

5857-6

08/24/1987

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AUG 24 1987

Pestcon Systems, Inc.
2221 Poplar Boulevard
P.O. Box 469
Alhambra, CA 91802

SUBJECT: Aluminum and Magnesium Phosphide Registration Standard
Your letter of July 30, 1987
EPA Reg. Nos. 5857-6

Attention: Betty Lilyquist

Madam:

Your submission has been reviewed and found to be acceptable for the product listed above. Enclosed is stamped, approved labeling. Incorporate any comments noted on the labeling and submit five copies of finished printed labeling for our records.

Sincerely,



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

Enclosures

ACCEPTED
with COMMENTS
in EPA Letter Dated:

AUG 24 1987

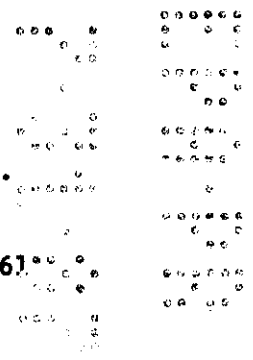
Under the Federal Insecticide,
Fungicide, and Rodenticide Act
as amended, for the pesticide
registered under EPA Reg. No.

5857-6

*See center
panel*

**DRAFT CONTAINER LABEL
FOR FUMITOXIN®
ALUMINUM PHOSPHIDE BAGS**

Pestcon Systems, Inc.
2221 Poplar Blvd.
Alhambra, CA 91801
Telephone 213-283-2761
Telex 698635
Fax 818-281-9892



Precautionary Statements

Hazards to humans and domestic animals. Danger: FUMITOXIN® dust from the bags can be fatal if swallowed. Do not get in eyes, on skin, or on clothing. Do not eat, drink or smoke while handling aluminum phosphide fumigants. When a sealed container is opened, allowing bags to come in contact with moisture, water or acids, toxic phosphine gas will be released. If a garlic odor is detected, for appropriate monitoring procedures, refer to section on Industrial Hygiene Monitoring in the Applicator Manual. Pure phosphine gas is odorless; the odor is due to a contaminate. Since an odor may not be detected under certain circumstances, the absence of a garlic odor does not mean that phosphine gas is absent. Observe proper application, aeration, re-entry and disposal procedures specified elsewhere in the labeling to prevent overexposure.

Physical and Chemical Hazards

Aluminum phosphide bags will release hydrogen phosphide if exposed to moisture from the air or if they come into contact with water, acids and many other liquids. Piling of bags may cause a temperature increase and confine the release of gas so that ignition could occur.

It is recommended that you open aluminum phosphide products in open air or near a fan which exhausts outside immediately. Never open in flammable atmosphere because on rare occasions it may flash. When opening, point the container away from the face and body. These precautions will also reduce the applicator exposure to hydrogen phosphide (phosphine) gas.

Pure hydrogen phosphide (phosphine) gas is practically insoluble in water, fats and oils, and is stable at normal fumigation temperatures. However, it may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities.

Metals such as copper, brass and copper alloys, and precious metals such as gold and silver are susceptible to corrosion by phosphine, especially at high temperatures and humidity. Thus items such as small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, forklifts, temperature monitoring systems, electrical switch gear, communication devices, computers, calculators, watches, and other electronic equipment should be protected or removed before fumigation. Hydrogen phosphide will also react with certain metallic salts and, therefore, sensitive items such as photographic film, copying papers and some inorganic pigments, etc. should not be exposed.

NOTE TO PHYSICIAN: Aluminum phosphide in the bags reacts with moisture from the air, water, acids and many other liquids to release hydrogen phosphide (phosphine) gas. Mild exposure by inhalation causes malaise (indefinite feeling of sickness), ringing of ears, fatigue, nausea, and pressure in the chest which is relieved by removal to fresh air. Moderate poisoning causes weakness, vomiting, pain just above the stomach, chest pain, diarrhea and dyspnea (difficulty in breathing). Symptoms of severe poisoning may occur within a few hours to several days, resulting in pulmonary edema (fluid in lungs) and may lead to dizziness, cyanosis (blue or purple skin color), unconsciousness, and death.



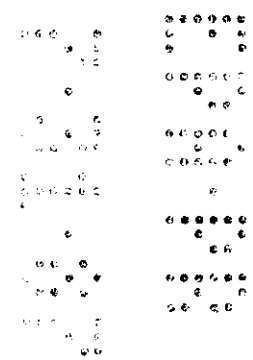
In sufficient quantity, phosphine effects the liver, kidneys, lungs, nervous system and circulatory system. Inhalation can cause lung edema (fluid in lungs) and hyperemia (excess of blood in a body part), small perivascular brain hemorrhage and brain edema (fluid in brain). Ingestion can cause lung and brain symptoms but damage to the viscera (body cavity organs) is more common. Phosphine poisoning may result in (1) pulmonary edma, (2) liver elevated serum GOT, LDH and alkaline phosphatase, reduced prothrombin, hemorrhage and jaundice (yellow skin color) and (3) kidney hematuria (blood in urine) and anauria (abnormal or lack of urination). Pathology is characteristic of hypoxia (oxygen deficiency in blood tissue). Frequent exposure to subacute concentrations over a period of days or weeks may cause poisoning . Treatment is symptomatic.

Direction^s for Use

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

THIS PRODUCT IS ACCOMPANIED BY AN APPLICATOR'S MANUAL. READ AND UNDERSTAND THE ENTIRE LABELING. ALL PARTS OF THE LABELING ARE EQUALLY IMPORTANT FOR SAFE AND EFFECTIVE USE OF THIS PRODUCT. CALL PESTCON SYSTEMS, INC. OR EPA IF YOU HAVE ANY QUESTIONS, OR DO NOT UNDERSTAND ANY PART OF THIS LABELING.

Refer to the Applicator's Manual for detailed precautions, recommendations and directions for use.



CENTER PANEL

RESTRICTED USE PESTICIDE

Due To Acute Inhalation Toxicity Of Highly Toxic Phosphide Gas For retail sale to and use only by Certified Applicators for those uses covered by the applicators certification or persons trained in accordance with the attached product manual working under the direct supervision and in the physical presence of the Certified Applicator. Physical presence means on-site or on the premises. Refer to Pestcon Systems, Inc. Applicator's Manual for complete instructions for the sale and use of this product.

FUMITOXIN®

Aluminum Phosphide Bags

FOR USE AGAINST LISTED INSECTS WHICH INFEST STORED COMMODITIES, SPECIFIED FOODS, AND ANIMAL FEEDS.

ACTIVE INGREDIENT - Aluminum Phosphide -----55%
INERT INGREDIENTS -----45%
100%



**KEEP OUT OF REACH OF CHILDREN
DANGER-PELIGRO-POISON**



*Skull +
Crossbones
Signal word in Red.*

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

Statement of Practical Treatment: Symptoms of overexposure are headache, dizziness, nausea, difficult breathing, vomiting, and diarrhea. In all cases of overexposure get medical attention immediately. Take victim to a doctor or emergency treatment facility.

If excessive amount of gas or dust from FUMITOXIN® bags is inhaled: Get exposed person to fresh air. Keep warm and make sure person can breathe freely. If breathing has stopped, give artificial respiration. Do not give anything by mouth to an uncounscious person.

If gas or dust from FUMITOXIN® bag is swallowed: Drink or administer one or two glasses of water and induce vomiting by touching back of throat with finger, or if available administer syrup of ipecac. Do not give anything by mouth if victim is uncounscious or not alert.

