, etc.)
c. The specific commodity to be fumigated
d. The previous treatment history of the commodity, if available
e. Accessibility of utility service connections
f. Nearest telephone or other means of communication and note the location of these items
g. Emergency shut-off stations for electricity water and gas. Note the location of these items
h. Location and number of fans, introduction sites and monitoring lines
i. Current emergency telephone numbers of local health, fire, police, hospitals and physician responders
j. Name and phone number (both day and night) of appropriate company officials
k. Location of command center
l. Review labeling including the Applicator's Manual
m. Location of cylinders
n. Cylinder temperature or pressure
o. Introduction line: length, inside diameter, and burst pressure
p. Fan capacity (i.e., cu. ft/mm)
q. Record and calculate dosage in Drexel Chemical's Master Fume AG Calculator
   (1) Cubic footage or other appropriate space/location calculations
   (2) Estimated HLT
   (3) Temperature
   (4) Exposure time
   (5) Target pest
   (6) Whether the low, high or user-defined CT was used and the resultant CT target value
   (7) Initial, additional and total amount of fumigant used
   (8) Time of introduction and if any, times of introduction of add gas applied
   (9) Actual CT achieved

B. PERSONNEL

1. Confirm that all relevant personnel in and around the structure to be fumigated have been notified prior to application of the fumigant. Consider using a checklist that each employee initials indicating they have been notified.
2. Instruct all relevant fumigation personnel to read the Applicator's Manual about the hazards that may be encountered and about the selection of personal protection devices including sufficiently sensitive detection equipment.
3. Confirm that all personnel are aware of and know how to proceed in case of an emergency situation.
4. Instruct all relevant personnel on how to report any accident and/or incidents related to fumigant exposure. Provide a telephone number for emergency response reporting.
5. Instruct all personnel to report to proper authorities any theft of fumigant and/or equipment related to fumigation.
6. Establish a meeting area for all personnel in case of emergency.

C. MONITORING

1. Safety
   a. Monitoring of conditions of this product must be conducted in areas to prevent excessive exposure and bystander exposure.
   b. Keep a log or manual of monitoring records for each fumigation site. This log must at a minimum contain the timing, number of readings taken, location, and level of concentrations found.
   c. When monitoring, document even if there is no fumigant present above the safe levels. In such cases, subsequent monitoring is not routinely required. However, spot checks must be made occasionally, especially if conditions significantly change.
   d. Monitoring must be conducted during aeration and corrective action taken if gas levels exceed the allowed levels in an area where bystanders and/or nearby residents or domestic animals may be exposed.

2. Efficacy
   a. Readings of this product should be taken from within the fumigated structure to insure proper gas concentrations. Drexel Chemical's Master Fume AG Calculator analysis of these readings must be used as a basis for any decisions to add gas and the determination of subsequent amounts needed.
   b. All readings of this product must be recorded in Drexel Chemical's Master Fume AG Calculator.
   c. Readings should be of sufficient nature to reasonably determine HLT and, thus, identify whether any significant unforeseen leaks are occurring.

D. NOTIFICATION
1. Confirm the appropriate local authorities (fire departments, police departments, etc.) have been notified as per label instructions, local ordinances or instructions of the client.
2. Prepare written procedure ("Emergency Response Plant") that contains explicit instructions, names and telephone numbers so as to be able to notify local authorities if levels of this product are exceeded in an area that could be dangerous to bystanders and/or domestic animals.

E. SEALING PROCEDURES
1. Sealing must be adequate to control the pests. Care should be taken to ensure that sealing materials will remain adequately intact until the fumigation is complete.
2. If the site has been fumigated before, review the previous FMP and/or Drexel Chemical's Master Fume AG Calculator files for previous sealing and HLT information.
3. Make sure that construction/remodeling has not changed the building in a manner that will materially affect the fumigation.
4. Warning placards must be placed on all entrances and all sides of the fumigation site.

F. APPLICATION PROCEDURES AND FUMIGATION PERIOD
1. Plan carefully and apply the product in accordance with the label requirements.
2. Two persons trained in the use of the product, at least one being an applicator certified by the state, must be present on site at all times during the introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure, when testing for re-entry after aeration (if aerated in an enclosed space) and during re-entry.
3. Apply fumigant from the outside when and where appropriate.
4. Provide watchmen when entry into the fumigation site by unauthorized persons cannot otherwise be assured (e.g., by secondary locks, barricades, etc.).
5. When entering structures, always follow OSHA rules for confined spaces.
6. Keep the flexibility and record keeping function of Drexel Chemical's Master Fume AG Calculator in mind - it will provide a basis for improved understanding and thus, safer fumigation application in the future.
   a. If Drexel Chemical's Master Fume AG Calculator calculated CT is achieved early, the fumigation can be ended early.
   b. If additional time is necessary, use Drexel Chemical's Master Fume AG Calculator to calculate how much time is needed.
   c. If it is necessary to add gas, use Drexel Chemical's Master Fume AG Calculator to calculate how much additional gas is required.

G. POST-APPLICATION OPERATIONS
1. Provide watchmen when you cannot otherwise secure the fumigation site from entry (e.g., by secondary locks, barricades, etc.) by unauthorized persons during the aeration process.
2. Determine gas concentration in the fumigated environment from outside if possible. Use a sufficiently sensitive gas detector before re-entry into a fumigated structure to determine fumigant concentration.
3. Turn on ventilating or aerating fans where appropriate.
4. Ventilate and aerate in accordance with structural limitations and nearby occupied areas so as to minimize bystander exposure.
5. Consider temperature when aerating.
6. Determine gas concentration in the surrounding area if required.
7. Remove warning placards when aeration is complete and the fumigated space has been cleared for re-entry using a detection device of sufficient sensitivity.
8. Inform business/client that employees/other persons may return to work or otherwise be allowed to re-enter the aerated structure.
9. Keep records of monitoring of gas concentration inside (efficacy readings) and outside (safety readings) the fumigation environment to document completion of aeration.

Chapter 6
PREPARATIONS FOR FUMIGATION

Prior to fumigation, read the Applicator's Manual carefully. Notify appropriate owners, employees, and/or operators at the facility where the fumigation will occur and provide relevant safety and health information to local fire and rescue officials for use in the event of an emergency.

Best practice is to notify local police, fire department and emergency responders of impending start and finish times for the fumigation.
Property Owner/Customer Checklist: The owners of buildings to be fumigated need to be informed of circumstances and conditions associated with the fumigation process and of their involvement in preparation, vacancy and re-occupancy. Some states require the fumigator to provide the customer with a list of preparations required for the fumigation. The customer may also be required to acknowledge in writing certain liabilities.
The responsibility for proper fumigation procedures lies with the certified fumigator regardless of who does the work.

OCCUPANTS/CUSTOMERS NEED TO KNOW:

1. Qualifications of the certified applicator who will be doing the fumigation.
2. Their specific role in preparation for fumigation - what to prepare, turn off, remove, etc.
3. What the fumigation process (introduction, exposure, aeration and clearance) entails so that there can be absolutely NO ENTRY by unauthorized personnel into the structure until it is certified clear for re-entry by the fumigator.
4. The specific times to leave the structure and when re-occupancy may occur.
5. That the fumigator often requires that the property owners surrender keys to the structure to be fumigated. The fumigator should have access to all areas of the fumigation site during the whole period that the site is under their control.
6. This product has no residual effectiveness and so does not control future infestations of pests.
7. To reveal to the fumigator known or potential connections to adjacent/other buildings.

WHAT TO REMOVE PRIOR TO FUMIGATION

Remove from the structure to be fumigated all persons, non-target animals and desirable growing plants. All drugs (including tobacco products) and medicinals (including those items in refrigerators and freezers) need to be removed prior to fumigation.

FLAMES OR HEATING ELEMENTS

This product is a very stable compound that is relatively non-reactive and non-flammable. However, under high heat conditions present in gas flames or glowing electric elements, this product can decompose into sulfur dioxide SO_2, hydrofluoric acid HF, and other decomposition products. Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Therefore, extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated.
Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. When a single gas meter serves more than 1 structure, gas service to all sources may be interrupted. The gas lines should be cleared. Fumigation companies may request that customers have the local gas company turn off the gas prior to fumigation. The local gas company will always need to turn gas service on after it has been turned off to determine that the gas flow rate and pressure are appropriate.

Important: Before fumigating, ALL pilot lights must be turned off. The heat of gas flames, pilot light flames, or the glowing wires or hot surfaces of electric heaters can cause this product to break down to form a corrosive material. Make sure the gas flames and pilot flames of furnaces, gas refrigerators and kitchen ranges are extinguished and that glowing electric heaters that represent a reasonable risk of a heat source that is at or near 752°F are turned off.

CHLORINE GAS: Damage to metals can also occur from the inclusion of chlorine gas for bleaching or chlorination processes. Ensure this equipment is turned off with no leaks or excluded from the fumigation.

CHECKING FOR CONNECTED AREAS

Prior to fumigation, the certified applicator is required to check for connected areas. A connected area is defined as any area connected with the space to be fumigated by construction elements (e.g., pipes, conduits, ducts, etc.) that may allow the passage of fumigant between the spaces.
Any connected areas must be vacated during the fumigation process unless it is isolated from the space to be fumigated by methods that will prevent passage of the fumigant from the space to be fumigated into the connected area. When it is necessary to vacate areas that have been isolated, that area shall be considered as a fumigated space and all applicable rules, regulations and label instructions apply such as preparation, placarding, securing and aeration.
Concentrations of this product must be continually measured during the fumigation of a structure in any occupied isolated connected structures to verify concentrations are less than 1 ppm to confirm that individuals in the isolated areas are not exposed to unacceptable levels of this product.
Use only a detection device of sufficient sensitivity such as the INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR to confirm a concentration of 1 ppm or less. If concentrations of this product is more than 1 ppm, then the sealing of the isolated space from the fumigated area is probably not working and the immediate space must be evacuated unless the concentration is continuously monitored to prevent exposure greater than 1 ppm. SCBA must be worn by the applicator if the concentration is more than 1 ppm. **Important:** All connected/adjoining areas must be vacated if required by state or local laws or regulations.

DISTRIBUTION / AERATION FAN USE AND PLACEMENT

Purpose of Fans

The purposes for fans in a structural fumigation are:

1. Fumigant introduction
2. Equilibrium and circulation
3. Aeration

Positioning Fans

- There is no set pattern established for the positioning or the number of fans to use.
- Fans should be strategically placed in order to mix the fumigant and rapidly reach equilibrium.
- At least one fan for each level of the structure.
- It is good fumigation practice to use more fans in structures that are divided into numerous smaller compartments or rooms.

A rule of thumb is to use one fan for each 75,000 ft^3 and at least one fan for each area or level of the fumigation.

In structures frequently used or dedicated to fumigation, air circulation equipment and fans can be built into the structure. Examples of some systems include air-handling systems that provide for the fumigant introduction, continuous circulation, and also aid in the quick, effective aeration of the structure.

Reaching Equilibrium

When the liquid form of this product is released from the introduction hose, it extracts a substantial amount of heat from the surrounding air as it expands to form a gas. A pound of the liquid form of this product changing to the gas phase will drop the temperature of 1000 cubic foot of dry air 4.5°F (28.3 cubic meters of air 2.5°C).

The chilling causes the formation of a cloud of condensed water (fog) that must be dissipated before it collects on a surface. The rate of dissipation depends upon the release rate, atmospheric conditions and mixing rate. The fan capacity, quantity, and placement determine the mixing rate. The chilled gas of this product is much denser than the surrounding air and can settle to the bottom of the fumigation space unless mechanically mixed with the surrounding air.

All gases tend to move from an area of high concentration to low concentration and will eventually come to equilibrium in a confined space. This product will do the same when it is introduced into a fumigation space, regardless of the fact that molecules of this product are heavier than air molecules. However, the rate of passive diffusion may be too slow to achieve equilibrium within a practical period. Thus, mechanical mixing by fans is essential.

Important: High capacity fans are needed when introducing this product into a space to prevent stratification, to aid in proper dispersion and to assist temperature distribution.

Continuous Circulation with Fans

A significant benefit of continuous circulation is the movement of this product from areas of high concentration to areas of lower concentration. This continuous circulation maintains a more equal concentration within the fumigation space and helps ensure that this product will penetrate all areas where infestation may exist.

It is next to impossible to seal a structure so that there are no leaks. Unless there are abnormally large leaks, continuous circulation during the entire exposure period will not appreciably affect the loss rate for this product. Obviously, the air stream should not flow directly against "leaky" areas because excessive fumigant loss can occur.

Preparing for Aeration

When first preparing the fumigation, plan ahead for the aeration period and take steps to aid aeration by strategic placement of fans and other aeration tools. Just as fans are useful in achieving equilibrium of fumigants, they are excellent aids in attaining rapid aeration and are essential where cross ventilation is poor. Have a detailed plan in place for safe, effective aeration of the structure. Be sure to consult local regulations for more restrictive aeration procedures.

MONITORING HOSES

Arrangements should be made to place sampling hoses in the structure prior to fumigant introduction. Semi-rigid vinyl hoses (3 to 6 mm or 1/8 to 1/2" ID) should be placed to allow sample representative concentrations with a Fumiscope or similar device. Monitoring hoses larger than 6 mm ID may take a longer time to pull the sample from the fumigated space to the monitoring device because of the larger volume of air needed to be moved.

Ideally, monitoring lines should be placed on all levels of the fumigated structure. If the structure is compartmentalized into separate rooms or other sub-units, place lines in areas representative of the different units.

SEALING THE STRUCTURE

No two fumigations are exactly alike. Each job requires the fumigator to establish and maintain an effective fumigation environment. The fumigation must be conducted in a manner that will effectively control the pests without causing undue risk to people or property. The fumigator must conform to the label for this product and the Applicator's Manual, as well as to federal, state and local regulations. When in doubt, a fumigator should seek assistance from suppliers, regulators, Drexel Chemical Company representatives or other educational sources.

The quality of the seal has a huge influence on the effectiveness of the fumigation. Increasing the seal of the fumigation site is one of the most effective ways to ensure a quality fumigation and reduce the total amount of fumigant needed.

There are several approaches to the challenges of confining the fumigant. The fumigator needs to make field judgments how to best seal a space. Pay special attention to drains, vents, conduits, wiring, electrical junction boxes, floor cracks, wall/floor or wall/ceiling joints and damage to outside walls from equipment. When sealing, keep in mind a few basic thoughts:

1. Identify and address key leakage areas. Careful inspection of the structure will help identify leaky areas. Be sure to carefully seal protruding equipment on the top floors and roofs. Building eaves also can be very leaky.
2. To the extent necessary and possible, close off all connected structures and install an "air break" to stop gas moving to connected structures.

Tape and Seal

For fumigation structures that can be appropriately sealed with materials such as plastic or tape, seal adequately around doors, windows, vents and other openings. When necessary to minimize escape of fumigant through the soil and to avoid injury to nearby plants, wet soil (if not sufficiently moist) around the structure to act as a barrier for the fumigant. Often, structures are too large to be completely tarped for fumigant confinement. The most common practices are to use polyethylene sheeting, non-porous panels, fumigation tape, spray adhesives, foams and insulation materials to seal the structure for fumigation. These techniques are usually used around doors, windows, roof eaves, loading docks, pipes, augers, conveyers, vents, etc. If properly used, these materials can do an ample job of confining the fumigant within the structure.

Stucco or masonry block buildings may be sealed by taping laminated paper or plastic film over outside doorways, windows and vents. This sealing method is recommended for structures in which any wooden section, including roofing, is exposed to the outside.

However, even with an excellent job of tape and seal around windows, doors, etc., if the building walls, roof or basement have holes that are not sealed, the structure may not hold fumigant satisfactorily.

Always monitor with a Fumiscope or similar device when necessary.

Foam Sealing

The use of expandable spray foams have been effectively used to help seal structures. Expandable foam is economical and can be used for both permanent and temporary seals. Refer to the foam product directions for proper use and compatibility issues.

Tarping

Good sealing is necessary for an effective fumigation. Tarpaulins (tarps) can be used in the sealing process with tapes/adhesives to help seal leaky areas or to envelop the entire area to be fumigated. This method is effective on almost any size or type of space/site. The ability of a tarp to contain a gas depends on the condition of the tarp, the material of construction and its thickness.

One of the most critical operations in tarping a space is achieving a tight seal at the ground where protrusions, debris or rough-textured soil or concrete may provide an opening for gas to escape. The edges of the cover that contact the floor or soil must be sealed by techniques such as taping the tarp to the floor or placing sand or water snakes over the edges of the tarp. Sand or water snakes may be used effectively if the ground surface is very smooth. One method of improving the seal with a sand or water snake is to run a trough of water on the tarps along with the snakes. Vinyl/nylon snake covers do not deteriorate readily. To minimize escape of fumigant through the soil and to avoid injury to nearby plants, wet soil (if not sufficiently moist) around the structure to act as a barrier for the fumigant. When possible, avoid walking on tarped, fumigated material to maintain seal during the exposure period. To achieve an adequate ground seal, allow at least 2 feet of tarp to clear the ground snakes. This will accommodate movement of the tarps from wind movement.

TARP MATERIAL: Plastic tarps are semi-permeable membranes that permit different fumigants to pass through them at different rates. The passage of this product through most plastic sheeting of sufficient thickness is very slow (see Table 1).

Use only tarps made of materials that will adequately confine this product for the required time. Tarps are sold in many sizes. Experience has shown that the following have proven satisfactory:

1. 4 to 6 mil polyethylene for "single use" tarps
2. Laminated (several layers) polyethylene
3. Vinyl coated nylon
4. Neoprene coated nylon
5. PVC (polyvinyl chloride) coated nylon

THICKNESS: As a minimum, 4 to 6 mil (160 to 240 microns) thickness of the above materials adequately confines this product. A tarp of 100 microns is equivalent to a 400 gauge material. Polyethylene tarps less than 4 mil (160 microns) are not of an adequate thickness to confine this product because they do not possess the strength and weight needed for the handling, wind resistance and abrasion encountered in most fumigations.

TABLE 1. Percent permeation loss and adsorption of 8 oz/1000 ft^3 sulfuryl fluoride after 24 hours from 11 ounce glass bell jar with lid made of tarp materials.

	% Permeation Loss	% Adsorption*
	Sulfuryl fluoride	Sulfuryl fluoride
Polyethylene 4 mil	0.0	1.3
Tarp A, 10.3 oz/yd^2	3.3	6.1
Tarp B, 7.2 oz/yd^2	5.5	3.1
Tarp C, 9.6 oz/yd^2	0.2	3.3
Used tarp**	100.0	8.8

*Values reflect subtraction of fumigant loss due to glass container adsorption (2.2% for sulfuryl fluoride). (n=4)
**A used tarp is a tarp which has abrasions of the vinyl coating causing the nylon fabric to be exposed in a few spots.

Source: Scheffrahn, R.H. and E.M. Thomas (1993) "Penetration of Sulfuryl Fluoride and Methyl Bromide Through Substrates During Fumigation." DOWN TO EARTH 48 (1) pp. 15-19.

PLACARDING AND SECURING FUMIGATED AREAS

Placarding of Fumigated Areas

This product is a toxic gas without a warning agent.

All entrances and all sides of the fumigated environment and any connected area not monitored must have warning signs. Do not connect cylinders to introduction equipment until all fumigation warning signs have been posted, the space to be fumigated is clear of people and non-target animals, and it is secured. Warning signs must be of weather resistant material and should be securely affixed to the structure. Do not allow entry by unprotected persons into fumigated area until the signs are removed. Signs must remain legible during the entire posting period. Warning signs should be placed in advance of the fumigation in order to keep unauthorized persons away. The warning signs must be printed, in English and Spanish, with:

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 and time.
4) Name of fumigant used and EPA Reg. No.
5) Name, address and telephone number of the applicator.

Only a certified applicator may authorize removal of placards and only when concentration of this product in the breathing zone of the treated site is 1 ppm or less.

Use the following considerations when posting warning signs:

- Follow local, state and federal regulations for sign format, size, durability or additional information requirements.
- Use materials that will allow information to remain legible when posted.
- Use information that allows for 24 hour communication with the certified applicator in the event of an emergency.

Transfer of incompletely aerated commodity to a new storage site within a facility is permissible. However, the new storage site must have placarding and security similar to the fumigation site if concentration of this product is equal to or greater than 1 ppm. Workers who handle incompletely aerated commodity must be informed and appropriate measures must be taken (ventilation and wearing of SCBA) to prevent any exposure greater than 1 ppm.

Securing Structures

In order to secure against unauthorized entry during the fumigation exposure period, a locking device or barricade must be used on all exterior doors or doorways. A locking device or barricade must be effective in preventing entry of any exterior door or doorway using normal opening or entering processes by anyone other than the certified applicator in charge of the fumigation or persons in his/her on-site direct supervision. Consult state and local regulations for any supplementary instructions and local restrictions on securing against entry. Several additional security options to consider might include:

CLAM SHELL LOCKS:

(Insert Picture Here) CLAM SHELL LOCKS are designed to prevent use of the door or occupant's keys to unlock entrance doors.

KEY-WAY LOCKS:

(Insert Picture Here) KEY-WAY LOCKS are designed to prevent use of the occupant's keys to unlock entrance doors. These function by inserting a two-part locking key into the door keyhole and removing only half of the key. The other half of the locking key remaining in the door prevent insertion of the occupant's key.

J-SAFE LOCKS:

(Insert Picture Here) J-SAFE LOCKS or chains can also be used on certain structures.

GUARDS:
Guards may be considered in some circumstances and may be required in some locations. Consult local regulations. Best practice is to notify local police, fire department and emergency responders of impending start and finish times for the fumigation.

RAILCARS, TRAILERS OR SHIPS:
Railcars, trailers or ships must be secured against unauthorized entry during the fumigation exposure period.

Chapter 7
INTRODUCTION AND DISTRIBUTION OF THIS PRODUCT
CHOOSING INTRODUCTION SITES

The specific site(s) of release of this product is (are) very important to the success of the fumigation. This product should be introduced in a manner to achieve rapid equilibrium, avoid excessive loss, prevent fog-out and ensure safety to personnel and materials.

Site selection should be made using good judgment. Ask, "If this product was introduced in this location, how and when will it get to the most remote locations in the commodity or structure?" The size and configuration of the space and the adequacy of the circulation typically dictate the number of release sites for this product. Therefore, for many applications, it is often appropriate to use multiple introduction sites to rapidly attain equilibrium.

In structures that are frequently used for fumigation, permanent introduction systems can be built into the structure to ensure safe, effective and adequate fumigant introduction. Be sure to inspect all components of introduction systems prior to each use.

The proper introduction of this product (release from the cylinder) is essential to the success, safety and economy of a fumigation. It is imperative that the fumigator understands the principles involved and the conditions that exist for introducing the fumigant on each job.

Below are points that are considered when introducing this product:

1. The introduction methods used will practically achieve the target dosage (sufficient ounce-hours for the working temperature to control the target pest).
2. This product must be introduced in a manner that is safe to personnel and property inside and outside of the fumigation space.
3. The goal is to reach concentration equilibrium of this product throughout the fumigated space as quickly as is safe and practical.

Important: Prior to release of this product, make sure a thorough check of the structure and surroundings is conducted and all safety precautions have been taken.

Do not apply for insect control when temperature at the site of the pest is below 40°F. This temperature may be measured wherever the infestation may be. This restriction does not apply when fumigating for rodents. To prevent damage, do not apply liquid fumigant directly to any surface within the fumigation area.

This product is packaged as a liquid under pressure and requires a heat source for conversion of the liquid to a gas during introduction.

The heat source can be the air around the introduction site or mechanical heat exchanging systems.

The introduction system must:

- Prevent breakdown or contamination of this product.
- Confine this product until it is released into the fumigation area.
- Prevent liquid sulfuryl fluoride from contacting surfaces which could be damaged or the commodity within the fumigation area.
- Prevent a fog-out in the fumigation area. A fog-out is substantial condensation of moisture inside a fumigated structure that is caused by the air temperature dropping below the dew point.

  Damage to materials can occur if the rate of release of this product exceeds fan capacity. Use electric fan(s) to facilitate forced distribution and aeration of other dead air spaces and rapid dispersion of the gas.

  This product must be introduced from the cylinder through a suitable leak-proof delivery system (hoses, connectors, gauges, solenoids, etc.) with a minimum burst pressure of 500 psi. It is recommended to:
- Release the fumigant into a large open space.

- Direct the fumigant into the blast of air from a fan(s) having a capacity of at least 1000 cubic foot per minute per pound of this product released per minute.
- Introduce no more than 4 cylinders per introduction site.
- Have one introduction site per every 75,000 cubic foot.

SELECTION AND USE OF EQUIPMENT FOR FUMIGANT INTRODUCTION

Weighing the Fumigant

Either platform or hanging scales can be used to weigh the cylinder during fumigant introduction. If hanging scales are used, hanging bonnets or cylinder slings must be used to hang the cylinder from the scale.

Consult your distributor or Drexel Chemical Company for a source of hanging bonnets. Scales should be routinely calibrated to assure correct readings. Refer to the scale manufacturer for calibration and maintenance details.

THE CYLINDER SHOULD NEVER BE SUSPENDED BY THE VALVE!

Hoses

Release the fumigant through a suitable leak-proof hose with a minimum burst pressure of 3450 kPa (500 psi). The hose should be flexible, kink-resistant, durable and compatible with the liquid form of this product.

Prior to use, confirm with distributor or manufacturer that the introduction hose meets the above requirements.

The introduction rate of this product is mostly controlled by the inside diameter and the length (resistance) of the fumigant introduction hose. Flow rates can be easily calculated using Drexel Chemical's Master Fume AG Calculator.

Protective Sheeting

Protective sheeting, such as polyethylene plastic, can be placed under the hose and fan to further protect floors and other materials during application from potential moisture condensation.

Securing Introduction Hose

A widely used method is to securely attach the introduction hose to a tarp clamp and then use the tarp clamp to attach the hose to the fan cage. The fan cage is angled upward at about 45°. Another option is to attach the fumigant introduction hose to a solid heavy object in front of a fan angled upward at 45°. If the introduction hoses are part of a permanent introduction system, be sure to inspect the hoses prior to each use to ensure they are securely mounted and still in required working order.

Fog-Outs

A cloud of fine droplets suspended in air near the ground is called fog. It is very important when introducing this product to prevent excessive fog and dew formation. Releasing this product will cause some condensation near the release point - slow release rate and low humidity will cause less and a fast release rate and high humidity will cause more. After the condensation forms, it will evaporate at a rate that is dependent on the relative humidity, the temperature of the fumigation atmosphere and the air mixing rate controlled by the introduction fans.

Condensation forming on the photoelectric eye of a smoke detector or motion detector can cause the alarm to activate. It is very important to use proper fans to help mix the heat of the building and fumigation atmosphere to evaporate the condensation. Liquid water absorbs the very small amount of impurities in this product and can result in corrosion.

