

APPLICATOR'S MANUAL



DEGESCH MAGTOXIN® GRANULES

Patent Nos. - PENDING

THIS PRODUCT MUST BE ACCOMPANIED BY AN APPROVED LABEL AND APPLICATOR'S MANUAL. READ AND UNDERSTAND THE ENTIRE LABELING AND APPLICATOR'S MANUAL. ALL PARTS OF THE LABELING AND APPLICATOR'S MANUAL ARE EQUALLY IMPORTANT FOR SAFE AND EFFECTIVE USE OF THESE PRODUCTS. CONSULT WITH YOUR STATE LEAD PESTICIDE REGULATORY AGENCY TO DETERMINE REGULATORY STATUS, REQUIREMENTS AND RESTRICTIONS FOR FUMIGATION USE IN THAT STATE. CALL (540) 234-9281 OR 1-800-330-2525 IF YOU HAVE ANY QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABELING.

RESTRICTED USE PESTICIDE

DUE TO HIGH ACUTE INHALATION TOXICITY OF PHOSPHINE GAS

For retail sale to Dealers and Certified Applicators only. For use by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification. Refer to the directions in this Applicator's Manual for requirements of the physical presence of a Certified Applicator.

FOR USE ONLY WITH THE DEGESCH GENERATOR TO PRODUCE PHOSPHINE GAS FOR CONTROL OF PESTS OF STORED PRODUCTS

Active Ingredient: Magnesium Phosphide.....	94.6%
Inert Ingredients:.....	5.4%
Total.....	100%



KEEP OUT OF REACH OF CHILDREN  
DANGER - POISON - PELIGRO



PRECAUCION AL USUARIO: Si usted no puede leer ingles, no use este producto hasta que el marbete le haya sido completament explicada.

(TO THE USER: If you cannot read English, do not use this product until the label has been fully explained to you.)

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EPA Est. No. 40285-CH-01

EPA Reg. No. 72959-11

**WARRANTY**

Seller warrants that the product conforms to its chemical description and when used according to label directions under normal conditions of use, it is reasonably fit for the purpose stated on the label. Seller makes no other warranty, either express or implied, and Buyer assumes all risks should the product be used contrary to label instructions.

## TABLE OF CONTENTS

<b><u>SECTION</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>PAGE NUMBER</u></b>
	<b>RESTRICTED USE STATEMENT</b> .....	Front Cover
	<b>WARRANTY</b> .....	Inside Cover
<b>1</b>	<b>FIRST AID</b> .....	1
	Hot Line Number .....	1
<b>2</b>	<b>NOTE TO PHYSICIAN</b> .....	1
<b>3</b>	<b>INTRODUCTION</b> .....	2
<b>4</b>	<b>PRECAUTIONARY STATEMENTS</b> .....	4
	4.1 Hazards to Humans & Domestic Animals .....	4
	4.2 Physical and Chemical Hazards .....	4
	<b>DIRECTIONS FOR USE</b> .....	5
<b>5</b>	<b>PESTS CONTROLLED</b> .....	5
<b>6</b>	<b>COMMODITIES WHICH MAY BE FUMIGATED</b> .....	6
	6.1 Raw Agricultural Commodities, Animal Feed and Feed Ingredients .....	6
	6.2 Processed Foods .....	6
	6.3 Non-Food Commodities .....	7
<b>7</b>	<b>EXPOSURE CONDITIONS</b> .....	7
<b>8</b>	<b>DOSAGE RAGE GUIDELINES</b> .....	8
	8.1 Maximum Allowable Dosage Guidelines .....	8
	8.2 Recommended Dosages for Various Types of Fumigations .....	8
<b>9</b>	<b>PROTECTIVE CLOTHING</b> .....	10
<b>10</b>	<b>RESPIRATORY PROTECTION</b> .....	10
	10.1 When Respiratory Protection Must Be Worn .....	10
	10.2 Permissible Gas Concentration Ranges .....	10
	10.3 Requirements for Availability of Respiratory Protection .....	10
<b>11</b>	<b>REQUIREMENTS FOR CERTIFIED APPLICATOR</b> .....	10
<b>12</b>	<b>TRAINING REQUIREMENTS FOR RECEIPT OF     IN-TRANSIT VEHICLES</b> .....	11
<b>13</b>	<b>GAS DETECTION EQUIPMENT</b> .....	11
<b>14</b>	<b>NOTIFICATION REQUIREMENTS</b> .....	12
	14.1 Authorities and On-Site Workers .....	12
	14.2 Incident Reporting .....	12
	14.3 Theft of Products .....	12
<b>15</b>	<b>APPLICATOR AND WORKER EXPOSURE</b> .....	12
	15.1 Exposure Limits .....	12

<u>SECTION</u>	<u>DESCRIPTION</u>	<u>PAGE NUMBER</u>
	15.2 Application of Fumigant .....	12
	15.3 Leakage from Fumigated Sites .....	12
	15.4 Aeration and Re-Entry .....	12
	15.5 Handling Un aerated Commodities .....	13
	15.6 Industrial Hygiene Monitoring .....	13
	15.7 Engineering Controls and Work Practices .....	13
<b>16</b>	<b>PLACARDING OF FUMIGATED AREAS</b> .....	<b>13</b>
<b>17</b>	<b>SEALING OF STRUCTURE</b> .....	<b>14</b>
<b>18</b>	<b>AERATION OF FUMIGATED COMMODITIES</b> .....	<b>14</b>
	18.1 Foods and Feeds .....	15
	18.2 Non-Food Commodities .....	15
	18.3 Tobacco.....	15
<b>19</b>	<b>STORAGE INSTRUCTIONS</b> .....	<b>15</b>
	19.1 Labeling of Storage.....	15
<b>20</b>	<b>TRANSPORTATION INSTRUCTIONS</b> .....	<b>16</b>
	20.1 Transport Designations .....	16
	20.2 Transportation Exemption .....	16
<b>21</b>	<b>FUMIGATION MANAGEMENT PLAN</b> .....	<b>16</b>
	<b>GUIDANCE FOR PREPARATION OF A FUMIGATION MANAGEMENT PLAN</b> .....	<b>17</b>
	Purpose .....	17
	A Checklist Guide for a Fumigation Management Plan .....	18
	A. Preliminary Planning & Preparation .....	18
	B. Personnel.....	19
	C. Monitoring.....	19
	D. Notification .....	20
	E. Sealing Procedures .....	20
	F. Application Procedures & Fumigation Period.....	21
	G. Post-Application Operations.....	21
<b>22</b>	<b>APPLICATION PROCEDURES</b> .....	<b>21</b>
	22.1 Fumigation of Warehouses, Mills & Food Processing Plants .....	22
	22.2 Fumigation of Vertical Storages .....	22
	22.3 Fumigation of Flat Storages.....	23
	22.4 Fumigation of Railcars, Containers, Trucks, Vans and Other Transport Vehicles.....	24
	22.5 Fumigation of Storages to Control Rodents and Other Non-Insect Pests.....	24
<b>23</b>	<b>DISPOSAL INSTRUCTIONS</b> .....	<b>24</b>
	23.1 General .....	24
	23.2 Directions for Deactivation .....	25
<b>24</b>	<b>SPILL AND LEAK PROCEDURES</b> .....	<b>25</b>
	<b>FOR ASSISTANCE CONTACT NUMBERS</b> .....	<b>27</b>

## 1. **FIRST AID**

Symptoms of exposure to this product 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 inhaled:**

- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance; then give artificial respiration, preferably by mouth-to-mouth, if possible.
- Keep warm and make sure person can breathe freely.
- Call a poison control center or doctor for further treatment advice.

