

PM32

59209-4

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US ENVIRONMENTAL PROTECTION AGENCY OFFICE OF PESTICIDES PROGRAMS REGISTRATION DIVISION (75-767) WASHINGTON, DC 20460  NOTICE OF PESTICIDE: <input checked="" type="checkbox"/> REGISTRATION <input type="checkbox"/> REREGISTRATION (Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended)	EPA REGISTRATION NO. 59209-4  TERM OF ISSUANCE Conditional  NAME OF PESTICIDE PRODUCT Magnaphos Tablets	DATE OF ISSUANCE DEC 31 1996
NAME AND ADDRESS OF REGISTRANT (Include ZIP code)  Inventa Corporation 990 Highland Park Drive #110-T. Solona Beach, CA 92075		
NOTE: Changes in labeling formula differing in substance from that accepted in connection with this registration must be submitted to and accepted by the Registration Division prior to use of the label in commerce. In any correspondence on this product always refer to the above U.S. EPA registration number.		
On the basis of information furnished by the registrant, the above named pesticide is hereby Registered/Reregistered under the Federal Insecticide, Fungicide, and Rodenticide Act.		
A copy of the labeling accepted in connection with this Registration/Reregistration is returned herewith.		
Registration is in no way to be construed as an indorsement or approval of this product by this Agency. In order to protect health and the environment, the Administrator, on his motion, may at any time suspend or cancel the registration of a pesticide in accordance with the Act. The acceptance of any name in connection with the registration of a product under this Act is not to be construed as giving the registrant a right to exclusive use of the name or to its use if it has been covered by others.		
This product is conditionally registered in accordance with FIFRA sec. 3(c)(7)(A) provided that you:		
1. Submit/cite all data required for registration/reregistration of your product under FIFRA section 3(c)(5) when the Agency requires all registrants of similar products to submit such data; and submit acceptable responses required for reregistration of your product under FIFRA section 4.		
2. Make the labeling changes listed below before you release the product for shipment:		
a. Add the phrase "EPA Registration No. 59209-4."		
b. Revise the Environmental Hazards statement according to PR Notice 93-10 (published July 29, 1993): "This product is toxic to fish and aquatic organisms. Do not contaminate water by cleaning of equipment or disposal of wastes. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA."		
<input type="checkbox"/> ATTACHMENT IS APPLICABLE		
SIGNATURE OF APPROVING OFFICIAL	DATE DEC 31 1996	

c. In the "Storage and Handling" instructions of the product label, revise "Disposal Statement" to "Pesticide Disposal".

3. Submit Guideline Ref. No. 63-20 (Corrosion Characteristics) of the Product Chemistry Data requirements within ninety (90) days of the date of this notice.

4. Submit one copy of your final printed labeling which incorporates the comments listed above before releasing the product for shipment.

If these conditions are not complied with, the registration will be subject to cancellation in accordance with FIFRA sec. 6(e). Your release for shipment of the product constitutes acceptance of these conditions.

A stamped copy of the label is enclosed for your records.

Sincerely,

*Robert Suaroglin for*

Vivian A. Turner  
Acting Product Manager (32)  
Antimicrobial Program Branch  
Registration Division (7505C)

Enclosures

RESTRICTED USE PESTICIDE

DUE TO ACUTE INHALATION TOXICITY OF HIGHLY TOXIC PHOSPHINE 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 INVENTA CORPORATION Applicator's Manual working under direct supervision and in the physical presence of the certified applicator. Physical presence means on site or on premises. Read and follow the label and the INVENTA CORPORATION Applicator's Manual which contains complete instructions for safe use of this pesticide.

MAGNAPHOS

TABLETS

Magnesium Phosphide Fumigant

A fumigant for use against list insects which infest listed raw Agricultural Commodities, Specified Processed foods, and Animal Feed.

Active Ingredient. .... 66.0%  
Inert Ingredients.....34.0%

PRECAUCION AL USUARIO: Si usted no lee ingles, no use este producto hasta que la etiqueta se le haya sido explicado and ~~comentado~~ <sup>COMMENTS</sup> commented.

with COMMENTS  
EPA Letter Dated:

KEEP OUT OF REACH OF CHILDREN

DEC 31 1996

DANGER - PELIGRO - POISON

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

59209-4

PRACTICAL TREATMENT STATEMENT

SYMPTOMS of overexposure to phosphine are headache, dizziness, nausea, difficult breathing, vomiting and diarrhea. In all cases of overexposure, get immediate medical attention. Take the victim to a doctor or emergency treatment facility. If the gas from Magnesium phosphide is INHALED: Move exposed person to fresh air. Keep person 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.