If dust from FUMITOXIN® bags get on skin or clothing: Brush or shake material off clothes in a well ventilated area. Allow clothes to aerate in a ventilated area prior to laundering. Do not leave contaminated clothing in occupied and/or confined area such as automobiles, vans, motel rooms, homes, etc. Wash contaminated skin thoroughly with soap and water.

If dust from FUMITOXIN® bags get in eyes: Flush with plenty of water. Get medical attention.

See side panel for additional precautionary statements.

Manufactured for:

PSI Pestcon Systems, Inc.

Box 469, Alhambra, CA 91802

Telephone 213-283-2761

Contents: 6 Bags
10 Bags
100 Bags

EPA REG. NO. 5857-6
EPA EST NO. 46060-CI-04

Storage Instructions

1. Store FUMITOXIN® in a dry, well ventilated area away from heat, under lock and key. Post as a pesticide storage area. Do not contaminate water, food or feed by storing pesticides in the same area used to store these commodities.
2. Do not store in buildings where humans or domestic animals reside. Keep out of reach of children.
3. FUMITOXIN® bags are supplied in non-resealable hermetically sealed tins. Keep containers sealed until ready to apply fumigant.
4. The self life of FUMITOXIN® is virtually unlimited as long as the containers are tightly sealed.

DISPOSAL INSTRUCTIONS:

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

Unreacted or partially reacted FUMITOXIN® is acutely hazardous. Improper disposal of excess pesticides is a violation of Federal Law. If these wastes cannot be used according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste Representative at the nearest EPA Regional office for guidance. For specific instructions, see Disposal Instructions and Spill And Leak Procedures in the Applicator's Manual.

Some local and state waste disposal regulations may vary from the following recommendations. Disposal procedures should be reviewed with appropriate authorities to ensure compliance with local regulations. Contact your state pesticide or Environmental Control Agency or Hazardous Waste Specialist at the nearest EPA Regional Office for guidance. Dispose of cans in a sanitary landfill or by other approved state or local procedures.

Spill and Leak Procedures:

General Precautions and Directions:

A spill, other than incidental to application or normal handling or punctured containers, can produce high levels of gas and, therefore attending personnel must wear a SCBA or its equivalent when the concentration of hydrogen phosphide gas is unknown. If the concentration is know, other NIOSH/MSHA approved respiratory protection can be worn. Do not use water at anytime to clean up a spill of FUMITOXIN®. Water in contact with unreacted bags will greatly accelerate the production of hydrogen phosphide gas which could result in a toxic and/or fire hazard.

Return all intact cans to cardboard case or other suitable packaging which has been properly marked according to DOT regulations. Notify consignee and shipper of damaged cases.

If the cans have been punctured or damaged so as to leak, the product may be immediately used, the container may be temporarily repaired with aluminum tape, the bags may be transferred from the damaged can to a sound metal container which should be sealed and properly labeled as aluminum phosphide, or the bags may be deactivated and disposed of. Refer to the Applicator's Manual for more detailed Spill and Leak Procedures. Further information and recommendations may be obtained, if required, from Pestcon Systems, Inc.

General Information: FUMITOXIN® is a fumigant which when applied according to label instructions is activated by atmospheric humidity. FUMITOXIN® has been found effective against many stored products insects and their pre-adult stages - that is eggs, larvae, and pupae. Refer to the Applicator's Manual for specific species and commodities which may be fumigated.

8/35

ACCEPTED
with COMMENTS
in EPA Letter Dated:

See changes on
pp. 3, 5, 8

AUG 24 1987

Under the Federal Insecticide,
Fungicide, and Rodenticide Act
as amended, for the pesticide
registered under EPA Reg. No.
5857-6

**RESTRICTED USE PESTICIDE
DUE TO ACUTE INHALATION TOXICITY OF HIGHLY
TOXIC HYDROGEN PHOSPHIDE (PHOSPHINE PH₃) GAS**

For retail sale to and use only by certified applicators for those uses covered by the applicator's certification or persons trained in accordance with the attached product manual working under the direct supervision and in the physical presence of the certified applicator. Physical presence means on site or on the premises. Read and follow the label and Pestcon Systems, Inc.'s product manual which contains complete instructions for the safe use of this pesticide.

**APPLICATION PROCEDURES
FOR
FUMITOXIN® ALUMINUM PHOSPHIDE BAGS**

For use against listed insects which infest listed raw agricultural commodities, animal feeds, processed food, non-food products and stored tobacco.

**PESTCON SYSTEMS, INC.
2221 POPLAR BOULEVARD
P.O. BOX 469
ALHAMBRA, CALIFORNIA 91802
213-283-2761
TELEX 698635 FAX 818-281-9892**

EPA REG. NO. - 5857-6
EPA EST. NO. - 46060-CI-04

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I. INTRODUCTION:

A. History:

} Fill in

B. Product Description:

FUMITOXIN® aluminum phosphide bags allow for the marketing of aluminum phosphide, ammonium carbamate and paraffin in granular form. The paper bag is an integral part of this concept and should never be torn open during fumigation. Once the hermetically sealed metal shipping container is opened the bags will begin to release hydrogen phosphide, in the following way:



Warm, humid air accelerates the reaction while cool, dry air has the opposite effect. For example, when relative humidity and temperature to which the bags are exposed are high, decomposition of FUMITOXIN aluminum phosphide may be complete in 3 days. However, at moderate temperatures and low humidities decomposition may require 7 days or more. This reaction starts slowly, gradually accelerates and then tapers off again as the aluminum phosphide is spent.

Spent FUMITOXIN aluminum phosphide is a gray-white powder composed almost entirely of aluminum hydroxide and other approved inert ingredients. When properly exposed, the spent FUMITOXIN bags will normally contain only a small amount of unreacted aluminum phosphide and may be disposed of without hazard. It is not considered a hazardous waste. However, the partially spent residue from incompletely exposed FUMITOXIN bags requires special care. Precautions and instructions for further deactivation and disposal will be given later in this manual.

C. Product Packaging:

FUMITOXIN bags are packaged in tins of 6, 10 or 100 bags each. Each bag is approximately 3 inches by 3 inches and contains 34 grams of 55% aluminum phosphide. FUMITOXIN bags release 11 grams of hydrogen phosphide when exposed to atmospheric conditions.

The variety of package sizes provides for convenience of application in different sizes and types of storages. The 6 or 10 can size is especially well suited to fumigation of small spaces and small bulk storage such as rail cars. It may also be added directly to bulk raw agricultural commodities and other indicated commodities as bins are filled. In this instance the bags must be removed when the commodity is pulled from the bins.

The 100 size container is well suited to large scale fumigations such as shipholds, large flat storage bins, and large space fumigations.

The metal cans are hermetically sealed and are easily opened with a common strip key. Each can contains a secured gas-absorbing pouch that serves to absorb loose hydrogen phosphide liberated inside the can.

The shelf life of FUMITOXIN bags is virtually unlimited as long as the packaging remains sealed and intact.

D. Hydrogen phosphide:

Hydrogen phosphide, more commonly referred to as phosphine, is a colorless gas which is toxic to insects, humans, and other forms of animal life. It is very mobile with a high vapor pressure. Thus the penetrating capability of hydrogen phosphide is great. The combination of high molecular activity, vapor pressure and toxicity to insects at low dosages accounts for its wide acceptance as a fumigant.

E. Safety Recommendations:

1. Carefully read all the labeling and follow instructions explicitly.
2. Never work alone when applying fumigant from within an enclosed area.
3. Never allow untrained personnel to apply FUMITOXIN bags.
4. NIOSH/MSHA approved respiratory protection must be available at the site of application when applying fumigant from within an enclosed area.
5. It is preferable to open container in open air or near a fan that exhausts outside immediately. NEVER OPEN IN A FLAMMABLE ATMOSPHERE.
6. Do not allow FUMITOXIN bags to contact liquid water or pile up.
7. Dispose of empty container and spent bags in a proper manner consistent with the label instructions.