### **If swallowed:**

- Call a poison control center or doctor immediately for treatment advice.
- Have person drink 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 to an unconscious person.

### **If on skin or clothing:**

- Brush or shake material off clothes and shoes 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 areas such as automobiles, vans, motel rooms, etc.
- Wash contaminated skin thoroughly with soap and water.

### **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 further treatment advice.

### **HOT LINE NUMBER**

Have the product container label or Applicator's Manual with you when calling a poison control center, doctor, or when going for treatment. **CONTACT 1-800-308-4856 FOR ASSISTANCE WITH HUMAN OR ANIMAL MEDICAL EMERGENCIES.** You may also contact Degesch America, INC. – (540) 234-9281/1-800-330-2525 or CHEMTREC – 1-800-424-9300 for all other chemical emergencies.

## 2. **NOTE TO PHYSICIAN** (We recommend that this section be given to the attending physician)

Magnesium phosphide reacts with water, acids and many other liquids to release phosphine gas. Mild exposure by inhalation causes malaise (indefinite feeling of sickness), ringing in the 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 affects 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 hemorrhages 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 edema, (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 anuria (abnormal or lack of urination). Pathology is characteristic of hypoxia (oxygen deficiency in body tissue). Frequent exposure to concentrations above permissible levels over a period of days or weeks may cause poisoning. Treatment is symptomatic.

The following measures are suggested for use by the physician in accordance with his own judgement. In its milder forms, symptoms of poisoning may take some time (up to 24 hours) to make their appearance and the following is suggested:

1. Give complete rest for 1-2 days, during which the patient must be kept quiet and warm.
2. Should patient suffer from vomiting or increased blood sugar, appropriate solutions should be administered. Treatment with oxygen breathing equipment is recommended, as is the administration of cardiac and circulatory stimulants.

In cases of severe poisoning (Intensive Care Unit recommended):

1. Where pulmonary edema is observed, steroid therapy should be considered and close medical supervision is recommended. Blood transfusions may be necessary.
2. In case of manifest pulmonary edema, venesection should be performed under vein pressure control. Heart glycosides (I.V.) (in case of hemoconcentration, venesection may result in shock). On progressive edema of the lungs, immediate intubations with a constant removal of edema fluid and oxygen overpressure respiration, as well as any measures required for shock treatment. In case of kidney failure, extracorporeal hemodialysis is necessary. There is no specific antidote known for this poisoning.
3. Mention should be made here of suicidal attempts by taking solid phosphide by mouth. After swallowing, emptying of the stomach by vomiting, flushing of the stomach with diluted potassium permanganate solution or a solution of magnesium peroxide until flushing liquid ceases to smell of carbide. Thereafter, apply medicinal charcoal.

### 3. **INTRODUCTION**

DEGESCH **MAGTOXIN® GRANULES** may **not** be used in the manner conventionally employed with other metal phosphide fumigants. That is, the GRANULES may **not** be applied directly to warehouses, containers, silos, railcars, tarped structures, rodent burrows or any of the other sites in which metal phosphide fumigants are approved for use. They may **not** be added directly to raw or any other type of agricultural commodity. **MAGTOXIN® GRANULES are for use exclusively in a DEGESCH Phosphine Generator** for generating phosphine gas for fumigation of stored products and for short term fumigations to control vertebrate pests in storages.

DEGESCH **MAGTOXIN® GRANULES** are used to protect stored commodities from damage by insects, rodents and other vertebrate pests. Fumigation of stored products with **MAGTOXIN® GRANULES** in the manner prescribed in the labeling does not contaminate the marketed commodity.

DEGESCH **MAGTOXIN® GRANULES** are acted upon by atmospheric moisture or liquid water to produce phosphine gas. Phosphine gas is highly toxic to insects, vertebrate pests, humans, and other forms of animal life. In addition to its toxic properties, the gas will corrode certain metals and may ignite spontaneously in air at concentrations above its lower flammable limit of 1.8% v/v. These hazards will be described in greater detail later on in this Applicator's Manual under PRECAUTIONARY STATEMENTS.

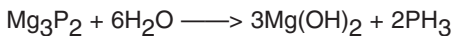
**MAGTOXIN® GRANULES** are gray, flattened particles 1-2mm in length and width. The GRANULES are packed in stoppered 1100cc aluminum flasks containing 850g of product. The GRANULES containing 94.6% magnesium phosphide and each flask will produce 405g of phosphine gas, almost 1g of phosphine gas for each 2g of **MAGTOXIN® GRANULES**. The flasks are packed in fiberboard cases containing 21 flasks each, a total of 17.85kg of **MAGTOXIN® GRANULES**, equivalent to 8.51kg of phosphine gas.

**MAGTOXIN® GRANULES** are supplied in gas-tight flasks and their shelf life is unlimited as long as the packaging remains intact. Once opened for fumigation, the aluminum flasks of GRANULES may be tightly resealed and stored for future use. Storage and handling instructions will be given in detail under STORAGE INSTRUCTIONS in the Applicator's Manual.

The DEGESCH Phosphine Generator is an automatic device in which the **MAGTOXIN® GRANULES** are rapidly hydrolyzed with liquid water under an atmosphere of carbon dioxide. The warm gas mixture of phosphine and carbon dioxide is cooled with liquid water and diluted in a separate chamber with air to a mixture containing 1.8% PH<sub>3</sub> or less. This gas mixture may be used directly for fumigations or may be diluted further with air from an auxiliary fan and pumped into commodities stored in silos or other structures in order to rapidly obtain effective levels of phosphine throughout the storage.

The reaction of liquid water with **MAGTOXIN® GRANULES** inside the Generator is very rapid and complete. Less than 10 ppm of phosphine gas remain in the spent solid from the DEGESCH Generator. The water used to flush the spent solids from within the Generator is purged with fresh air before discharge and, therefore, contains only traces of dissolved phosphine gas. These are not hazardous wastes. Additional deactivation of wastes produced by the DEGESCH Generator is not required. However, partially spent or unexposed **MAGTOXIN® GRANULES** are quite reactive and will require special care. Precautions and instructions for further deactivation and disposal are given under directions for deactivation by the wet method.

The following chemical reactions are carried out with the DEGESCH Phosphine Generator:



## 4. PRECAUTIONARY STATEMENTS

### 4.1 Hazards to Humans and Domestic Animals

**DANGER:** Magnesium phosphide from DEGESCH **MAGTOXIN® GRANULES** or its dust may be fatal if swallowed. Do not get in eyes, on skin or on clothing. Do not eat, drink or smoke while handling magnesium phosphide fumigants. If a sealed container is opened, or if the material comes into contact with moisture, water or acids, these products will release phosphine gas, which is an extremely toxic gas. If a garlic odor is detected, refer to the Industrial Hygiene Monitoring section of the Applicator's Manual for appropriate monitoring procedures. Pure phosphine gas is odorless; the garlic odor is due to a contaminant. Since the odor of phosphine gas may not be detected under some circumstances, the absence of a garlic odor does not mean that dangerous levels of phosphine gas are absent. Observe proper re-entry procedures specified in Section 15.4 in this labeling to prevent overexposure.