Fog-Out Prevention

There are several options to reduce the incidence of moisture condensation when fumigating air-conditioned structures in hot, humid weather:

1. Let structure warm a day or two before fumigation to equalize inside and outside temperature and stabilize the Relative Humidity (RH).
2. Reduce the introduction rate with a smaller diameter hose, longer hose or pulsed (interrupted) introduction.
3. Reduce the amount of this product introduced into one area by using multiple introduction sites. This would be most important in high-dosage fumigations.
4. Use multiple fans or larger fans to hasten the mixing of air and heat exchange.
5. Monitor the fumigation or extend the exposure period to reduce the overall fumigant requirements, if practical.
6. When necessary, use a combination of several of these techniques to reduce the release rate and relative humidity, and increase the heat exchange of the structure to the fumigation atmosphere. Drexel Chemical's Master Fume AG Calculator takes into consideration fan capacity to recommend the fumigant introduction rate.
7. Do not tarp or seal a space that is excessively wet.

Fumigated Space Leak Detection and Mitigation

During release of this product, the fumigator must monitor around the perimeter of the fumigation area (especially downwind) with a leak detector with sufficient sensitivity to ensure a good seal so that concentrations of this product are kept within 1 ppm or less outside of the fumigation area. An SCBA must be readily available during the fumigant introduction period in case of leaks.

Detectors such as TIF 5750 and XP-1 manufactured by TIF Instruments, Inc., Miami, Florida, can detect concentrations of this product over 50 ppm. These devices can only be used to check cylinders for significant leaks. A device capable of measuring to 1 ppm of this product must be used for all other tasks.
If more than 1 ppm of this product is detected, then clear the area of all personnel. Only persons wearing a self-contained breathing apparatus (SCBA) with full facemask and operating in pressure demand mode or its equivalent are permitted in the area to address the leak. Only after levels of this product are 1 ppm or less, are unprotected personnel permitted in the area. Large leaks must be minimized as quickly as possible to help avoid risk of exposure to bystanders and/or occupants of nearby structures and to minimize loss of fumigant. This involves walking around the structure or fumigated area with a monitoring device to determine if excessive amounts of fumigant are escaping. Proper respiratory protection must be worn when sealing leaks. Seal leaks from the exterior of the structure whenever possible. If it is necessary to seal a leak from the interior of the structure, the applicator must follow all proper re-entry procedures.

Re-entry Procedures
If re-entry into a fumigated area is necessary after introduction of the fumigant, but before complete aeration, to troubleshoot distribution of the fumigant or repair leaks, follow the re-entry procedures specified in Chapter 9.

CALCULATING DOSAGE
Establishing the Required Dosage
The fumigator is challenged with the task of distributing and maintaining a concentration of fumigant over the fumigation period to achieve the target dosage. Because of the multitude of factors, no two fumigations are identical. To specify a single dosage rate for all conditions would seldom be correct — usually it would be either excessive or insufficient for expected pest control.

Drexel Chemical's Master Fume AG Calculator Program
Drexel Chemical's Master Fume AG Calculator is used for all fumigations using this product. See directions for details and specific use. Do not use this product without the Drexel Chemical's Master Fume AG Calculator. Drexel Chemical's Master Fume AG Calculator must be used to calculate the dosage. Drexel Chemical's Master Fume AG Calculator Program may be modified and updated from time to time; please contact your Drexel Chemical Company representative for current information.

Precision Fumigation Defined
Precision Fumigation is not a new concept; however, most fumigators have lacked the tools to consistently plan and conduct precision fumigations. Precision Fumigation can be defined as "Optimizing fumigant use to maximize efficiency and minimize risk."

Precision Fumigation Concepts
Use of this product allows fumigators to use their skills, knowledge and experience to create and implement successful, flexible fumigations. Precision Fumigation methods: a) allow fumigation when/how necessary, b) capitalize on enhanced sealing methods, c) maximize exposure time and d) utilize temperature modification.

Fumigant Dosage
All fumigants utilize some form of the dosage relationship which is often referred to as the "CT Concept":

Dosage = Concentration (C) X Time (T)
or
D = C x T (CT)

Therefore, the dosage required to kill the target pest(s) is accumulated over a period of time and is measured in ounce-hours or gram-hours.

CT = oz-h/1000 cu. ft.

The concentration in ounce per 1000 cubic foot of fumigant multiplied by the exposure time in hours

The maximum target concentration in Drexel Chemical's Master Fume AG Calculator is 128 ounces per 1000 cubic foot.

The maximum target dosage for all normal atmospheric pressure (NAP) fumigations is 1500 CT (1500 ounce-hours per 1000 cubic foot).

For vacuum chamber fumigations, the maximum target concentration is 128 ounces per l000 cubic foot, and the maximum target dosage is 200 CT (200 ounce-hours per 1000 cubic foot).

Concentration Units of this Product
1 ounce per 1000 cubic foot = 240 ppm

FUMIGANT DOSAGE FACTORS
The proper dosage for efficacy and the total amount of this product needed for a fumigation is determined by four interrelated factors:
1. Pest species and life stages
2. Temperature at the site of infestation

3. Exposure time
4. Half-Loss Time (HLT)

Pest Factor
This product is effective on all key stored product insect pest species and can control all life stages of insects. However, different pest species and life stages require different dosages for effective control. Adult, larval and pupal stages are controlled with relatively low dosages of this product, while the egg stage requires higher dosages.
Several rodent pests such as rats and mice may infest commodities and sites, and damage materials within facilities. The temperature restriction of 40°F for insect fumigation does not apply to rodents because they are warm blooded. The target dosage for rodents is 36 ounces-hour per 1000 cubic foot.

Temperature Factor
Temperature is an important factor for successful fumigation. Insects are ectothermic, so increasing temperature increases insect metabolism. Increasing insect metabolism greatly improves the efficacy of this product. Increasing temperature can decrease exposure time and/or gas needed. Relatively large changes in temperature are generally not required. Achieving temperatures of 25 to 30°C (78 to 86°F), for example, can have a very positive effect on fumigation efficacy and efficiency.
Fumigators can use the following methods for increasing temperature of the fumigated space. Permanent/built-in systems utilizing hot water, steam, electric, fossil, solar heat sources. Temporary/leased units operating on propane or natural gas, electric or other fuels can be used. Fans, heater fans and other electrical equipment should be grounded and have a good protective fusable or breaker system. Planning fumigations during the warmer seasons or even during the warmer periods of the day can positively affect temperature factor.
Do not apply this product for insect control when the temperature of the site of the pests is below 40°F.
The measured minimum temperature at the site of the insect pest should be used for dosage calculations.
For rodents, temperature does not affect dosage because they are warm blooded.

Time Factor (T)
The time factor is a key component of C x T = Dosage formula. The exposure time is defined as the number of hours the target insect is exposed to the fumigant. If the structure has good gas confinement, increasing the exposure period is one of the most cost effective practices available to the fumigator. Doubling exposure time in a well-sealed structure can decrease gas needed by up to 50%. The fumigator should work with the customer to plan and optimize exposure time to minimize the fumigant needed.

Increase time = Decrease gas needed
Decrease time = Increase gas needed

Half Loss Time (HLT)
HLT is the measurement of how well a fumigated space or area holds fumigant from loss. HLT is defined as the time in hours during which 50% of the initial concentration of fumigant is lost. Research has shown fumigant retention is often extremely variable between and even among areas within a structure. Results from numerous measurements for this product indicate the main influencing factors are:
1. Condition of seal (wall construction, number and size of leaks, etc.).
2. Type of underseal (slab, soil, wood).
3. Volume of structure (ratio of surface area to volume).
4. Wind velocity.
5. Number of windows and doors and other openings such as pipes, vents, racks, etc.

If HLT is more than 20 hours for structures, the seal is considered very good. HLT is calculated by actively monitoring the fumigation with a Fumiscope or similar device over a period of time and determining the specific loss of gas in that time period. To get a reasonably accurate picture of the HLT in a large structure, monitoring points should be established throughout the building. This ensures that each area or compartment of the structure will achieve the required dosage. Drexel Chemical's Master Fume AG Calculator will calculate an HLT by area using the collected monitoring data.
Under conditions of rapid fumigant loss (low HLT), only the initial hours of exposure significantly accumulate dosage. If the HLT is significantly shorter than expected (fumigant leaking drastically faster than planned), to achieve the required dosage, the fumigator must take additional steps. These steps include, but are not limited to, stopping the addition of fumigant and addressing the leak (following re-entry procedures if there is a need to reenter or wearing SCBA if working from outside), before increasing gas concentration of this product, increasing the time of exposure or utilizing a combination of the two methods.

Best practice is to use monitoring data, from previous fumigations for this or similar sites and conditions to estimate the HLT, and then monitor to confirm the true HLT. When a reasonable estimate of HLT is not available prior to the initiation of exposure, the following Precision Fumigation method should be used. Introduce part of the calculated dosage of this product, monitoring to determine the actual HLT and then introduce additional parts of the calculated dosage and/or increase exposure time to achieve the target dosage.

USING DREXEL CHEMICAL'S MASTER FUME AG CALCULATOR PROGRAM

Drexel Chemical's Master Fume AG Calculator is a computer-based program that requires entry of key information to determine the dosage and amount of this product to be used. Before Drexel Chemical's Master Fume AG Calculator Program can be used, contact your Drexel Chemical Company representative on how to activate the computer program for calculating dosage. Drexel Chemical's Master Fume AG Calculator Program may be modified and updated from time to time; please contact your Drexel Chemical Company representative for more information.

Drexel Chemical's Master Fume AG Calculator Program has been developed to allow fumigators to calculate the correct dosage over a broad range of pest species, life stages, temperatures and exposure times. Drexel Chemical's Master Fume AG Calculator determines the necessary dosage (gram-hours or ounce hours), converts this to pounds of this product per 1000 cubic feet (or cubic meter) based on volume of fumigated space for all target pests referenced in this Manual. The program also can calculate the necessary adjustments to the exposure period or pounds of this product required to reach the target dosage based on fumigation monitoring data.

- The maximum target concentration in Drexel Chemical's Master Fume AG Calculator is 128 ounces per 1000 cubic foot.
- The maximum target dosage for NAP fumigation in Drexel Chemical's Master Fume AG Calculator is 1500 CT (ounces-hour per 1000 cu. ft.).

Drexel Chemical's Master Fume AG Calculator Temperature Range

This Manual states that the lower fumigation temperature limit is 40°F for insects. At present, however, Drexel Chemical's Master Fume AG Calculator calculates specific dosages for temperatures between 68°F (20°C) and 86°F (30°C). Drexel Chemical's Master Fume AG Calculator allows the user to input temperatures higher than 86°F, but will calculate the dosage based on 86°F. Since the efficacy of this product increases with temperature, Drexel Chemical's Master Fume AG Calculator dosages for temperatures higher than 86°F are conservative.

Drexel Chemical's Master Fume AG Calculator allows the user to input temperatures below 68°F, but will calculate the dosage based on 68°F and provide a warning message that insect control may be less than optimal due to the cooler temperature and decreased insect metabolism. Following the fumigation, monitoring the pest population is recommended to assess control.

Drexel Chemical's Master Fume AG Calculator Exposure Time Range

Drexel Chemical's Master Fume AG Calculator allows the user to input exposure times between 1 and 168 hours. Short exposures of a few hours are best suited for vacuum fumigations, while exposure periods of several days can be appropriate for reasonably sealed structures. Fumigations will commonly be 24 hours due to the need to limit shutdown time, but extending the exposure time can decrease the amount of fumigant necessary. Use Drexel Chemical's Master Fume AG Calculator to determine the most appropriate exposure time to meet both the customer's and fumigator's needs.

Drexel Chemical's Master Fume AG Calculator HLT Range

Drexel Chemical's Master Fume AG Calculator accepts HLTs from 1 to 1000 hours. The fumigator estimates this value prior to the fumigation preferably based on results of monitoring previous fumigations of this structure or of fumigations conducted under similar conditions. HLTs of greater than 50 hours are normally achieved only in chambers and other tightly sealed silos. Change HLTs in Drexel Chemical's Master Fume AG Calculator to see the impact of HLT on the amount of fumigant needed for a fumigation.

Drexel Chemical's Master Fume AG Calculator Area Volume Range

Drexel Chemical's Master Fume AG Calculator calculates fumigant dosages for structures ranging in volume from 35 to 10,000,000 cubic foot. Errors in measuring the volume can lead to under-dosing and not achieving the target dosage or using more fumigant than is needed to achieve the target dosage.

Drexel Chemical's Master Fume AG Calculator Ranges

Temperature:	68 to 86°F
HLT:	1 to 1000 hours
Exposure Time:	1 to 168 hours
Volume:	35 to 10,000,000 cu. ft.
Dosage:	"Low" or "High"
Fumigation Type:	"Space" or "Commodity"
Pressure Type:	"Normal Atmospheric" or "Vacuum"

Limits

Dosage (CT):	1500 oz-h/1000 cu. ft. (NAP)
	200 oz-h/1000 cu. ft. (vacuum)
Concentration:	128 oz/1000 cu. ft.

Drexel Chemical's Master Fume AG Calculator Example

INPUT	
Species:	Red Flour Beetle
Temperature:	86°F
HLT:	15 hours
Exposure Time:	24 hours
Volume:	800,000 cu. ft.
Dosage:	Low
Fumigation Type:	Space
Pressure Type:	Normal Atmospheric
OUTPUT	
Dosage (CT):	338 oz-h/1000 cu. ft.
Concentration:	23.3 oz/1000 cu. ft.
Quantity:	1164 lbs.

Steps of Operation

Preparation prior to fumigant release:

1. Determine pest species and life stages to be controlled.
2. Measure temperature at pest location with a thermometer. (Drexel Chemical's Master Fume AG Calculator operates in both English (°F) and metric (°C) units.)
3. Calculate volume of fumigation space.
4. Determine the targeted exposure period.
5. Estimate the HLT based on previous experience or estimation.
6. In Drexel Chemical's Master Fume AG Calculator, calculate dosage of this product in ounce per 1000 cubic foot (or gm/m^3) and get pound (or kg) of this product needed for the job.

Sequential Fumigations

Sequential fumigations are an alternative dosage strategy that may be used to control insect infestations. Fumigate once at the low dosage, which is sufficient for control of the post-embryonic (larva, pupa, adult) stages, plus a significant portion of the eggs. If there are any surviving insect eggs, then after they have hatched, but prior to their maturation and deposition of new eggs, fumigate a second time, again at the low dosage. When sequential fumigations are done, do not exceed the maximum cumulative target dosage of 1500 CT (1500 oz-h/1000 cu. ft.) for the target commodity.

Using Drexel Chemical's Master Fume AG Calculator When Monitoring

During the exposure period, the concentration of this product can be measured by a Fumiscope or similar device. After the fumigant concentration has reached equilibrium, measurements taken over an interval of time will give the actual loss rate from which the HLT can be determined. Use of Drexel Chemical's Master Fume AG Calculator during monitored fumigations has shown that significant quantities of this product can be saved compared to unmonitored fumigations and better control achieved. Refer to Drexel Chemical's Master Fume AG Calculator help file for specific directions on how to use this program. Drexel Chemical's Master Fume AG Calculator is designed to determine actual HLT based on measurements of concentrations of this product during fumigation.

Monitoring to Determine Status and Updated Dosing Directions

1. Measure (with a gas measuring instrument such as a Fumiscope or similar device) concentration of this product ounce per 1000 cubic foot (gm/m^3).
2. After one or more hours, take a second measurement of concentration of this product. Accuracy of HLT increases as time between monitoring intervals is increased.
3. Drexel Chemical's Master Fume AG Calculator will calculate the actual measured HLT.
4. If the HLT is shorter than estimated (more rapid loss of fumigant), then either more of this product needs to be added to finish on time or the exposure time may be extended if sufficient product is present. Drexel Chemical's Master Fume AG Calculator will provide the time and "add gas" directions.

Chapter 8
MONITORING THIS PRODUCT

Monitoring discussed within this chapter refers to measuring accumulated dosage and does not refer to required monitoring for worker and bystander exposure.

Monitoring fumigant concentration at key places in the fumigated environment is directed because it can provide important information to the fumigator regarding the placement of fumigant introduction sites that will assist in the efficiency and success of future fumigations.
Thus, in addition to helping maximize efficiency of a large fumigation, monitoring fumigant concentration can serve as a learning experience for the fumigator. For instance, if equilibrium is not achieved quickly, the fumigator can consider placing additional introduction sites or fans in the next fumigation.
Measurement of the accumulated concentration of this product while the fumigation is in progress becomes increasingly valuable as the structure size, complexity and the repercussions of poor pest control increase.

THE OBJECTIVES OF MONITORING FUMIGANT CONCENTRATION OF THIS PRODUCT ARE:
1. To allow Drexel Chemical's Master Fume AG Calculator to determine the optimal amount of this product needed to control the target pests under the actual fumigation conditions.
2. To allow Drexel Chemical's Master Fume AG Calculator to calculate CT (dosage) needed and achieved to ensure a successful fumigation.
3. To allow Drexel Chemical's Master Fume AG Calculator to calculate the actual HLT vs. just estimating the HLT.
4. To create a reasonable history of Drexel Chemical's Master Fume AG Calculator file records so that enhanced Precision Fumigation techniques can be built upon in subsequent fumigations.

SPECIFIC GUIDELINES FOR MONITORING A TYPICAL FUMIGATION
This product should be circulated so as to reach equilibrium rapidly, ideally within an hour of introduction. The time for HLT determination starts only after equilibrium of this product has been established.
1. Monitor this product in spaces most representative of the atmosphere in which insects will be located within the structure. In larger jobs, more sampling points may be necessary.
2. In structures with partitions or poor air circulation, samples should be taken from the separate sections, such as each floor of multiple story structures or each room in a partitioned building.
3. Measurements should be as dependable and accurate as possible, especially when low concentrations are involved.
4. The time required between measurements to determine the HLT will depend on the estimated HLT or past history of the structure.

Monitoring Hoses
Arrangements should be made to place sampling hoses in the structure prior to fumigant introduction. Semi-rigid vinyl hoses (3 to 6 mm or 1/8 inch to ½ inch ID) should be placed so as to sample representative concentrations with a Fumiscope or similar device. Monitoring hoses larger than 6 mm ID may take a longer time to pull the sample from the fumigated space to the monitoring device because of the larger volume of air needed to be moved.
Adequate tubing must be connected to the Fumiscope or similar device to direct all of the fumigant exhausted from the unit back into the enclosure or structure to prevent exposure to the fumigant.

Chapter 9
AERATION, CLEARING, AND RE-ENTRY
Two persons trained in the use of this product, at least one being an applicator certified by the state, must be present on site at all times during introduction of the fumigant, re-entry prior to aeration, initiation of the aeration procedure, when testing for re-entry after aeration (if aerated in an enclosed space) and during re-entry.
It is essential that no occupant reenter the structure after fumigation until the fumigant has been aerated and the space has been fully tested and cleared for re-entry.
One of the features of this product for structural fumigation is its capacity to rapidly diffuse into the sites of the pests. Then, when the confinement seals are removed, aeration is also typically rapid. Fans are excellent aids in attaining quick aeration and are essential where cross ventilation is poor. The "opening" of a fumigation should be carried out with care to minimize crew and bystander exposure to this product.
PRECAUTION: Prior to aeration, fumigators need to take into account the proximity to bystanders, location of other structures, wind speed and direction.

AERATION — PRACTICES
Successful, timely, and safe aerations following fumigations must be planned. The following five practices should always be factored into the fumigation prior to fumigant introduction:
1. MINIMIZE CONCENTRATIONS AT END OF EXPOSURE PERIOD: The lower the concentration of fumigant at the end of the exposure period, the easier and more timely the aeration process will be. By using Precision Fumigation techniques, the fumigator can minimize the amount of fumigant introduced, maximize its efficiency and maximize the accumulated dosage (CT).
2. AERATE AT THE HIGHEST POINT PRACTICAL: By aerating at the highest point on the structure, the highest concentrations of fumigant are directed away from workers and bystanders and are allowed to quickly dilute to less than 1 ppm levels.

3. DIRECT AERATION GASES UPWARD: Aeration in an upward manner also directs fumigant away from workers and bystanders and by using additional fans, acts to further dilute the fumigant to safe levels. In many cases, a permanent exhaust system that forcefully directs the air column upward or emits it through a stack would aid in the efficiency and safety of the aeration process.
4. CONTROL THE EXHAUST RATE: The exhaust rate during the aeration process should be controlled to ensure large volumes of fumigant laden air have time to disperse, thus minimizing the risk of bystander exposure to concentrations greater than 1 ppm. Many structures have air handling systems that can easily achieve a total air exchange within the facility in a very short period of time.
5. MONITOR TO ENSURE WORKER AND BYSTANDER EXPOSURE LEVELS ARE NOT EXCEEDED: The perimeter of the fumigation area, especially downwind, must be monitored to ensure that concentrations of this product are kept within acceptable levels outside the fumigation area.

FACTORS INFLUENCING AERATION TIME

Five factors affect the time needed for aeration:
1. Rate of air exchange
2. Terminal fumigant concentration
3. Load factor - sorption/desorption and diffusion rate
4. Temperature
5. Interior layout of the structure

Rate of Air Exchange

The most important factor in aeration is the rate of air exchange in a structure. The air exchange rate will be influenced by openings in the external walls (windows, vents, door, etc.), wind velocity, size and arrangement of the structure. The most effective, practical method to increase the rate of aeration is to increase cross ventilation by opening doors and windows. Fans are also useful for this purpose as a means of establishing a directed airflow through the structure in which fresh air is introduced and air inside the structure is exhausted/ventilated as efficiently as possible.

Terminal Fumigant Concentration

The amount of fumigant left in a structure at the end of the fumigation period can vary greatly. All other factors being equal, the greater the terminal concentration, the longer the time required to complete aeration. Thus, good planning and monitoring to ensure only the necessary amount of this product is introduced can decrease the aeration period.

Load Factor — Sorption, Desorption and Diffusion

The "load factor" can be expressed as the amount of materials fumigated that will adsorb or absorb the fumigant. This product has relatively low sorptive characteristics, meaning it has a low potential to stick to or react with fumigated materials.

The sorption that does occur, however, can affect aeration in some situations. Desorbing fumigant can slow the time to reach safe re-entry levels of 1 ppm or less. Often, the greatest amount of this product to be desorbed is associated with the commodities.

The sorption/desorption phenomenon is a function of fumigant concentration and temperature — the higher the concentration throughout the fumigation, the greater the driving force for sorption and, therefore, the higher the quantity to be desorbed. As with sorption, desorption initially occurs very rapidly. Most of the fumigant will desorb during the initial part of the aeration period in response to the immediate lowered concentration inside the structure when seal is broken.

Temperature

Temperature has a direct effect on the clearance rate of a fumigant. The higher the temperature, the faster the rate of gas diffusion and desorption.

HANDLING UNAERATED COMMODITIES

Transfer of an unaerated commodity to a new storage site within a facility prior to complete aeration is permissible; however, transfer of unaerated containers or truck trailers over public roads is prohibited. Also, railcars cannot be moved off site until aerated.

While handling unaerated commodities, people must not be exposed to this product in excess of permitted exposure levels.

Transfer of incompletely aerated commodity via bulk handling equipment such as augers, drag conveyors and conveyor belts to a new site is permissible. However, the new storage must have proper placarding and adequate security if it contains greater than 1 ppm of this product. Workers who handle incompletely aerated commodity must be informed and appropriate safety measures must be taken (i.e., ventilation and respiratory protection) to prevent exposures from exceeding 1 ppm.

CLEARANCE AND RE-ENTRY

Re-entry Procedures

Before aeration, if re-entry into an area under fumigation is required for any reason, the following procedures must be strictly adhered to:

1. Before re-entry, measure the concentration of this product using a sufficiently sensitive device to adequately prepare for worker safety.
2. A minimum of two persons, one an applicator certified by the state and others being trained in the use of this product, must be present on site to reenter an area under fumigation for initiating aeration or trouble shooting and testing for concentration of the fumigant after aeration before releasing for reoccupation.
3. The person before entering must be wearing a self-contained breathing apparatus (SCBA) with full facemask and operating in pressure demand mode or its equivalent.
4. Other appropriate worker protective equipment must be worn by all workers at the site depending upon the site and the type of work being done.
5. Notify authorities, emergency personnel and other required personnel if re-entry is done under emergency conditions (see Chapter 9).

No one shall be in fumigated areas if the level of this product is more than 1 ppm unless wearing a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air supplied/SCBA respirator, such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Only a detection device of sufficient sensitivity, such as the INTERSCAN gas analyzer [Model GF 1900], MIRAN vapor analyzer [SapphIRe] or SF-ExplorIR can be used to confirm a concentration of 1 ppm or less of this product.

Re-occupancy
Do not allow re-occupancy of any fumigated area until the aeration and clearing process is complete according to directions and levels of this product do not exceed 1 ppm as determined by the use of a detection device with sufficient sensitivity.
Following the aeration period, the fumigator must test the breathing spaces in the space or structure to make certain that the concentration of this product is 1 ppm or less before allowing re-occupation of the structure.
Follow all federal, state, and local requirements for re-occupancy.

Chapter 10
SITE SPECIFIC CONSIDERATIONS
KEY CONSIDERATIONS FOR FUMIGATING STORAGE FACILITIES, TRANSPORT VEHICLES AND PROCESSING PLANTS
Follow all local, state and federal regulations covering the fumigation of vehicles and processing plants.

Stationary vs. In-Transit
Empty and loaded containers, trucks, railcars, surface ships and other transport vehicles or vessels may be fumigated in essentially the same way as other storage facilities. However, in-transit fumigation (including aeration) of any vehicle is prohibited on public roads or waterways. Nevertheless, stationary vehicles under fumigation may be moved within the confines of the fumigation site if necessary. Special care must be given while moving a stationary vehicle or vessel under fumigation so as to prevent exposure to bystanders or workers to levels of 1 ppm or more of this product. Vehicles and vessels successfully moved must have proper placarding and adequate security. Workers who handle incompletely aerated commodity must be informed and appropriate safety measures must be taken (i.e., ventilation and respiratory protection) to prevent exposures from exceeding 1 ppm. Moving vehicles while under fumigation on the fumigation site may result in loss of fumigant and, therefore, potentially less effective fumigation.

Selection of Fumigation Location
The size and configuration of the space and the adequacy of the circulation will dictate the placement and number of release sites for this product in a stationary vehicle or vessel. Careful planning must be made for fumigant introduction in railcars, shipping containers and trailers. Prevent the liquid form of this product from contacting any part of the vehicle or contents as it can damage paint or tarnish metals. Railcars, shipping containers and trailers must be placed in a location appropriate for conducting fumigation. The location should be away from other work areas in a secured place.

Sealing the Vehicle or Vessel
Stationary vehicles should be prepared and sealed following general fumigation using tarpaulin and tape.
Seal vessels using tarping, taping, and other methods specific for ships to confine this product to the fumigation area.

Securing the Vehicle or Vessel
After the fumigation site has been selected, railcars and trailers should be moved into position and secured by setting the brakes and blocking the wheels so that the vehicle will not move during the fumigation and aeration periods.
When fumigating vessels, place warning signs at all entrances and secure the fumigated space. Only certified applicator and trained workers involved in the fumigation, wearing appropriate personal protective equipment, may be at the site during fumigation and aeration.
Follow label instructions for securing entrances and posting warning signs on fumigated spaces and structures.