- Danger*
8. Post "~~WARNING~~" signs on fumigated areas.
 9. Notify appropriate company employees and provide relevant safety information to local officials annually for use in the event of an emergency.
 10. Hydrogen phosphide fumigants are not to be used for vacuum fumigations.
 11. Exposure to hydrogen phosphide must not exceed the 8 hour TWA of 0.3 ppm during application or a maximum concentration of 0.3 ppm after application is completed. This includes re-entry into a structure.
 12. Fumigated finished foods and feeds must be aerated 48 hours prior to offering to the end consumer.
 13. Transfer of a treated commodity to another site without complete aeration (down to 0.3 ppm maximum) is permissible provided the new site is placarded.
 14. It is recommend that you aerate contaminated clothing in a well ventilated area prior to washing.
 15. Keep container sealed and intact until ready to begin applying fumigant.
 16. Use all bags from opened cans.
 17. OSHA recommends that exposure screening of employees be conducted to detect impaired pulmonary function. OSHA recommends that any employee developing the above condition be referred for medical attention.

II. PRECAUTIONARY STATEMENTS:

A. Hazards to Humans and Domestic Animals:

Keep out of reach of children. Danger - Poison

Aluminum phosphide in FUMITOXIN bags can be fatal if swallowed. Do not get in eyes, in nose, on skin or on clothing. Do not eat, drink or smoke while handling aluminum phosphide fumigants. When the sealed container is opened FUMITOXIN bags will begin to release hydrogen phosphide (phosphine) which is extremely toxic gas. Contact with water, acids and some other liquids will accelerate this reaction. If a garlic odor is detected refer to section on Industrial Hygiene Monitoring for appropriate monitoring procedures. Pure hydrogen phosphide gas is odorless; the odor is due to a contaminant. Since an odor may not be detected under certain circumstances, the absence of a garlic odor does not mean that hydrogen phosphide gas is absent. Observe proper application, aeration, re-entry and disposal procedures specified elsewhere in the labeling to prevent overexposure.

B. Statement of Practical Treatment:

Symptoms of overexposure to hydrogen phosphide are headache, dizziness, nausea, difficult breathing, vomiting and diarrhea. In all cases of overexposure get medical attention immediately. Take victim to a doctor or emergency treatment facility.

1. If gas or dust from FUMITOXIN bags is inhaled: Get exposed person to fresh air. Keep warm and make sure person can breathe freely. If breathing has stopped, give artificial respiration by mouth-to-mouth or other means of resuscitation. Do not give anything by mouth to an unconscious person.
2. If the dust from FUMITOXIN bags is swallowed: Drink or administer one or two glasses of water and induce vomiting by touching back of throat with finger, or if available, administer syrup of ipecac. Do not give anything by mouth if victim is unconscious or not alert.
3. If dust from FUMITOXIN bags gets on skin or clothing: Brush or shake material off clothes and shoes in well ventilated area. Allow clothes to aerate in a ventilated area prior to laundering. Do not leave contaminated clothing in occupied and/or confined area such as automobiles, vans, motel rooms, homes, etc. Wash contaminated skin thoroughly with soap and water.
4. If dust from FUMITOXIN bags gets in eyes: Flush with plenty of water. Get medical attention.

C. Physical and Chemical Hazards:

Aluminum phosphide in FUMITOXIN bags will release hydrogen phosphide gas if exposed to moisture from the air or if it comes into contact with water, acids or many other liquids. Piling of bags may cause a temperature increase and confine the release of gas so that ignition could occur. It is recommended that you open FUMITOXIN bags in open air or near a fan which exhaust outside immediately. Never open in a flammable atmosphere because on rare occasions it may flash. When opening, point the container away from the face and body. These precautions will also reduce the applicators exposure to hydrogen phosphide (phosphine) gas.

Pure hydrogen phosphide (phosphine) gas is practically insoluble in water, fats and oils, and is stable at normal fumigation temperatures. However, it may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities. Metals such as copper, brass, and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by phosphine, especially at high temperatures and humidity. Thus small electric motors, smoke detectors, brass sprinkler heads, batteries, and battery chargers, forklifts, temperature monitoring systems, electrical switch gear, communication devices, computers, calculators, watches, and other electronic equipment should be protected or removed before fumigation. Hydrogen phosphide will also react with certain metallic salts and, therefore, sensitive items such as photographic film, copying papers and some inorganic pigments, etc. should not be exposed.

III. DIRECTIONS FOR USE:

A. General:

- 1. It is a violation of federal law to use this product in a manner inconsistent with its labeling.
- 2. FUMITOXIN aluminum phosphide bags are Restricted Use Pesticides due to the acute inhalation toxicity of hydrogen phosphide (phosphine, PH₃) gas.
- 3. FUMITOXIN is a highly hazardous material and may be used only by individuals trained in its proper use. Before using, read and follow all label precautions and directions on the label and in labeling.

Additional copies of this manual are available from:

PESTCON SYSTEMS, INC.
 P.O. BOX 469
 ALHAMBRA, CALIFORNIA 91802
 213-283-2761
 TELEX 698635 FAX 818-281-9892

- 4. At least two trained persons must be present when FUMITOXIN bags are applied from within the space being treated or during re-entry into a fumigated or partially aerated site. Only one trained person is required when the fumigant is applied from outside the area to be treated.
- 5. Prior to applying this product you should determine
 - a. if the structure can be made sufficiently gas tight;
 - b. if recording of gas readings will be required;
 - c. how to efficiently and safely apply the fumigant; and
 - d. emergency procedures.
- 6. Shipholds, barges, containers on ships, railroad cars and containers shipped piggyback by rail may be fumigated in-transit. However, fumigated trucks, vans, trailers and similar transport vehicles cannot be moved over public roads or highways until they are aerated.
- 7. The powder in FUMITOXIN bags must not come into contact with any processed food with the exception that it can be added directly to processed brewers rice, malt and corn grits used in the manufacture of beer.
- 8. Protect copper, silver, gold and their alloys from corrosive exposure to hydrogen phosphide.
- 9. Do not fumigate commodities with this product when commodity temperature is below 40° F (5° C).

B. Efficacy:

Although it is possible to achieve total control of the listed insect pests, this is frequently not realized in actual practice. Factors contributing to less than total control are leaks, poor gas distribution, unfavorable exposure conditions, etc. In addition, some insects are less susceptible to hydrogen phosphide than others. If maximum control is to be attained, extreme care must be taken in sealing, the higher dosages must be used, exposure periods lengthened, proper application procedures followed and temperature and humidity conditions must be favorable.