### 4.2 Physical and Chemical Hazards

Magnesium phosphide in **MAGTOXIN® GRANULES** partially spent dust will release phosphine gas if exposed to moisture from the air or if exposed to moisture from the air until it comes into contact with water, acids and many other liquids. Magnesium phosphide is considerably more reactive than is aluminum phosphide and will liberate gas more rapidly. This is particularly true in the presence of liquid water and at higher temperatures. Since phosphine may ignite spontaneously at levels above its lower flammable limit of 1.8% v/v, it is important not to exceed this concentration. Ignition of high concentrations of phosphine gas can produce a very energetic reaction. Explosions can occur under these conditions and may cause severe personal injury. **Never allow the buildup of phosphine to exceed explosive concentrations.** Do not confine spent or partially spent metal phosphide fumigants as the slow release of phosphine from this material may result in formation of an explosive atmosphere. Magnesium phosphide fumigants should not be stacked or piled up or contacted with liquid water. This may cause a temperature increase, increase the rate of gas production and confine the gas so that ignition could occur.

It is preferable to open containers of magnesium phosphide products in open air as under certain conditions, they may flash upon opening. Containers may also be opened near a fan or other appropriate ventilation which will rapidly exhaust contaminated air. When opening flasks of the **GRANULES**, point the flask away from the face and body. Although the chances for a flash are very remote, never open containers of metal phosphide fumigants in a flammable atmosphere. These precautions will also reduce the fumigator's exposure to phosphine gas.

Pure 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 humidity. Metals such as copper, brass and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by phosphine. Thus, small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gears,

communication devices, computers, calculators and other electrical equipment should be protected or removed before fumigation. Phosphine gas will also react with certain metallic salts and, therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed. In addition, all non-essential lights and electrical equipment should be turned off.

**MAGTOXIN® GRANULES** are Restricted Use Pesticides due to the high acute inhalation toxicity of phosphine gas. Read and follow the label and the Applicator's Manual. The Manual contains complete instructions for the safe use of the pesticide. Additional copies of this Manual are available from:

Degesch America, Inc.  
P.O. Box 116  
153 Triangle Drive  
Weyers Cave, VA 24486 USA  
Telephone: (540) 234-9281 / 1-800-330-2525  
Fax: (540) 234-8225  
Internet: [www.degeschamerica.com](http://www.degeschamerica.com)  
Email: [degesch@degeschamerica.com](mailto:degesch@degeschamerica.com)

### DIRECTIONS FOR USE

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

#### 5. **PESTS CONTROLLED**

Phosphine gas from **MAGTOXIN® GRANULES** has been found effective against vertebrate pests and the following insects and their preadult stages – that is, eggs, larvae and pupae:

almond moth	European grain moth	Mediterranean flour moth
Angoumois grain moth	flat grain beetle	pink bollworm
bean weevil	fruit flies	raisin moth
bees	granary weevil	red flour beetle
cadelle	greater wax moth	rice weevil
cereal leaf beetle	hairy fungus beetle	rusty grain beetle
cigarette beetle	Hessian fly	saw-toothed grain beetle
confused flour beetle	Indian meal moth	spider beetle
dermestid beetle	Khapra beetle	tobacco moth
dried fruit beetle	lesser grain borer	yellow meal worm
dried fruit moth	maize weevil	

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 100% control are leaks, poor gas distribution, unfavorable exposure conditions, etc. In addition, some insects are less susceptible to phosphine gas 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 followed, temperature and humidity conditions must be favorable.

The use of Granules in the short-term fumigation of storages to control vertebrate pests has also proven to be effective. Pests such as mice, pigeons, squirrels, ground hogs, etc., which are frequent sources of problems in storages, may be controlled.

## 6. **COMMODITIES WHICH MAY BE FUMIGATED WITH DEGESCH MAGTOXIN® GRANULES**

**MAGTOXIN® GRANULES** may be used for the fumigation of listed raw agricultural commodities, animal feed and feed ingredients, processed foods, tobacco and certain other nonfood items.

### 6.1 **Raw Agricultural Commodities, Animal Feed and Feed Ingredients Which May Be Fumigated with MAGTOXIN® GRANULES**

almonds	filberts	rye
animal feed & feed ingredients	flower seed	safflower seed
barley	grass seed	sesame seed
Brazil nuts	millet	seed & pod vegetables
cashews	oats	sorghum
cocoa beans	peanuts	soybeans
coffee beans	pecans	sunflower seeds
corn	pistachio nuts	triticale
cottonseed	popcorn	vegetable seed
dates	rice	walnuts
	wheat	

### 6.2 **Processed Foods**

The listed processed foods may be fumigated with **MAGTOXIN® GRANULES** .

#### **Processed Foods Which May be Fumigated with MAGTOXIN® GRANULES**

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 Byproducts  
Chocolate and Chocolate Products (such as assorted chocolate, chocolate liquor, cocoa, cocoa powder, dark chocolate coating and milk chocolate)  
Processed Coffee  
Corn Grits  
Cured, Dried and Processed Meat Products and Dried Fish  
Dates and Figs  
Dried Eggs and Egg Yolk Solids  
Dried Milk, Dried Powdered Milk, Non-Dairy Creamers, and Non-Fat Dried Milk  
Dried or Dehydrated Fruits (such as apples, dates, figs, peaches, pears, prunes, raisins and sultanas)

Processed Herbs, Spices, Seasonings and Condiments

Malt

Processed Nuts (such as almonds, apricot kernels, Brazil nuts, cashews, filberts, peanuts, pecans, pistachio nuts and walnuts)

Processed Oats (including oatmeal)

Rice (brewer's rice, grits, enriched and polished)

Soybean Flour and Milled Fractions

Processed Tea

Dried and Dehydrated Vegetables (such as beans, carrots, lentils, peas, potato flour, potato

products and spinach)

Yeast (including primary yeast)

Wild Rice

Other processed foods

### 6.3 Non-Food Commodities Including Tobacco Which May be Fumigated with MAGTOXIN® GRANULES

The listed non-food items may be fumigated with **MAGTOXIN® GRANULES**. Tobacco, psyllium seed and psyllium seed husks intended for drug use and certain other of the non-food commodities should not be contacted by residual dust from metal phosphide fumigants. Only lots of psyllium seed and psyllium seed husks destined for shipment to pharmaceutical manufacturers may be fumigated. Such dedicated lots may be fumigated in transport vehicles (truck trailers, railcars, containers) prior to shipment. In addition, psyllium seed and husks may be fumigated at other locations.

Processed or Unprocessed Cotton, Wool and Other Natural Fibers or Cloth, Clothing Straw and Hay

Feathers

Human Hair, Rubberized Hair, Vulcanized Hair, Mohair

Leather Products, Animal Hides and Furs

Tobacco

Wood, Cut Trees, Wood Chips and Wood and Bamboo Products

Paper and Paper Products

Psyllium Seed and Psyllium Seed Husks

Dried Plants and Flowers

Seeds (such as grass seed, ornamental herbaceous plant seed and vegetable seed)

Other non-food commodities

## 7. **EXPOSURE CONDITIONS**

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

<b><u>Temperature</u></b>	<b><u>MAGTOXIN® GRANULES Minimum Exposure Periods</u></b>
below 40° F (5° C)	not recommended
40° - 53° F (5-12° C)	4 days (96 hours)
54° - 68° F (12-20° C)	3 days (72 hours)
above 68° F (20° C)	2 days (48 hours)

The length of the fumigation must be great enough so as to provide for adequate control of the insect pests which infest the commodity being treated. The proper length of the fumigation period will vary with exposure conditions since, in general, insects are more difficult to control at lower temperatures. Fumigations of temperatures below 40°F (5°C) are not recommended. However, since production of phosphine gas by the DEGESCH Generator is rapid and complete, regardless of ambient temperatures, it is often possible to achieve satisfactory control under cooler conditions, if the exposure period is lengthened and/or if a higher concentration of phosphine gas is used.