Fumigation of Surface Ships and Vessels in Port
Because of its physical properties, this product is ideally suited to control pest infestations in surface ships. Its high volatility allows the gas to penetrate into all areas of the vessel very quickly, control the pest and aerate rapidly. However, due to its lack of warning properties and high inhalation toxicity, this product must not be used to fumigate ships or other vessels while they are in use. People and desirable plants or pets must not remain on board during the fumigation.
Surface ships and barges may be fumigated with this product, but all aeration procedures must be completed before these vessels are allowed to sail. The vessel must not be moved during the fumigation and aeration periods. If re-entry is necessary before aeration is completed, strictly follow re-entry procedures (see Chapter 9). Only those persons involved in the fumigation may be at the fumigation site, including during the aeration process.

Important: Submarines and other below-the-surface ships must not be treated with this product.
Except for those persons involved in the fumigation, no people, desirable plants, or pets may be on board during fumigation. The professional fumigator and the ship's captain (or owner) shall follow all applicable regulations including those listed in the Coast Guard, DOT, Title 46, Shipping, section Parts 147A.1-147A.43. Since the codes listed are for fumigants in general, do not use procedures that are not permissible for this product as directed by label instructions and regulations.
If conditions of high relative humidity exist in the vessel during fumigation, great care should be exercised to use the proper sized fan and shooting hose to avoid overshooting the fan capacity, thereby causing a "fog out" in the vessel and possibly tarnishing and staining.

Vehicle (Containers, Railcars, Trailers, etc.) Aeration
Aerate the vehicle using active ventilation methods. To help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry, to the extent possible, control the ventilation process using the best practices procedures described in this Manual (Chapter 7), monitor concentrations of this product around the fumigated ship and/or prohibit entry into the area in question. At the end of the aeration time when the vehicle has been cleared for re-entry, the warning signs should be removed, the chocks removed from the wheels, and the vehicle put back into service. In-transit fumigation and aeration of railcars and other transportation vehicles are not permitted.

Surface Ship Aeration
Only those persons involved in the fumigation may be at the present fumigation site until the site is cleared for re-occupancy. In-transit aeration of ships is not permitted. Ships must be aerated and cleared for re-entry prior to being reoccupied. Aerate the ship using active ventilation methods to ventilate the bulk of the fumigant from the ship. To help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry, to the extent possible, control the ventilation process using the best practices procedures in this Manual (Chapter 7), monitor concentrations of this product around the fumigated ship and/or prohibit entry into the area in question.

PREPARATION FOR CHAMBER OR STACK FUMIGATION
Safety precautions and fumigation procedures vary by whether the chamber or stack is outside or within another structure. Before any chamber or stack is fumigated, it is appropriate to:
1. Determine the correct dosage (concentration x time = ounce-hours) to control the designated pest under the specific treatment conditions.
2. Confirm that the chamber or stack and any accessory equipment perform as intended.
3. Determine that this product will be confined within the chamber or stack by making a test run and monitoring for leaks with appropriate equipment. Pressure testing can also indicate the gas confinement capabilities of the chamber.
4. Have on hand proper respiratory protection equipment (SCBA) and personnel trained in how to properly use it.
5. Train personnel in the proper handling of the cylinders.
6. Educate personnel in first aid procedures to be followed should an accident occur and personnel be exposed to this product.
7. Notify other appropriate individuals that fumigations of this product will be taking place:

Company employees other than those performing the fumigations such as security patrols, janitors, etc., police and fire department personnel and others required by local, state and federal laws.

A. CHAMBERS AND STACKS WITHIN STRUCTURES
Permanent Chambers
Fumigations with this product may be conducted in permanent fumigation chambers enclosed within a larger structure. A permanent chamber is defined as a durable hard-walled structure engineered specifically for fumigation that effectively confines this product.
Monitor indoor areas around the permanent fumigation chamber for concentrations of this product during the fumigation, especially during introduction. No one is permitted to be in an area where the concentration of this product is more than 1 ppm without proper respiratory protection (SCBA). It is advisable to position the chamber away from work areas.

LOADING: Chambers and stacks should be loaded so that adequate air movement can occur around commodities to allow even distribution of the gas.

CIRCULATION FAN(S): A shooting fan/circulation fan is recommended when introducing this product. A small circulating fan inside the chamber will provide a gentle movement of air adequate to achieve even gas distribution throughout the chamber. However, if a large open space is not available or if use of an introduction fan is dangerous or impractical, an introduction/circulation fan is not required. If a fan is not used, ensure introduction will not result in a fog-out within the fumigation chamber. Slow introduction rates (1 to 4 pounds per minute) are recommended to prevent excessive cooling of air near the introduction site. Do not apply liquid fumigant directly onto food commodities. Another recommendation is to increase the number of introduction sites. Without circulation fans, reaching equilibrium will be delayed or may not be achieved. Thus, insect control may not be achieved throughout the chamber and aeration will be slowed since ventilation will be lessened.

TESTING SEAL EFFECTIVENESS: Fittings for conducting pressure tests and for monitoring lines during fumigation should be incorporated in the chamber.

Vacuum Chambers
Vacuum fumigations often require a lower use rate than normal atmospheric fumigations. Do not exceed 200 ounces-hour per 1000 cubic foot. Vacuum fumigations can be conducted in vacuum chambers located within an enclosed structure without considering the entire structure as being under fumigation.

PLACARDING: Post warning signs at all entrances to the vacuum chamber.

INTRODUCTION: This product should be released from outside the building. If this product is released into the vacuum chamber from within the enclosing structure, then the occupied area must be monitored to ensure the concentration of this product does not exceed 1 ppm.

WORKER EXPOSURE MONITORING: The area surrounding the vacuum chamber should be frequently monitored for concentrations of this product to ensure that occupants and workers are not exposed above 1 ppm. Special care should be taken to monitor during introduction to ensure that the introduction lines and cylinder connections are not leaking. If any leak resulting in detectable levels greater than 1 ppm is encountered during application, immediately clear the area of all personnel not wearing an SCBA. Only persons who are wearing an SCBA are permitted in the area to address the leak. Only after the level of this product has dropped to 1 ppm or less are unprotected personnel permitted to enter the area.

AERATION: Aerate the vacuum chamber following instructions above for vacuum chamber fumigations outside structures. If re-entry is necessary before aeration is completed, strictly follow re-entry procedures (see Chapter 9).

Tarped-Stacks
This product may be used to fumigate stacked commodities by covering the commodity with highly fumigant-resistant tarpaulins and then sealing them to the subsurface to create a temporary fumigation chamber (tarped-stack).
All personnel not trained or not involved in the fumigation must be vacated from the immediate area in which the tarped-stack fumigation is occurring until the fumigation is completed and the immediate area has been cleared for re-entry.
The indoor areas around the tarped-stack must be monitored for concentrations of this product when fumigation workers, without proper respiratory protection (SCBA) are present within the structure. Perform air monitoring by utilizing a detection device with sufficient sensitivity such as an INTERSCAN gas analyzer [Model GF 1900] or MIRAN vapor analyzer [SapphIRe] to ensure that workers are not exposed to concentrations of this product exceeding 1 ppm. No one is permitted to be in an area where the concentration of this product is above 1 ppm without proper respiratory protection (SCBA).

PLACARDING: Post warning signs to all sides of the structure that encloses the stack. For a tarped-stack, post all sides of the stack as well as all entrances and sides of the building.

OCCUPANCY: All personnel not trained or involved in execution of the fumigation are not permitted within the immediate area of the tarped-stack during the fumigation.

SECURING THE ENCLOSING STRUCTURE: When the fumigation workers are not present at the fumigation site, the enclosing structure must be secured from entry by anyone other than the certified fumigator or persons under his/her direct supervision.

WORKER EXPOSURE MONITORING: Workers and bystanders should not be exposed above 1 ppm of this product. When fumigation workers are present within the enclosing structure during the fumigation, frequently monitor with a detection device of sufficient sensitivity to measure at the 1 ppm level. Immediately vacate the area or use proper respiratory protection (SCBA) if the concentration of this product exceeds 1 ppm. Utilize ventilation procedures to reduce this product below 1 ppm prior to allowing re-entry without an SCBA.

INTRODUCTION: This product should be released from outside the building. If this product is released into the tarped-stack from within the enclosing structure, then the occupied area must be monitored to ensure the concentration of this product does not exceed 1 ppm.
If any leak resulting in detectable levels above 1 ppm is encountered during application, immediately clear the area of all personnel not wearing an SCBA. Only persons who are wearing an SCBA are permitted in the area to address the leak. Only after the level of this product has dropped below 1 ppm are unprotected personnel permitted to enter the area.

AERATION: Aeration should be designed to exhaust fumigant from the enclosing structure to ensure that workers and bystanders are not exposed to levels above 1 ppm.

B. CHAMBERS AND STACKS OUTSIDE OF STRUCTURES

Atmospheric Pressure Chambers
DESIGN AND CONSTRUCTION: A suitable atmospheric fumigation chamber consists of a sufficiently gas-tight room with an appropriate door. An application system, exhaust blower and a small fan for even gas distribution are recommended.

PLACARDING: The applicator must post all entrances and all sides of the chamber (if accessible) to be fumigated with warning signs.

INTRODUCING FUMIGANT: Release this product from the cylinder placed outside the chamber through an introduction system (introduction lines, connectors, etc.) with a minimum 500 psi burst pressure rating. A small fan should be used to distribute the gas uniformly within the chamber. Monitoring gas concentrations within the chamber can confirm the distribution of gas within the chamber.

DOSAGE MONITORING: Monitoring gas concentrations within the chamber during the exposure period with a Fumiscope or similar device is recommended to confirm HLT, describe gas distribution throughout the chamber, and ensure the target dosage is achieved. Recommended monitoring site locations include one at high, medium, and low heights and in the front, middle and back of the chamber.

EXHAUST FAN(S): The size of the exhaust blower will depend on the size of the fumigation chamber and the aeration time requirements. Generally, a fan capable of changing the air in the chamber in 5 to 10 minutes is recommended. The chamber must exhaust this product outside the building and away from adjoining buildings or work areas. Consult your state agency for emission control requirements.

Vacuum Chambers
Vacuum chambers require special designs which take into account the vacuum pressure exerted on the materials of construction. For this reason, it is recommended that trained engineers be consulted before constructing a vacuum chamber. Follow all directions given by the manufacturer or design engineer.
Vacuum fumigations often require a lower use rate than normal atmospheric fumigations. Do not exceed 200 oz-h/1000 cubic foot.
Specially built steel chambers for vacuum fumigations provide the fastest and most effective fumigation. After the commodity is placed in the chamber, pumps evacuate air. This product is introduced and rapidly penetrates all space previously occupied by air. A lethal dosage of this product results when the proper concentration is maintained for the required fumigation period. With the sustained concentration (no leakage) and a vacuum of 25 to 27 inches Hg, the time of exposure and the dosage may be reduced for some insects and life stages.

PLACARDING: The applicator must post all entrances and all sides of the chamber (if accessible) to be fumigated with warning signs.

DRAWING A VACUUM: A vacuum of 25 to 27 inches of mercury is commonly drawn for vacuum fumigations. Check to ensure that the vacuum is maintained according to plan. Unplanned vacuum release indicates leakage. Note that some vacuum fumigations are planned to allow release of the vacuum during exposure with the objective of improving penetration of the commodity as air enters the chamber.

INTRODUCING FUMIGANT: Because of the special design of vacuum chambers, the manufacturer or design engineer's operation procedure be followed. Release this product from the cylinder placed outside the chamber through an introduction system (introduction lines, connectors, etc.) with a minimum 500 psi burst pressure rating. A small fan can be used to distribute the gas uniformly in the chamber if the vacuum is to be maintained throughout the exposure period.

DOSAGE MONITORING: The Fumiscope or similar device cannot be used to measure this product during a vacuum fumigation unless the vacuum is released. If the vacuum is maintained, and thus no gas is leaking from chamber, the achieved dosage (CT) can be calculated by using the simple Concentration x Time formula.

AERATION PROCEDURES: At the end of the exposure, release the vacuum, ensuring any exhaust does not expose workers or bystanders above the permissible exposure limit. Purge the chamber of air/fumigant 2 times by pulling a partial vacuum prior to checking the gas concentration for re-entry purposes. Aeration of this product is very rapid, but desorption can occur for a longer period of time.
Manage the aeration process (location, exhaust rate and direction) to ensure that workers and bystanders are not exposed to levels above 1 ppm.
Always check for the concentration of this product with a suitable detector before entering the chamber without proper respiratory protection (SCBA). Keep the exhaust fans running during the aeration period and also while unloading the chamber. Remove the warning signs when aeration has been completed and it has been determined that the area is safe to enter.

Tarped-Stacks
Fumigations may be conducted in temporary chambers created using tarpaulins or other gas impermeable sheeting as the "walls" to hold in the fumigant. These are sometimes called "stack fumigations." The following instructions pertain to fumigation of tarped-stacks located outside other structures.
The items should be placed on a sufficiently airtight foundation, such as another tarp or on concrete, and covered with a fumigation tarp to ensure a tight seal. The tarp over the items should be supported so as to create a gas expansion dome. The edge of the tarp on the foundation must be sealed either by weighting the edges with sand or water "snakes" or equivalent.

PRECAUTION: Tarp fumigations should be conducted out of doors or in a building that will not be occupied during fumigation and aeration periods.

PLACARDING: All entrances and all sides of the fumigated environment and any connected area not monitored must have warning signs.

DOSAGE MONITORING: Monitoring gas concentrations within the tarped-stack during the exposure period with a Fumiscope or similar device is recommended to confirm HLT, describe gas distribution throughout the stack, and ensure the target dosage is achieved. Monitoring site locations include one at high, medium, and low heights and in the front, middle and back of the stack.

AERATION: Best practices for aeration of tarped-stacks involves setting up a chimney system that will ventilate from the highest point of the stack in an upward direction at a rate that will not lead to workers or bystanders being exposed to levels above 1 ppm.

STORED BULK COMMODITY FUMIGATION (e.g., Silos, etc.)
In many commodity storage situations, the amount of open space for introducing this product is limited compared to the total volume of the structure. It may not be possible to use shooting fans and release methods that are recommended for space fumigations.
Because of limited free air volume and lower air movement, fumigators can best adjust by slowing the introduction rate by using smaller diameter shooting hoses and/or extending the hose length.
If the fumigant is released directly into the headspace of a storage structure, care should be taken to avoid contact of liquid fumigant and the commodity. Sufficient air circulation should be provided to prevent
moisture condensation in the introduction area.
It is strongly recommended that recirculation systems (portable or built-in) be used to rapidly and evenly distribute this product throughout the space being treated. Existing aeration blowers that are vented to the outside should not be used.

Procedures for Fumigating Bulk Commodities
1. Follow instructions in this Manual regarding sealing, securing, placarding, and aeration/clearing.
2. Seal and secure the storage structure.
3. Determine the target dosage and quantity of fumigant needed using Drexel Chemical's Master Fume AG Calculator.
4. Make adjustments to the dosage based on the fumigant monitoring results and Drexel Chemical's Master Fume AG Calculator recommendations for achieving target dosages.
5. Determine where the fumigant will be released.
6. Best practice is to introduce fumigant directly into the air stream of a recirculation system. This may either be inside the storage structure or directly into the ducting of the system. If the fumigant is released into the recirculation system, it should be down stream of the fan itself.
7. In almost all cases fumigant introduction rates should be slower than for space fumigations of similar volumes to provide time for the fumigant to penetrate the grain mass and not establish high fumigant concentrations in the introduction space.
8. In the event that a recirculation system is not available, the fumigant should be released into the headspace above the commodity. Care should be taken to prevent contact of liquid fumigant with the commodity.

9. Air circulation should be started prior to fumigant introduction and continued during introduction to aid in the penetration of this product into the commodity mass. High concentrations in the introduction space can result in excessive fumigant loss via leakage before the fumigant penetrates evenly into commodity mass.
10. After introducing the initial amount of fumigant to reach the targeted dosage, gas concentrations should be monitored periodically. Any adjustments in terms of amount of fumigant or exposure time should be made based on Drexel Chemical's Master Fume AG Calculator status recommendations.

Bulk Commodity Aeration

1. Prior to the initiation of fumigation procedures, equipment should be put in place for a safe aeration.
2. The fumigant laden air should be vented from the highest practical point of the storage structure slow enough to not exceed exposure limits.
3. If available, aeration blowers can be used to rapidly exhaust remaining fumigant so long as these do not vent in areas where workers or bystanders might be affected.
4. SCBA equipment must be worn if workers must enter the fumigated space to initiate aeration or levels exceed 1 ppm.
5. The storage facility should be finally aerated to 1 ppm or less.
6. The area or site must be monitored to ensure that liberation of fumigant from the treated commodity does not result in the development of unacceptable levels of this product. Do not allow re-entry into treated areas by any person before this time without proper respiratory protection.
7. Actively aerate commodity a minimum of 24 hours prior to offering to consumers.

Mills and Food Processing Facilities

For mills and food processing facilities, special consideration should be given to help ensure workers and bystanders are not exposed to concentrations that exceed exposure levels for re-entry. To the extent possible, control the ventilation process using the best practices procedures described in this Manual (Chapter 7), monitor concentrations of this product around the fumigated site, and/or prohibit entry into the area in question.
Precautions to help protect accidental bystander exposure to this product in excess of 1 ppm can be of particular importance because of the sometimes proximate location of residential structures and bystanders that can occasionally occur around mills and food processing facilities.

Special care should be taken to minimize quantities of processed foods prior to space fumigations. Processed food not practical to remove prior to fumigation may undergo incidental fumigation with this product. However, no direct fumigation of processed foods is permitted unless the processed food is specifically listed in the section "*COMMODITIES THAT CAN BE FUMIGATED*".

Chapter 11
TROUBLESHOOTING

This product in the gaseous phase is a very slightly reactive chemical compared to other fumigants such as methyl bromide, hydrocyanic acid (HCN) or acrylonitrile.

CYLINDERS

Valve Problems

Cylinders of this product are fitted with special valves that are appropriate for use with this product. These valves can be damaged if the wrong size wrench is used. A 25 to 30 cm adjustable wrench should be used to open or close these valves.

STUCK VALVE: Never use excessive force to open a stuck valve. If a valve will not open using normal force, return the cylinder to your distributor.

LEAKING VALVE: Make sure the valve is completely shut off; however, do not use excessive force. Reopening and then closing can usually properly seal the valve and stop the leak. If the valve continues to leak, often tightening the packing nut on the top of the valve to 25 to 30 foot pounds of torque with an adjustable wrench will stop the leak. If the valve still leaks, move the cylinder to an isolated, secured area and allow the cylinder to continue to vent to the air. Be sure to keep people away from the area. When all the gas has escaped, replace the bonnet and identify faulty cylinders by painting the cylinder shoulders red and tagging the cylinder describing the problem in detail. Return the cylinder to your distributor so it may be sent to Drexel Chemical Company for repairs.

Dip Tubes

A broken dip tube rarely is the reason the liquid form of this product cannot be moved out of the cylinder when the valve is wide open. Sharp blows to the cylinder, rough handling, or dropping the cylinder can break off the dip tube from the bottom of the valve. If the dip tube is broken, this product will be released from the cylinder, but at a much slower rate. Either introduce this product slowly or replace the bonnet and call your distributor for instructions on cylinder return procedures.

Leaking Cylinders
Leaking may occur if cylinders receive rough handling. Abrasion on the side of the cylinder may produce pinholes in the metal.

Always identify faulty cylinders, valves and dip tube by painting the cylinder shoulders red. Attach a red tag describing the problem in detail. Return cylinders to your distributor.

CORROSION OF METALS
This product is not known to cause any corrosion when it is in the vapor (gaseous) phase under normal temperatures. Every batch of this product is tested for metal corrosion before being released for sale.
Metal surfaces of copper, silver, steel, stainless steel, brass, aluminum, etc., may become corroded or rusted if this product is released incorrectly. If this product is introduced too rapidly, the temperature of the air will drop below the dew point resulting in the formation of condensation.
Condensation generally occurs in or near the area of introduction of this product. Minute quantities of acids (by-products of the manufacturing process) are soluble in water condensation and can etch metal surfaces. The fumigant introduction rate should not exceed the fan capacity (1 kg of this product per 60 cubic meters per minute of fan capacity) to thoroughly mix the colder air when this product is introduced into the warmer air in the structure.
Metal tarnishing/corrosion can also occur if heat sources are left on during fumigation. This product is decomposed by heat from flames such as pilot lights in furnaces, stoves, dryers or refrigerators and such glowing heat sources as electric heaters. Heat sources above 400°C (752°F) decompose this product to corrosive materials (mainly HF). Therefore, it is imperative that pilot lights and other heat sources which pose this risk be eliminated or turned off during fumigations.
Damage to metals can also occur from the inclusion in the fumigated space of chlorine generators. These pieces of equipment should either be turned off or excluded from the fumigation.
Damage to metals can usually be corrected by cleaning the metal items with a good metal cleanser or polish. The corrosion or rust is usually only on the surface.

GLASS ETCHING
This product in the gaseous phase is not known to cause etching of glass. HF, the decomposition product of this product, may react with ceramic material such as window glass, china, glazed tile, etc., creating a condition referred to as "etching" or "frosting." Therefore, it is imperative that all heat sources which produce temperatures at or near 752°F and pilot lights be turned off during fumigation. Fog-outs can also cause etching of glass and ceramic tile. Each batch of this product is also tested for glass etching before it leaves the production plant.

RUN STAINS
This product in the gaseous phase is not known to cause staining of fabrics, walls, paintings, etc. Staining, however, can be caused by the presence of liquid water (dew or fog) caused by exceeding the capacity of the fan to mix cold air when this product is introduced with the air in the structure. A condition can occur when condensation forms on the interior and/or exterior surfaces of the structures and a "sticky" light to dark brown liquid (from grease, dirt, and smoke) runs down wall surfaces. This may have the appearance in color and consistency of cola. Spots also may form on the bottom side of horizontal surfaces. Most stains can be removed by washing.
Condensation forming and running down vertical surfaces can occur even without the introduction of this product. A structure that is air conditioned to a much lower temperature than the air temperature and then opened to introduce hot humid outside air will form condensation on cold surfaces such as heavy brass. This condition can be avoided by either warming the structure slowly prior to sealing or waiting until all seals are in place before opening windows and doors to avoid introducing outside air.

STAINING
This product in the vapor phase does not cause staining or discoloration of fabric or other materials normally found in a structure under fumigation. Fabric staining or color changes can occur when a high heat source (i.e., pilot light) converts this product to SO_2 and other corrosive materials. Many fabric dyes are acid or base indicators and will change color in the presence of acids or bases. For staining caused by frosting of the fumigant introduction hose, see *"FUMIGANT INTRODUCTION HOSE FREEZING"* section below.

FUMIGANT INTRODUCTION HOSE FREEZING
When this product is introduced according to label directions, the introduction hose will not freeze and the liquid will change to a gas at the end of the hose. The use of the proper size fumigant introduction hose is important. Initially, slowly open the valve a quarter to one-half turn to begin the liquid flow of this product. Then, open valve to one full turn or full flow through the hose. If the liquid changes to a gas within the hose, frost will collect along the length of the hose and water damage can occur to floors, furniture, etc., where the hose rests. Also, this product may change from a liquid to a gas in a hose with kinks. This can cause freeze damage from either frost accumulating on the outside of the hose or the hose becoming brittle, breaking and splashing the liquid form of this product on surfaces. Replace kinked or damaged hoses. Use mesh-reinforced, flexible hosing of proper specifications to avoid this problem.
During release of this product from the cylinder, some chilling of the valves, cylinder, and fumigant introduction hoses can occur under normal circumstances. Valves can freeze if this product is allowed to change from a liquid to a gas within the

valve area. Valve freezing is usually caused by using an improper fumigant introduction hose connector. Carpeting and floors can be damaged if cylinders, fans and hoses are allowed to rest upon them. When this could pose a problem, plastic or other protective material should be placed under the fumigant introduction hoses and fans.

PLANT AND TURF DAMAGE

This product is quite toxic to most plants and they should be protected from the fumigant; however, plants should not be used as an indicator of the success or failure of a fumigation. Plants should be removed from inside the fumigation site. Structural foundation plantings of ornamental shrubs and trees can be protected to a certain degree from the gas by wetting the soil, thereby sealing off the gas from the plant root system. Water is an excellent barrier and this product will not readily move through moist soil.

Certain plants have been found to be more sensitive to this product than others. These include junipers, some dwarf palms, springeri fern, orchids and Lily grasses *(Liriope* spp. and *Ophiopogon* spp.*)* which are commonly used as border plantings. Special attention should be given to these plants during fumigation and the initiation of aeration to reduce the exposure to this product. Plants that have been moved should be placed in a similar environment to that where they were being grown — same temperature, light, humidity, etc.

ODOR PROBLEMS

Odors can also be caused by the decomposition of dead animals. Occasionally, animals such as rats or mice are trapped inside the fumigation site and killed during the fumigation. Many times they die in inaccessible areas within the structure and cannot be easily removed.

POOR CONTROL OF PESTS

Poor control of the target pest is caused by not generating the target CT (Concentration x Time) for the temperature to kill the pest. Accumulation of target CT does not begin until the fumigant has reached equilibrium in the site. Many factors may contribute to insufficient CT accumulation.

1. Confinement of fumigant, primarily ground seal or tarps is worse than estimated.
2. Inaccurate monitoring device.
3. Too short an exposure period (insufficient CT).
4. Using the wrong dosage (insufficient ounces per hour).
5. Not using adequate fans to distribute the gas properly within the site.
6. Not accurately determining the temperature of the pest site.
7. Error in calculating volume to be fumigated.
8. High winds which can cause excessive loss of gas.
9. Target pest excluded from exposure to fumigant by some gas inhibiting barrier.

Latent Mortality

Sometimes live insects may be found immediately after fumigation. Under optimum or favorable conditions, the target pest will be dead or obviously dying by the end of the fumigation period. Researchers have evaluated eventual mortality of several stages of key postharvest pests following exposure to this product. Latent mortality in insects occurs for exposures very near mortality threshold levels. Within a species, the latent mortality period for the egg stage is generally longer and more variable than other life stages.

Non-target Organisms

Signs of activity of live non-target organisms (organisms which are not specific targets of the fumigation) found within the fumigated space does not mean the fumigation failed to control the target pests. Consider the following:

- Lethal dosage requirements vary for different organisms and may be higher for non-target organisms than for the target pest.
- The organism may have received a toxic dosage and will eventually die (latent mortality).
- The non-target organism may have entered the structure during the aeration period.

Therefore, judgment of the success or failure of the fumigation should not be made on the presence of live organisms immediately following the fumigation.

PLASTICS

Liquid form of this product can be a solvent of some plastic materials. This product should not be introduced directly onto plastic surfaces, such as windows, as liquid droplets may discolor or etch the material.