C. Use Pattern:

1. Insect Pests:

FUMITOXIN aluminum phosphide bags are registered with the United States Environmental Protection Agency (EPA) and have been found to be effective against the following insects and their pre-adult stages that is, eggs, larvae and pupae:

- | | |
|-----------------------|--------------------------|
| Almond Moth | Hessian Fly |
| Angoumois Grain Moth | Khapra Beetle |
| Bean Weevil | Indian Meal Moth |
| Cadelle | Lesser Grain Borer |
| Cereal Leaf Beetle | Maize Weevil |
| Cigarette Beetle | Mediterranean Flour Moth |
| Confused Flour Beetle | Pink Ballworm |
| Dermeid Beetle | Red Flour Beetle |
| Dried Fruit Beetle | Rice Weevil |
| Dried Fruit Moth | Rusty Grain Beetle |
| European Grain Moth | Saw-toothed Grain Beetle |
| Flat Grain Beetle | Spider Beetle |
| Fruit Fly | Tobacco Moth |
| Granary Weevil | Yellow Meal Worm |
| Greater Wax Moth | Africanized Bee |
| Hairy Fungus Beetle | Honey Bee invested with |
| | Tracheal Mite |

2. Commodities:

FUMITOXIN aluminum phosphide bags are registered by EPA for the following commodities:

a. Raw Agricultural Commodities:

- | | |
|--------------|------------------------------------|
| Almonds | Pistachio Nuts |
| Barley | Popcorn |
| Brazil Nuts | Rice |
| Cashews | Rye |
| Cocoa Beans | Safflower Seed |
| Coffee Beans | Sesame Seed |
| Corn | Seed & Pod Vegetables |
| Cottonseed | Sorghum |
| Dates | Soybeans |
| Filberts | Sunflower Seeds |
| Flower Seed | Triticale |
| Grass Seed | Vegetable Seed |
| Millet | Walnuts |
| Oats | Wheat |
| Peanuts | Wild rice <i>delete</i> |
| Pecans | |

b. Processed Foods:

The listed processed foods may be fumigated with FUMITOXIN. Under no conditions shall any processed foods or bagged commodity come in contact with the residual dust from FUMITOXIN bags except that FUMITOXIN may be added directly to processed brewers rice, malt and corn grits for use in the manufacture of beer.

- Processed candy and sugar
- Cereal flours and bakery mixes
- Cereal foods (including cookies, crackers, macaroni, noodles, pasta, pretzels, snack foods and spaghetti)
- Processed cereals (including milled fractions and packaged cereals)
- Cheese and cheese by-products
- Chocolate and chocolate products (assorted chocolate, chocolate liquor, cocoa, cocoa powder, dark chocolate coating and milk products)
- Processed coffee
- Corn grits
- Cured, dried and processed meat products and dried fish
- Dates
- Dried eggs and egg yolk solids
- Dried milk, dried powdered milk, nondairy creamers
- Dried or dehydrated fruits (apples, dates, figs, peaches, prunes, raisens, and sultanas)
- Figs
- Malt
- Peanuts
- Processed herbs, spices, seasonings and condiments
- Processed nuts (almonds, apricot kernals, brazil nuts, cashews, filberts, pecans, pistachio nuts and walnuts)
- Processed Oats
- Rice, (brewers rice grits, enriched and polished, wild rice)
- Soybean flour and milled fractions
- Processed Tea
- Dried and dehydrated vegetables (beans, carrots, lentils, peas, potatoe flour, potato products and spinach)
- Yeast (including primary yeast)

c. Animal Feed and Feed Ingredients:

d. Nonfood Products:

- Animal Hide
- Clothing
- Processed or unprocessed cotton, wool and other natural fibers or cloth
- Feathers
- Furs

- Human hair, rubberized hair, vulcanized hair, mohair
- Leather Products
- Tobacco
- Wood, cut trees, wood chips and wood and bamboo products
- Paper and paper products
- Dried plants and flowers
- Seed (grass seed, or ornamental herbaceous plant seed, and vegetable seed)
- Straw or hay

D. Dosage Guide:

The successful conclusion of a fumigation depends on the concentration being held for a sufficient length of time or exposure period. With hydrogen phosphide, minimum exposure times are required because of the means of generating the gas from solid material and the biological action of the insect. For successful results against all stages, exposure times are not generally possible in less than 48 hours.

It is beyond the scope of this brochure to take into account all conditions prevailing in all situations where FUMITOXIN is used. Construction and tightness of storages vary considerably, so do climatic conditions. Therefore, we can only give a general guidance, which explains the wide range of the following recommended dosage rates.

Dosage rate depends primarily upon the following factors:

- Type of storage
- Pests to be controlled
- Commodity temperature

Dosage is calculated per 1000 cu. ft.

Dosage range: 2 to 13 bags per 1000 cu. ft.

NOTE: The maximum dosage allowed for dates, nuts and dried fruits is 4 bags per 1000 cu. ft.

Recommended dosages for several types of fumigations: It is permissible to choose from the full range of dosages listed, however, these dosages should not be exceeded. Remember a shortened exposure period cannot be compensated for with an increased dosage. The upper dosages listed are recommended in structures that are of loose construction and in bulk stored commodities.

<u>TYPE OF FUMIGATION</u>	<u>DOSAGE RANGE</u> <u>(Bags/1000 Cu. Ft.)</u>
1. Space (Including packaged commodities)	
a. Mills, Warehouses, etc.	2-6
b. Bagged Commodities	3-6
c. Dried Fruits, Nuts & Dates	2-4
d. Stored Tobacco	2-4
2. Bulk Stored Commodities	
a. Vertical Storage	3-5
b. Tanks	4-6
c. Flat Storage (loose construction)	5-13
d. Farm Bins	6-13
e. Rail Cars	3-6
f. Bunkers, Tarped, Ground Storage	3-6
g. Barges	3-7
h. Shipholds	3-6

E. Sealing:

There are many factors affecting a fumigation but most are minor compared to sealing. Proper sealing is necessary to insure effective control of insects and to protect man and other forms of life in adjoining enclosed areas from hydrogen phosphide during the fumigation. Proper sealing should include the closure of all openings. Contact Pestcon Systems, Inc. for additional information.

F. Exposure Guidelines:

The following table may be used as a guide in determining the minimum length of the exposure period at the indicated temperature.

<u>TEMPERATURE TO WHICH FUMIGANT AND INSECTS ARE EXPOSED</u>	<u>EXPOSE PERIOD</u>
Below 40°F	Do not fumigate
40°F - 49°F	14 days (336 hours)
50°F - 59°F	9 days (216 hours)
60°F - 77°F	5 days (120 hours)
Above 77°F	3 days (72 hours)

The length of the fumigation must be long enough so as to provide for adequate control of the insect pests which infest the commodity being treated. It will be necessary to lengthen the fumigation at lower temperatures and relative humidities (or grain moistures) since insects are more difficult to control under these conditions.

The fumigation period should also be long enough so that the generation of hydrogen phosphide gas has essentially ceased and worker exposure minimized during further storage and/or processing.

There is little to be gained by extending the exposure period if the structure to be fumigated has not been carefully sealed. This is required to insure that adequate gas levels are retained. Proper application procedures must be followed to provide satisfactory distribution, retention and results.

The exposure periods in the above table are minimum periods and should not be shortened for any reason other than when it may be necessary to abort the fumigation.

G. Application Procedures:

1. General Statement:

The following instructions are intended to provide general guidelines for typical fumigations. These instructions are not intended to cover every type of situation nor are they meant to be restrictive. Other procedures may be used if they are safe, effective and consistent with the properties of aluminum phosphide products.

2. Application Procedures For Direct Addition Of FUMITOXIN Aluminum Phosphide Bags To Bulk Commodities:

- a. Commodities: Listed raw agricultural commodities, seed, wood chips, animal feed and feed ingredients; and processed brewers rice, malt and corn grits used in the manufacture of beer.
- b. Storage Structure: Bins, tanks, silos, granaries, flat storage, bunkers, bulk rail cars, etc.
- c. Procedure For Vertical Storage: (concrete upright bins and other silo type bins that can be quickly transferred)
 - 1. Bags may be added to the commodity as the bin is filled, but must be removed as the bin is emptied. FUMITOXIN tablets or pellets are most suited to this application since they can be automatically added to the commodity and are not removed after the fumigation. Refer to the training manual for tablets and pellets for directions on these uses.
 - 2. Locate all ventilation facilities for basement/tunnel. To the extent possible seal all openings except for fill opening.
 - 3. Calculate the number of bags needed and the rate which they must be added based upon the rate at which the bin will be filled.
 - 4. FUMITOXIN bags are applied by hand on the headhouse/gallery belt or into fill opening. Add fumigant in as continuous a manner as possible to the commodity stream.
 - 5. Keep an accurate count of bags added since the bags must be removed when the bin is emptied. Bags can be removed by transfer of the commodity through a screen or scale operator.
 - 6. Seal the bin deck openings after the application is complete.