It should be noted that there is little to be gained by extending the exposure period if the structure to be fumigated has not been carefully sealed or if the distribution of gas is poor and insects are not subjected to lethal concentrations of phosphine gas. Careful sealing is required to ensure that adequate gas levels are retained and proper application procedures must be followed to provide satisfactory distribution of phosphine gas. Some structures can only be treated when completely tarped while others cannot be properly sealed by any means and should not be fumigated. Exposure times must be lengthened to allow for penetration of gas throughout the commodity when fumigant is not uniformly added to the commodity mass. For example, by surface application of phosphine from the Generator to the top of a tall bin. This is particularly important in the fumigation of bulk commodity contained in large storage bins which should be treated using air from an auxiliary source to drive phosphine from the Generator to all parts of the structure.

Remember, exposure periods recommended in the table are minimum periods and may not be adequate to control all stored products pests under all conditions. The DEGESCH Generator produces phosphine gas very rapidly and completely depletes magnesium phosphide in the **MAGTOXIN® GRANULES** regardless of external environmental conditions of temperature or humidity. Therefore, this is the technique of choice under conditions of low humidity and/or low temperature.

## 8. **DOSAGE RATE GUIDELINES**

### **Allowable and Recommended Dosage Rates**

Phosphine is a mobile gas and will penetrate to all parts of the storage structure. Therefore, dosage must be based upon the total volume of the space being treated and not on the amount of commodity it contains. The same amount of phosphine is required to treat a 30,000 – bushel silo whether it is empty or full of grain unless, of course, a tarpaulin seals off the surface of the commodity.

#### 8.1 **Maximum Allowable Dosage Guidelines for Fumigation with MAG-TOXIN® GRANULES**

**PHOSPHINE**  
**g/1000 cu. ft.**  
145

**MAGTOXIN® GRANULES**  
**g/1000 cu. ft.**  
304

#### 8.2 **Recommended Dosages for Various Types of Fumigations**

The above maximum dosages are not to be exceeded and must be calculated to include any metal phosphide fumigants added to the structure. It is

important to be aware that a shortened exposure period cannot be fully compensated for with an increased dosage of phosphine gas. Although it is permissible to choose from the full range of dosages listed above, the following dosage ranges can be used as a guideline for the various types of fumigations.

### Dosage Ranges

<u>Type of Fumigation</u>	<u>Phosphine</u> g/1000 cu.ft.	<u>MAGTOXIN® GRANULES</u> g/1000 cu.ft.
1. Space		
mills, warehouses, etc.	20 - 60	42 - 126
bagged commodities	30 - 60	63 - 126
dried fruits and nuts	20 - 40	42 - 84
stored tobacco	20 - 40	42 - 84
2. Bulk Stored Commodities		
vertical storages	30 - 60	63 - 126
tanks	30 - 70	63 - 147
flat storages (loose construction)	50 -145	105 - 304
farm bins	70 -145	147 - 304
bunkers and tarped ground storages	30 - 80	63 - 168
railcars	30 - 65	63 - 136
barges	50 -145	105 - 304
shipholds	30 - 65	63 - 136
dates, nuts and dried fruits		
20-40g PH <sub>3</sub> (42-84g Granules/1000 cu.ft.)		
all other commodities		
20-145g PH <sub>3</sub> (42-304g Granules/1000 cu.ft.)		

Higher dosages are recommended in structures that are of loose construction and in the fumigation of bulk stored commodities in which diffusion will be slowed and result in poor distribution of phosphine gas.

The wide range of dosages listed above may be required to handle the variety of fumigation situations encountered in practice. Somewhat higher dosages are usually recommended under cooler conditions or where exposure periods are relatively short. However, the major factor in selection of dosage is the ability of the structure to hold phosphine gas during the fumigation. A good illustration of this point is comparison of the low dosages required to treat modern, well-sealed warehouses with the higher ranges used for poorly constructed buildings that cannot be sealed adequately. In certain other fumigations, proper distribution of lethal concentrations of gas to reach all parts of the structure becomes a very important factor in dose selection. An example where this may occur is in the treatment with tablets or pellets of grain stored in tall silos. Poor gas distribution frequently results when the solid fumigant cannot be uniformly added to the grain and it must be treated by surface application of a metal phosphide fumigant. Use of the Generator can eliminate the problem of non-uniform gas concentrations.

Likewise, the addition or “add-back” of supplemental phosphine to a storage in the event that significant losses of the original dosage have occurred may readily be accomplished by the Generator. This has the advantages of ease and not requiring re-entry by fumigators into the hazardous atmosphere of the storage.

## 9. **PROTECTIVE CLOTHING**

### GLOVES:

Wear dry gloves of cotton or other material if contact with **MAGTOXIN® GRANULES** or its dust is likely. Gloves should remain dry during use.

Wash hands thoroughly after handling magnesium phosphide products.

Aerate used gloves and other contaminated clothing in a well-ventilated area prior to laundering.

## 10. **RESPIRATORY PROTECTION**

### 10.1 **When Respiratory Protection Must Be Worn**

Respiratory protection approved by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA) must be worn during exposure to concentrations in excess of permitted limits or when concentrations are unknown. Self-Contained Breathing Apparatus (SCBA) must be worn during entry into sites that are under fumigation if the concentration of phosphine is unknown or known to exceed the Short-Term Exposure Level (STEL) for phosphine (1 ppm for 15 minutes).

### 10.2 **Permissible Gas Concentration Ranges for Respiratory Protection Devices**

A NIOSH/MSHA approved full-face gas mask – phosphine canister combination may be used at levels up to 15 ppm or following manufacturers’ use conditions instructions for escape. Above 15 ppm or in situations where the phosphine concentration is unknown, a NIOSH/MSHA approved, SCBA must be worn. The NIOSH/OSHA Pocket Guide DHHS (NIOSH) 97-140 or the NIOSH ALERT – Preventing Phosphine Poisoning and Explosions During Fumigation, list these and other types of approved respirators and the concentration limits at which they may be used.

### 10.3 **Requirements for Availability of Respiratory Protection**

Respiratory protection need not be available for applications from outside the area to be fumigated such as addition of tablets or pellets to automatic dispensing devices, outdoor applications (including those using the DEGESCH Phosphine Generator, etc.) if exposures above the permitted exposure limits will not be encountered. The Generator may **never** be used to apply phosphine from inside the structure to be fumigated.

## 11. **REQUIREMENTS FOR CERTIFIED APPLICATOR TO BE PRESENT AND RESPONSIBLE FOR ALL WORKERS AS FOLLOWS:**

- A. A Certified Applicator must be physically present, responsible for, and maintain visual and/or voice contact with all fumigation workers during the applica-

tion of the fumigant. Once the application is complete and the structure has been made secure, the Certified Applicator does not need to be physically present at the site.

- B. A Certified Applicator must be physically present, responsible for and maintain visual and/or voice contact with all fumigation workers during the initial opening of the fumigation structure for aeration. Once the aeration process is secured and monitoring has established that aeration can be completed safely, the Certified Applicator does not need to be physically present and trained person(s) can complete the process and remove the placards.
- C. Persons with documented training in the handling of phosphine products must be responsible for receiving, aerating and removal of placards from vehicles which have been fumigated in transit. Refer to Section 12 for training requirements.