MISCELLANEOUS

WHITE POWDER LEFT AS RESIDUE: A white powder substance found on windows, tile, glass, lamps, etc., indicates that a source of heat (pilot lights, etc.) was left on during the fumigation.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: Store in dry, cool, well ventilated area under lock and key. Post as a pesticide storage area. If the storage area is in an occupied building, the storage area must have either 1) a forced air ventilation system that meets required local ordinances for the storage of hazardous materials and operates continuously; or 2) be equipped with a permanently mounted and properly maintained and functioning sulfuryl fluoride monitoring device designed to alert occupants of the building if sulfuryl fluoride in the air of the storage area is greater than 1 ppm. Store cylinders upright secured to a rack or wall to prevent tipping.

Pesticide Handling: Do not subject cylinders to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use ropes, 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 transport any cylinders in closed vehicles where they occupy the same common airspace as personnel. Transport securely only in an upright position. 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 supplier. Only the registrant is authorized to refill cylinders. Do not use cylinder for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.

Leak Procedures: Evacuate immediate area of leak. Use a NIOSH approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator, such as manufactured by Ranger, Survivair, Scott or MSA, for entry into affected areas to correct problem. Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant is determined to be 1 ppm or less in the breathing zone, as determined by a detection device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR. For more detailed information on the source and use of air monitoring devices or respirators, consult the Applicator's Manual of this product.

CYLINDER AND PRODUCT DISPOSAL:

Promptly return all empty cylinders to your distributor of this product. Follow proper cylinder handling directions above. 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, consult your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

WARRANTY DISCLAIMER

Manufacturer warrants that this product conforms to the chemical description on the label and based upon tests believed reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. To the extent consistent with applicable law, Manufacturer makes no other expressed or implied warranty of merchantability or fitness for a particular purpose or any other express or implied warranty.

Use Risk

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable weather, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Manufacturer or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to one of the following, at Manufacturer's discretion:

1. Refund of purchase price paid by Buyer or use for product bought, or
2. Replacement of amount of product used.

To the extent consistent with applicable law, in no case shall Manufacturer or the Seller be liable for consequential, special or indirect damages or losses from the use, handling or storage of this product.

The terms of the *"Warranty Disclaimer"* above and this *"Limitation of Remedies"* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of the Manufacturer or the Seller is authorized to vary or exceed the terms of the *"Warranty Disclaimer"* or this *"Limitation of Remedies"* in any manner.

MASTER FUME and the Drexel logo are registered trademarks of Drexel Chemical Company. All other brand names, product names or trademarks belong to their respective holders

APPENDIX A
ENGLISH-METRIC CONVERSION TABLES

Temperature	Volume	Wind Speed
(°C x 1.8) + 32 = °F	1 ft^3 = 0.0283 m^3	1.609 kph = 1 mph
(°F - 32) ÷ 1.8 = °C	1 m^3 = 35.31 ft^3	0.621 = 1 kph

[INSERT HERE THE CONVERSION TABLES FOR TEMPERATURE, VOLUME AND WIND SPEED]

DOSAGE : oz-hr/1000 ft^3 ~~ gm-hr/m^3
PRESSURE : 1 PSI ~~ 6.9Kpa~~ 0.689 bar
1 bar ~~ 100 Kpa ~~ 14.50 PSI

APPENDIX B
GLOSSARY TERMS

ACTIVE AERATION: Aeration that is not passive. Any increased aeration as a result of human intervention or process.
ACTIVE INGREDIENT: Components of a pesticide that control the target pest and is responsible for the pesticidal effect.
ACUTE INHALATION TOXICITY: Immediate poisoning from a single elevated inhalation exposure to a substance; causes injury or death from a single exposure.
ACUTE ORAL TOXICITY: Immediate poisoning from a single oral elevated ingestion exposure to a substance; causes injury or death from a single exposure.
ACUTE TOXICITY: A rapid response, often within minutes or hours to a single exposure or dose of a chemical.
ADSORBTION/ABSORBTION = SORPTION: The action of a material in holding a gas or substance. The opposite of desorption.
AERATE: Exchange fumigant-laden air with fresh air until the concentration of fumigant has reached the permitted entry level.
AERATION: The final step of a fumigation that involves proper ventilation and clearance of this product from the structure.
AMERICAN CONFERENCE FOR GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH): The professional organization of governmental industrial hygienists which establishes annual recommended guideline threshold limit values (TLVs) for lifetime noise, radiation and chemical occupational exposures for eight hours per day, 40 hours per week.
ANTIDOTE: A remedy that counteracts the effects of a poison.
ARTHROPOD: Any segmented invertebrate of the phylum Arthropoda having jointed legs.
ATMOSPHERE: A mass or body of gases that are present in a region or place.
AXIAL FLOW FAN: A fan in which the air flows through the impeller and casing is primarily axial. The impeller is contained within a cylinder housing (AMCA Publication 211).
BOILING POINT (BP): The temperature at which a liquid converts from liquid phase into a gas (the temperature at which the vapor pressure in a liquid equals the external pressure).
BONNET: The cap that covers the valve and safety cap on the fumigant cylinder to protect the valving system from damage and prevent accidental release of the fumigant.
CARCINOGENICITY: Possessing the power, ability or tendency to produce or incite cancer in a living tissue.
CENTRAL NERVOUS SYSTEM (CNS) DEPRESSION: An alteration of level of consciousness that proceeds other changes in vital and neurologic signs.
CERTIFIED APPLICATOR: Member of a fumigation crew who has successfully completed the proper training and is approved by the State and the manufacturer to release the fumigant.
CIRCULATION: Mechanically stir or circulate the fumigation atmosphere.
CLAMPS: Devices used to attach tarps together and hold them in place during a fumigation.

CLEARING: The procedure following the aeration period when the fumigator tests the breathing space in the structure with sensitive equipment to make certain the concentration of this product is 1 ppm or less before allowing re-occupancy.
CONCENTRATION: Amount of fumigant per unit area within the fumigated space during exposure period. Usually measured in ounces per 1000 cubic feet or grams per cubic meter.
CONDENSATION: The change of a vapor or gas into a liquid.
CUBIC FEET PER MINUTE (CFM): Often used as a rating system for the amount of air a fan can move.
CYLINDER SLING: A type of holster or suspension ring used to suspend a fumigant cylinder.
DESORPTION: The liberation or removal of a fumigant substance from other substances.
DEW POINT: The temperature at which water will condense from air (the temperature at which dew forms).
DEW POINT DEPRESSION: The number of degrees the temperature must be lowered for dew (water condensation form air) to form.
DIP TUBE: A PVC tube that extends from the bottom of the cylinder to the valve on the top that releases liquid Master Fume.
DISPERSE: Distribute the fumigant throughout the fumigation site.
DIFFUSION: The spontaneous process whereby a fumigant moves from an area of high concentration toward an area of lower concentration.
DOSAGE: The number of ounce-hours (gram-hours) accumulated during the exposure period. Target dosage is the ounce-hours targeted during the planning phase.
DOSE: The amount of fumigant introduced into the fumigation space — oz/1000 cubic feet (gm/cubic meter). Often confused with dosage.
DRIERITE: The hygroscopic material used in the Fumiscope unit to remove moisture from the air. Drierite in good condition is normally blue in color.
EQUILIBRIUM: The state when all the sulfuryl fluoride molecules are at equal concentrations from each other in a confined area.
EXPOSURE TIME: The amount of time a fumigant is confined in a structure to kill the target pest.
°F/°C: Working temperature. Usually the temperature of the closest spots insect pests are located. Usually expressed in degrees Fahrenheit or Celsius. In the case of chamber fumigations, the internal temperature of the commodities to be fumigated (i.e., site of pest).
FACE SHIELD: One of two pieces of safety equipment permitted to protect the eyes required when releasing the fumigant (see goggles).
FLASH POINT: The temperature at which vapor explodes.
FLUOROSIS: A mottling or blackening of the teeth caused by an overexposure to fluorine.
FOG: Very fine droplets of liquid moisture in air.
FOG-OUT: The condensation of moisture inside a fumigated structure which is caused by a large drop in air temperature. Methods to prevent a fog-out include: (1) using the proper inside diameter and length of the introduction hose, and (2) using appropriate fans with sufficient velocity to effectively mix the warmer air inside the structure with the colder Master Fume gas.
FUMIGANT INTRODUCTION: Release of the fumigant from its containers into the fumigation space.
FUMISCOPE: A thermal conductivity analyzer used to monitor the concentration of this product during a fumigation. Measures in ounces per 1000 cubic feet or gm per cubic meter. The Fumiscope is not for monitoring for human exposure.
GAS: Matter in vapor state. That fluid form of matter which is compressible with limits and, which owing to the relatively free movement of its molecules, diffuses readily in other like forms of matter and is capable of indefinite expansion in all directions.
GOGGLES: One of two pieces of approved safety equipment to protect the eyes required when releasing the fumigant (see face shield).
GROUND SEAL: The sealing of tarps to the ground to prevent fumigant loss during a fumigation.
HALF-LOSS TIME (HLT): The relative measure of how well a structure holds fumigant. Actual time required to lose one-half of the fumigant concentration, measured in hours. The fumigant loss rate depends on the building construction, sealing practices, wind, and fumigant distribution influences. The *actual/HLT* can be established only by measuring the fumigant concentration during the exposure period with a gas measuring measuring instrument and using Drexel Chemical's MasteRate program.
HANGING BONNET: A type of cap or ring used to suspend the fumigant cylinder.
HEAT OF VAPORIZATION: The amount of heat necessary to change a liquid state to a gaseous state. This is usually measured in British Thermal Units (BTUs).
HEPATIC: Pertaining to the liver.
HOURS EXPOSURE (HE): The number of hours the site is exposed to the fumigant.
HYDROFLUORIC ACID: A highly reactive chemical which can corrode or damage many household effects. This product can decompose into hydrofluoric acid and sulfur dioxide if exposed to high heat conditions present in gas, flames or glowing electric elements.
HYDROGEN FLUORIDE: A colorless liquid made by the action of sulfuric acid on calcium fluoride. The compound is an extremely strong fluorinating agent, which attacks glass.
HYDROLYSIS: A chemical reaction that causes chemical breakdown in the presence of water.
INSIDE DIAMETER (ID): The measurement of the interior width of the fumigant introduction and monitoring hoses.
INERT INGREDIENT: Other non-pesticidal or formulating ingredients in a pesticide formulation.

INTERSCAN GAS ANALYZER: A portable analyzer designed to measure low concentrations of this product for worker and bystander exposure and final clearing. The Interscan provides immediate and continuous readings of gas concentrations from 1 to 50 ppm.
LATENT HEAT OF VAPORIZATION: The number of calories per mole of substance needed to change a liquid at its boiling point to a gas. For this product, this is 4600 cal/mole. When liquid fumigants under pressure are released, available heat is "pulled" from the immediate surroundings as the liquid changes to a gas.
LATENT MORTALITY: The delayed kill of an organism receiving a toxic dose.
LEAK DETECTOR: Device used to detect leaks in the structure or seal during a fumigation. An example would be a TIF 5750 or XP-1 detector models.
LOAD FACTOR: The amount of material within the fumigated space. Sometimes fumigant is sorbed by materials and made unavailable for insect control.
MAXIMUM CONCENTRATION: The greatest concentration of chemical that can or is permitted to exist as a gas in a given space. The higher the maximum concentration of the fumigant, the more that can be applied in a given space.
MIRAN SapphIRe (mobile infrared analyzer): A type of clearance device used to clear a structure for re-occupancy after a fumigation. Uses infrared technology to measure down to ppm.
MOLECULAR WEIGHT: The sum of the weights of the constituent atoms of a molecule. For this product it is 102.07.
MONITORED FUMIGATION: Repeated observations of a fumigation during the exposure period to determine the concentration of gas at a specific location, detect gas loss over time, ensure the appropriate amount of fumigant and the exposure time, and/or to reduce potential problems or expenses.
MUTAGENICITY: Possessing the power, ability or tendency to produce genetic changes or mutations.
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH): The U.S. government agency responsible for research regarding occupational safety and health issues in the workplace. They also approve appropriate safety equipment, such as hard hats, respirators, eye protection, etc.
NON-FLAMMABLE: Not flammable or readily ignitable.
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA): Federal agency that regulates worker health and safety procedures and practices.
ODOR POTENTIAL: The possibility of malodor being generated due to the fumigant having been in contact with certain materials.
OUNCE-HOURS (OH) OR GRAM-HOURS: Dosage = concentration X hours exposure.
OVICIDAL: Possessing the ability to kill the egg stage of an insect.
PARTIAL PRESSURE (DALTON'S LAW): In any mixture of gases the total pressure is equal to the sum of the partial pressures each gas would exert were it present alone in the volume occupied by the mixture. The total pressure P is equal to the sum of the partial pressures of the individual gases.
PARTS PER MILLION (PPM): A measure of the concentration of a substance, e.g., 10 ppm = 10 drops of water in a million drops.
PERMISSIBLE EXPOSURE LIMIT (PEL): The eight-hour time weighted average acceptable inhalation exposure limit for any regulated substance in the workplace. This exposure limit is enforced by OSHA and is the law.
PENETRATION: The passage of fumigant into or through an object, such as flour, commodities, wood, tarps, soil, etc.
POST-EMBRYONIC: The larval, pupal and adult stages of insects.
POUNDS PER SQUARE INCH ABSOLUTE (PSIA): A measure of atmospheric pressure. PSIG is pounds per square inch as measured by a gauge.
PULMONARY: Pertaining to or affecting the lungs.
PULMONARY EDEMA: The presence of abnormally large amounts of fluids in the intercellular spaces of the lungs.
REACTIVITY: The ability of the fumigant to react with (combine with or change) other compounds in which it comes into contact.
RELATIVE HUMIDITY: The ratio of the amount of water present in the air relative to the amount it could hold at 100% saturation; usually expressed in percent.
RELEASE OF FUMIGANT: The actual introduction of fumigant into the fumigation space or site.
RENAL: Relating to the kidneys.
REVOLUTIONS PER MINUTE (RPM): A measure of fan speed.
RODENTS: Any animal from the order Rodentia, such as mice and rats. SAFETY CAP: A covering that protects the cylinder valve from damage or accidental release of the fumigant.
SAND SNAKES: Sand- or water-filled tubes made of material used to seal tarps to the ground to minimize release of the fumigant.
SCBA - POSITIVE PRESSURE: Self-contained breathing apparatus that maintains a slightly positive pressure of air inside the face piece at all times.
SECONDARY LOCKS: Securing mechanisms used during fumigation to prevent inadvertent or illegal entry to a structure under fumigation.
SHORT-TERM EXPOSURE LIMIT (STEL): The time-weighted average exposure limit for a particular compound which should not be exceeded at any time during a work day, even if the eight hour time-weighted average is within the threshold limit value (TLV). *Exposures to this level of a compound should not be longer than 15 minutes and should not occur more than four times* per day. There should be 60 minutes between exposures in this range.

SOLUBILITY: The capability of being dissolved in a solvent such as water.
SORPTION: The uptake of gaseous fumigant resulting from the attraction and retention by liquid and solid materials present. If great enough, there is a gradual reduction of fumigant available to kill the target pest. Sorption may also negatively affect the penetrability of the gas.
SPECIFIC GRAVITY: The ratio of the weight of a body to that of an equal volume of some standard substance — water in the case of solids and liquids, air in the case of gases. The ratio of the mass of a liquid to the mass of an equal volume of water at 4°C, water = 1.
SUBCHRONIC ORAL TOXICITY: The oral toxicity of a material determined for an exposure period between an acute (24 hours) and chronic (weeks to months) in length.
SULFURYL FLUORIDE: The active ingredient of this product, which is non-flammable, non-corrosive and does not cause undesirable odors, is a gas at temperatures above -55°C (-67°F).
TARPAULIN: Semi-permeable membranes used during fumigation to confine the fumigant in a specific area during the exposure period.
TEMPERATURE (°C OR °F): The pesticidal activity of a fumigant varies with temperature. The dosage requirements for this product are based on the mean temperature of the coldest potential pest infested site in the structure. This temperature is nearly always represented by that of the sub-area soil or slab. A probe or surface thermometer can be used to measure temperature. It is very important to accumulate the proper ounce-hours for the temperature that exists.
TERATOGENIC: The potential for an effect to cause congenital abnormality.
TERATOLOGY: The division of embryology and pathology that deals with abnormal development and congenital malformations.
THRESHOLD LIMIT VALUE (TLV): The time-weighted average concentration for a normal eight-hour day and 40-hour work week to which nearly all workers may be repeatedly exposed day-to-day without adverse effects.
VACUUM CHAMBER: Specially built steel chamber used for fumigation. After the material to be fumigated is placed in the chamber, air is evacuated by pumps. The fumigant is then admitted and rapidly fills all the air space previously occupied by air.
VALVE STEM: Opening at the top of the cylinder through which the fumigant is released.
VAPOR CORROSIVENESS: The tendency of the gas to corrode materials. When properly introduced, this product is not corrosive.
VAPOR DENSITY: The weight ratio of a gas to air.
VAPOR PRESSURE: The pressure exerted by a gas that is in equilibrium with its solid or liquid state. The higher the vapor pressure, the more easily and rapidly a fumigant will diffuse and penetrate to reach a gas-air equilibrium and the more rapidly it will aerate and desorb.
WATER SOLUBILITY: The ability of the fumigant to dissolve in water. The less soluble in water, the less that compound is attracted to and adsorbed on the surface of materials. It is also important when considering penetration of the fumigant into soil moisture.
WATER VAPOR: Water in the gaseous state.

Drexel

Drexel Chemical Company

DREXEL CHEMICAL COMPANY
MASTER FUME® AG PRODUCT STEWARDSHIP POLICY

OBJECTIVE

The objective of the Drexel Chemical Company Master Fume AG Product Stewardship Policy is to promote and facilitate Product Stewardship and educate distributors and fumigators on the continued safe use of Master Fume AG gas fumigant in accordance with all label directions, as well as Drexel Chemical Company requirements. Product Stewardship requires all parties to participate in the responsible and ethical management of the health, safety and environmental risks of a pesticide product during all phases of its lifecycle. Purchasers and users acknowledge and agree that their cooperation and participation in Product Stewardship requirements, activities and initiatives for Master Fume AG is mandatory for their continued access to Master Fume AG. **Only those customers and users who have attended a Drexel Master Fume Ag training course within the last 12 months and actively comply with the conditions outlined in this Drexel Master Fume AG Condition of Sale and Applicator Agreement will be allowed to purchase Master Fume AG.**

DEFINITIONS

Fumigator: An individual licensed and/or certified by a state to perform fumigations (certified applicator or equivalent), and eligible to use Master Fume AG following training by Drexel Chemical Company and/or its designees on the use and application of Master Fume AG.
Fumigator Location: Office or location at or from which a fumigator conducts activities subject to this agreement.
Distributor: A company or corporation that is under contract with Drexel Chemical Company to purchase Master Fume AG for resale to fumigators.
Purchaser: An entity that is qualified to purchase Master Fume AG.

IMPLEMENTATION

Drexel Chemical Company will employ a Master Fume AG product manager responsible for implementing and managing the Master Fume AG Product Stewardship Program. All employees and contractors involved with the Master Fume AG Product Stewardship and Master Fume AG sales will report directly to the Master Fume AG product manager.

Drexel Chemical Company will employ a sufficient number of Master Fume AG product Stewards to provide its Master Fume AG customers with training in the safe transportation, handling, and use of the product. In addition to providing training to Master Fume AG customers and applicators, Drexel's Master Fume AG Stewards will conduct routine visits to applicators to evaluate their compliance to the Master Fume AG product label use directions and Master Fume AG Stewardship Program. Failure to comply will result in termination of the Master Fume AG Condition of Sale and Applicator Agreement or require the applicator to receive additional training and evaluation prior to allowing continued use of Master Fume AG.

Drexel Chemical Company and its distributors will implement the following guidelines and procedures for all purchasers and/or users of Master Fume AG.

1. Drexel Chemical Company and its distributors will communicate the Drexel Chemical Company Master Fume AG Product Stewardship Policy to all purchasers of Master Fume AG.

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: info@drexchem.com . www.DrexChem.com

SINCE 1972

2. **Initial Master Fume AG Training**
   All fumigators newly responsible for releasing Master Fume AG into a structure and/or aerating and clearing a structure for re-entry must successfully complete the INITIAL MASTER FUME AG TRAINING PROGRAM which will include, amongst others:
   a. Classroom and on-site training and testing on the proper use, handling, and storage of Master Fume AG, the use and calibration of monitoring and clearing equipment, necessary safety equipment and safety procedures, review of the label, Safety Data Sheet (SDS), Master Fume AG Calculator program for Master Fume AG gas fumigant and the Master Fume AG Applicators Manual;
   b. Field use of the product with Drexel Chemical Company and/or approved distributor personnel participating and evaluating fumigators.
3. **Master Fume AG Stewardship Training**
   After participation in the Initial Master Fume AG Training, all fumigators responsible for releasing Master Fume AG into a structure and/or aerating and clearing a structure for re-entry must participate in the MASTER FUME AG STEWARDSHIP TRAINING PROGRAM provided by Drexel Chemical Company and/or its distributors. It is the responsibility of each fumigator to make certain that all appropriate fumigators attend the program(s). "Make up" sessions will be conducted at the discretion of Drexel Chemical Company or its distributors.
   At a minimum, the MASTER FUME AG STEWARDSHIP TRAINING PROGRAM will include the following:
   a. Review of the label for Master Fume AG with special emphasis on worker protection and public safety requirements.
   b. Proper use, handling and care of safety equipment including, but not limited to, an approved clearance device and positive pressure self-contained breathing apparatus (SCBA).
   c. Updates to the Master Fume AG Applicators Manual and other technical information.
4. **Clearance Devices**
   Each fumigation company is required to own at least 2 approved clearance devices. Clearance device owners are responsible for maintaining proper calibration of their clearance devices (such as INTERSCAN, MIRAN, and/or SF ExplorIR gas analyzers), based on the manufacturer's recommendations, the Master Fume AG product label, and the Master Fume AG Product Stewardship Policy. Once a year, the fumigator will provide relevant information, such as the model number, serial number, calibration record, and last date of calibration check, on operational clearance device(s) that they own to their Drexel Chemical Company representative and/or distributor of Master Fume AG. The fumigator will present to their Drexel Chemical Company representative and/or distributor of Master Fume AG all approved clearance devices used in their business for inspection and/or calibration (or performance verification thereof) or provide verification of the operational status of each clearance device. In the event a fumigator changes distributors during the year, the above information must be provided to the newly chosen distributor.
5. **Availability of Clearance Devices**
   To help ensure proper care, calibration, and use of all approved clearance devices, each company fumigating with Master Fume AG must own its own approved clearance device(s). Fumigation companies may not jointly own these devices.
6. Fumigator shall ensure that each fumigator location that stocks, stores, handles or transports Master Fume AG shall be properly equipped to do so safely, securely and in compliance with federal, state, and local regulations including, but not limited to, DOT rule HM-232 which requires employee background checks. In addition, the fumigator agrees to employ at least two separate types of security methods for storing Master Fume AG cylinders, and to employ at least one method to secure Master Fume AG cylinders being transported.
7. Fumigator is responsible for obtaining any and all licenses, permits, registrations, etc. necessary for handling, storing, transporting, disposing of, and/or using Master Fume AG.

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: info@drexchem.com . www.DrexChem.com

8. **Deficiency Reporting**
   Drexel Chemical Company and its distributors will require their personnel to document observed violations of the label for Master Fume AG and breaches of this Master Fume AG Product Stewardship Policy by a fumigator, whether noted at a fumigation site, during transportation, or in storage. Drexel Chemical Company and/or distributor personnel will notify the fumigator of any such deficiency that requires correction. A copy of the observation may be sent to the fumigator's management. Drexel Chemical Company may also provide its distributors with a copy of the observation. It will be the responsibility of the fumigator to ensure any label violations or stewardship deficiencies are corrected.
9. **Reporting Information**
   1. Report summary level information about Master Fume AG fumigations on a regular basis to Drexel Chemical Company or distributor in the form and manner designated by Drexel Chemical Company. As required in the Master Fume AG Condition of Sale and Applicator Agreement, all Applicators must record and maintain in written and/or electronic form the following minimum details for each use of Master Fume AG:
      a. Date of fumigation;
      b. Address of fumigation site;
      c. Applicators name and license number;
      d. Amount of Master Fume AG use in fumigation of site;
      e. Serial numbers of Master Fume AG cylinder(s) used;
      f. Date and method of empty cylinder return to Drexel.

10. **Fumigation Practices**
    All fumigators responsible for releasing, aerating or clearing a structure of Master Fume AG hereby consent when requested to the presence of Drexel Chemical Company representatives at any job site, routinely, as well as unannounced, at which Master Fume AG is being used, to conduct a quality assurance review. The Drexel Chemical Company representative will be permitted to observe any fumigation activities desired to assist in good stewardship of the product. Drexel Chemical Company representatives will document deficiencies in a company's fumigation procedures noted at a fumigation site. Any fumigation procedure deficiencies will be documented by the Drexel representative(s) and copies of the written report will be provided to the fumigation company and its distributor. Where they are able, field personnel for Drexel Chemical Company or distributors may point out to the fumigator any such deficiency (including any related to the fumigation vehicle) that requires correction. A copy of the observation may be sent to the fumigation company's management. Drexel Chemical Company may also provide its distributors with a copy of the observation. It will be the responsibility of the fumigator to ensure that any deficiencies are corrected. Fumigators are required to correct any noted deficiencies prior to their next fumigation.

In the event that Drexel Chemical Company learns or observes that a fumigator has failed to follow product label requirements properly and/or has violated federal, state or local law or knowingly misrepresents the use of Master Fume AG, Drexel Chemical Company shall have the option of limiting or discontinuing fumigator's ability to purchase Master Fume AG. Should such fumigator thereafter fail to adequately demonstrate to Drexel Chemical Company and/or the distributor that it has corrected these deficiencies to the satisfaction of Drexel Chemical Company, the appropriate state regulatory agency may be contacted and Drexel Chemical Company may seek the discontinuance of further sales of Master Fume AG to the fumigator either on a temporary or permanent basis.

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: info@drexchem.com . www.DrexChem.com
SINCE 1972

Drexel

Drexel Chemical Company

Label requirements, the violation of which may limit or restrict a fumigator's ability to purchase Master Fume AG include, but are not limited to, site preparation for fumigation, fumigant introduction, aeration and re-entry procedures, and safety provisions such as:

1. Use of an approved and properly calibrated clearance device to clear the structure, or
2. Follow "Connected Areas" requirements on the label for Master Fume AG, or
3. Proper use of a positive pressure self-contained breathing apparatus, or
4. Proper posting and securing of structures, or
5. Improper security or storage of Master Fume AG cylinders, empty or full, or
6. Use of Master Fume AG to treat commodities or structures not listed on the Master Fume AG label.

In addition, Drexel Chemical Company will require that its distributors not sell Master Fume AG to companies that do not have proper fumigation state licenses. Failure to comply with one or more of the Master Fume AG Product Stewardship Policy requirements specified above can result in interruption of a fumigator's ability to purchase Master Fume AG.