7. Bins requiring more than 24 hours to fill should not be fumigated by direct addition as the bin is filled. These bins should be fumigated by shallow probing or surface application.
 8. Post "Danger" placards on all entrances and on the discharge gate.
 9. Bins need not be aerated until they are transferred. Workers must not be overexposed during this transfer.
- d. Procedures For Flat Storage: (Bunkers, quonset buildings, large steel tanks, rectangular shaped bins, etc.)
1. Check the storage for tightness.
 2. To the extent practical seal any vents, cracks or sources of leaks.
 3. Determine commodity temperature, moisture and type of application to be made.
 4. Determine the dosage and exposure time based on the above information.
 5. Determine application procedure to be used. This can include shallow probing, uniform addition as the bin is filled, or surface application. Bins requiring more than 24 hours to fill should not be fumigated by addition as the bin is filled since large quantities of gaseous fumigant may escape before the bin is finally sealed.
 6. Surface application can be used if the bin can be made sufficiently gas tight to contain the fumigant long enough for it to penetrate throughout. In this instance it is advisable to place 1/4 of the dosage in the floor level aeration ducts. This fumigant must not contact liquid phase water.

Surface application may include placing of the individual bags directly on the raw agricultural commodity or placing them on strips of Kraft paper. The latter will allow for easier retrieval of the spent bags. Better retention of gas in the commodity mass will be accomplished by digging a long narrow trench on the surface, placing the bags in the trench and covering with the commodity.

7. Arrange enough applicators and other workers to complete the job quickly enough to avoid exposure to hydrogen phosphide gas. Monitoring with a suitable detection device is required to assure that the 0.3 ppm 8 hour TWA is not exceeded. See "Industrial Hygiene Monitoring" section found elsewhere in this manual.
8. When possible it is advisable to cover the commodity with plastic tarps. This will act as an additional sealing measure.
9. Seal all remaining exits.
10. Post "Danger" placards on and lock all entrances.
11. The bin needn't be aerated unless re-entry is required. Consult safety procedures listed elsewhere in labeling.
12. Remove and dispose of bags prior to emptying bin or during emptying if the bags cannot be retrieved otherwise.

e. Procedures For Bunkers And Other Outdoor Tarped Commodities:

1. Follow steps 3, 4, 5 and 6 in Section d above.
2. When tarps are spread over ground storage be sure they are sealed together. Sand snakes or dirt can be used for a ground seal.
3. Surface or shallow probing may be done through slits in the tarp or the tarp can be spread over the commodity after application. Be sure slits are sealed after application.
4. This is an outdoor application so safety monitoring and respiratory equipment are not required.
5. Post "Danger" placards.
6. When possible remove bags prior to moving the commodity.

f. Procedure For Farm Storage:

1. General:

Since on farm storage is almost always flat storage, refer to "Procedures For Flat Storage" found elsewhere in this manual. The instructions which follow provide additional guidance.

2. Sealing:

Leakage is the single most important cause of failure in the treatment of farm bins. Since these bins are usually small by comparison they have a higher leakage area in proportion to their capacity. Most wooden granaries are so porous that they cannot be successfully fumigated unless they are completely covered with plastic sheeting or similiar tarp. Steel bins are also usually of very loose construction and therefore require much attention to sealing. All vents and aeration ducts must be tightly sealed using 4 mil polyethylene sheeting or its equivalent. The plastic must be sealed directly to the metal with tape or other adhesive. It is not sufficient to "cinch up" the plastic as with a belt. The surface of the grain should be covered with plastic sheeting after FUMITOXIN bags have been applied. Tarping of the grain surface will greatly reduce leakage. Other sealing techniques are recommended ie. closure of all large cracks with caulking, foam insulation or other sealant. Sealing these cracks will greatly reduce the required dosage. 2 mil or thicker plastic can be used for tarping the grain surface, however the plastic used on the outside of the bin should be at least 4 mils. When an entire structure is tarped the plastic must be at least 6 mils thick to prevent excessive tearing during the fumigation.

3. Dosage:

Unless all the large cracks are sealed as described above, the dosage recommended should be 8-16 bags per 1000 bu. (6-13 bags per 1000 cu. ft.) capacity of the space under the plastic tarp.

4. Additional Application Instructions:

- Probing bags into the grain mass is the recommended method of application. Probe insertions should be scattered evenly over the surface. Place no more than 1/4 of the total dose in floor level aeration ducts. Be sure the inside of the aeration duct is dry before adding the bags. Addition of bags to water in an aeration duct can cause a fire. Seal the aeration fan as described above.
5. Place "Danger" placards on entrances to the bin and near the ladder. Refer to placarding instructions found elsewhere in this manual.

NOTE: If monitoring equipment is not available on a farm and application cannot be done from outside of a structure, an approved respirator must be worn during application from within an enclosed indoor area.

3. Application Procedures For Space Fumigations:

a. Procedures for Mills, Warehouses, Food Processing Plants, Chambers, Trucks, Trailers, Containers and Other Static Sealable Enclosures:

1. Determine the dosage of bags to be applied based upon the following parameters for space fumigation:
 - The volume of the structure
 - The and/or commodity temperature
 - The general tightness of the structure to be fumigated
2. Determine exposure period based on the "Exposure Guide" found elsewhere in this document.
3. Seal all openings except for the door being used to enter and leave.
4. Place bags on floor in a systematic manner, beginning at the point furthest from the exit door. Do not toss bags into inaccessible areas. Do not pile bags. Spread bags so they are not touching.
5. FUMITOXIN bags are not to be placed in or attached to commodity packages containing processed food. If bags cannot be placed on the floor, attach to walls or other support. Bags may be taped to a cardboard disc and disc attached to commodity packaging.
6. When fumigating multiple story buildings, each floor is considered a separate enclosure. Application should begin with the top floor and end with the ground floor.
7. Doors leading to the fumigated space are then closed, sealed and locked. "Danger" placards must be placed on all entrances. Refer to placarding instructions found elsewhere in this manual.
8. Upon completion of the exposure period, windows and doors should be opened and the fumigated structured allowed to aerate. Gas concentration readings must be taken using low level detector tubes before allowing personnel to re-enter the area. Refer to aeration, re-entry and Industrial Hygiene Monitoring sections found elsewhere in this document.
9. Dispose of remaining bags according to DISPOSAL instructions found elsewhere in this manual.

b. Procedures for Space Fumigations Under Tarps:

1. General:

Follow the pertinent instructions given immediately above in part "a".

2. Sealing:

An enclosure suitable for fumigation may be formed by covering packaged commodities with plastic sheeting. The sheets may be taped, glued, or clamped together to provide a sufficient width of material to ensure that adequate sealing is obtained.

The plastic covering may be sealed to the floor using tape, glue, sand snakes or by placing soil or sand onto the ends of plastic covering or by other suitable procedures that ensures a good seal.

3. Additional Application Instructions:

Bags may be applied under the edge of the tarp or through slits. The bags should be protected from condensation or other source of water. The slits in the covering should be sealed after application of bags. Bags should not be piled or overlapped. Care should be taken to prevent the plastic tarp from covering the bags.