## **12. TRAINING REQUIREMENTS FOR RECEIPT OF INTRANSIT VEHICLES UNDER FUMIGATION**

The trained person(s) must be trained by a Certified Applicator following the EPA accepted product Applicator's Manual that must precede or be attached to the outside of a transport vehicle; or by other training which is accepted by local and/or state authorities. When training has been completed and the employee demonstrates safety knowledge proficiency, the training date must be logged and maintained in the employee's safety training record for a minimum of three years. Refresher training must be done on an annual basis.

This training must cover the following items, each of which may be found in the manual:

- a. How to aerate the vehicle and verify that it contains no more than 0.3 ppm phosphine.  
OR
- b. How to transfer the commodity to another storage area without prior aeration and ensure that worker safety limits are not being exceeded during the transfer.
- c. How to determine when respiratory protection must be worn.
- d. How to protect workers and nearby persons from exposure to levels above the 8-hour Time-Weighted Average (TWA) of 0.3 ppm or the 15-minute TWA Short-Term Exposure Limit (STEL) of 1.0 ppm phosphine.
- e. Proper removal of placards from the vehicle.
- f. How to follow proper residual disposal instructions.

## **13. GAS DETECTION EQUIPMENT**

There are a number of devices on the market for the measurement of phosphine gas at both industrial hygiene and fumigation levels. Glass detection tubes used in conjunction with the appropriate hand-operated air sampling pumps are widely used. These devices are portable, simple to use, do not require extensive training and are relatively rapid, inexpensive and accurate. Electronic devices are also available for both low level and high phosphine gas readings. Such devices should be used in full compliance with manufacturers' recommendations.

## 14. NOTIFICATION REQUIREMENTS

### 14.1 **Authorities and On-Site Workers:**

As required by local regulations, notify the appropriate local officials (fire department, police department, etc.) of the impending fumigation. Provide to the officials an MSDS and an Applicator's Manual for the product and any other technical information deemed useful. Offer to review this information with the local official(s).

### 14.2 **Incidents Involving These Products:**

Registrants must be informed of any incident involving the use of this product. Please call 540-234-9281 so Degesch America, Inc. can report the incident as per requirements of 40 CFR Part 159.

### 14.3 **Theft of Products:**

Immediately report to the local police department thefts of metal phosphide fumigants.

## 15. APPLICATOR AND WORKER EXPOSURE

### 15.1 **Exposure Limits**

Exposures to phosphine must not exceed the 8-hour Time Weighted Average (TWA) of 0.3 ppm or the 15-minute Short-Term Exposure Limit (STEL) of 1.0 ppm phosphine. All persons are covered by these exposure standards.

### 15.2 **Application of Phosphine Gas Using the DEGESCH Phosphine Generator**

Use of the DEGESCH Phosphine Generator virtually eliminates exposure to the applicator since the gas is generated internally and pumped into the structure through a system which is essentially gas-tight. Gas-tight stoppered flasks are opened, one at a time, for very brief periods during addition of **MAG-TOXIN® GRANULES** to the Generator. The Generator is most often positioned in open air, alongside the storage under treatment.

Care must be taken not to expose the GRANULES to liquid water during additions to the Generator. Do not attempt to apply the GRANULES to the Generator in situations where rain condensation or other sources of liquid water can come into contact with them.

### 15.3 **Leakage from Fumigated Sites**

Phosphine gas 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 must be examined to ensure that significant leakage has not occurred. Sealing of the fumigated site and/or airflow in the occupied area must be sufficient to bring down the phosphine concentration to a safe level of 0.3 ppm or below.

### 15.4 **Aeration and Re-entry**

If the structure is to be entered after fumigation, it must be aerated until the level of phosphine gas 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 (i.e., over industrial hygiene levels of phosphine). Do not allow re-entry into treated structures by any person before the level of phosphine reaches 0.3 ppm or below, unless protected by an approved respirator.

### 15.5 Handling Un aerated Commodities

Transfer of incompletely aerated commodity via bulk handling equipment such as augers, drag conveyors and conveyor belts to a new storage structure is permissible. A certified applicator is responsible for training workers who handle the transfer of incompletely aerated listed commodities and appropriate measurers must be taken (i.e., ventilation or respiratory protection) to prevent exposures from exceeding the exposure limits for phosphine. The new storage structure must be placarded if it contains more than 0.3 ppm phosphine. If the fumigation structure must be entered to complete the transfer, at least two trained persons, wearing proper respiratory protection may enter into the structure. A certified applicator must be physically present during the entry into the structure. Remember transporting containers or vehicles under fumigation over public roads is prohibited.

### 15.6 Industrial Hygiene Monitoring

Phosphine exposures must be documented in an operations log or manual at each fumigation area and operation where exposures may occur. Monitor airborne phosphine concentrations in all indoor areas to which fumigators and other workers have had access during fumigation and aeration. Perform such monitoring in workers' breathing zones. This monitoring is mandatory and is performed to determine when and where respiratory protection is required. Once exposures have been adequately characterized, spot checks must be made, especially if conditions change significantly or if an unexpected garlic odor is detected or a change in phosphine level is suspected.

### 15.7 Engineering Controls and Work Practices

If monitoring shows that workers may be exposed to concentrations in excess of the permitted limits, then engineering controls (such as forced air ventilation) and/or appropriate work practices must be used to reduce exposure to within permitted limits. In any case, appropriate respiratory protection must be worn if phosphine exposure limits are exceeded.

## 16. PLACARDING OF FUMIGATED AREA

All entrances to the fumigated structure must be placarded. Placards must be made of substantial material that can be expected to withstand adverse weather conditions and must bear the wording as follows:

1. The signal word DANGER/PELIGRO and the SKULL AND CROSSBONES symbol in red.
2. The statement "Structure and/or commodity under fumigation. DO NOT ENTER/NO ENTRE".
3. The statement "This sign may only be removed by a certified applicator or a person with documented sign training after the structure and/or commodity is com-

pletely aerated (contains 0.3 ppm or less of phosphine gas). If incompletely aerated commodity is transferred to a new storage structure, the new structure must also be placarded if it contains more than 0.3 ppm. Workers exposure during this transfer must not exceed allowable limits.

4. The date fumigation begins.
5. Name and EPA registration number of fumigant used.
6. Name, address and telephone number of the Fumigation Company and/or applicator.
7. A 24-hour emergency response telephone number.

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

Do not remove placards until the treated commodity is aerated down to 0.3 ppm phosphine gas or less. To determine whether aeration is complete, each fumigated structure or vehicle must be monitored and shown to contain 0.3 ppm or less phosphine gas in the air space around and, if feasible, in the mass of the commodity.

## 17. **SEALING OF STRUCTURE**

The structure to be fumigated must first be inspected to determine if it can be made sufficiently gas tight. Careful sealing is required so that adequate gas levels are retained. Turn off all ventilation, supply air, air conditioning and any other air moving systems which could negatively affect the fumigation. Thoroughly inspect the structure to be fumigated and seal cracks, holes and openings. These areas could include, but are not limited to: windows, doors, vents, chimneys, open pipes and structural flaws. Sealing techniques can vary, but most often include polyethylene sheeting, adhesive tapes and adhesive sprays. Expandable foam or caulking material can work well on structural flaws. Proper sealing will insure sufficient gas levels within the fumigated structure and will decrease the chance of unwanted exposures outside of the fumigated area.