RESPONSIBILITIES OF DISTRIBUTORS

In addition to the implementation and support of the Master Fume AG Product Stewardship Policy requirements, distributors shall comply with federal, state, and local regulations including, but not limited to, DOT rule HM-232 and are also required to perform the following functions:

1. Provide adequate security measures to prevent product tampering or theft by:
   a. Having a written security plan,
   b. Performing background checks on employees having access to Master Fume AG cylinders,
   c. Employing at least two methods simultaneously to secure Master Fume AG cylinders while in storage,
   d. Installing adequate lighting to deter theft and provide for safe emergency response, and
   e. Instituting a lock and key control policy.
2. Verify that customers purchasing Master Fume AG possess an adequate number of operational clearance devices.
3. At the request of Drexel Chemical Company, provide a list of all purchase details of Master Fume AG and the related clearance device information.
4. Assist in INITIAL and ANNUAL STEWARDSHIP TRAINING PROGRAMS provided by Drexel Chemical Company and make mailings to purchasers of record when necessary to ensure notification of the Drexel Chemical Company Master Fume AG Product Stewardship Policy and training opportunities and/or requirements.
5. Deny the sale of Master Fume AG to any fumigator and/or fumigator location that fails to attend the INITIAL and ANNUAL STEWARDSHIP TRAINING PROGRAMS. As outlined by the Drexel Chemical Company Master Fume AG Product Stewardship Policy, all fumigators responsible for releasing Master Fume AG into a structure and/or aerating and clearing a structure for re-entry must participate in the INITIAL and ANNUAL STEWARDSHIP TRAINING PROGRAMS.
6. Deny the sale of Master Fume AG to any fumigator and/or fumigator location that is not equipped to transport cylinders securely in an upright position and/or attempts to transport cylinders in a closed vehicle where cylinders occupy the same airspace as personnel.
7. Discontinue sales of Master Fume AG to a fumigator and/or fumigator location upon request to do so by Drexel Chemical Company or if the distributor is aware of deficiencies as outlined above or if the fumigator does not have necessary state licensing. The discontinuance of sale must be immediately communicated to Drexel Chemical Company and appropriate regulatory officials.
8. Report monthly to Drexel Chemical Company all sales and transfers of Master Fume AG, in the form and manner designated by Drexel Chemical Company.
9. Collect and report summary level information about Master Fume AG fumigations on a regular basis in the form and manner designated by Drexel Chemical Company.

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: info@drexchem.com . www.DrexChem.com

SINCE 1972

Drexel Chemical Company

10. Transport and store cylinders of Master Fume AG gas fumigant according to the label requirements and guidelines specified on the marketing letter. Distributors will keep track of individual cylinder identification (ID) codes (or bar codes) going to fumigators and make those records available to Drexel Chemical Company upon request. Furthermore, distributors must utilize and maintain any cylinder serial number or barcode tracking equipment provided by Drexel Chemical Company.
11. Immediately notify the local Drexel Chemical Company representative of all new fumigators and/or fumigator locations that seek to purchase Master Fume AG from them.

® Master Fume is a registered trademark of Drexel Chemical Company.
Master Fume AG is a federally Restricted Use Pesticide.
Always read and follow label directions.

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: info@drexchem.com . www.DrexChem.com

SINCE 1972

Drexel

Drexel Chemical Company

MASTER FUME AG CONDITION OF SALE AND APPLICATOR AGREEMENT

THIS AGREEMENT is made between Drexel Chemical Company, Inc., 1700 Channel Drive, Memphis, Tennessee 38106, USA (hereinafter "DREXEL") and _____ (hereinafter "APPLICATOR").

WHEREAS, DREXEL has received United States Environmental Protection Agency (hereinafter "EPA") registration for its sulfuryl fluoride fumigant, Master Fume AG; and

WHEREAS, besides the detailed use instructions found in the Master Fume AG EPA label and Master Fume AG Manual for Fumigation, DREXEL has developed specific training, procedures and guidelines, known as the Master Fume AG Stewardship Policy (hereinafter "Policy"), to ensure the safe handling and use of Master Fume AG and wishes to restrict Master Fume AG's distribution and use to only those APPLICATORS who comply with the Policy and terms and conditions of this Agreement; and

WHEREAS, APPLICATOR wishes to purchase and use Master Fume AG according to the terms of the Master Fume AG Stewardship Policy and this Agreement; and

NOW, THEREFORE, the Parties hereto agree as follows:

1. **Definitions**

   As used in or in relation to this Agreement, the terms listed below shall have the following meaning:

1.1 Agreement shall mean this Agreement between DREXEL and APPLICATOR, including Schedules, if any.

1.2 Territory shall mean United States of America (USA).

1.3 Pesticide shall mean any chemical substance regulated in its distribution and/or use by the US EPA under the Federal Insecticide, Fungicide, Rodenticide Act (FIFRA).

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: info@drexchem.com . www.DrexChem.com

SINCE 1972

1.4 Registration shall mean the license granted by the US EPA to sell a pesticide in the USA.

1.5 Master Fume AG is a trademark for Drexel's EPA registered sulfuryl fluoride fumigant for use in treating commodities and certain non-residential structures.

2. Availability

2.1 Subject to, and in accordance with the terms and conditions of this Agreement, DREXEL hereby grants APPLICATOR the non-exclusive right to purchase and use Master Fume AG in the Territory.

3. Term and Termination

3.1 This Agreement shall commence upon execution by both DREXEL's Master Fume AG product manager and APPLICATOR's authorized company officer and shall continue until terminated under the terms of this Agreement.

3.2 APPLICATOR may at any time terminate this Agreement, without cause, by providing DREXEL with thirty (30) days written notice of termination.

3.3 DREXEL or APPLICATOR may terminate, with cause, this Agreement without prior notice. Causes for termination include:

a. Failure to comply with any conditions or provisions of this Agreement.

b. Failure of APPLICATOR to follow Master Fume AG label use directions.

c. Use of Master Fume AG on commodities or structures not listed on the Master Fume AG label.

d. Failure of APPLICATOR to maintain proper restricted use pesticide license or certification as required to apply structural fumigants.

e. Unauthorized transfer of Master Fume AG to a third party or use outside of the Territory.

f. Either party becoming financially insolvent.

g. As described in Section 8.4 of this Agreement.

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: info@drexchem.com . www.DrexChem.com

SINCE 1972

3.4 DREXEL may update, modify, or replace a portion or part of the Master Fume AG label and Master Fume AG Manual at any time following EPA approval. Written and/or electronic notice of any changes will be provided to APPLICATOR as soon as practical.

4. DREXEL's Responsibilities

4.1 Maintain EPA and state registrations necessary to allow the lawful use of Master Fume AG by qualified APPLICATORS.

4.2 Maintain and update Master Fume AG use instructions, Policy, and training as necessary to insure safe use of Master Fume AG.

4.3 Maintain necessary Master Fume AG staff to annually (or more often as necessary) train and assist APPLICATORS to insure safe use of Master Fume AG.

4.4 Conduct audits and site inspections as necessary to confirm APPLICATOR is complying with Master Fume AG label use instructions and Policy.

4.5 Maintain convenient and adequate inventories of Master Fume AG to satisfy market needs.

5. APPLICATOR Responsibilities

5.1 APPLICATOR must strictly follow the terms of this Agreement and Policy.

5.2 APPLICATOR must strictly follow all instructions, restrictions, and precautions found in the Master Fume AG Label and Master Fume AG Manual.

5.3 APPLICATOR must comply with all federal, state, and local laws governing the transport, handling, storage, use, and disposal of Master Fume AG and Master Fume AG cylinders.

5.4 APPLICATOR must possess the necessary governmental licensing/certification to apply a restricted use pesticide, in particular fumigant pesticide products, such as Master Fume AG.

5.5 APPLICATOR personnel using Master Fume AG must receive annual Master Fume AG training as described in Policy.

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: Info@drexchem.com . www.DrexChem.com

5.6 APPLICATOR insures only personnel properly licensed for application of restricted use pesticide and specifically trained in the use and handling of Master Fume AG may apply Master Fume AG and aerate fumigation site.

5.7 Maintain up to date records to track location of all Master Fume AG cylinders, full and empty.

5.8 Promptly return all empty cylinders as directed by DREXEL according the Master Fume AG Manual.

5.9 Maintain current and accurate records of each Master Fume AG application for at least two (2) years or as directed by DREXEL.

5.10 APPLICATOR shall not sell or transfer any amount of Master Fume AG to a third party without the written consent of DREXEL.

5.11 Allow DREXEL access to inspect or audit all records pertaining to purchase and use of Master Fume AG.

5.12 Allow DREXEL access to inspect any APPLICATOR facilities storing or transporting Master Fume AG.

5.13 Allow DREXEL to monitor and audit any site fumigation conducted by APPLICATOR.

5.14 Should this Agreement be terminated, with or without cause, APPLICATOR agrees to immediately return all Master Fume AG cylinders, empty or full, to DREXEL.

5.15 Should the EPA registration for use of Master Fume AG be terminated or suspended, APPLICATOR may return any Master Fume AG to DREXEL that as a condition of such termination or suspension cannot be used under label directions.

6. Warranty and Liability

6.1 DREXEL warrants that Master Fume AG is reasonably fit for the use(s) described in the Master Fume AG label when used in accordance to the directions for use found in the label and Master Fume AG Manual. DREXEL extends NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EXPRESS OR IMPLIED.

6.2 APPLICATOR shall indemnify and hold DREXEL harmless from and against any and all losses, claims, suits, actions, damages, judgements, assessments, charges, costs, and other liabilities of any type whatsoever, and APPLICATOR shall reimburse DREXEL for any and all fees and expenses, including reasonable attorney fees and court costs expended due to and caused by or arising out of or in connection with:

a. Failure to follow Master Fume AG label and Master Fume AG Manual use instructions and precautions.
b. Improper or negligent transport, handling, storage or disposal of Master Fume AG and Master Fume AG cylinders.
c. Breach of any term or condition of this Agreement.
d. Any claim, action, or suit arising from APPLICATOR's performance or lack of performance using Master Fume AG.
e. Any violation or claim of violation of any law arising from use of Mater Fume AG by APPLICATOR.

6.3 DREXEL shall not be liable for incidental, consequential, or indirect loss of profit or damages caused by use of Master Fume AG or resulting from this Agreement regardless of whether DREXEL had any prior knowledge or suspicion of possible damages.

6.4 The terms of 6.2 and 6.3 shall survive termination of this Agreement.

6.5 DREXEL and APPLICATOR represents and warrants it has the full power and right to enter into and perform this Agreement, and the person signing this Agreement for each party is duly authorized to bind that party in accordance with the terms herein.

7. Delivery

7.1 DREXEL shall not be liable for failure to deliver all requests or orders for Master Fume AG. DREXEL shall make every effort to keep adequate supplies of Master Fume AG on hand in anticipation of market needs. It is agreed by both parties that safety considerations of transportation and storage is a greater consideration than immediate need.

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: info@drexchem.com . www.DrexChem.com

SINCE 1972

Drexel

Drexel Chemical Company

8. Amendments and Assignments

8.1 This Agreement may be amended only in writing.

8.2 Any notice or amendment to this Agreement must be submitted in writing and delivered via certified mail, return receipt postage, or courier to the following addresses:

DREXEL: DREXEL CHEMICAL COMPANY
P.O. Box 13327
Memphis, TN 38113-0327

or

DREXEL CHEMICAL COMPANY
1700 Channel Avenue
Memphis, TN 38106-1412

APPLICATOR: _____
_____
_____

8.3 Should a majority share in DREXEL be sold, the rights and obligations of this Agreement will remain in effect.

8.4 Should a majority share in APPLICATOR be sold or if the management of APPLICATOR significantly changes, this Agreement will be terminated and the new ownership or management must seek a new Agreement with DREXEL.

9. Applicable Law and Venue

9.1 This Agreement shall be interpreted under the laws of the State of Tennessee.

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: info@drexchem.com . www.DrexChem.com

SINCE 1972

Drexel

Drexel Chemical Company

IN WITNESS WHEREOF, the parties hereto caused this Agreement to be executed by their respective duly authorized representatives on the day and year first above written.

DREXEL CHEMICAL COMPANY	_____
_____	_____
Ben Johnson	_____
Master Fume AG Product Manager	_____
Date:_____	Date:_____

1700 Channel Avenue . Post Office Box 13327 . Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 . Fax: (901) 774-4666 . E-Mail: info@drexchem.com . www.DrexChem.com

SINCE 1972

Drexel Chemical Company

July 10, 2015

Document Processing Desk **(REGFEE)**
ATTN: Ms. Venus Eagle, PM 1
Office of Pesticide Programs (7505P)
U.S. Environmental Protection Agency
Rm S-4900, One Potomac Yard
2777 S Crystal Drive, Arlington, VA 22202

Re: Submission of Me-Too Registration Application
MASTER FUME AG (EPA File Symbol 19713-XXX)

Dear Ms. Eagle,

Please find the following in support of the above.

1. PRIA fee amounting to $1,806 for Code Action R301

2. Completed EPA Form 8570-1

3. Two copies of the proposed basic CSF

4. Certification with respect to citation of data

5. Data matrix

6. Three (3) copies of the proposed label for the cylinder and Applicator's Manual

If you have questions/clarification regarding this submission, I can be reached at (901) 774-4370 or e-mail lchan@drexchem.com.

Thank you.

Respectfully yours,
FOR DREXEL CHEMICAL COMPANY

Luz G. Chan
Luz G Chan
Registration Manager

1700 Channel Avenue • Post Office Box 13327 • Memphis, Tennessee 38113-0327
Phone: (901) 774-4370 • Fax: (901) 774-4666 • E-Mail: info@drexchem.com • www.DrexChem.com
SINCE 1972

Please read instructions on reverse before completing form. Form Approv. MB No. 2070-0060, Approval expires 2-28-95

EPA

United States
Environmental Protection Agency
Washington, DC 20460

☑ Registration
☐ Amendment
☐ Other

OPP Identifier Number

Application for Pesticide - Section I

1. Company/Product Number 19713-ATE	2. EPA Product Manager Venus Eagle	3. Proposed Classification ☐ None ☑ Restricted
4. Company/Product (Name) MASTER FUME AG	PM# 1	
5. Name and Address of Applicant *(Include ZIP Code)* Drexel Chemical Company P.O. Box 13327 Memphis, TN 38113-0327 ☐ *Check if this is a new address*	6. **Expedited Reveiw.** In accordance with FIFRA Section 3(c)(3)(b)(i), my product is similar or identical in composition and labeling to: EPA Reg. No. 62719-376 (Labeling); 19713-596 (Formulation) Product Name Pro-Fume Gas Fumigant -Labeling; Master Fume -Formulation	

Section - II

☐ Amendment - Explain below.
☐ Resubmission in response to Agency letter dated _____
☐ Notification - Explain below.
☐ Final printed labels in repsonse to Agency letter dated _____
☑ "Me Too" Application.
☐ Other - Explain below.

Explanation: Use additional page(s) if necessary. (For section I and Section II.)

Submission of me-too registration application. Details are in the cover letter accompanying this submission.

Section - III

1. Material This Product Will Be Packaged In:

Child-Resistant Packaging	Unit Packaging	Water Soluble Packaging	2. Type of Container
☐ Yes ☑ No	☐ Yes ☑ No	☐ Yes ☑ No	☐ Metal ☐ Plastic ☐ Glass ☐ Paper ☑ Other (Specify) Cylinder
* *Certification must be submitted*	If "Yes" Unit Packaging wgt. / No. per container	If "Yes" Package wgt / No. per container	

3. Location of Net Contents Information	4. Size(s) Retail Container	5. Location of Label Directions
☑ Label ☐ Container	125 pounds	☑ On the label

6. Manner in Which Label is Affixed to Product ☐ Lithograph ☑ Paper glued ☐ Stenciled ☐ Other _____

Section - IV

1. Contact Point *(Complete items directly below for identification of individual to be contacted, if necessary, to process this application.)*

Name	Title	Telephone No. (Include Area Code)
Luz G Chan	Registration Manager	(901) 774-4370

Certification

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowlingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law.

6. Date Application Received (Stamped)

2. Signature Luz G. Chan	3. Title Registration Manager
4. Typed Name Luz G Chan	5. Date 09/28/2015

Went to sim clinic - review that was done was wrong and needs to be updated using PRN 84-5, the current label, and updates to the LRM/NIOSH. Venus pointed this out to john Redden and he said to send it back over with a new bean to acute tox.

Hold off on sending beans (which are already created) until:
1. data matrix is sorted out - efficacy data for rats and mice needs to be listed, they must also submit a full generic data matrix as they are using their own product for a source of active ingredient.
2. Check with Venus if she thinks the uses align with the label of the source of active ingredient. uses don't align.
9/9 - discussion with Venus - On the applicaiton, they need to cite 1. the product that they are similiar to in formulation, and 2. the product that they are similiar to in use.

-they also need efficacy data on their data matrix, and they need to submit full data matrix instead of cite all for their generic data (since they own their source of ai).

email went to registrant 9/9.

9/10 - Discussion needed with Steve Schaible on data comp . Venus now doesnt think data matrix is needed for the source of a.i. but Drexel needs to be taken off of the generic data list. They also need to list the data that has been called in for reg review DCI.

9/16 - Call with Michelle of OGC: 1. this needs to be recoded with an unregistered source of active ingredient - they cannot cite their own end use product as a source of their a.i. 2. They need to take themselves off of the data matric for the generic data because they do not own a source.

9/25 - Venus spoke with OGC and they said it can be an R301 - beaned to pc and marianne instead of tox. They did a cite all for efficacy so no review is needed.

Data matrix still needs to be updated with DCI info and new applicaiton that has the uses and formulation me too. - sent email to Luz Chan 9/25

10/5 - all reviews are in, asked Luz chan to submit a stewrdship plan. This cannot go through until the stewardship plan petition gets figured out. Label review and efficacy review are now needed on my end.

10/20 - stewardship plan submitted

11/30 - sent label revisions over to drexel

*L
(a)

RESTRICTED USE PESTICIDE
(Due To Acute Inhalation Toxicity Of Sulfuryl Fluoride)
FOR 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. AN APPLICATOR CERTIFIED BY THE STATE MUST BE PRESENT ON SITE AT ALL TIMES DURING INTRODUCTION OF FUMIGANT, REENTRY PRIOR TO AERATION AND INITIATION OF THE AERATION PROCEDURE.

Drexel

Master Fume® AG

Gas Fumigant

For control of rodent, insect and other listed invertebrate pests.
Use Sites: Stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers, and storage structures.
Read the entire container label and Applicator's Manual before using this product. Refer to the Applicator's Manual for additional precautionary information and directions for use. The Applicator's Manual must be in the user's possession during fumigation. If the Applicator's Manual is lost, obtain a replacement copy from your distributor or Drexel Chemical Company.
APPLICATION PERSONNEL MUST PARTICIPATE IN DREXEL CHEMICAL'S SULFURYL FLUORIDE TRAINING AND STEWARDSHIP PROGRAM, MASTER TRAIN.

ACTIVE INGREDIENT:
Sulfuryl fluoride..... 99.8%
OTHER INGREDIENTS: 0.2%
TOTAL: 100.0%

KEEP OUT OF REACH OF CHILDREN

DANGER PELIGRO

POISON VENENO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

See FIRST AID on Page 2

EPA Reg. No. 19713-XXX
EPA Est. No. 19713-XX-X

Net Content: 125 LBS.

Manufactured By:
Drexel Chemical Company
P.O. BOX 13327, MEMPHIS, TN 38113-0327
SINCE 1972

*No fact sheet referenced on Profume label
* compare ch 3 of profume to this label
* "glove statement?

See Acute Tox Review

FIRST AID

IF INHALED:
- ~~Get exposed~~ Move person to fresh air.
- ~~Keep warm and at rest.~~
- Make sure person can breathe freely.
- If breathing has stopped give artificial respiration.
- Do not put anything in the mouth of an unconscious person.
- Call a poison control center or doctor for further treatment advice.

IF LIQUID IS ON SKIN OR CLOTHING:
- Immediately apply water to contaminated area of clothing before removing.
- Once area has thawed, remove contaminated clothing, shoes, and other items covering skin.
- Wash contaminated skin area thoroughly or shower.
- Call a poison control center or doctor for treatment advice.

IF LIQUID IS IN EYES:
- Hold eye open and rinse slowly and gently with water for 15 to 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

if swallowed

In all cases of overexposure, such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, numbness in extremities, get medical attention immediately. Take person to a doctor or emergency treatment facility. Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also call CHEMTREC at 800-424-9300 for emergency.

Note to Physician: This product is a gas which has no warning properties such as odor or eye irritation. (However, chloropicrin is used as a warning agent and is a known lachrymator). Early symptoms of exposure to this product are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations of this product can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically. The liquid form of this product in the eye may cause damage due to refrigeration or freezing.

PRECAUTIONARY STATEMENTS

→ see acute tox review

Hazards To Humans And Domestic Animals

corrosive

which may have a delayed onset, or may freeze

DANGER: Fatal if inhaled. May be fatal if swallowed. Extremely hazardous liquid and vapor under pressure. Liquid may cause freeze burns ~~of~~ exposed skin. Do not get in eyes, on skin, or on clothing. This product is ~~an~~ odorless ~~gas fumigant~~. Exposure to toxic levels may occur without warning or detection by the user.

☐ May be fatal if absorbed through skin

contains SF, uni

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Protective Clothing

Wear splash-resistant goggles (goggles designed and made of material that allows no measurable movement of the liquid pesticide being used to pass through them during use) or full face shield for eye protection during introduction of the fumigant. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with this product until thoroughly aerated and cleaned.

Respiratory Protection

If the concentration of this product in the breathing zone of the fumigated area (as measured by a detector device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR™) does not exceed 1 ppm (4 mg/cubic meter), no respiratory protection is required. [A breathing zone is defined as the area within a structure where individuals typically stand, sit or lie down.] If the concentration of this product is greater than 1 ppm, further aeration and re-testing is required. When this concentration is exceeded or when concentration is unknown, all persons in the exposed area must wear a NIOSH or MSHA approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott or MSA. Before using any make or brand of SCBA, learn how to use it correctly. Determine that it has an adequate air supply for the job at hand, that it fits properly providing an adequate seal around the face and that it is in good working order. For more detailed information on the source and use of air monitoring devices and respirators, consult the Applicator's Manual of this product.

Delete all references to MSHA Christina Schwartz

Notice: Read the entire label. Use only according to label directions. Before buying or using this product, read "*Warranty Disclaimer*".

In case of emergency endangering health or the environment involving this product, call 1-877-208-2593. If you wish to obtain additional product information, call Drexel Chemical Company at (901) 774-4370.

→ This product is used w/ 0.25% chloropicrin as a warning agent. Chloropicrin may be irritating to the upper resp. tract: even @ low levels, can cause painful irritation to the eyes, producing tearing. If these symptoms occur, leave the fumigation area immediately.

* if inhaled (I)
* if in eyes (I)
* if swallowed (II)
* if on skin or clothing (II)

SF Vapor pressure = 1.7×10^6 pa (@ 21.1°C)
↳ 13,000 mmHg

40CFR says: (last updated 12/12/08)

For handling activities in enclosed areas, use either a supplied-air respirator w/ MSHA/NIOSH approval # prefix TC-19C, or a self-containing breathing apparatus (SCBA) w/ MSHA/NIOSH approval # TC-13F.

User Safety recommendations
-users should wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. -User should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly & put on clean clothing.

next page

ENVIRONMENTAL HAZARDS

Sulfuryl fluoride is a highly toxic gas. Do not expose non-target organisms. This pesticide is toxic to fish and wildlife.

PHYSICAL OR CHEMICAL HAZARDS

Sulfuryl fluoride is a colorless, odorless toxic gas. Cylinders of this product are under pressure and must not be stored near heat or open flame. Exposures to temperatures above 158°F will cause a fusible plug to melt and the contents will be released. Under high heat conditions (temperatures above 752°F), this product can decompose into sulfur dioxide (SO_2), hydrofluoric acid (HF), and other decomposition products.

Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc., that represent a reasonable risk of a heat source that is at or near 752°F. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated. Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

Notice: Read the entire label. Use only according to label directions. Before using this product, read Warranty-Conditions of Sale, Inherent Risks of Use, and Limitation of Remedies elsewhere on the label. If terms are unacceptable, return at once unopened.

In case of emergency endangering health or the environment involving this product, call 1-800-CHEMTREC. If you wish to obtain additional product information call Drexel Chemical Company at (901) 774-4370.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

not in LPM

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: Store in dry, cool, well ventilated area under lock and key. Post as a pesticide storage area. If the storage area is in an occupied building, the storage area must have either 1) a forced air ventilation system that meets required local ordinances for the storage of hazardous materials and operates continuously; or 2) be equipped with a permanently mounted and properly maintained and functioning sulfuryl fluoride monitoring device designed to alert occupants of the building if sulfuryl fluoride in the air of the storage area is greater than 1 ppm. Store cylinders upright secured to a rack or wall to prevent tipping.

Pesticide Handling: Do not subject cylinders to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not transport any cylinders in closed vehicles where they occupy the same common airspace as personnel. Transport securely only in an upright position. 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 supplier. Only the registrant is authorized to refill cylinders. Do not use cylinder for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.

Leak Procedures: Evacuate immediate area of leak. Use a NIOSH or MSHA approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA) or combination air-supplied/SCBA respirator, such as manufactured by Ranger, Survivair, Scott, or MSA, for entry into affected areas to correct problem. Move leaking or damaged cylinder outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Do not permit entry into leakage area by unprotected persons until concentration of fumigant is determined to be 1 ppm or less in the breathing zone, as determined by a detection device with sufficient sensitivity such as an INTERSCAN, MIRAN or SF-ExplorIR. For more detailed information on the source and use of air monitoring devices or respirators, consult the Applicator's Manual of this product.

on product label, not in LPM

CYLINDER AND PRODUCT DISPOSAL:

Promptly return all empty cylinders to your distributor of this product. Follow proper cylinder handling directions above. 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, consult your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

According to RED:
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 the label instructions, consult your State Pesticide or Env. Control Agency, or the Hazardous waste rep of the nearest EPA Reg. office for guidance.

* users should remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly & change into clean clothing.

O Do not use ropes, 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.

WARRANTY DISCLAIMER

Manufacturer warrants that this product conforms to the chemical description on the label and based upon tests believed reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. To the extent consistent with applicable law, Manufacturer makes no other expressed or implied warranty of merchantability or fitness for a particular purpose or any other express or implied warranty.

Use Risk

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable weather, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Manufacturer or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by Buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to one of the following, at Manufacturer's discretion:

1. Refund of purchase price paid by Buyer or use for product bought, or
2. Replacement of amount of product used.

To the extent consistent with applicable law, in no case shall Manufacturer or the Seller be liable for consequential, special or indirect damages or losses from the use, handling or storage of this product.

The terms of the *"Warranty Disclaimer"* above and this *"Limitation of Remedies"* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of the Manufacturer or the Seller is authorized to vary or exceed the terms of the *"Warranty Disclaimer"* or this *"Limitation of Remedies"* in any manner.