4. Additional Precautions:

Indoor fumigation precautions are handled as any other situation where the application is made from outside the area being fumigated. Workers may occupy adjacent indoor areas but they must be protected from overexposure to hydrogen phosphide by adequate sealing, ventilation or respiratory protection.

Do not walk on stacks during the fumigation.

Place "Danger" placards at conspicuous points on the enclosure.

5. Aeration:

Precautions must be taken to assure that exposure to hydrogen phosphide in excess of 0.3 ppm does not occur during the fumigation and/or aeration.

4. Application Procedure For Rail Cars, Containers, Trucks, And Other Similar Vehicles:

a. General:

The following directions are for transport vehicles both static or in-transit. Trucks, vans, chambers, containers and other transport vehicles to be placed aboard vessels or on piggyback rail shipments may be fumigated in-transit, but must not be moved over public roads or highways when moved to the rail site or vessel for loading.

Railcars, containers, trucks, and other transport vehicles loaded with bulk commodities to which FUMITOXIN bags may be added are treated in the same way as any other storage facility. FUMITOXIN may be added as the vehicle is being filled, the bags may be scattered over the service after loading is complete or probed beneath the surface.

Surface application is not recommended for in-transit fumigation. Be sure all vents, cracks or other openings are sealed.

b. Procedures For Processed Foods:

FUMITOXIN bags must not come into contact with processed foods. Bags must be applied in such a way as to prevent contact with the commodity or its packaging.

Bulk Rail Cars

1. Close and secure all hatch covers except those being utilized for the fumigation.
2. Seal all other openings. Pay particular attention to vents.
3. Clean the flange lip of hatch (or hatches) being utilized. If the commodity extends into the throat of the hatch, force it away as far as possible.
4. Open cans and tape bags to a cardboard disc. Be sure to only tape across the bag ends only.
5. Place the disc into position, bag side up, and secure with masking tape.
6. Lower the cover into place and secure. Tape a "Danger" placard securely to the hatch cover.

c. Procedures For Boxcars:

1. Close and secure one of the doors from the inside. Seal all openings and joints. If possible, caulk joints and drape entire doorway with polyethylene film, securing the edges to the inner wall, floor and ceiling with masking tape.
2. Inspect the roof, floor and walls for holes and/or cracks. Seal all openings.
3. If possible, drape remaining doorway with polyethylene film before door is closed. Secure edges to door jams and floor. Close door and secure. If doorway is draped with polyethylene it may not be necessary to seal the door from the outside. If door is not draped, seal all cracks, openings and joints from the outside.
4. Open cans and tape bags to cardboard discs. Be sure to tape across the bag ends only.
5. Place the loaded discs inside the boxcar and secure, bag side up, with tape or nail to the wall.
6. Post "Danger" placards on each door.

d. Procedures For Containers:

Procedures for truck vans and other transport containers are essentially the same as boxcars, except their doors tend to be more gas tight, and they often have only a rear door, which must be sealed after application is completed.

5. Application Procedures For In-transit Fumigation Of Ship Holds:

a. General Information:

- 1. Shipboard fumigation is also regulated by the U.S. Coast Guard Regulations 46 CFR 147A.
- 2. This product is toxic to fish. Keep out of lakes, streams and other aquatic environments. Do not contaminate water by cleaning equipment or disposal of wastes.

b. Pre-voyage Fumigation Procedures and Precautions:

- 1. Prior to fumigating a vessel for intransit cargo fumigation, the master of the vessel or his representative, and the fumigator must determine whether the vessel is suitably designed and configured so as to allow for safe occupancy by the ship's crew throughout the duration of the fumigation.

If it is determined that the design and configuration of the vessel does not allow for safe occupancy by the ship's crew throughout the duration of the fumigation, then the vessel will not be fumigated unless all crew members are removed from the vessel. The crew members will not be allowed to occupy the vessel until the vessel has been properly aerated and a determination has been made by the master of the vessel and the fumigator that the vessel is safe for occupancy.

- 2. The person responsible for the fumigation must notify the master of the vessel, or his representative, of the requirements relating to personal protection equipment, detection equipment and that a person qualified in the use of this equipment must accompany the vessel with cargo under fumigation. Emergency procedures, cargo ventilation, periodic monitoring and inspections, and first aid measures must be discussed with and understood by the master of the vessel or his representative.
- 3. Seal all openings to the cargo hold or tank using suitable, water proof, gas tight materials. Lock and/or otherwise secure all openings, manways, etc., used to enter the hold. Post appropriate "Danger" placards on same.
- 4. On tankers the over-space pressure relief system of each tank must be sealed by (1) the closing of appropriate valves and (2) sealing the openings into over-space with gas tight materials.
- 5. Contact appropriate authorities.
- 6. If the fumigation is not completed and the vessel aerated before the manned vessel leaves port, the person in charge of the vessel shall ensure that at least two units of personal protection equipment and one gas or vapor detection device and a person qualified in their operation be on board the vessel during voyage.
- 7. During the fumigation or until a manned vessel leaves port or the cargo is aerated, the person in charge of the fumigation shall ensure that a qualified person using gas or vapor detection equipment tests areas adjacent to spaces containing fumigated cargo and all regularly

occupied areas for fumigation leakage. If leakage of the fumigant is detected, the person in charge of the fumigation shall take action to correct the leakage, or shall inform the master of the vessel, or his representative, of the leakage so that corrective action be taken. Personal protection equipment means a gas mask fitted with a canister designed for phosphine gas which is approved by NIOSH/MSHA. A gas mask and canister is approved for use up to 15 ppm. Above 15 ppm or at unknown concentrations a SCBA or its equivalent must be used.

c. Procedures For Bulk Dry Cargo Vessels And Tankers:

1. Calculate dosage on the basis of cargo hold volume. Dosage is always calculated for total hold volume irrespective of the commodity tonnage in the hold.

FUMITOXIN® bags -----2 to 6 bags per 1,000 cu. ft.

2. After a hold has been filled or completed, open containers and distribute bags uniformly onto commodity surface with spacing between each. Do not place bags within 10 feet of side walls. Step on each bag after placement or probe bags into the commodity.
3. Observe closing of hatch covers closely. Stop the closing if the cover snags an individual bag. Reposition the bag and resume closing.

d. Voyage Precautions and Procedures:

1. At regular interval monitor spaces adjacent to areas containing fumigated cargo and all regularly occupied areas, for fumigant leakage using appropriate gas detection equipment.

Special attention should be given to living quarters, kitchens, storerooms, mess halls, keel ducts, day rooms, the bridge, engine room and any other enclosed spaces occupied or frequented by crew members during a voyage.