As with all fumigations, it is required that sealing be inspected for leaks. If phosphine above 0.3 ppm is found in an area where exposure to workers or bystanders may occur, the fumigator, using proper respiratory protective equipment, must attempt to seal the leak from the exterior of the structure. Failing this, the fumigators, following proper procedures to prevent accidental poisoning, may enter the structure and seal the leaks from the interior. If the concentration inside the structure has decreased below the target level as a result of the leakage, additional phosphine may be added following the sealing repairs.

**DO NOT FUMIGATE A STRUCTURE THAT CANNOT BE SEALED SUFFICIENTLY GAS TIGHT.**

## 18. **AERATION OF FUMIGATED COMMODITIES**

As an alternative to the aeration time periods listed below, each container of the treated commodity may be analyzed for residues using accepted analytical methods.

### 18.1 Foods and Feeds

Tolerances for phosphine gas 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 a minimum of 48 hours prior to offering them to the end consumer.

### 18.2 Non-Food Commodities

Aerate all non-food commodities to 0.3 ppm or less of phosphine. Monitor densely packed commodities to ensure that aeration is complete.

### 18.3 Tobacco

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

## 19. STORAGE INSTRUCTIONS

Store **MAGTOXIN® GRANULES** 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 areas used to store these commodities. **DEGESCH MAGTOXIN® GRANULES** are supplied in gas-tight resealable aluminum flasks. Do not contaminate food, water or feed by storing pesticides in the same areas used to store these commodities. Do not store in buildings where humans or domestic animals may reside. Keep out of reach of children. Do not expose the product to atmospheric moisture any longer than is necessary and seal tightly before returning opened flasks to storage. The shelf life of the **MAGTOXIN® GRANULES** is virtually unlimited as long as the containers are kept tightly sealed.

### 19.1 Labeling of Storage

The labeling of the storage area should take into account the needs of a variety of organizations. These include, but are not limited to: company policy, insurance carrier, Occupational Safety and Health Administration (OSHA), Emergency Planning and Community Right-to-Know and local emergency response professionals. At a minimum, the storage must be marked with the following signs and should be locked:

1. Danger, Poison (with skull and cross bones)
2. Authorized Personnel Only
3. National Fire Protection Association (NFPA) Hazard Identification Symbols for the pesticide.

The NFPA has developed Hazard Identification symbols. This standardized system is designed to provide, at a glance, the information regarding the health, fire and reactivity hazards associated with hazardous materials. The following are the hazard categories and degree of hazard for aluminum phosphide:

<u>Category</u>	<u>Degree of Hazard</u>
Health	4 (Severe Hazard)
Flammability	4 (Severe Hazard)
Reactivity	2 (Moderate)
Special Notice Key	W

NOTE: When using the NFPA Hazard Identification System, the characteristics of all hazardous materials stored in a particular area must be considered. The local fire protection district should be consulted for guidance on the selection and placement of such signs.

## **20. TRANSPORTATION INSTRUCTIONS**

The United States Department of Transportation (DOT) classifies magnesium phosphide as Dangerous When Wet material and it must be transported in accordance with DOT regulations.

### **20.1 Transport Designations**

The following transport designations apply to magnesium phosphide

Proper Shipping Name:	Magnesium phosphide
Hazard Class:	4.3
Identification No.:	UN 2011
Packing Group:	PG I
Shipping Label:	Dangerous When Wet/Poison
Shipping Placard:	Dangerous When Wet

### **20.2 Transportation Special Permit**

Special Permit: DOT-SP 11329

Purpose and Limitation: "...The motor vehicles used under the terms of this special permit are not required to be placarded..."

Modes of Transportation Authorized: Motor vehicle (Only private motor vehicles used in pest control operations are authorized to transport the packages covered by the terms of this special permit.)

NOTE: You must have a copy of this special permit with you during transportation.

For a copy of this special permit contact: DEGESCH America, Inc., 153 Triangle Drive, P.O. Box 116, Weyers Cave, VA 24486 USA - Telephone: (540)234-9281/ 1-800-330-2525 - Fax: (540)234-8225 or Internet: [www.degeschamerica.com](http://www.degeschamerica.com)

## **21. FUMIGATION MANAGEMENT PLAN**

The certified applicator is responsible for working with the owners and/or responsible employees of the structure and/or area to be fumigated to develop and follow a Fumigation Management Plan (FMP). The FMP is intended to ensure a safe and effective fumigation. The FMP must address characterization of the structure and/or area and include appropriate monitoring and notification requirements consistent with, but not limited to, the following:

1. Inspect the structure and/or area to determine its suitability for fumigation.
2. When sealing is required, consult previous records for any changes to the structure, seal leaks and monitor any occupied adjacent buildings to ensure safety.
3. Prior to each fumigation, review any existing FMP, MSDS, Applicator's Manual and other relevant safety procedures with company officials and appropriate employees.

4. Consult company officials in the development of procedures and appropriate safety measures for nearby workers that will be in and around the area during application and aeration.
5. Consult with company officials to develop an appropriate 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 placards to secure entrance into any structure under fumigation.
8. Confirm the required safety equipment is in place and the necessary manpower is available to complete a safe and effective fumigation.
9. Written notification must be provided to the receiver of a vehicle that is fumigated in-transit.

These factors **must** be considered in putting a FMP together. It is important to note that some plans will be more comprehensive than others. All plans should reflect the experience and expertise of the applicator and circumstances at and around the structure and/or area.

In addition to the plan, the applicator must read the entire label and Applicator's Manual and follow its directions carefully. If the applicator has any questions about the development of a FMP, contact **DEGESCH AMERICA, INC.** for further assistance.

The FMP and related documentation, including monitoring records, must be maintained for a minimum of 2 years.

## **GUIDANCE FOR PREPARATION OF A FUMIGATION MANAGEMENT PLAN**

### Purpose

A Fumigation Management Plan (FMP) is an organized, written description of the required steps involved to help ensure a safe, legal and effective fumigation. It will also 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 structure and/or area.

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. By following a step-by-step procedure which allows for flexibility, a 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 also 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 Degesch America, Inc. for assistance. Finally, before any fumigation begins you must be familiar with and comply with all applicable federal, state and local regulations. The success of the fumigation is

not only dependent on your ability to do your job but also upon carefully following all rules, regulations, and procedures required by governmental agencies.

## A CHECKLIST GUIDE FOR A FUMIGATION MANAGEMENT PLAN

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 site.

### A. PRELIMINARY PLANNING AND PREPARATION

1. Determine the purpose of the fumigation:
  - a. Elimination of insect infestation.
  - b. Elimination of vertebrate pests.
  - c. Plant pest quarantine.
2. Determine the type of fumigation, for example:
  - a. Space: tarp, mill, warehouse, food plant, or outdoor area
  - b. Vehicle: railcar, truck, van, container
  - c. Commodity: raw agricultural or processed foods or non-food
  - d. Type of Storage: vertical silo, farm storage, flat storage, etc.
3. Fully acquaint yourself with the structure and commodity to be fumigated, including:
  - a. The general structure layout, construction (materials, design, age, maintenance) of the structure, fire or combustibility hazards, connecting structures and escape routes, above and below ground, and other unique hazards or structural characteristics. Prepare with the owner/operator/person in charge, a drawing or sketch of structure to be fumigated, delineating features, hazards and other structural characteristics.
  - b. The number and identification of persons who routinely enter the area to be fumigated (i.e., employees, visitors, customers, etc.)
  - c. The specific commodity to be fumigated, its mode of storage and its condition.
  - d. The previous treatment history of the commodity, if available.
  - e. Accessibility of utility service connections.
  - f. Nearest telephone or other means of communication. Mark the location of these items on the drawing/sketch.
  - g. Emergency shut-off stations for electricity, water and gas. Mark the location of these items on the drawing/sketch.
  - h. Current emergency telephone numbers of local health, fire, police, hospital and physician responders.