MASTER FUME and the Drexel logo are registered trademarks of Drexel Chemical Company. All other brand names, product names, or trademarks belong to their respective holders.

* Venus, factsheet is required by RED – have them fax what the fact sheet. looks like + add to file

Decision #: 506852
DP #: (428913)
PRIA
Parent DP #:
Submission #: 971044
E-Sub #:

DATA PACKAGE BEAN SHEET

Date: 31-Aug-2015

* * * Registration Information * * *

Registration: 19713-ATE - MASTER FUME AG

Company: 19713 - DREXEL CHEMICAL COMPANY

Risk Manager: RM 01 - Venus Eagle - (703) 308-8045 Room# PY1 S-7228

Risk Manager Reviewer: Jacquelyn Marchese JMARCHES

Sent Date: _____ PRIA Due Date: 04-Dec-2015 Edited Due Date: _____

Type of Registration: Product Registration - Section 3

Action Desc: (R301) NEW PRODUCT;IDENTICAL OR SUBSTANTIALLY SIMILAR IN COMPOSITION AND I

Ingredients: 078003, Sulfuryl fluoride(99.8%)

* * * Data Package Information * * *

Expedite: ○ Yes ● No Date Sent: 31-Aug-2015 Due Back: _____

DP Ingredient: 078003, Sulfuryl fluoride

DP Title: Chem Review

CSF Included: ○ Yes ● No Label Included: ○ Yes ● No Parent DP #: _____

	Assigned To	Date In	Date Out		
Organization:	RD / CITAB			Last Possible Science Due Date:	05-Oct-2015
Team Name:	CHEM			Science Due Date:	
Reviewer Name:				Sub Data Package Due Date:	
Contractor Name:					

* * * Studies Sent for Review * * *

Printed on Page 2

* * * Additional Data Package for this Decision * * *

Can be printed on its own page

* * * Data Package Instructions * * *

CITAB Chem team:

Please review the submitted studies in support of the new product Master Fume AG (19713-ATE) and determine if they adequately support the new product and its formulation. This action was coded as an R 301 and the registrant believes this product is substantially similiar to 62719-376.

Included in this packet are the cover letter, copies of the label and applicator's manual, CSF, and current data matrix.

Please complete a 45 day screen by 9/10/15.

If you have any questions please let me know.

Thanks,
Jackie
marchese.jacquelyn@epa.gov
347-0559

DP#: (428913) *** Studies Sent for Review *** Decision#: (506852)

MRID	MRID Status	Citation Reference	Guideline	86-5 Status
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.6302/Color	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.6303/Physical state	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.6304/Odor	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.6313/Stability to normal and elevated temperatures, metals, and metal ions	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.6314/Oxidizing or reducing action	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.6315/Flammability	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.6316/Explodability	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.6317/Storage stability	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.6320/Corrosion characteristics	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.7000/pH	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.7200/Melting point/melting range	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.7220/Boiling point/boiling range	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.7300/Density/relative density	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.7840/Water solubility: Column elution method, shake flask method	Pass (24-Aug-2010)
46837101		Wherry, K. (2006) Physical and Chemical Properties of Sulfuryl Fluoride. Project Number: DRXL/200605. Unpublished study prepared by Drexel Chemical Company. 7 p.	830.7950/Vapor pressure	Pass (24-Aug-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.1550/Product Identity and composition	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.1600/Description of materials used to produce the product	Pass (20-Sep-2010)

DP#: (428913) *** Studies Sent for Review *** Decision#: (506852)

MRID	MRID Status	Citation Reference	Guideline	86-5 Status
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.1670/Discussion of formation of impurities	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.1750/Certified limits	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.1800/Enforcement analytical method	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.6302/Color	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.6303/Physical state	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.6304/Odor	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.6313/Stability to normal and elevated temperatures, metals, and metal ions	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.6314/Oxidizing or reducing action	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.6315/Flammability	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.6316/Explodability	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.6320/Corrosion characteristics	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.7000/pH	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.7200/Melting point/melting range	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.7220/Boiling point/boiling range	Pass (20-Sep-2010)

DP#: (428913) *** Studies Sent for Review *** Decision#: (506852)

MRID	MRID Status	Citation Reference	Guideline	86-5 Status
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.7300/Density/relative density	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.7840/Water solubility: Column elution method, shake flask method	Pass (20-Sep-2010)
48188401		Bernard, S. (2010) Product Identity, Composition, Analysis of Master Fume. Project Number: DRXL/201005. Unpublished study prepared by Drexel Chemical Company. 36 p.	830.7950/Vapor pressure	Pass (20-Sep-2010)

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

OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION
OFFICE OF PESTICIDE PROGRAMS REGISTRATION DIVISION (7505P)

FEE

~~DOCUMENT CONTAINS CONFIDENTIAL BUSINESS INFORMATION~~

DP BARCODE No.: 428913; **FILE SYMBOL No.**: 19713-ATE; **PRODUCT NAME**: Master Fume AG; **DECISION No.**:506852; **PC Code(s)**:078003; **ACTION CODE**: R301; **FOOD Use**: Yes

DATE OUT: September 30, 2015

SUBJECT: End Use Product Chemistry Review
Product Name: Master Fume AG

FROM: Shyam Mathur
Product Chemistry Team Leader
CITAB/RD (7505P)

10/01/15

TO: Jacquelyn Marchese / Venus Eagle, RM 01
I-V Branch 3 / RD (7505P)

Company Name: Drexel Chemical Company
Formulation Type: Gas Fumigant (for control of Rodents, Insects & other Invertebrate pests)

INTRODUCTION:

The registrant has submitted an application for the registration of the new end use product Master Fume AG. In support of the registration application, the registrant has cited 830 series group A and group B product chemistry data with MRID Nos. 48188401. The registrant has submitted a CSF for basic formulation (dated August 28, 2015) and the product label. The registrant has claimed that the proposed product is substantially similar to the cited product with Reg. No. 19713-596. CITAB has been asked to determine the acceptability of the proposed basic CSF and the supporting product chemistry data.

SUMMARY OF FINDINGS:

1. Name of Active Ingredient(s): Sulfuryl fluoride (99.8%)

2. Has the registrant claimed substantial similarity to a registered product?

   [ ] Yes; [X] No; [ ] NA; if yes, give the registration number of the cited product.

   Reg. No. 19713-596

3. All of the source materials of the active ingredient are derived from registered sources: [X] Yes [ ] No

4. All inert ingredients have been screened by IIAB and found to be approved for the proposed labeled Uses: [X] Yes; [ ] No

5. Confidential Statement of Formula(s):

   [X] Basic CSF- Dated: 08-28-2015

   [ ] Alternate CSF – Both Dated: ; Re-submitted – Dated: NA

   Alternate CSF(s) complies with 40CFR§152.43: [ ] Yes; [ ] No; [X] NA

6. Product label

   a. Ingredient statement: Nominal concentration of AI listed on CSF(s) concurs with product label (PR Notice 91-2).
   [X] Yes; [ ] No; if not, explain below:

   Is the sub statement in compliance with PR Notice 97-6 (inert ingredient vs other ingredient)
   [X] Yes; [ ] No; if not, explain below:

Metallic equivalent:	[ ] Yes [X] NA
Soluble arsenic:	[ ] Yes [X] NA
Isomeric ratios:	[ ] Yes [X] NA
Acid Equivalent:	[ ] Yes [X] NA; Imazethapyr acid equivalent = 21.6%

   b. Health related sub statements: Product contains?

Petroleum distillate at > 10%:	[ ] Yes [ ] No [X] NA
Methanol at > 4%:	[ ] Yes [ ] No [X] NA
Sodium nitrate/Sodium Nitrite	[ ] Yes [ ] No [X] NA

   c. Physical chemical hazard statement: Product label requires a statement per 40 CFR §156.78 for flammability, explosive potential or electric insulator breakdown?
   [ ] Yes; [X] No

   Is the sub statement in compliance with PR Notice 98-6 (Total Release Fogger)?
   [ ] Yes; [ ] No; [X] NA; if not, explain below

   d. Label requires an additional Storage and Disposal statement:
   [ ] Yes; [X] No; if yes explain below:

7. Group **A**: Product Chemistry Data cited from Reg. No. 19713-596

CITAB determination of the acceptability for the proposed product is listed in the tables below.

Guideline No.	**Study Title**		**Data cited**		**CITAB's Assessment of Data**	**MRID Nos. cited**
			Yes	**No**		
830.1550	Product Identity & Composition		X		A	48188401
830.1600	Description of materials used to produce the product		X		A	48188401
830.1650	Description of formulation process		X		A	48188401
830.1670	Discussion on the formation of impurities		X		A	48188401
830.1700	Preliminary analysis				NA	
830.1750	Certified limits (158.350)	Standard certified limits	X		A	CSF 8-28-2015
		Proposed Limits			NA	
		Justification for wider limits			NA	
830.1800	Enforcement analytical method		X		A	48188401

A = Acceptance, N = Not Acceptable, G = Data Gap, W = Waiver Request, I = In Progress, NA = Not Applicable; U = Upgradeable.

8. Group **B:** Product Chemistry Data cited from Reg. No. 19713-596

Guideline No.	**Study Title**	**Value or Qualitative Description cited**	**CITAB's Assessment of Data**	**MRID Nos.** cited
830.6302-6303	Physical State	Gas at room temperature & pressure	A	48188401
830.6315	Flammability	Non-Flammable	A	48188401
830.6316	Explodability	Non-explosive	A	48188401
830.7000	pH	6.06 (10 gm sulfuryl chloride bubbled through 100 ml water yielded a solution for pH determination was made)	A	48188401
830.7300	Density	4.20 g/L g/ml @ 20 °C under1 atmospheric pressure (calculated ideal gas law)	A	48188401
830.6314	Oxidation/reduction	No oxidizing or reducing properties	A	48188401
830.6317	Storage stability	Stable when stored in original gas cylinder under warehouse or transportation conditions. Stable to light; stable to temperatures up to 500°C when dry; Rapidly hydrolyzed by aqueous alkali.	A*	48188401
830.6320	Corrosion characteristics	Non-corrosive. Evaluation of steel storage cylinders indicate corrosion rate is less than 2 mils/year.	A	48188401

A = Acceptance, N = Not Acceptable, G = Data Gap, W = Waiver request, NA = Not applicable, I = In progress; U = Upgradeable.

A* = data submitted under the guideline 830.6314

CONCLUSIONS:

The CITAB has reviewed the product chemistry data submitted for the proposed end-use product and has concluded that:

1. The proposed CSF for basic formulation (dated 8-28-2015) is acceptable.

2. The data cited corresponding to guidelines 830.1550 (product identity & composition, 830.1600 (description of materials used to produce product), 830.1650 (description of formulation process), 830.1670 (description of formation of impurities), and 830.1750 (certified limits), and 830.1800 (enforcement analytical limits) are acceptable.

3. The product chemistry data submitted corresponding to guidelines 830.6302 (color), 830.6303 (physical state), 830.6304 (odor), 830.6313 (stability at room & elevated temperature), 830.6314 (oxidation/reduction), 830.6315 (flammability), 830.6316 (explodability), 830.6317 (storage stability), 830.6320 (corrosion characteristics), 830.7000 (pH), and 830.7300 (density) are acceptable.

4. The proposed product with FSN: 19713-ATE was found to be identical to the cited product with Reg. No. 19713-596 from the product chemistry point of view.

Decision #: 506852
DP #: (429282)
PRIA
Parent DP #:
Submission #: 971044
E-Sub #:

DATA PACKAGE BEAN SHEET

Date: 25-Sep-2015

672 *** Registration Information ***

Registration: 19713-ATE - MASTER FUME AG

Company: 19713 - DREXEL CHEMICAL COMPANY

Risk Manager: RM 01 - Venus Eagle - (703) 308-8045 Room# PY1 S-7228

Risk Manager Reviewer: Jacquelyn Marchese JMARCHES

Sent Date: _____ PRIA Due Date: 04-Dec-2015 Edited Due Date: _____

Type of Registration: Product Registration - Section 3

Action Desc: (R301) NEW PRODUCT;IDENTICAL OR SUBSTANTIALLY SIMILAR IN COMPOSITION AND I

Ingredients: 078003, Sulfuryl fluoride(99.8%)

*** Data Package Information ***

Expedite: ○ Yes ● No Date Sent: 25-Sep-2015 Due Back: _____

DP Ingredient: 078003, Sulfuryl fluoride

DP Title: Marianne's Tox Review

CSF Included: ○ Yes ● No Label Included: ○ Yes ● No Parent DP #: _____

	Assigned To	Date In	Date Out	
Organization:	RD / IVB3			Last Possible Science Due Date: 05-Oct-2015
Team Name:	RM 01			Science Due Date:
Reviewer Name:	Lewis, Marianne			Sub Data Package Due Date:
Contractor Name:				

*** Studies Sent for Review ***

Printed on Page 2

*** Additional Data Package for this Decision ***

Can be printed on its own page

*** Data Package Instructions ***

Marianne:

Please review the submitted studies in support of the new product Master Fume AG (19713-ATE) and report on the product's approriate toxicity categories. This action was coded as an R 301 and the registrant believes this product is substantially similiar to 62719-376. Please note that the registrant has submitted a 'cite all' for acute oral and acute dermal studies. These studies were already reviewed in sim clinic, however, the review needs to be revisited/revised based on PRN 84-5, updated LRM/NIOSH requirements and the studies need to be compared to the enclosed label.

Included in this packet are the cover letter, copies of the label and applicator's manual, CSF, and current data matrix. Also included is an applicable 11/17/99 review that you wrote with written comments by Venus pointing out what areas are outdated and in need of updating.

If you have any questions please let me know.

Thanks,
Jackie
marchese.jacquelyn@epa.gov
703-347-0559

DP#: (429282) *** Studies Sent for Review *** Decision#: (506852)

MRID	MRID Status	Citation Reference	Guideline	86-5 Status
43314		Dow Chemical Company (1959) Toxicological Studies with Vikane (Sulfuryl fluoride). (Compilation; unpublished study received Oct 22, 1959 under 464-236; CDL:104918-A)	870.1100/Acute oral toxicity	
43314		Dow Chemical Company (1959) Toxicological Studies with Vikane (Sulfuryl fluoride). (Compilation; unpublished study received Oct 22, 1959 under 464-236; CDL:104918-A)	870.1300/Acute inhalation toxicity	
43314		Dow Chemical Company (1959) Toxicological Studies with Vikane (Sulfuryl fluoride). (Compilation; unpublished study received Oct 22, 1959 under 464-236; CDL:104918-A)	870.3100/90-Day oral toxicity in rodents	
43314		Dow Chemical Company (1959) Toxicological Studies with Vikane (Sulfuryl fluoride). (Compilation; unpublished study received Oct 22, 1959 under 464-236; CDL:104918-A)	870.3150/90-day oral toxicity in nonrodents	
43314		Dow Chemical Company (1959) Toxicological Studies with Vikane (Sulfuryl fluoride). (Compilation; unpublished study received Oct 22, 1959 under 464-236; CDL:104918-A)		
72289		Dow Chemical Company (1959) The Acute Vapor Toxicity of Vikane As Determined on Male and Female Rats: Single Exposures of Groups of Rats to High Concentrations of Vikane in Air. (Unpublished study received on unknown date under 464-236; CDL:022799-F)	870.1300/Acute inhalation toxicity	
104295		Rowe, V. (1956) Summary of Toxicological Data on Sulfuryl Fluoride. (Unpublished study received Aug 9, 1956 under 464-236; submitted by Dow Chemical U.S.A., Midland, MI; CDL:050062-A)	870.1100/Acute oral toxicity	
104295		Rowe, V. (1956) Summary of Toxicological Data on Sulfuryl Fluoride. (Unpublished study received Aug 9, 1956 under 464-236; submitted by Dow Chemical U.S.A., Midland, MI; CDL:050062-A)	870.1300/Acute inhalation toxicity	
104295		Rowe, V. (1956) Summary of Toxicological Data on Sulfuryl Fluoride. (Unpublished study received Aug 9, 1956 under 464-236; submitted by Dow Chemical U.S.A., Midland, MI; CDL:050062-A)	870.3465/90-day inhalation toxicity	
104295		Rowe, V. (1956) Summary of Toxicological Data on Sulfuryl Fluoride. (Unpublished study received Aug 9, 1956 under 464-236; submitted by Dow Chemical U.S.A., Midland, MI; CDL:050062-A)		
148955		Nitschke, K.; Miller, R. (1985) Sulfuryl Fluoride (Vikane Gas Fumi- gant): Effects of Treatment with Calcium Gluconate or Anticon- vulsants on Rats. Unpublished study prepared by Dow Chemical U. S. A. 21 p.	870.1300/Acute inhalation toxicity	
148955		Nitschke, K.; Miller, R. (1985) Sulfuryl Fluoride (Vikane Gas Fumi- gant): Effects of Treatment with Calcium Gluconate or Anticon- vulsants on Rats. Unpublished study prepared by Dow Chemical U. S. A. 21 p.		
148956		Eisenbrandt, D.; Nitschke, K.; Streeter, C. et al (1985) Sulfuryl Fluoride (Vikane Gas Fumigant): 2-week Inhalation Toxicity Probe with Rats and Rabbits: Final Report: Project No. K/016399/022R. Unpublished study prepared by Dow Chemical U. S. A. 228 p.	870.1300/Acute inhalation toxicity	
40839901		Miller, R.; Calhoun, L.; Keyes, D.; et al. (1980) Sulfuryl Fluoride (Vikane Fumigant): An LC50 Determination: Project ID: K-016399- 013. Unpublished study prepared by Dow Chemical Co. 244 p.	870.1300/Acute inhalation toxicity	

DP#: (429282) *** Studies Sent for Review *** Decision#: (506852)

MRID	MRID Status	Citation Reference	Guideline	86-5 Status
40839903		gorzinski, S.; Streeter, C. (1985) Effect of Acute Vikane Exposure on Selected Physiological Parameters in Rats: Project ID: HET K-016399-021. Unpublished study prepared by Dow Chemical Co. 30 p.	870.1300/Acute inhalation toxicity	
40839904		Eisenbrandt, D.; Williams, D.; Albee, R.; et al. (1987) Sulfuryl Fluoride (Vikane Gas Fumigant): An Ultrastructural Assessment of the Lungs of Rats Exposed to High Concentrations of Sulfuryl Fluoride: Project Study: HET K-016399-023. Unpublished study prepared by Dow Chemical Co. 35 p.	870.1300/Acute inhalation toxicity	
41099001		Nitschke, K.; Lomax, L. (1989) Sulfuryl Fluoride: Acute LC50 Study with B6C3F1 Mice: Project ID K-016399-028. Unpublished study prepared by the Dow Chemical Company. 35 p.	870.1300/Acute inhalation toxicity	
41769101		Nitschke, K.; Quast, J. (1990) Sulfuryl Fluoride: Acute LC50 Study with CD-1 Mice: Lab Project Number: K-016399: K-016399-031: K-016399-031B. Unpublished study prepared by The Toxicology Research Laboratory/The Dow Chemical Co. 56 p.	870.1300/Acute inhalation toxicity	Pass (18-Aug-2010)
48642701		Tillman, A. (2011) UPI Technical Pendimethalin - Product Identity and Composition, Description of the Materials Used, Description of the Production Process, Discussion of the Formation of Impurities, and Certified Limits. Project Number: UPI/201106. Unpublished study prepared by United Phosphorus, Inc. 43p.	830.1550/Product Identity and composition	Pass (07-Apr-2014)
48642701		Tillman, A. (2011) UPI Technical Pendimethalin - Product Identity and Composition, Description of the Materials Used, Description of the Production Process, Discussion of the Formation of Impurities, and Certified Limits. Project Number: UPI/201106. Unpublished study prepared by United Phosphorus, Inc. 43p.	830.1600/Description of materials used to produce the product	Pass (07-Apr-2014)
48642701		Tillman, A. (2011) UPI Technical Pendimethalin - Product Identity and Composition, Description of the Materials Used, Description of the Production Process, Discussion of the Formation of Impurities, and Certified Limits. Project Number: UPI/201106. Unpublished study prepared by United Phosphorus, Inc. 43p.	830.1620/Description of production process	Pass (07-Apr-2014)
48642701		Tillman, A. (2011) UPI Technical Pendimethalin - Product Identity and Composition, Description of the Materials Used, Description of the Production Process, Discussion of the Formation of Impurities, and Certified Limits. Project Number: UPI/201106. Unpublished study prepared by United Phosphorus, Inc. 43p.	830.1670/Discussion of formation of impurities	Pass (07-Apr-2014)
48642701		Tillman, A. (2011) UPI Technical Pendimethalin - Product Identity and Composition, Description of the Materials Used, Description of the Production Process, Discussion of the Formation of Impurities, and Certified Limits. Project Number: UPI/201106. Unpublished study prepared by United Phosphorus, Inc. 43p.	830.1750/Certified limits	Pass (07-Apr-2014)

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

OFFICE OF
CHEMICAL SAFETY AND
POLLUTION PREVENTION

MEMORANDUM:

Subject: EPA Reg. No.: 19713-ATE/Master Fume AG
DP Barcode: 429282
PC Code: 078003

From: Marianne Lewis, Biologist
Invertebrate and Vertebrate Branch 3
Registration Division (7508P)

Marianne Lewis
JCR
9/29/15

To: Venus Eagle, PM 01
Invertebrate and Vertebrate Branch 3
Registration Division (7508P)

Applicant: Drexel Chemical Company
1700 Channel Avenue
P.O. Box 13327
Memphis, TN 38113-0327

FORMULATION FROM EPA Reg. No. 19713-ATE LABEL:

	% by wt.
Active Ingredient(s):	
Sulfuryl fluoride:	99.8%
Inert Ingredient(s):	0.2%
Total	100.0%

BACKGROUND: The registrant is doing a "cite all" for five (81-1, 81-2, 81-4, 81-5, 81-6) of the acute toxicity studies to support the registration of their new product, EPA Reg. No. 19713-ATE. The registrant is also citing many very old studies to fulfill the acute inhalation study requirement (81-3).

In PR Notice 84-5 which addresses fumigants, it states that sulfuryl fluoride "... may cause chemical burns, which may have a delayed onset, or may freeze exposed skin." In the Sulfuryl Fluoride RED it states: "This product is sold as a pressurized liquefied gas. On contact with water, it hydrolyzes initially to chlorosulfonic acid and hydrogen fluoride and ultimately to sulfuric acid and hydrogen fluoride. Accordingly, it must be contained and used with caution".

Based on the use pattern for this product and the number of incidences reported in the RED and since the RED was written, the following acute toxicity categories will be assigned to the subject product: acute oral (81-1) – II; acute dermal (81-2) – II; acute inhalation (81-3) – I; primary eye irritation (81-4) – I; primary skin irritation (81-5) – II; and classify the subject product as a non sensitizer (81-6).

RECOMMENDATIONS:

- The subject product has been assigned the toxicity categories listed above.

The acute toxicity profile for EPA Reg. No. 19713-ATE is currently:

Acute Oral	II	Acceptable
Acute Dermal	II	Acceptable
Acute Inhalation	I	Acceptable
Primary Eye	I	Acceptable
Primary Dermal	II	Acceptable
Skin Sensitization	non sensitizer	Acceptable

NOTE: The acute toxicity requirements have been satisfied for the subject product.

LABELING:

ID #: 019713-ATE MASTER FUME AG

RESTRICTED USE LABELING REQUIRED:

Based on acute inhalation & primary eye irritation toxicity categories

SIGNAL WORD: **DANGER** **PELIGRO**

POISON **Skull & Crossbones symbol**

HAZARDS TO HUMANS AND DOMESTIC ANIMALS:

Corrosive. Extremely hazardous liquid and vapor under pressure. Fatal if inhaled. Causes irreversible eye damage. Do not breathe vapor. Do not get in eyes, on skin, or on clothing. Liquid may cause chemical burns, which may have a delayed onset, or may freeze exposed skin. May be fatal if swallowed. May be fatal if absorbed through skin. Sulfuryl fluoride is odorless. Exposure to toxic levels may occur without warning or detection by the user.

This product is used with 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.

FIRST AID:

IF INHALED: Move person to fresh air. If person is not breathing, call 911 or ambulance, then give artificial respiration, **DO NOT** give mouth-to-mouth resuscitation. Call a poison control center or doctor for further treatment advice.

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

Have the product container or label with you when calling a poison control center or

doctor or going for treatment. You may also contact 1-800-xxx-xxxx for emergency medical treatment information.

USER SAFETY RECOMMENDATIONS:

User should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.

User should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

Users should remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

The proposed "**NOTE TO PHYSICIAN**" that is on the label (pin punched 7/13/15) is acceptable – no changes needed.

In the PPE section of the label – all references to "MSHA" should be removed from the label. You may want to consult with HED (Jeff Dawson) to see if the general respirator statements are acceptable – label is not specific for type of respirator.

Eagle, Venus

From: Eagle, Venus
Sent: Thursday, August 20, 2015 3:35 PM
To: Redden, John
Cc: Shah, Pv
Subject: Similarity Clinic Review - DER problems/Issues

Hi John,

Thank you very much for asking Masih to generate a full similarity clinic profile for the new Drexel Sulfuryl Flouride product 19713-ATE (rather than just stating the new pending product is similar to the cited Dow product). Receiving a similarity review at the beginning of the PRIA time frame is very helpful when there are issues that have to be addressed. As sulfuryl fluoride (SF) is a deadly gas, it is important that an accurate acute toxicity review be generated so me-too products in the future have the correct information. Unfortunately, this is a DER that contains several issues that I would like to bring to your attention and request a revised DER.

1. In the Background section of the DER, there is no explanation of what was done, e.g. – where the acute toxicity profile was developed from. Usually the acute tox. reviewer lists the set of MRID's that were either cited and/or used to develop the DER along with the product that was cited and history of the previous decision on the similar product.

   - In the DER for the new product (19713-ATE), it mysteriously lists a product that wasn't cited by the registrant with no explanation. The registrant stated they were substantially similar to 62719-376 not 62719-4.
   - This DER is also listed as CBI, but no MRID's were mentioned and the mysterious product (62719-4) is cited as the basis for the acute toxicity profile.

2. In the Recommendations section of the 8/10/15 DER, it states the acute profile is derived from "cite all" method and lists the following acute toxicity profile:

Acute oral study	II	Supplementary	#62719-04
Acute dermal study	IV	waived	#62719-04*
Acute inhalation study	I	acceptable	#62719-04
Acute eye irritation	I	waived	#62719-04
Primary dermal irritation	IV	waived	#62719-04*
Skin sensitization	IV -ive	waived	#62719-04*

*In accordance with PR Notice 84-5

but fine if it isn't
However the
language nee
to be
spec
M
TH
IDE
PRN
84-

   - Although this profile was probably based on the reregistration acute tox. review of 62719-4 (DER dated 11/17/99), the ensuing label language that was generated for pending product, DER dated 8/10/15, is not up to today's standards. Based on the cited product label (62719-376) – the acute dermal and primary dermal should probably be revised to be at least tox. Category II – since the label language states "liquid causes freeze burns of exposed skin". Specific label language listed in PRN 84-5 for SF (as asterisked above) needs to be incorporated into the 8/10/15 DER so the profile matches the actual cited product.
   - Since this product triggers RUP (due to inhalation and eye) – the label language in the DER needs to specify that the RUP is triggered by those categories (since many young reviewers will not know this).