2. If hydrogen phosphide (phosphine) is detected, evacuate the space or area, and seal off the source of the leak wearing appropriate respiratory protection equipment. Ventilate the area before allowing occupants to return.
3. Do not enter fumigated holds or tanks.
4. Do not open, ventilate or aerate the fumigated holds during the voyage unless the fumigation must be aborted.

e. Precautions and Procedures During Discharge:

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

- f. Personal Protective Equipment and Monitoring:
1. Fully loaded holds on dry bulk carriers are considered an outdoor fumigation.
 2. Tanker holds which must be entered to fumigate and partially loaded holds on dry bulk carriers are fumigated from within the area being treated.
 3. See sections on "Respiratory Protection" and "Applicator and Worker Exposure" found elsewhere in this manual for requirements.
 4. If hydrogen phosphide (phosphine) is detected a minimum of two qualified persons should wear the gas mask and canister described above while aerating the area and locating and sealing the leak.
6. Application Procedures For Intransit Fumigation Of Containers On Ships:
- a. When fumigating bulk commodities to which direct addition of this fumigant is not allowed or contact to its packaging, please refer to section covering directions for static containers.
 - b. In-transit fumigation of containers on ships is regulated by Coast Guard Regulation 46 CFR 147A and the applicator or shipper must obtain and comply with U.S. Coast Guard Special Permit No. 52-75. Contact the Coast Guard or Pestcon Systems, Inc. for additional information.
 - c. Comply with general precautions given in labeling.
7. Applications Procedures For Fumigations Of Barges:
- a. General:
Since barge fumigation is a type of flat storage fumigation as well as having similarities in common with a ship, refer to sections on "Procedures for Flat Storage" and "Application Procedures for In-transit Fumigation of Ship's Holds" found elsewhere in this manual. Barge fumigation is regulated by the U.S. Coast Guard Regulations 46 CFR 147A as modified by U.S. Coast Guard Special Permit 2-75. The shipper or fumigator must possess this permit prior to fumigating. To obtain this permit contact.

U.S. Coast Guard
Hazardous Materials Branch
Washington, D.C. 20593-0001

- b. Sealing:
Special care must be taken in determining whether a barge is suitable for fumigation. Excessive leakage may occur through poorly sealed hold covers.
- c. Prior to unloading barges make appropriate tests to ascertain cargo area, as well as ballast areas, are free of hydrogen phosphide gas.

H. Protective Clothing:

It is not necessary to wear gloves or other protective clothing. However, it is recommended to wear dry gloves of cotton or other suitable material if contact with the dust is likely. Wash hands after use.

I. Respiratory Protection:**1. When Respiratory Protection Must Be Worn:**

NIOSH/MSHA approved respiratory protection must be worn during exposure to concentrations in excess of permitted limits or when concentrations are unknown.

2. Permissible Gas Concentration Ranges For Respiratory Protection Devices:

A NIOSH/MSHA approved, full face gas mask, hydrogen phosphide canister combination may be used at levels up to 15 ppm or to escape from levels up to 1500 ppm. Above this level or in situations where hydrogen phosphide concentration is unknown, a NIOSH/MSHA approved, self-contained breathing apparatus (SCBA) or its equivalent must be used. The NIOSH/OSHA Pocket Guide, 8-85, DHEW/NIOSH 78-210, lists these and other types of approved respirators and the concentration limits of which they may be used.

3. Requirements For Availability Of Respiratory Protection:

Respiratory protection must be available at the site of application in case it is needed when applying FUMITOXIN bags from within the structure being fumigated. An approved full face gas mask, phosphine canister combination or self-contained breathing apparatus (SCBA) or its equivalent must be available at the site of application. If SCBA or its equivalent is not available at the application site, it must be available locally, for example, at a fire station or rescue squad. Respiratory protection need not be available for applications from outside the area to be fumigated such as when using automatic dispensing equipment, etc., if exposure above the permitted exposure limit will not be encountered.

Respiratory protection need not be available for outdoor applications.

If monitoring equipment is not available on a farm and application cannot be done from outside the structure, an approved canister respirator must be worn during application from within the enclosed indoor area.

J. Gas Detection Equipment:

There are several reliable devices marketed. One type is the hand pump when used in conjunction with the appropriate detector tube. They are portable, simple devices and do not require intensive training or elaborate supporting equipment to operate. Furthermore, they are inexpensively adaptable to remote monitoring procedures and will measure concentrations of hydrogen phosphide in air in trace amounts on up. Use instructions are enclosed with each purchase. Consult your local supplier of such equipment or contact Pestcon Systems, Inc. for more information.

K. Applicator And Worker Exposure:**1. Hydrogen Phosphide Exposure Limits:**

Exposure to hydrogen phosphide must not exceed the 8 hour TWA of 0.3 ppm for applicators and workers during application. Application is defined as the time period covering the opening of the first container, applying the appropriate dosage of fumigant and closing up the site to be fumigated. All persons in the treated site and in adjacent indoor areas are covered by this exposure standard.

After application is completed worker or applicator exposure must not exceed 0.3 ppm maximum concentration. Such exposure may occur because of leakage into enclosed areas from fumigation sites, during re-entry or during transfer of unaerated commodity.

2. Application of Fumigant:

Depending upon temperature and humidity, FUMITOXIN bags release hydrogen phosphide gas slowly upon exposure to moisture from the air. This release is often slow enough to permit applicators to deposit fumigant in the desired areas and then vacate the premises without significant exposure to the gas. If the fumigator's exposure exceeds the 8 hour TWA of 0.3 ppm, approved respiratory protection must be worn. Gas concentration measurements for safety purposes must be made using low level detector tubes or other suitable low level detection equipment. See the "Industrial Hygiene Monitoring" section below. Information on hydrogen phosphide (phosphine, PH₃) detector tubes may be obtained from Pestcon Systems, Inc.

3. Leakage From Fumigated Sites:

Hydrogen phosphide is highly mobile and given enough time may penetrate seemingly gas-tight materials such as concrete and cinder block. Therefore, adjacent, enclosed areas likely to be occupied should be examined to ensure that significant leakage has not occurred. Sealing of the fumigated site and/or air flow in the occupied areas must be sufficient to prevent exposures exceeding the TLV's.

4. Aeration and Re-entry:

If the area is to be entered after fumigation, it must be aerated until the level of hydrogen phosphide is 0.3 ppm or below. The area or site must be monitored to ensure that liberation of gas from the treated commodity does not result in the development of unacceptable levels of hydrogen phosphide. Do not allow re-entry into treated areas by any person before this time unless protected by an approved respirator.

5. Handling Unaerated Commodities:

Following the required exposure time for fumigation, transfer and processing of a treated commodity prior to complete aeration is permissible, however, workers must not be exposed to hydrogen phosphide in excess of the permitted exposure limits.

- 6. It is recommended that hydrogen phosphide exposure be documented in an operation log or manual for each site and operation where exposure may occur. The purpose of this monitoring is to prevent excessive exposure and to determine when and where respiratory protection is required. Once exposures have been adequately characterized, subsequent monitoring is not routinely required. However, spot checks should be made occasionally, especially if conditions significantly change.

L. Placarding Of Fumigated Areas:

The applicator must placard or post all entrances to the fumigated area with signs bearing:

- 1. The signal word Danger/Peligro and the skull and crossbones symbol in red.
- 2. The statement, "Area and/or Commodity Under Fumigation, DO NOT ENTER/NO ENTRE".
- 3. The statment "This sign may only be removed after the commodity and/or area is completely aerated (contains 0.3 ppm or less phosphine gas). If incompletely aerated commodity is transferred to a new site, the new site must also be placarded, and workers must not be exposed to more than 0.3 ppm phosphine".
- 4. The date and time fumigation begins and is completed.
- 5. Name of fumigant used.
- 6. Name, address, and telephone number of the applicator.

All entrances to a fumigated area must be placarded. Where possible, placards should be placed in advance of the fumigation in order to keep unauthorized persons away. For railroad hopper cars, placarding must be placed securely on both sides of the car near the ladders and next to the top hatch into which the fumigant is introduced.

Do not remove a placard until the treated area is aerated down to 0.3 ppm or less. To determine whether aeration is complete, each fumigated site or vehicle must be monitored following directions found under Industrial Hygiene Monitoring and shown to contain 0.3 ppm or less phosphine gas in the air space around and, when feasible, in the mass of the commodity. Transfer of incompletely aerated commodity to a new site is permissible, however, the new storage site must be placarded if more than 0.3 ppm is detected. Workers who handle incompletely aerated commodity must be informed and appropriate measures taken (i.e. ventilation or respiratory protection) to prevent exposures from exceeding the TLV's for hydrogen phosphide.