- i. Name and phone number (both day and night) of appropriate company officials.
- j. Check, mark and prepare the points of fumigant application locations if the job involves entry into the structure for fumigation.
- k. Review labeling and Applicator's Manual
- l. Exposure time considerations.
  1. Product to be used.
  2. Minimum fumigation period, as defined and described by the label use directions.
  3. Down time required to be available
  4. Aeration requirements
  5. Cleanup requirements, including dry or wet deactivation methods, equipment and personnel needs, if necessary.
  6. Measured and recorded commodity temperature and moisture.
- m. Determination of dosage
  1. Cubic footage or other appropriate space/location calculations.
  2. Structure sealing capability and methods.
  3. Label recommendations
  4. Temperature, humidity, wind
  5. Commodity/space volume
  6. Past history of fumigation of structure
  7. Exposure time.

## B. PERSONNEL

1. Confirm in writing that all personnel in and around the structure and/or area 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 fumigation personnel to read the Applicator's Manual concerning the hazards that may be encountered, the selection of personal protection devices, including detection equipment.
3. Confirm that all personnel are aware of and know how to proceed in case of an emergency situation.
4. Instruct all 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 an emergency.

## C. MONITORING

1. Safety
  - a. Monitoring of phosphine concentrations must be conducted in areas to prevent excessive exposure and to determine where exposure may occur. Document where monitoring will occur.

- b. Keep a log or manual of monitoring records for each fumigation structure and/or area. This log must, at a minimum, contain the timing, number of readings taken and level of concentrations found in each location.
- c. When monitoring, document even if there is no phosphine present above the safe levels. In such cases, subsequent monitoring is not routinely required. However, spot checks must be made occasionally, especially if conditions change significantly.
- d. Monitoring must be conducted during aeration and corrective action must be 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. Phosphine readings should be taken from within the fumigated structure to insure proper gas concentrations. If the phosphine concentrations have fallen below the targeted level, the fumigators, following proper procedures, may add additional phosphine.
- b. All phosphine readings should be documented.

## 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 Plan”) which contains explicit instructions, names, and telephone numbers so as to be able to notify local authorities if phosphine levels are exceeded in an area that could be dangerous to bystanders and/or domestic animals.
- 3. Confirm that the receiver of in-transit vehicles under fumigation have been notified and are trained according to Section 12 of this Applicator’s Manual.

## E. SEALING PROCEDURES

- 1. Sealing must be adequate to control the pests. Care should be taken to insure that sealing materials would remain intact until the fumigation is complete.
- 2. If the structure has been fumigated before, review the previous FMP for previous sealing information.
- 3. Make sure that construction/remodeling has not changed the building in a manner that will effect the fumigation.
- 4. Warning placards must be placed on every possible entrance to the fumigation structure.

## F. APPLICATION PROCEDURES & FUMIGATION PERIOD

1. Plan carefully and apply the fumigant in accordance with the label requirements.
2. When entering into the area under fumigation, always work with two or more people under the direct supervision of a certified applicator wearing appropriate respirators.
3. Apply **MAGTOXIN® GRANULES** fumigant with the Generator, from the outside only.
4. Provide watchmen when the possibility of entry into the fumigation site by unauthorized persons cannot otherwise be assured.
5. When entering structures, always follow OSHA rules for confined spaces.
6. Document that the receiver of vehicles fumigated in transit has been notified.
7. Turn off any electric lights in the fumigated area of the structure as well as all non-essential electrical motors.

## G. POST-APPLICATION OPERATIONS

1. Provide watchmen when the fumigation structure cannot be secured from entry by unauthorized persons during the aeration process.
2. Aerate in accordance with structural limitations.
3. Turn on ventilating or aeration fans where appropriate.
4. Use a suitable gas detector before re-entry into a fumigated structure to determine fumigant concentration.
5. Keep written records of monitoring to document completion of aeration.
6. Consider temperature when aerating.
7. Ensure that aeration is complete before moving a treated vehicle onto public roads.
8. Remove warning placards when aeration is complete.
9. Inform business/client that employees/other persons may return to work or otherwise be allowed to re-enter the aerated structure.

## 22. APPLICATION PROCEDURES

**A FMP must be devised to cover application and exposure period, aeration and disposal of the fumigant so as to keep to a minimum any human exposure to phosphine and to help assure adequate control of the insect pests.**

**The following instructions are intended to provide general guidelines for typical fumigation sites:**

### 22.1 Fumigation of Warehouses, Mills and Food Processing Plants

1. Using information provided in the Applicator's Manual, calculate the dosage of phosphine to be applied and the duration of the fumigation based upon the volume of the building, the general tightness of the structure and the air and/or commodity temperature.

2. Turn off all lights within the area to be treated and shut off all electrical motors not essential to operation of the storage.
3. Carefully seal and place warning placards on the space to be fumigated. Doors leading to the fumigated space should be closed, sealed, locked and placarded with fumigation warning signs.
4. Attach the outlet and inlet piping from the DEGESCH Generator so that air from inside the structure is pulled into the Generator to dilute the phosphine-carbon dioxide mixture and then injected back into the space to be treated.
5. Add **MAGTOXIN® GRANULES** to the DEGESCH Generator and inject phosphine into the structure. Make sure beforehand that the funnel through which the GRANULES are applied and the receiving chamber for the GRANULES are not wet. Do not allow the GRANULES to contact water outside the Generator.
6. Although phosphine will diffuse very rapidly through open air, it is a good idea to continue recirculation of air from the Generator until adequate concentrations of phosphine are attained throughout the structure, as determined by gas concentration readings. Phosphine may be injected into the structure at several points if necessary to achieve more uniform distribution of the gas.

## 22.2 Fumigation of Vertical Storages (farm bins, concrete upright bins and other silos)

1. Carefully seal and place fumigation warning placards on the storage.
2. Smaller bins and silos may be fumigated by recirculation of phosphine gas produced by the Generator, in a manner similar to that employed for warehouses. Alternatively, they may be treated by adding gas from the Generator without recirculation into the bottom of the bin or silo. Addition is continued until phosphine is detected at the opening at the top of the structure.
3. Larger vertical storages, whose volumes greatly exceed the capacity of the fan motor (120 m<sup>3</sup>/hr., 4200 ft.<sup>3</sup>/hr.) of the DEGESCH Generator, will require an auxiliary air supply to distribute phosphine throughout the silo in a reasonable length of time. Depending upon the volume of the silo, the auxiliary air should have a flow rate of 5 to 10 times that of the Generator's fan, 350 to 700 cfm. Use of an auxiliary air supply will enable the addition of phosphine from the DEGESCH Generator and distribution of the gas throughout the structure to be complete within a few hours.
4. For fumigation of larger vertical storages, leave an opening of 2 sq. ft. or more at the top of the structure. This will prevent a build-up of pressure

from gas pumped into the storage. Place a gas sampling near the top of the storage.

5. Connect the outlet gas lines from the DEGESCH Generator and the auxiliary air supply to the bottom of the silo.
6. Turn on the auxiliary air supply and then begin injection of phosphine from the Generator into the storage.
7. Take periodic gas readings from the top of the silo, particularly near the time estimated for phosphine to reach the top.
8. Plan the addition of **MAGTOXIN® GRANULES** to the DEGESCH Generator so that phosphine is being generated more or less continuously throughout the time estimated for phosphine to reach the top.
9. Turn off the auxiliary air supply and disconnect the Generator when the **MAGTOXIN® GRANULES** have been reacted and all the phosphine has been injected into the structure.
10. More or less uniform concentrations will be reached by diffusion of phosphine throughout the structure with several additional hours. This may be verified by making gas readings from sampling lines placed in appropriate positions in the storage.