3. Under the Hazards to Humans and Domestic Animals

- It indicates that "Child Resistant Packaging Required". This is a RUP, so this product would not trigger this requirement.
- The respirator language specified in the DER dated 8/10/15 is much less restrictive then the cited label and PR N 84-5 which specify SCBA.

4. Under the First Aid Statements
    - Under the "if inhaled" – need to revise by removing "preferably mouth-to-mouth if possible" as per the PRN 84-5. If a person were to give mouth to mouth and inhale any residual gas, they could perish. Please substitute with "not mouth-to-mouth resuscitation." (per PRN 84-5).
    - As per 84-5, insert if on skin or clothing statement found in this notice and cited product.
    - Please indicate that you have reviewed the Note to Physician on the proposed label and state that it is sufficient rather than listing the Agency canned statements.

Thanks very much for your attention to this matter. Let me know what you need to revise the DER as I would like to keep the jacket and assign it to a review so that they may bean this off to pc since the PRIA time clock is ticking.

Best regards,
Venus

Venus Eagle
Product Manager 1
Invertebrate & Vertebrate Branch 3
Registration Division, Office of Pesticide Programs
US EPA (Mail Code 7505P)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Phone: 703.308.8045

#19713—ARE (P.C. Code 078003)

Superseded by acute tox review dated 9/29/15

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

OFFICE OF CHEMICAL SAFETY AND
POLLUTION PREVENTION
REGISTRATION DIVISION

August 10, 2015

~~Note: This review contains Confidential Business Information (CBI), should be treated accordingly.~~

SIMILARITY CLINIC MEMORANDUM

Subject:	EPA File Symbol:	#19713-ATE Master Fume AG
	P.C Code	078003
	DP:	428373
	Action Code:	R301
	Decision No.	506852

From: Masih Hashim, Team Leader, Toxicology MH
Chemistry, Inerts, and Toxicology Assessment Branch (CITAB)

Through: John C. Redden, M.S., Senior Assessor (CITAB) JCR
Registration Division (7505P)

To: Venus Eagle, RM 01
Invertebrate and Vertebrate Branch 3
Registration Division (7505P)

Applicant: Drexel Chemical Company
Memphis, TN 38113-0327

FORMULATION FROM LABEL:

Active Ingredient(s):	% by wt.
Sulfuryl fluoride	98.8
Other ingredients	1.2
Total:	100.0%

why was this product chosen?

ACTION REQUIRED/ BACKGROUND: The Registrant is asking a cite-all method to support the registration of the proposed product, #19713-ATE, Master Fume AG from #62719-376 and (#62719-04). The active ingredient is Sulfuryl flouride 99.8% in both the products. "This product is sold under pressurized liquid gas. On contact with water, it hydrolyzes initially to chlorosulfonic acid and hydrogen fluoride and ultimately to sulfuric acid and hydrogen fluoride. Accordingly it must be contained and used with caution." (Sulfuryl Fluoride RED).

RECOMMENDATIONS: Following is the acute toxicity profile (cite-all) from #62719- 376 (and #62719-04) to the proposed product #19713-ATE:

Acute oral study	II	Supplementary	#62719-04
Acute dermal study	IV	waived	#62719-04*
Acute inhalation study	I	acceptable	#62719-04
Acute eye irritation	I	waived	#62719-04
Primary dermal irritation	IV	waived	#62719-04*
Skin sensitization	-ive ?	waived	#62719-04*

*In accordance with PR Notice 84-5

Label:

PRODUCT ID #: 019713-00672

Restricted Use

PRODUCT NAME: Master Fume AG

Due to acute inhalation of Sulfuryl Fluoride

PRECAUTIONARY STATEMENTS

SIGNAL WORD: DANGER POISON

SPANISH SIGNAL WORD:
PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Hazards to Humans and Domestic Animals:

Restricted Use Pesticide due to toxicity categories. 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. ~~Child Resistant Packaging Required.~~ It an RUP - so not required

Fatal if inhaled. Corrosive. Causes irreversible eye damage. May be fatal if swallowed. Do not breathe spray mist. Remove and wash contaminated clothing before reuse. Do not get in eyes or on clothing. Wear protective eyewear (goggles, face shield, or safety glasses). Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco, or using the toilet. Wear: Long-sleeved shirt and long pants, Socks, Shoes, and gloves.

outdated SU Mem 10-11

For handling activities, use a non-powered, NIOSH-approved air purifying cartridge respirator equipped with an organic-vapor (OV) removing cartridge plus an N-, R- or P-series filter, OR a

non-powered air purifying canister-type respirator equipped with an organic vapor canister that uses an N-, R-, or P-series air-purifying filter.

First Aid:

Doesn't match cited product? which is more restrictive + has PRN 84-5 lang.

If inhaled:
-Move the person to fresh air.
-If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible.
-Call a poison control center or doctor for further treatment advice.

If in eyes:
-Hold eye open and rinse slowly and gently with water for 15-20 minutes.
-Remove contact lenses, if present, after the first 5 minutes, then continue rinsing.
-Call a poison control center or doctor for treatment advice.

If swallowed:
-Call a poison control center or doctor immediately for treatment advice.
-Have person sip a glass of water if able to swallow.
-Do not induce vomiting unless told to by a poison control center or doctor.
-Do not give anything to an unconscious person.

NOTE TO PHYSICIAN: Note to PM/CRM/Registrant: The proposed label should contain a Note to Physician which addresses the category I Acute Inhalation Toxicity, Primary Eye Irritant toxicity. The following statements are suggested types of information that may be included, if applicable:
- technical information on symptomatology;
- use of supportive treatments to maintain life functions;
- medicine that will counteract the specific physiological effects of the pesticide;
- company telephone number to specific medical personnel who can provide specialized medical advice.

Have the product container or label with you when calling a poison control center or doctor or going for treatment.

Pls. comment on the proposed labels note to physician which has these elements already.

User Safety Recommendations
User should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. User should remove PPE immediately after handling this product. Wash outside of gloves before removing, and wash thoroughly and change into clean clothing, as soon as possible.

Cited product label - First aid

2/74

(Label)

RESTRICTED USE PESTICIDE and use
DUE TO ACUTE INHALATION TOXICITY OF SULFURYL FLUORIDE
For 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. An applicator certified by the state must be present on site at all times during introduction of fumigant, reentry prior to aeration, and initiation of the aeration procedure.

Should be specific in DER

(Logo) Dow AgroSciences

ProFume®

Gas Fumigant

For control of rodent, insect, and other invertebrate pests.

Sites to be fumigated: Non-residential structures, food handling establishments (e.g. pet food facilities, bakeries, food production facilities mills, warehouses, etc.), stationary transportation vehicles (railcars, shipping containers, trucks, etc., excluding aircraft and passenger railcars), temporary and permanent fumigation chambers and storage structures.

This product is accompanied by a ProFume Applicator's Manual describing the sites and commodities that can be fumigated, pests controlled, application rates and safety procedures to follow during fumigation. Read the entire container label and ProFume Applicator's Manual before use. The ProFume Applicator's Manual contains important information for the safe and effective use of this product and must be read and in the user's possession during fumigation. If the ProFume Applicator's Manual is lost, contact your ProFume distributor or Dow AgroSciences representative to obtain a replacement copy.

When fumigating, all local, state, and federal rules and regulations regarding use of detection devices, positive-pressure self-contained breathing apparatus, security requirements, and placement of warning signs must be observed.

Active Ingredient	
sulfuryl fluoride	99.8%
Inert Ingredients	0.2%
Total	100.0%

ACCEPTED
with COMMENTS
In EPA Letter Dated:
MAR 24 2006
Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, for the pesticide registered under EPA Reg. No 62719-376

Keep Out of Reach of Children

DANGER **POISON**

[Editors note: the word POISON must appear in red]

PELIGRO

Si usted no entiende la etiqueta ni el manual de fumigacion del gas fumigante ProFume, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label nor ProFume Applicator's Manual, find someone to explain it to you in detail.)

needs to be updated to today's stds.

3/74

not or artifical means

First Aid

In all cases of overexposure, when symptoms such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech, or numbness in extremities are exhibited, get medical attention immediately. Take person to a doctor or emergency treatment facility.

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, ~~preferably~~ mouth-to-mouth ~~if possible~~. Call a poison control center or doctor for further treatment advice.

If on skin or clothing: May cause frostbite to unprotected skin upon contact with dispensing equipment when gas is discharged. Immediately apply water to contaminated area of clothing before removing. Once area has thawed, remove contaminated clothing, shoes, and other items covering skin. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

If in eyes: May cause "cryogenic burn" if exposed. Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Liquid ProFume in the eye may cause damage due to refrigeration or freezing. Call a poison control center or doctor for treatment advice.

Note to Physician: ProFume is a gas that has no warning properties such as odor, color, or eye irritation. Early symptoms of exposure to ProFume are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness, and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea, and abdominal pain. Repeated exposure to high concentrations can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically.

Have the product label or ProFume Applicator's Manual with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-992-5994 for emergency medical treatment information.

Precautionary Statements

Hazards to Humans and Domestic Animals

Danger • Fatal If Inhaled • Causes Irreversible Eye Damage • Liquid Causes Freeze Burns Of Exposed Skin • May Be Fatal If Swallowed

Do not breathe vapor. Do not get in eyes, on skin, or on clothing. ProFume is odorless and colorless. Exposure to toxic levels may occur without warning or detection by the user.

Personal Protective Equipment for Fumigation

Protective Clothing

Wear splash resistant goggles or full face shield when handling the liquid product during introduction of fumigant or when working around any lines containing fumigant under pressure. Do not wear gloves or rubber boots. Do not reuse clothing or shoes that have become contaminated with liquid ProFume until thoroughly aerated. Wear loose fitting or well-ventilated long-sleeve shirt, long pants, shoes and socks.

Respiratory Protection

If the concentration of ProFume in the fumigated area as measured by a detection device with sufficient sensitivity [Limit of Detection (LOD) ≤ 1 ppm] such as an INTERSCAN gas analyzer [Model GF 1900] or MIRAN vapor analyzer [SapphIRe] does not exceed 1 ppm, no respiratory protection is required. When this concentration is exceeded or when the concentration of ProFume is unknown, all persons in these areas must wear a NIOSH or MSHA approved positive pressure self-contained breathing apparatus (SCBA, not SCUBA), approval number prefix TC-19C, or combination air-supplied/SCBA respirator such as manufactured by Draeger, Ranger, Survivair, Scott, or MSA. This SCBA must be on site and operational before fumigation. Before using any make or brand of SCBA, learn how to use it correctly.

Determine that it is in good working order, has an adequate air supply for the job at hand, fits properly, and provides an adequate seal around the face.

Environmental Hazards

Sulfuryl fluoride is a highly toxic gas. Do not expose non-target organisms. This pesticide is toxic to fish and wildlife.

Physical or Chemical Hazards

Sulfuryl fluoride is a colorless, odorless toxic gas. ProFume cylinders are under pressure and must not be stored near heat or open flame. Exposures to temperatures above 158°F will cause a fusible plug to melt and the contents will be released. Under high heat conditions (temperatures above 752°F), ProFume can decompose into sulfur dioxide (SO_2), hydrofluoric acid (HF), and other decomposition products. Hydrofluoric acid is highly reactive and can corrode or damage many materials including metals, glass, ceramic finishes, fabrics, etc. Extinguish all flames including pilot lights of furnaces, hot water heaters, dryers, gas refrigerators, ranges, ovens, broilers, etc. Turn off or unplug all electrical heating elements such as those in heaters, dryers, etc., that represent a reasonable risk of a heat source that is at or near 752°F. Shut off automatic switch controls for appliances and lighting systems that will be included in the space to be fumigated. Contact your local gas company to determine what procedures should be followed in your area for shutting off natural gas or propane service. Gas service should be shut off at the main service valve. Sulfuryl fluoride can react with strong bases such as some photo developing solutions.

ProFume cylinders must never be transported by aircraft under any circumstance.

Refer to the ProFume Applicator's Manual for additional precautionary information and Directions for Use.

Notice: Read the entire label. Use only according to label directions. **Before using this product, read Warranty Disclaimer, Inherent Risks of Use and Limitation of Remedies elsewhere on the label. If terms are unacceptable, return at once unopened.**

In case of emergency endangering health or the environment involving this product, call 1-800-992-5994. If you wish to obtain additional product information, visit our web site at www.dowagro.com.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

EPA Reg. No. 62719-376 EPA Est. _____

®Trademark of Dow AgroSciences LLC
Dow AgroSciences LLC • Indianapolis, IN 46268 U.S.A.

Net Contents ___

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 1.25 hours per response for registration and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460.
Do not send the completed form to this address.

Certification with Respect to Citation of Data

Applicant's/Registrant's Name, Address, and Telephone Number Drexel Chemical Company, P.O. Box 13327, Memphis, TN 38113-0327 (Tel 901 774-4370)	EPA Registration Number/File Symbol 19713-XXX
Active Ingredient(s) and/or representative test compound(s) SULFURYL FLUORIDE	Date 07/10/2015
General Use Pattern(s) (list all those claimed for this product using 40 CFR Part 158) Terrestrial food crops	Product Name MASTER FUME AG

NOTE: If your product is a 100% repackaging of another purchased EPA-registered product labeled for all the same uses on your label, you do not need to submit this form. You must submit the Formulator's Exemption Statement (EPA Form 8570-27).

☐ I am responding to a Data-Call-In Notice, and have included with this form a list of companies sent offers of compensation (the Data Matrix form should be used for this purpose).

Submission of me-too registration.

SECTION I: METHOD OF DATA SUPPORT (Check one method only)

☐ I am using the cite-all method of support, and have included with this form a list of companies sent offers of compensation (the Data Matrix form should be used for this purpose).

☑ I am using the selective method of support (or cite-all option under the selective method), and have included with this form a completed list of data requirements (the Data Matrix form must be used).

SECTION II: GENERAL OFFER TO PAY

[Required if using the cite-all method or when using the cite-all option under the selective method to satisfy one or more data requirements]

☑ I hereby offer and agree to pay compensation, to other persons, with regard to the approval of this application, to the extent required by FIFRA.

SECTION III: CERTIFICATION

I certify that this application for registration, this form for reregistration, or this Data-Call-In response is supported by all data submitted or cited in the application for registration, the form for reregistration, or the Data-Call-In response. In addition, if the cite-all option or cite-all option under the selective method is indicated in Section I, this application is supported by all data in the Agency's files that (1) concern the properties or effects of this product or an identical or substantially similar product, or one or more of the ingredients in this product; and (2) is a type of data that would be required to be submitted under the data requirements in effect on the date of approval of this application if the application sought the initial registration of a product of identical or similar composition and uses .

I certify that for each exclusive use study cited in support of this registration or reregistration, that I am the original data submitter or that I have obtained the written permission of the original data submitter to cite that study.

I certify that for each study cited in support of this registration or reregistration that is not an exclusive use study, either: (a) I am the original data submitter; (b) I have obtained the permission of the original data submitter to use the study in support of this application; (c) all periods of eligibility for compensation have expired for the study; (d) the study is in the public literature; or (e) I have notified in writing the company that submitted the study and have offered (I) to pay compensation to the extent required by sections 3(c)(1)(F) and/or 3(c)(2)(B) of FIFRA; and (ii) to commence negotiations to determine the amount and terms of compensation, if any, to be paid for the use of the study.

I certify that in all instances where an offer of compensation is required, copies of all offers to pay compensation and evidence of their delivery in accordance with sections 3(c)(1)(F) and/or 3(c)(2)(B) of FIFRA are available and will be submitted to the Agency upon request. Should I fail to produce such evidence to the Agency upon request, I understand that the Agency may initiate action to deny, cancel or suspend the registration of my product in conformity with FIFRA.

I certify that the statements I have made on this form and all attachments to it are true, accurate, and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law.

Signature	Date	Typed or Printed Name and Title
	07/10/2015	SCOTT PACE, Director of Registration Division

EPA Form 8570-34 (9-97) Electronic and Paper versions available. Submit only Paper version.

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 09/28/2015	EPA Reg No./File Symbol 19713-ATE	Page 1 of 5
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
Product Specific Data:					
830.1550	Product identity and composition	48188401	Drexel Chemical Company	Own	
830.1600	Description of materials used to produce the product	48188401	Drexel Chemical Company	Own	
830.1620	Description of production process	48188401	Drexel Chemical Company	Own	
-	-	-	-	-	-
830.1670	Discussion of formation of impurities	48188401	Drexel Chemical Company	Own	
830.1700	Preliminary analysis	48188401	Drexel Chemical Company	Own	
830.1750	Certified Limits	48188401	Drexel Chemical Company	Own	Refer to CSF
830.1800	Enforcement analytical method	48188401	Drexel Chemical Company	Own	
-	-	-	-	-	-
830.6302	Color	46837101	Drexel Chemical Company	Own	
830.6303	Physical state	46837101	Drexel Chemical Company	Own	
830.6304	Odor	46837101	Drexel Chemical Company	Own	
830.6313	Stability to normal & elevated temp., metal, metal ions	46837101	Drexel Chemical Company	Own	
830.6314	Oxidation/Reduction Reaction	46837101	Drexel Chemical Company	Own	

Signature	Name and Title Scott Pace, Director of Registration Division	Date 09/28/2015

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 09/28/2015	EPA Reg No./File Symbol 19713-ATE	Page 2 of 5
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
830.6315	Flammability	46837101	Drexel Chemical Company	Own	
830.6316	Explodability	46837101	Drexel Chemical Company	Own	
830.6317	Storage stability	46837101	Drexel Chemical Company	Own	
830.6319	Miscibility	46837101	Drexel Chemical Company	Own	
830.6320	Corrosion characteristics	46837101	Drexel Chemical Company	Own	
830.6321	Dielectric breakdown voltage	46837101	Drexel Chemical Company	Own	
830.7000	pH	46837101	Drexel Chemical Company	Own	
830.7050	UV/Visible absorption	-	-	-	N/A; Product is a gas.
830.7100	Viscosity	46837101	Drexel Chemical Company	Own	
830.7200	Melting point	46837101	Drexel Chemical Company	Own	
830.7220	Boiling point	46837101	Drexel Chemical Company	Own	
830.7300	Density/Relative Density/Bulk Density	46837101	Drexel Chemical Company	Own	
830.7370	Dissociation constants in water	46837101	Drexel Chemical Company	Own	
830.7520	Particle size, fiber length and diameter distribution	46837101	Drexel Chemical Company	Own	
830.7550	Partition coefficient	46837101	Drexel Chemical Company	Own	

Signature	Name and Title	Date
	Scott Pace, Director of Registration Division	09/28/2015

EPA Form 8570-35 (9-97) Electronic and Paper versions available. Submit only Paper version.

Agency Internal Use Copy

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 09/28/2015	EPA Reg No./File Symbol 19713-ATE	Page 3 of 5
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
830.7840	Water solubility	-	-	-	N/A
830.7950	Vapor pressure	46837101	Drexel Chemical Company	Own	
870.1100	Acute oral	Cite all	Dow AgroSciences	Old	
870.1200	Acute dermal	Cite all	Dow AgroSciences	Old	
870.1300	Acute inhalation	48942701	Drexel Chemical Company	Own	
		00043314	Dow AgroSciences	Old	
		00072289	Dow AgroSciences	Old	
		00104295	Dow AgroSciences	Old	
		00148955	Dow AgroSciences	Old	
		00148956	Dow AgroSciences	Old	
		40839901	Dow AgroSciences	Old	
		40839903	Dow AgroSciences	Old	
		40839904	Dow AgroSciences	Old	
		41099001	Dow AgroSciences	Old	
		41769101	Dow AgroSciences	Old	

Signature	Name and Title Scott Pace, Director of Registration Division	Date 09/28/2015

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 09/28/2015	EPA Reg No./File Symbol 19713-ATE	Page 4 of 5
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
870.2400	Cite all	Cite all	Dow AgroSciences	Old	
870.2500	Cite all	Cite all	Dow AgroSciences	Old	
870.2600	Cite all	Cite all	Dow AgroSciences	Old	
96-13	Cite all	Cite all	Dow AgroSciences	Pay	
GENERIC DATA:					
Cite all	Cite all	Cite all	Ensystex II, Inc	Pay	
			Dow AgroSciences	Pay	
			Zeneca Inc	Pay	
			Solvay Fluorides LLC	Pay	
			Spray Drift Task Force	Own	
			Generic Endangered Species Task Force	Own	
			Drexel Chemical Company	Own	
875.1400	Inhalation exposure-indoor	48323101	Dow AgroSciences	Pay	
875.1700	Product Use Information	49145801	Drexel Chemical Company, Ensystex II Inc.	Own	
875.2500	Inhalation exposure	48323101	Dow AgroSciences	Pay	

Signature	Name and Title Scott Pace, Director of Registration Division	Date 09/28/2015

EPA Form 8570-35 (9-97) Electronic and Paper versions available. Submit only Paper version.

Agency Internal Use Copy

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 09/28/2015	EPA Reg No./File Symbol 19713-ATE	Page 5 of 5
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
870.6300	Developmental neurotoxicity study	48896102	Drexel Chemical Company, Ensystex II Inc.	Own	
870.7800	Immunotoxicity	49145802	Drexel Chemical Company, Ensystex II Inc.	Own	
SS-1	Measurement of Henry's Law Constant	48896101	Drexel Chemical Company, Ensystex II Inc.	Own	Waiver request granted 10/29/13
SS-2	Avian Inhalation	48942701	Drexel Chemical Company, Ensystex II Inc.	Own	
SS-3	Terrestrial Plant Toxicity	-	Drexel Chemical Company, Ensystex II Inc.	Own	Study protocol submitted to EPA
SS-4	Monitoring Data on Fumigated Commodities	Cite all	Dow AgroSciences	Pay	

Signature	Name and Title Scott Pace, Director of Registration Division	Date 09/28/2015

Form Approved OMB No. 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 07/10/2015	EPA Reg No./File Symbol 19713-XXX	Page 1 of 4
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
Product Specific Data:					
830.1550	Product identity and composition	48188401	Drexel Chemical Company	Own	
830.1600	Description of materials used to produce the product	48188401	Drexel Chemical Company	Own	
830.1620	Description of production process	48188401	Drexel Chemical Company	Own	
-	-	-	-	-	-
830.1670	Discussion of formation of impurities	48188401	Drexel Chemical Company	Own	
830.1700	Preliminary analysis	48188401	Drexel Chemical Company	Own	
830.1750	Certified Limits	48188401	Drexel Chemical Company	Own	Refer to CSF
830.1800	Enforcement analytical method	48188401	Drexel Chemical Company	Own	
-	-	-	-	-	-
830.6302	Color	46837101	Drexel Chemical Company	Own	
830.6303	Physical state	46837101	Drexel Chemical Company	Own	
830.6304	Odor	46837101	Drexel Chemical Company	Own	
830.6313	Stability to normal & elevated temp., metal, metal ions	46837101	Drexel Chemical Company	Own	
830.6314	Oxidation/Reduction Reaction	46837101	Drexel Chemical Company	Own	

Signature	Name and Title Scott Pace, Director of Registration Division	Date 07/10/2015

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 07/10/2015	EPA Reg No./File Symbol 19713-XXX	Page 2 of 4
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
830.6315	Flammability	46837101	Drexel Chemical Company	Own	
830.6316	Explodability	46837101	Drexel Chemical Company	Own	
830.6317	Storage stability	46837101	Drexel Chemical Company	Own	
830.6319	Miscibility	46837101	Drexel Chemical Company	Own	
830.6320	Corrosion characteristics	46837101	Drexel Chemical Company	Own	
830.6321	Dielectric breakdown voltage	46837101	Drexel Chemical Company	Own	
830.7000	pH	46837101	Drexel Chemical Company	Own	
830.7050	UV/Visible absorption	-	-	-	N/A; Product is a gas.
830.7100	Viscosity	46837101	Drexel Chemical Company	Own	
830.7200	Melting point	46837101	Drexel Chemical Company	Own	
830.7220	Boiling point	46837101	Drexel Chemical Company	Own	
830.7300	Density/Relative Density/Bulk Density	46837101	Drexel Chemical Company	Own	
830.7370	Dissociation constants in water	46837101	Drexel Chemical Company	Own	
830.7520	Particle size, fiber length and diameter distribution	46837101	Drexel Chemical Company	Own	
830.7550	Partition coefficient	46837101	Drexel Chemical Company	Own	

Signature	Name and Title	Date
	Scott Pace, Director of Registration Division	07/10/2015

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 07/10/2015	EPA Reg No./File Symbol 19713-XXX	Page 3 of 4
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
830.7840	Water solubility	-	-	-	N/A
830.7950	Vapor pressure	46837101	Drexel Chemical Company	Own	
870.1100	Acute oral	Cite all	Dow AgroSciences	Old	
870.1200	Acute dermal	Cite all	Dow AgroSciences	Old	
870.1300	Acute inhalation	48942701	Drexel Chemical Company	Own	
		00043314	Dow AgroSciences	Old	
		00072289	Dow AgroSciences	Old	
		00104295	Dow AgroSciences	Old	
		00148955	Dow AgroSciences	Old	
		00148956	Dow AgroSciences	Old	
		40839901	Dow AgroSciences	Old	
		40839903	Dow AgroSciences	Old	
		40839904	Dow AgroSciences	Old	
		41099001	Dow AgroSciences	Old	
		41769101	Dow AgroSciences	Old	

Signature	Name and Title	Date
	Scott Pace, Director of Registration Division	07/10/2015

Missing efficacy data - see Doris product matrix

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 07/10/2015	EPA Reg No./File Symbol 19713-XXX	Page 4 of 4
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
870.2400	Cite all	Cite all	Dow AgroSciences	Old	
870.2500	Cite all	Cite all	Dow AgroSciences	Old	
870.2600	Cite all	Cite all	Dow AgroSciences	Old	
GENERIC DATA:					
Cite all	Cite all	Cite all	Drexel Chemical Company	Own	
			Ensystex II, Inc	Pay	
			Dow AgroSciences	Pay	
			Zeneca Inc	Pay	
			Solvay Fluorides LLC	Pay	
			Spray Drift Task Force	Own	
What about data gaps based on			Generic Endangered Species Task Force	Own	
registration review to be addressed.					

Signature	Name and Title Scott Pace, Director of Registration Division	Date 07/10/2015

EPA Form 8570-35 (9-97) Electronic and Paper versions available. Submit only Paper version.