If Magnesium Phosphide Powder, Granules, Pellets or Tablets are SWALLOWED: Drink or administer one or two glasses of water and induce vomiting by touching back of throat with finger, or if available syrup of ipecac. Do not give anything by mouth if victim is unconscious or not alert.

If Powder, Granules, or Tablets of Magnesium Phosphide get on SKIN: Brush material off clothes and shoes in a well ventilated area. Allow clothes to aerate in a ventilated area prior to

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laundering. Wash contaminated bare skin thoroughly with soap and water .

If in EYES : Flush with plenty of water. Get medical attention immediately.

SEE SIDE PANELS FOR ADDITIONAL PRECAUTIONARY STATEMENTS

NET WEIGHT

CONTENTS

Manufactured by : UNITED PHOSPHORUS LIMITED, Bombay - 400 018,  
INDIA.

Manufactured for : INVENTA CORPORATION, 14, Phoenix Drive, Mendham,  
NJ 07945. U. S. A.

E. P. A. Registration No.

E. P. A. Establishment No. : 41876 - IY - 1

5/93

PRECAUTIONARY STATEMENTS  
Hazards to Humans and Domestic Animals  
KEEP OUT OF REACH OF CHILDREN  
DANGER - POISON

Magnesium Phosphide powder, granules, Tablets, Pellets or Bags may be fatal if swallowed. 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, extremely toxic phosphine gas will be released. If a garlic odour is detected, you must monitor to determine whether phosphine gas is present above the acceptable exposure limits. (see section on respiratory protection). Since an odour may not be detected in certain circumstances, the absence of a garlic odour does not mean that phosphine gas is absent. Observe proper application, aeration, reentry and disposal procedures specified elsewhere in the labeling to prevent overexposure.

Physical/Chemical Hazards.

Magnesium Phosphide in Tablets, Pellets and partially spent dust will release phosphine gas if exposed to moisture from the air or if it comes into contact with water, acid and many other liquids. Piling of Tablets, Pellets, Bags or dust from their fragmentation may cause a temperature increase and confine the release of gas so that ignition could occur.

Always open containers of Magnesium Phosphide products outdoors as under certain conditions they may flash upon opening. When opening, point the container away from the face and body and slowly loosen the cap. Although the chances for flash are very remote, never open these containers in a flammable atmosphere. These precautions will also reduce the applicators exposure to phosphine gas.

Pure phosphine gas is practically insoluble in water, 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. Thus, small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gears, communications 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.

ENVIRONMENTAL HAZARDS

This product is toxic to fish and wildlife. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans or public waters, unless this product is specifically identified and addressed in a National Pollutant Discharge Elimination System (NPDES) permit. Do not discharge effluent containing this product to sewer systems without previously notifying the Sewage Treatment Plant Authority. For guidance, contact your state water board, or regional office of EPA.

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DIRECTIONS FOR USE

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

This fumigant is a highly hazardous material and may only be used by individuals trained in its proper use. Before using, read and follow all precautions and directions on the label and in the INVENTA CORPORATION Applicators Manual.

At least two trained persons must be present when the product is applied from within a space to be fumigated or during reentry into a fumigated or partially aerated site.

Prior to applying this product, you must inspect the site to be fumigated to determine if it can be made sufficiently gas tight. You should also develop a plan for monitoring (if Not done before) how to most efficiently and safely apply the fumigant, emergency procedures, etc. Notify appropriate company employees and provide relevant safety information annually to local officials having jurisdiction (fire department, rescue squad, police etc.) over the fumigation site. Follow all local and state regulations.

Shipholds, barges, containers on ships, railroad cars and containers shipped piggyback by rail may be fumigated in transit. However, trucks, vans, trailers and similar transport vehicles cannot be moved over public roads or highways until the fumigation is completed. Do not fumigate commodities with this product when commodity temperature is below 40 Deg F (5 Deg C).

Protective Clothing: Wear dry gloves when handling unpackaged tablets, Pellets or Bags. Wash hands thoroughly after use before smoking or eating.

Storage and Handling

Store 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. Do not store in buildings inhabited by humans or domestic animals.

Disposal Statement

General Disposal Statement: Do not contaminate water, food or feed by storage or disposal. Unreacted or partially reacted Aluminium or Magnesium Phosphide is acutely hazardous. Improper disposal of excess pesticide, spray mixture or rinsate is a violation of Federal Law. If these wastes cannot be disposed off, 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 Spill and Leak procedures. For further information please refer to INVENTA CORPORATION Applicators Manual.

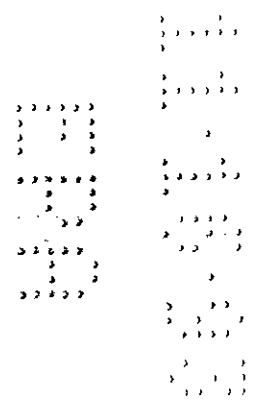
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Disposal of Bags: Please refer to INVENTA CORPORATION Applicators Manual.