### 22.3 Fumigation of Flat Storages, Bunkers and Other Tarpred Structures

1. Establish a plan for application of phosphine gas depending upon the characteristics of the structure to be treated. For example, it is difficult to treat a flat storage containing grain at depths greater than above 20 ft. and having no aeration ducts unless the storage is sealed very carefully.
2. If the structure has no aeration ducts, the surface of the grain must be carefully tarpred and remainder of the building sealed as tightly as possible.
3. Inject and recirculate phosphine gas through the aeration ducts or at points below the surface of the grain. Depending upon the size of the storage, it may be necessary to make injections of gas at several points along its perimeter.
4. It is recommended that gas concentration measurements be made at several points in the structure to verify the presence of lethal concentration throughout the term of the fumigation.

## 22.4 Fumigation of Railcars, Containers, Trucks, Vans and Other Transport Vehicles and Small Storages

Railcars and containers, trucks, vans and other transport vehicles shipped piggyback by rail may **not** be fumigated intransit with **MAGTOXIN® GRANULES**.

Transport vehicles and other small storages loaded with bulk commodities to which phosphine gas may be added directly are treated in essentially the same way as any other small storage facility. Carefully seal all vents, cracks or other leaks in the small storage. Small volume storages such as transport vehicles and small tarped spaces, buildings and rooms may be treated by adding the appropriate amount of phosphine gas from the Generator affixed to the space in the recirculation mode. See Section 16 of this Applicator's Manual for recommendations on placarding.

## 22.5 Fumigation of Storages to Control Rodents and other Non-Insect Pests

Rodents and many other non-insect pests in storages may be controlled with short-term fumigations using the DEGESCH Phosphine Generator. In contrast to insects, which generally require 3 or more days of fumigation to obtain adequate control, rodents and other vertebrate pests may be controlled within 1 to 4 hours after achieving distribution of phosphine throughout the structure. A concentration of 220 ppm PH<sub>3</sub> will control these pests in about one hour. Control will be achieved by exposure to 440 ppm PH<sub>3</sub> for one-half hour, 110 ppm PH<sub>3</sub> for two hours and so forth.

## 23. DISPOSAL INSTRUCTIONS

### 23.1 General

1. Do not contaminate water, food or feed by storage or disposal.
2. The aluminum flasks are non-refillable containers. Do not reuse or refill aluminum flasks. Offer for recycling, if available.
3. Unreacted or partially reacted **MAGTOXIN® GRANULES** are acutely hazardous. Improper disposal of excess pesticide is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance. For specific instructions, see Section 24 of this manual, Spill and Leak Procedures.
4. 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.

5. Triple rinse empty flasks with water if contacted with spent or partially reacted dust from **MAGTOXIN® GRANULES**. Dispose of containers in a sanitary landfill or by other procedures approved by state and local authorities.
6. The magnesium carbonate slurry produced in the Generator from the **GRANULES** will contain virtually no unreacted magnesium phosphide. This will be a nonhazardous waste. However, incompletely exposed **MAGTOXIN® GRANULES** will require special care for disposal.

### 23.2 Directions for Disposal of Reacted **MAGTOXIN® GRANULES**

1. Confinement of partially spent **MAGTOXIN® GRANULES**, as in a closed container or plastic bag, may result in a fire hazard. Small amounts of phosphine gas may be given off from unreacted magnesium phosphide and confinement of the gas may result in a flash.
2. In open areas, **GRANULES** may be disposed of on-site by burial.
3. Unreacted or improperly exposed **MAGTOXIN® GRANULES** must be further deactivated before disposal at a landfill.
4. The spent slurry produced by the Generator from **MAGTOXIN® GRANULES** is not a hazardous waste and may be disposed of at a sanitary landfill, or other approved sites or means, with or without prior decanting. Where permissible, the slurry or the decanted water from the slurry may be poured out onto the ground or may be poured into a storm sewer.

## 24. SPILL AND LEAK PROCEDURES

### 1. General Precautions and Directions

A spill, other than incidental to application or normal handling, may produce high levels of gas and, therefore, attending personnel must wear SCBA or its equivalent when the concentration of phosphine gas is unknown. Other NIOSH/MSHA approved respiratory protection may be worn if the concentration is known. Do not use water at any time to clean up a spill of **MAGTOXIN® GRANULES**. Water in contact with unreacted metal phosphides will greatly accelerate the production of phosphine gas which could result in a toxic and/or fire hazard. Wear dry gloves of cotton or other material when handling metal phosphides.

In the event of damage during shipment of the **GRANULES**, return all intact aluminum flasks to fiberboard cases or other packaging which has been suitably constructed and marked according to DOT regulations. Notify consignee and shipper of damaged cases.

If aluminum flasks have been punctured or damaged so as to leak, the container may be temporarily repaired with aluminum tape or the GRANULES may be transferred from the damaged flask to a sound metal container which should be sealed and properly labeled as magnesium phosphide. **MAGTOXIN® GRANULES** which have spilled or have been exposed to air for more than a few minutes must not be resealed. This might result in a dangerous buildup of pressure. This material must be deactivated by the wet method or by exposure to atmospheric moisture. Transport the damaged containers to an area suitable for pesticide storage for inspection. Further instructions and recommendations may be obtained, if required, from DEGESCH America, Inc.

If the flasks have been damaged so badly that they cannot be sealed and if no sound metal containers are available, the GRANULES may be deactivated by spreading out in a thin layer on the ground. The GRANULES should then be covered with an inch or two of sand or soil to prevent them from being carried away by wind. Do not use this procedure during periods of rain or if the soil is wet.

## 2. **Directions for Deactivation by the Wet Method**

If the contaminated material cannot be held until completely reacted by exposure to atmospheric moisture, deactivate the product by the "Wet Method" as follows:

- a. Water is used for the wet deactivation of **MAGTOXIN® GRANULES** and other magnesium phosphide fumigants. Detergent solution is **not** required. Fill several drums or other containers to be used for wet deactivation with water to within an inch of the top. Do **not** allow a large headspace above the surface of the water.
- b. Magnesium phosphide reacts very vigorously with water and, therefore, only a small amount of unexposed or partially exposed **MAGTOXIN® GRANULES** should be wet deactivated at one time. Fresh additions may be made as soon as the vigorous reaction of the GRANULES has subsided.
- c. Reaction of **MAGTOXIN® GRANULES** with water is practically complete within just a few minutes. However, the GRANULES should be totally immersed for 6 hours to ensure total hydrolysis.

**Caution: Removal of the GRANULES from water before they are largely deactivated may result in fire.** Deactivated material may then be taken to an approved site for disposal. Dispose of the water at a sanitary landfill or other approved site or means. Where permissible, the water may be poured out onto the ground or it may be poured into a storm sewer.

- d. **Caution:** Wear appropriate respiratory protection during wet deactivation of unexposed or incompletely exposed **MAGTOXIN® GRANULES**. Never place metal phosphide products or their dust in a closed container such as a dumpster, sealed drum, plastic bag, etc., as flammable

concentrations and a flash of phosphine gas are likely to develop. Do not cover the container being used for wet deactivation.

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