Agency Internal Use Copy

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 07/10/2015	EPA Reg No./File Symbol 19713-XXX	Page 1 of 4
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
Product Specific Data:					
830.1550	Product identity and composition	48188401	Drexel Chemical Company	Own	
830.1600	Description of materials used to produce the product	48188401	Drexel Chemical Company	Own	
830.1620	Description of production process	48188401	Drexel Chemical Company	Own	
-	-	-	-	-	-
830.1670	Discussion of formation of impurities	48188401	Drexel Chemical Company	Own	
830.1700	Preliminary analysis	48188401	Drexel Chemical Company	Own	
830.1750	Certified Limits	48188401	Drexel Chemical Company	Own	Refer to CSF
830.1800	Enforcement analytical method	48188401	Drexel Chemical Company	Own	
-	-	-	-	-	-
830.6302	Color	46837101	Drexel Chemical Company	Own	
830.6303	Physical state	46837101	Drexel Chemical Company	Own	
830.6304	Odor	46837101	Drexel Chemical Company	Own	
830.6313	Stability to normal & elevated temp., metal, metal ions	46837101	Drexel Chemical Company	Own	
830.6314	Oxidation/Reduction Reaction	46837101	Drexel Chemical Company	Own	

Signature	Name and Title Scott Pace, Director of Registration Division	Date 07/10/2015

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 07/10/2015	EPA Reg No./File Symbol 19713-XXX	Page 2 of 4
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
830.6315	Flammability	46837101	Drexel Chemical Company	Own	
830.6316	Explodability	46837101	Drexel Chemical Company	Own	
830.6317	Storage stability	46837101	Drexel Chemical Company	Own	
830.6319	Miscibility	46837101	Drexel Chemical Company	Own	
830.6320	Corrosion characteristics	46837101	Drexel Chemical Company	Own	
830.6321	Dielectric breakdown voltage	46837101	Drexel Chemical Company	Own	
830.7000	pH	46837101	Drexel Chemical Company	Own	
830.7050	UV/Visible absorption	-	-	-	N/A; Product is a gas.
830.7100	Viscosity	46837101	Drexel Chemical Company	Own	
830.7200	Melting point	46837101	Drexel Chemical Company	Own	
830.7220	Boiling point	46837101	Drexel Chemical Company	Own	
830.7300	Density/Relative Density/Bulk Density	46837101	Drexel Chemical Company	Own	
830.7370	Dissociation constants in water	46837101	Drexel Chemical Company	Own	
830.7520	Particle size, fiber length and diameter distribution	46837101	Drexel Chemical Company	Own	
830.7550	Partition coefficient	46837101	Drexel Chemical Company	Own	

Signature	Name and Title	Date
	Scott Pace, Director of Registration Division	07/10/2015

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 07/10/2015	EPA Reg No./File Symbol 19713-XXX	Page 3 of 4
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
830.7840	Water solubility	-	-	-	N/A
830.7950	Vapor pressure	46837101	Drexel Chemical Company	Own	
870.1100	Acute oral	Cite all	Dow AgroSciences	Old	
870.1200	Acute dermal	Cite all	Dow AgroSciences	Old	
870.1300	Acute inhalation	48942701	Drexel Chemical Company	Own	
		00043314	Dow AgroSciences	Old	
		00072289	Dow AgroSciences	Old	
		00104295	Dow AgroSciences	Old	
		00148955	Dow AgroSciences	Old	
		00148956	Dow AgroSciences	Old	
		40839901	Dow AgroSciences	Old	
		40839903	Dow AgroSciences	Old	
		40839904	Dow AgroSciences	Old	
		41099001	Dow AgroSciences	Old	
		41769101	Dow AgroSciences	Old	

Signature	Name and Title	Date
	Scott Pace, Director of Registration Division	07/10/2015

Missing efficacy data - see Doris product matrix

Form Approved OMB No. 2070-0060

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
401 M Street, S.W.
WASHINGTON, D.C. 20460

Paperwork Reduction Act Notice: The public reporting burden for this collection of information is estimated to average 0.25 hours per response for registration activities and 0.25 hours per response for reregistration and special review activities, including time for reading the instructions and completing the necessary forms. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to: Director, OPPE Information Management Division (2137), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, DC 20460. Do not send the form to this address.

DATA MATRIX

Date 07/10/2015 , 870 = health effects	EPA Reg No./File Symbol 19713-XXX	Page 4 of 4
Applicant's/Registrant's Name & Address DREXEL CHEMICAL COMPANY, P.O. BOX 13327, MEMPHIS, TN 38113-0327	Product MASTER FUME AG	

Ingredient SULFURYL FLUORIDE

Guideline Reference Number	Guideline Study Name	MRID Number	Submitter	Status	Note
870.2400	Cite all	Cite all	Dow AgroSciences	Old	
870.2500	Cite all	Cite all	Dow AgroSciences	Old	
870.2600	Cite all	Cite all	Dow AgroSciences	Old	
GENERIC DATA:					
Cite all	Cite all	Cite all	Drexel Chemical Company	Own	
			Ensystex II, Inc	Pay	
			Dow AgroSciences	Pay	
			Zeneca Inc	Pay	
			Solvay Fluorides LLC	Pay	
			Spray Drift Task Force	Own	
What about data gaps based on			Generic Endangered Species Task Force	Own	
registration review to be addressed.					

Signature	Name and Title Scott Pace, Director of Registration Division	Date 07/10/2015

EPA Form 8570-35 (9-97) Electronic and Paper versions available. Submit only Paper version.

Agency Internal Use Copy

Sheahin, Marc

From: Luz Chan <lchan@drexchem.com>
Sent: Thursday, July 16, 2015 10:44 AM
To: Sheahin, Marc
Cc: Scott Pace
Subject: RE: Master Fume AG EPA Reg. Number: 19713-ATE

Dear Marc,
Yes, I confirm that "830.1650 Description of Formulation Process" is not required for this product as explained below.
Thank you,
Luz

From: Sheahin, Marc [mailto:Sheahin.Marc@epa.gov]
Sent: Thursday, July 16, 2015 9:37 AM
To: Luz Chan
Subject: RE: Master Fume AG EPA Reg. Number: 19713-ATE

Dear Luz,
I have a checklist associated with your submission and both guidelines are listed separately. Can you confirm the guideline (830.1650: Description of Formulation Process) is not required?

Thank you,
Marc

From: Luz Chan [mailto:lchan@drexchem.com]
Sent: Thursday, July 16, 2015 10:26 AM
To: Sheahin, Marc
Cc: Scott Pace
Subject: RE: Master Fume AG EPA Reg. Number: 19713-ATE

Dear Marc,
Thank you for your below e-mail.
This is a gas product and is not formulated. It is used as is. Thus, the guideline number appropriate for this is the listed "830.1620 Description of Production Process" on the matrix.
Hope this helped.
Thank you,
Luz G Chan
(901) 774-4370

From: Sheahin, Marc [mailto:Sheahin.Marc@epa.gov]
Sent: Thursday, July 16, 2015 9:18 AM
To: Luz Chan
Subject: Master Fume AG EPA Reg. Number: 19713-ATE

Dear Luz Chan,

My name is Marc Sheahin and I am a contractor with the EPA. I am contacting you in regards to your submissions in support of the product Master Fume AG (EPA Reg. Number: 19713-ATE). We have found one deficiency with the submissions that will need to be addressed:

1. The Data Matrices you provided are missing the following guidelines. Please provide updated data matrices providing information about its status:
    a. 830.1650: Description of Formulation Process

Please send the necessary documents before Jul 28th so that we may further process your submission. After Jul 28th, please direct all correspondence/corrections to the appropriate EPA Risk Manager. If you have any questions, please do not hesitate to contact me.

Best,
Marc Sheahin

Contractor, US EPA
2777 S. Crystral Drive, S-4811
Arlington, VA 22202
(703) 347-8686
Email: sheahin.marc@epa.gov

PRN 84-5

ATTACHMENT F

REQUIRED LABEL STATEMENTS FOR SULFURYL FLUORIDE AS SOLE ACTIVE INGREDIENT

I. Spanish Warning Statement (to be located on the front panel)

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

II. Front panel signal word. The English and Spanish signal words DANGER and PELIGRO are required. The word POISON and the skull and crossbones symbol are also required.

III. Human Hazard Precautionary Statement (to be located on the front or side panel under the heading "Hazards to Humans" and in any supplemental labeling, such as instruction booklets or manuals)

DANGER

Extremely hazardous liquid and vapor under pressure. Inhalation of vapors may be fatal. Liquid may cause chemical burns, which may have a delayed onset, or may freeze exposed skin. Do not get in eyes, on skin or on clothing. Sulfuryl fluoride is odorless. Exposure to toxic levels may occur without warning or detection by the user.

[If the product has instructions to use chloropicrin as a warning indicator]

This product is used with 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.

IV. Practical Treatment Statement (to be located on front panel and in any supplemental labeling such as instruction booklets or manuals)

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

If inhaled: Get exposed person to fresh air. Keep warm. Make sure person can breathe freely. If breathing has stopped, give artificial respiration by arm lift method, not mouth-to-mouth resuscitation. Do not give anything by mouth to an unconscious person.

If on skin: Immediately remove contaminated clothing, shoes and other items covering 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.

V. Note to Physician (may be located in a separate paragraph with human hazard statements on the label, or may be placed solely in supplemental labeling, such as instruction booklets or manuals)

Sulfuryl fluoride is a gas which has no warning properties such as odor or eye irritation. (Chloropicrin which is used as a warning indicator is the active ingredient in tear gas and will cause tearing.) Early symptoms of exposure to sulfuryl fluoride are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness and slow or garbled speech may be noted.

Prolonged exposure can produce lung irritation, pulmonary edema, nausea and abdominal pain. Repeated exposure to high concentrations can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treatment is symptomatic.

[The remaining items may appear on the label, but are strongly recommended to be included in supplemental labeling, such as a separate instruction manual.]

VI. Use Directions

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

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

When used for fumigation of enclosed spaces [houses and other structures, warehouses, grain bins or elevators, vaults, chambers, greenhouses, trucks. vans, boxcars, ships, and other transport vehicles, and tarpaulin-covered areas or commodities], two persons trained in the use of this product must be present at all times during introduction of the fumigant, testing and aeration periods.

Do not fumigate with this product when commodity temperature is below 40°F.

[Specific use directions follow. The registrant must provide complete directions for use of the product for fumigation of specified spaces, commodities or structures.]

VII. Protective Clothing

Wear full-body clothing and shoes that are cleaned after each wearing or disposable protective clothing. Do not wear gloves or rubber boots. Sulfuryl fluoride is heavier than air and may be trapped inside and cause skin injury. If full-face respiratory protection is not required, wear goggles or full face shield for eye protection when handling liquid.

VIII. Respiratory Protection

If the concentration of sulfuryl fluoride in the working area, as measured by a [direct-reading detector device], does not exceed 10 ppm (40 mg/M^3), no respiratory protection is required. [The registrant must identify the detector device suitable for use with the product and provide or reference instructions on its use.]

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]. [The registrant may also identify specific respirators to be used with the fumigant.]

IX. Placarding of Fumigated Areas

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.

Only the applicator may remove placards, and only when the concentration of sulfuryl fluoride in the treated area is below 10 ppm.

X. Aeration and Reentry

After fumigation, treated areas must be aerated until the level of sulfuryl fluoride is below 10 ppm. Do not allow entry into the treated area by any person before this time unless provided with a respiratory protection device (SCBA or combination air-supplied/SCBA).

XI. Storage and Handling

Store in dry, cool, well-ventilated area under lock and key. 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 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 or fork truck 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 onto valve outlet and replace protection bonnet before returning to shipper. Only the registrant is authorized to refill cylinders. Do not use cylinders for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.

XII. Disposal Statements

[Label statements must conform to requirements of PR Notice 83-3, March 29, 1983.]

XIII. Spill and Leak Procedures

Evacuate immediate area of spill or leak. Use 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. Wash fumigant into soil or cover with soil or other absorbent material, which may be disposed of on site, or an at approved disposal facility. Do not permit entry into spill area by unprotected persons until concentration of fumigant is determined to be less than 10 ppm.

21-Day Screen Completed by Contractor

21-Day Expires on 7-15-15

Jacket # 19713-ATE

MRID# _____

Content Screen: Recommend to Pass/Fail

11-3 Review: Pass/Fail/NA

Overall Status: Recommend to Pass/Fail

Transfer This Jacket to:

STEPHEN SCHAIBLE

cited: 62719-376
506852

PRIA 3 – 21 Day Content Screen Review Worksheet

(EPA/OPP Use Only)

September 2012

21 Day Screen Start Date: 7-13-15

Experts In-Processing Signature: B.B. Date 7-14-15 Fee Paid: Yes ✓

Division management contacted on issues No_____ Yes _____ Date _____

EPA Reg. Number: 19713-ATE	EPA Receipt Date: 7-13-15

	Items for Review			Yes	No	N/A*
1	**Application Form** (EPA Form 8570-1) signed & complete including package type			X		
2	**Confidential Statement of Formula** all boxes completed, form signed, and dated (EPA Form 8570-4)			X		
	a) All inerts, including fragrances, approved for the proposed uses (see Footnote A) Active and Impurity	yes	no			
3	**Certification with Respect to Citation of Data** (EPA Form 8570-34) completed and signed (N/A if 100% repack)			X		
	Certificate and data matrix consistent			X		
	If applicant is relying on data that are compensable, is the offer to pay statement included. (see Footnote B)	yes	no			
	If applicable, is there a letter of Authorization for exclusive use only.					
4	**Formulator's Exemption Statement** (EPA Form 8570-27) completed and signed (N/A if source is unregistered or applicant owns the technical)					X
5	**Data Matrix** (EPA Form 8570-35) both internal and external copies (PR 98-5) completed and signed (N/A if 100% repack)			X		
	a) Selective Method (Fee category experts use)	yes X	no			
	b) Cite-All (Fee category experts use)					
	c) Applicant owns all data (Fee category experts use)					
6	**5 Copies of Label (Electronic labels on CD are encouraged and guidance is available)**			X		
7	**Is the data package consistent with PR Notice 86-5**					X
8	**Notice of Filing included with petitions**					X

9	**If applicable for conventional applications, reduced risk rationale**			X
10	**Required Data and/or data waivers. See Footnote C.**			
	a) List study (or studies) not included with application			

Comments:

Documentation: PASS

- required forms are complete
- email correspondence included regarding missing guideline. (Not Required) (per Registrant)

Inerts: N/A

- active and impunity only. no inerts to review.

II-3: N/A

- no studies associated.

Status: PASS

- MS 07/16/15

* N/A – Not Applicable

Footnotes

A. During the 21 day initial content review, all CSFs will be reviewed to determine whether all inerts listed, including fragrances, are approved for the proposed uses or have an application pending with the Agency. If an unapproved inert with no application pending with the Agency is identified, the applicant must either 1) resolve the inert issue by, for example, removing the inert, substituting it with an approved inert, submitting documentation that EPA approved the inert for the proposed pesticidal uses, correcting mistakes on the CSF, etc. or 2) provide the data to support OPP approval of the inert or 3) withdraw the application. Removing or substituting an inert ingredient will require a new CSF and may require submission of data. All information, forms, data and documentation resolving the inert issue must have been received by the Agency or the application withdrawn within the 21 day period, otherwise, the Agency will reject the application as described below.

To successfully complete this aspect of the 21 day initial content screen, applicants are **strongly encouraged** to verify that all inert ingredients have been approved for the application's uses or have an application pending with the Agency **even if a product is currently registered** by consulting the inert Web site and if the inert is not approved nor has an application pending with the Agency, to **obtain the necessary inert approval prior to submitting an application to register a pesticide product containing that inert ingredient.** Some inert ingredients are no longer approved for food uses or certain types of uses. The name and/or CAS number on a CSF must match the name and CAS number on this web site. Simple typographical errors in the name or CAS number have resulted in processing delays.

If an inert is not listed on the inert ingredient web site and the applicant believes that the inert has been approved, the applicant should contact the Inert Ingredient Assessment Branch (IIAB) at inertsbranch@epa.gov and resolve the issue. Copies of the correspondence with IIAB resolving the issue should accompany the application. All new inerts except PIP inerts are reviewed by IIAB. The IIAB should also be contacted for any questions on what supporting data needs to be submitted for and the Agency's inert review process. Questions on PIP inerts should be directed to the Chief of Microbial Pesticides Branch.

When a brand, trade, or proprietary name of an inert ingredient is listed on a CSF, additional information such as an alternate name of the inert, CAS number or other information must also be included to enable the Agency to determine if it has been approved. Each component of an inert mixture (including a fragrance) must be identified. In some cases, the supplier of the mixture or fragrance may need to provide this information to the Agency. Prior to the Agency's receipt of an application, applicants must arrange with a proprietary mixture or fragrance supplier to provide the component information to the Agency or promptly upon EPA's request. If the inert ingredients in a proprietary blend (including fragrances) cannot or are not identified or provided within the 21-day content review period, the Agency will reject the application.

During the 21 day content review, applicants should submit information to the individual identified by the Agency when the applicant is informed of an unapproved inert.

Unapproved Inerts Identified on CSFs

All applications except conventional new products and PIPs

Once an unapproved inert is identified on a CSF, the Agency will contact the applicant with the following options:

1. Correct the application by, for instance, correcting the inert's identity or CAS number, providing documentation that the inert has been approved, or removing the unapproved inert from the CSF or replacing it with one that is approved for the application's uses; or

2. Provide the required information necessary to identify an inert approval application that is pending with the Agency; or

3. Submit the information and data needed for the Agency to approve the unapproved inert. If this option is selected and implemented, the Agency may request an extension in the PRIA decision review timeframe to accommodate the inert review/approval process;

4. Withdraw the application (the Agency retains 25% of the full fee for the fee category estimated); or

If none of these options is selected and implemented by the applicant within the 21 day content review period, the Agency will reject the application and retain 25% of the full fee of the category identified.

Conventional New Product Applications

When the Registration Division identifies an unapproved inert on a CSF with an application for a new product that the applicant has not identified as requiring an inert approval (R300 or R301), it will contact the applicant with the following options:

1. Correct the application by, for instance, correcting the inert's identity or CAS number, providing documentation that the inert has been approved, or removing the unapproved inert from the CSF or replacing it with one that is approved for the application's uses; or

2. Submit the information and data needed for the Agency to approve the unapproved inert, including any required petition to establish or amend a tolerance or exemption from a tolerance. (This option may change the PRIA category for the application, which could require a longer decision review time and a larger fee. If additional fees are due, they must be received by the Agency within the 21 day content review period.)

3. Withdraw the application (the Agency retains 25% of the full fee for the fee category estimated); or

If none of the above options is selected and implemented during the 21-day content-review period, the Agency will reject the application and retain 25% of the appropriate fee for the new product-inert approval category.

PIP Applications

When the Biopesticide and Pollution Prevention Division identifies an unapproved inert on a PIP CSF and a request to approve the inert does not accompany the application, it will contact the applicant with the following options:

1. Correct the application by, for instance, correcting the spelling or name of the inert to that in 40 CFR 174, or providing documentation that the inert has been approved; or

2. Submit the information and data needed for the Agency to approve the unapproved inert. If an inert ingredient tolerance exemption petition is required, the petition must be received by the Agency and the B903 fee paid within the 21 day period. If this option is selected and implemented, the Agency will discuss harmonizing the timeframe for both actions.

3. Withdraw the application (the Agency retains 25% of the full fee for the fee category estimated); or

If none of the above options is selected and implemented during the 21 day content review period, the Agency will reject the application and retain 25% of the fee.

B. A policy on documentation of offers to pay is still being developed, however, for a me-too or fast track (similar/identical) new product, R300 or A530, an application without the necessary authorizations of offers to pay will be placed into either R301 or A531. The Agency recommends that authorizations of offers to pay be submitted with other PRIA applications to avoid delays in the Agency's decision.

C. Biopesticide applicants are advised to contact the Agency and discuss study waivers prior to submitting their application to the Agency. Documentation of such discussions should be submitted with the study waiver.

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

July 14, 2015

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

OPP Decision Number: D-506852
EPA File Symbol or Registration Number: 19713-ATE
Product Name: MASTER FUME AG
EPA Receipt Date: 13-Jul-2015
EPA Company Number: 19713
Company Name: DREXEL CHEMICAL COMPANY

LUZ G. CHAN
DREXEL CHEMICAL COMPANY
PO Box 13327
MEMPHIS, TN 38113-0327

SUBJECT: Receipt of Registration Application Subject to Registration Service Fee

Dear Registrant:

The Office of Pesticide Programs has received your application and certification of payment. If you submitted data with this application, the results of the PRN-2011-3 screen will be communicated separately. During the administrative screen, the Office of Pesticide Programs has determined that this Action is subject to a Pesticide Registration Service Fee as defined in the Pesticide Registration Improvement Act.

The Action has been identified as Action Code: R301

NEW PRODUCT;IDENTICAL OR SUBSTANTIALLY SIMILAR IN COMPOSITION AND USE TO A REGISTERED PRODUCT;REGISTERED SOURCE OF ACTIVE INGREDIENT;SELECTIVE DATA CITATION ONLY FOR DATA ON PRODUCT CHEMISTRY / ACUTE TOXICITY / PUBLIC HEALTH PEST EFFICACY, WHERE APPLICANT DOES NOT OWN ALL REQUIRED DATA NOR HAS AUTHORIZATION LETTER FROM DATA OWNER;

No additional payment is due at this time. If you have any questions, please contact the Pesticide Registration Service Fee Ombudsman at (703) 308-9362.

Sincerely,

Front End Processing Staff
Information Technology & Resources Management Division

Fee for Service

{971044È~

This package includes the following

- ◉ New Registration
- ○ Amendment

☐ Studies? ☐ Fee Waiver?

☐ volpay % Reduction: ___

for Division

- ○ AD
- ○ BPPD
- ◉ RD

Risk Mgr. 1

Receipt No.	S- 971044
EPA File Symbol/Reg. No.	19713-ATE
Pin-Punch Date:	7/10/2015

☐ This item is NOT subject to FFS action.

Action Code:

Requested: R301

Granted: R301

Amount Due: $ 1,806

Parent/Child Decisions:

▣ Inert Cleared for Intended Use ▣ Uncleared Inert in Product

Reviewer: Jennifer Haines Date: 7/14/15

Remarks: Sim. Clinic

Receipt for Section 3

S: 971044 Milestone Email:

Regulatory Type: Product Registration - Section 3

Application Type: New Registration

Resubmission: Yes No

Fee For Service: Yes No

Billable: Yes No

Print Letter

Enter More Information

Tracking

Company: 19713 DREXEL CHEMICAL COMPANY

Risk Manager: Registration Division, Risk Management Team 1

Product #: 19713-ATE Product Name: MASTER FUME AG

Override#:

Me Too Section3: 62719-376 Me Too Product Name: DOW AGROSCIENCES/PROFUME GAS FUMIG

Application Date: 10-Jul-2015 OPP Rec'vd Date: 13-Jul-2015

Front End Date: 13-Jul-2015 Risk Manager Send Date:

FFS Due Date: Negotiated Due Date:

OPP Target Date:

Receipt Content	Da
CSF	
Paper Label	

View/Edit

Fast Track: New Ingredient:

Receipt Description:

NEW REGISTRATION

New Ingredient Request Date:

New Ingredient Received Date:

Form A: Signature Date: Form B: Signature Date:

DREXEL CHEMICAL COMPANY

DETACH AND RETAIN THIS STATEMENT
THE ATTACHED CHECK IS IN PAYMENT OF ITEMS DESCRIBED BELOW.
IF NOT CORRECT, PLEASE NOTIFY US PROMPTLY. NO RECEIPT DESIRED.

DATE	INVOICE NUMBER	DESCRIPTION	AMOUNT	DEDUCTIONS		NET AMOUNT
				PARTICULARS	AMOUNT	
07/02/15	150702		1,806.00		0.00	1,806.00

CHECK#: 334171 07/07/15 U.S. EPA CHK TOTAL: 1,806.00

THIS DOCUMENT CONTAINS A MICRO-PRINT SIGNATURE LINE, BLEED-THRU NUMBERING AND A COPY-VOID SCREEN.

FIRST TENNESSEE BANK 26-2/840

Drexel Chemical Company
P.O. BOX 13327, MEMPHIS, TENN. 38113-0327

No. 334171

EPA COMPANY NO.: 19713

*ONE THOUSAND EIGHT HUNDRED SIX AND XX / 100

PAY TO THE ORDER OF

U.S. EPA
US BANK GOVN'T LOCKBOX 979074
1005 CONVENTION PLAZA
SAINT LOUIS, MO 63197

CHECK DATE	CHECK AMOUNT
07/07/15	**********1,806.00*

DREXEL CHEMICAL COMPANY

⑈334171⑈ [redacted]

Commercial/financial information may be entitled to confidential treatment

R 300 and 301

100% identical (repack): YES or (NO) (circle one)
{If **yes**, it's a 100% repack - then product chemistry, acute toxicity and efficacy data are not required}

Data on Group A and B must be submitted - Group A and B can not be cited.

Guideline No.	Group A: Product Chemistry Data Study Title	Data submitted Yes	Data submitted No
830.1550	Product Identity & Composition	✓	
830.1600	Description of materials used to produce the product	✓	
830.1650	Description of formulation process see email N A		✓
830.1670	Discussion on the formation of impurities	✓	
830.1700	Preliminary analysis	✓	
830.1750	Certified limits (158.345)	✓	
830.1800	Enforcement analytical method	✓	

Guideline No.	Group B: Product Chemistry Data Study Title	Data submitted Yes	Data submitted No
830.6302	Color	✓	
830.6303	Physical State	✓	
830.6304	Odor	✓	
830.6314	Oxidation/Reduction (Chemical incompatibility)	✓	
830.6315	Flammability	✓	
830.6316	Explodability	✓	
830.6317	Storage stability	✓	
830.6319	Miscibility	✓	
830.6320	Corrosion Characteristics	✓	
830.6321	Dielectric Breakdown voltage	✓	
830.7000	pH	✓	
830.7100	Viscosity	✓	
830.7300	Density	✓	

R 300 and 301

New products must provide a bridging rationale document. The bridging document directs OPP to use a currently registered set of 6 acute toxicity data and label; instead of submitting product specific data.

Guideline No.	Acute toxicity (6 pack) Study Title	Cited	
		Yes	No
870.1100	Acute Oral (LD50)	✓	
870.1200	Acute Dermal (LD50)	✓	
870.1300	Acute Inhalation (LC50)	✓	
870.2400	Acute Eye Irritation	✓	
870.2500	Acute Dermal Irritation	✓	
870.2600	Dermal Sensitization	✓	

Efficacy - which guideline depends on the proposed label use and they must cite the data to be used for the bridging rationale.

"Not required"

Guideline No.	Efficacy Study Titles	Cited		Comments
		Yes	No	
810.3100	Soil Treatments for Imported Fire Ants			
810.3200	Livestock, Poultry, Fur and Wool-Bearing Animal Treatments			
810.3300	Treatments to Control Pests of Humans and Pets			
810.3400	Mosquito, Black Fly, and Biting Midge (Sand Fly) Treatments			
810.3500	Premises Treatments			
810.3600	Structural Treatments			
810.3800	Methods for Efficacy Testing of Termite Baits			

Pages 225-227 - *Confidential Statement of Formula may be entitled to confidential treatment*