It is recommended that the person responsible for removing placards be familiar with the physical, chemical and toxicological properties of hydrogen phosphide. They should also be knowledgeable in how to take gas readings, exposure limits, symptoms and first aid treatment for hydrogen phosphide poisoning.

M. Aeration Of Fumigated Commodities:

1. Foods and Feeds:

Tolerances for hydrogen phosphide residues have been established at 0.1 ppm for animal feeds and 0.01 ppm for finished foods. To guarantee compliance with these tolerances, it is necessary to aerate these commodities for 48 hours prior to offering them to the end consumer.

2. Tobacco:

Tobacco must be aerated for at least three days (72 hours) when fumigated in hogshead or until concentration is below 0.3 ppm and for at least two days (48 hours) when fumigated in other containers. When plastic liners are used, longer aeration periods will probably be required to aerate the commodity down to 0.3 ppm.

As an alternative to these aeration periods, each container of a treated commodity may be analyzed for residue using accepted analytical methods. If residues are less than tolerance levels, the commodity may be shipped to the consumer regardless of the above holding periods.

N. Storage And Disposal:

1. Storage:

Cans should be stored in a dry, well ventilated area, away from heat and under lock and key. Post as a pesticide storage area. Do not contaminate water, food or feed by storing pesticides in the same areas used to store these commodities. Do not store in buildings where humans or domestic animals reside. Keep out of reach of children.

The shelf life of FUMITOXIN bags is virtually unlimited if the containers are tightly sealed.

2. Disposal of UNREACTED or PARTIALLY REACTED FUMITOXIN Bags:

(From spills, leaking cans or other sources) Unreacted or partially reacted FUMITOXIN bags are acutely hazardous. Improper disposal of this product is a violation of federal law. If this product cannot be disposed of by ordinary use or according to the instructions that follow, contact your state pesticide or environmental control agency or the hazardous waste representative at the nearest EPA regional office for guidance. Do not contaminate water by disposal.

Some local and state waste disposal regulations may vary from the following recommendations. Disposal procedures should be reviewed with appropriate authorities to ensure compliance with local regulations.

FOR SPECIFIC INSTRUCTIONS SEE "SPILL AND LEAK PROCEDURES" FOUND ELSEWHERE IN THIS MANUAL.

3. Disposal Of FUMITOXIN Bags Following A Space Fumigation:

a. General:

If properly exposed, the bags remaining after a fumigation will contain a grayish white, spent, nonhazardous waste and will contain only a small amount of unreacted aluminum phosphide. However, residual dust from incompletely exposed bags (See "EXPOSURE GUIDE" found elsewhere in this manual) will require special care. Confinement of partially spent bags, as in a closed container may result in a fire hazard. Small amounts of hydrogen phosphide may be given off from the unreacted aluminum phosphide, and confinement of the gas may result in a flash. Unless it can be determined with certainty that the bags are spent they must be deactivated as described below prior to disposal.

b. Deactivation of FUMITOXIN bags:

1. General:

The methods below may be used for deactivating used or unused FUMITOXIN bags regardless of the extent to which the aluminum phosphide has decomposed.

2. Dry Deactivation:

Collect bags and place them into a well ventilated holding container such as wire cage used for other hydrogen phosphide fumigants or other similar device. Store the bags in one of these devices until the bags are spent. Unused or partially spent bags can be spread out on the ground in a secure open area away from occupied buildings to be deactivated by atmospheric moisture. Care should be taken so that they are not carried away by the wind. Dry deactivation is the recommended procedure for unused or partially spent bags. If in doubt, as to whether the bags are spent, contact Pestcon Systems, Inc.

Ignition may occur if large numbers of incompletely reacted bags are contacted by liquid water. This can occur in open or perforated storage containers. Therefore, such storage should be out of doors in a relatively isolated area protected from rain.

3. Wet Deactivation - Method One:

Fill an appropriate sized container with water a few inches from the top. Submerge bags for 36 hours. A metal grid works well to keep bags submerged. Do not cover container. Wear appropriate respiratory protection. This should be done outdoors. The water may be disposed of in a storm sewer or by pouring it out on the ground.

4. Wet Deactivation - Method Two:

Fill an appropriate sized metal container 2/3 full with water. For each gallon of water add 1/4 cup of low sudsing detergent or surfactant. Use no less than 1 gallon of water/detergent solution for 60 FUMITOXIN bags. Open each bag and dump the contents into the container as the water is stirred. Wear appropriate respiratory protection. DO NOT COVER THE CONTAINER AT ANY TIME. This should be done outdoors.

c. Disposal Procedures:

In open areas, small amounts (up to 7.0 kg) of the spent bags may be disposed of on site by burial of the bags or by opening the bags and spreading the dust over the land surface away from inhabited buildings.

Spent bags may also be collected and disposed of at a sanitary landfill, approved pesticide incinerator or other approved sites or by other procedures approved by federal, state and local authorities.

Do not dispose of dust in a toilet.

Dispose of water/dust mixture (slurry) (with or without preliminary pouring out of excess water) in a sanitary landfill or other suitable burial site approved by local authorities. Where permissible, the slurry may be poured out on the ground. If it is held 36 hours it may be poured into a storm sewer.

Never confine, partially spent bags or slurry in closed containers such as closed drums or plastic bags.

d. Disposal of cans:

Dispose of cans in a sanitary landfill or by other approved state or local procedures.

e. Spill And Leak Procedures:

1. General:

A spill other than incidental to application or normal handling or punctured containers, can produce high levels of gas and, therefore attending personnel must wear a SCBA or its equivalent when concentration of hydrogen phosphide gas is unknown. If the concentration is known, other NIOSH/MSHA approved respiratory protection can be worn. Wear dry gloves of cotton or other suitable material when contact with the powdered formulation is likely.

2. Damage to Fiberboard Case:

Check cans, if they are damaged handle as described below. If they are undamaged return them to cardboard cartons or other suitable packaging which complies with DOT regulations.

3. Leaking Flask Procedures:

If cans have been punctured or damaged causing a leak, the product may be immediately used or the container may be temporarily repaired with aluminum tape. The FUMITOXIN bags may be transferred from the damaged can to a sound metal container which should be sealed and properly labeled as aluminum phosphide, or it may be deactivated and disposed of. Refer to deactivation and disposal method found in the manual. Transport the damaged containers to an area suitable for pesticide storage for inspection. Further instructions and recommendations may be obtained, if required, from Pestcon Systems, Inc.

Handle empty damaged containers as described under "Disposal of Empty Cans".

4. Spill Procedures:

Since the formulation is placed in small, tough paper bags, spill will be either bags or a small quantity of powder spilled from a punctured bag. Consequently, spills are not likely to constitute a frequent problem.

Do not flush spillage down drain with water. DO NOT use water at anytime to clean up a spill. Water in contact with unreacted FUMITOXIN bags will rapidly accelerate the production of hydrogen phosphide gas and could cause spontaneous ignition of the gas. If bags have just been spilled and have not been contaminated by other materials, collect the bags and use them or place them into a sound metal container and seal it or deactivate and dispose of them. If possible use immediately. CAUTION: AN IGNITION MAY OCCUR WHEN THESE CONTAINERS ARE OPENED. If the spill is more than a few minutes old or has been contaminated with water, gather it up and place it into an open top can and deactivate it immediately. If on-site deactivation is not feasible, these open containers should be transported in open vehicles to a suitable area away from occupied building. Wet or dry deactivation may then be carried out. See deactivation instructions found elsewhere in this manual.

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