Spill and Leak Procedure

A spill, other than incident 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 Magnesium phosphide. Water in contact with unreacted Tablets, Pellets or Bags will greatly accelerate the production of phosphine gas which could result in a toxic and/or fire hazard. Wear cotton gloves when handling pesticides. Return all intact Magnesium flasks to cardboard cases or other suitable packaging which has been properly marked according to DOT regulations. Notify consignee and shipper of damaged cases. If Magnesium flasks have been punctured or damaged to leak, the container may be temporarily repaired with Aluminium tape or the Magnesium phosphide may be transferred from the damaged flasks to a sound metal container which should be sealed and properly labeled as Magnesium phosphide. Transport the damaged containers to an area suitable for pesticide storage for inspection. Further recommendations and instructions may be obtained if required, form INVENTA CORPORATION

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RESTRICTED USE PESTICIDE

DUE TO ACUTE INHALATION TOXICITY OF HIGHLY TOXIC PHOSPHINE 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 INVENTA CORPORATION Applicator's Manual working under direct supervision and in the physical presence of the certified applicator. Physical presence means on site or on premises. Read and follow the label and the INVENTA CORPORATION Applicator's Manual which contains complete instructions for safe use of this pesticide.

ACCEPTED  
with COMMENTS  
in EPA Letter Dated:

DEC 31 1996

APPLICATOR'S MANUAL

for

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act as  
amended, for the Pesticide  
registered under EPA Reg. No.  
59209-4

MAGNAPHOS Tablets, Pellets, and Bags  
Magnesium Phosphide Fumigant

A fumigant for use against list insects which infest listed raw Agricultural Commodities, Specified Processed foods, and Animal Feed.

Active Ingredient: Magnesium Phosphide..... 66.0%  
Inert Ingredients.....34.0%

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

KEEP OUT OF REACH OF CHILDREN

DANGER - PELIGRO - POISON

PRACTICAL TREATMENT STATEMENT

SYMPTOMS of overexposure to phosphine are headache, dizziness, nausea, difficult breathing, vomiting and diarrhoea. In all cases of overexposure, get immediate medical attention. Take the victim to a doctor or emergency treatment facility. If the gas from Magnesium phosphide is INHALED: Move exposed person to fresh air. Keep the person warm and make sure the 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.

If Magnesium Phosphide Powder, Granules, Pellets or Tablets are SWALLOWED: Drink or administer one or two glasses of water and induce vomiting by touching back of throat with finger, or if available syrup of ipecac. Do not give anything by mouth if victim is unconscious or not alert.

If Powder, Granules, or Tablets of Magnesium Phosphide get on SKIN: Brush material off clothes and shoes in a well ventilated area. Allow clothes to aerate in a ventilated area prior to laundering. Wash contaminated bare skin thoroughly with soap and water.





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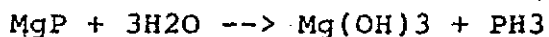
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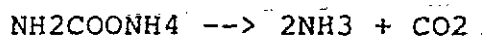
SECTION 1

INTRODUCTION

Magnaphos fumigants are used to protect stored commodities from damage by insects and for control of burrowing pests. Fumigation of stored products with Magnaphos in the manner prescribed in the labeling does not contaminate the stored commodity. Magnaphos and other Magnesium Phosphide fumigants are acted upon by atmospheric moisture to produce phosphine (PH<sub>3</sub>, hydrogen phosphide) gas. Magnaphos tablets, pellets and bags contain Magnesium Phosphide (MgP) as their active ingredient and will liberate phosphine via the following chemical reaction:



Phosphine gas is highly toxic to insect, burrowing 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 Manual for Magnaphos pellets, tablets and bags. Magnaphos also contains ammonium carbamate which liberates ammonia and carbon dioxide as follows



These gases are essentially nonflammable and act as inerting agents to reduce fire hazards. The ammonia gas also serves as a warning agent.

Magnaphos is prepared in three forms, tablets, pellets, and bags. The rounded tablets with approximately 3 grams and release 1 gram of phosphine gas. They are about 10mm in diameter and are bulk packaged in resealable aluminium flasks containing 100 or 500 tablets each. The pellets weigh approximately 0.6 grams and release 0.2 gram of phosphine gas. They are about 10mm in diameter and are packaged in resealable flasks containing 1660 pellets. The bags weigh 34 grams each and release 11 grams of phosphine gas. They are packaged in aluminium containers of six, ten, or one hundred bags to the container. The bags are packaged in an oxygen free environment.

Upon exposure to air Magnaphos pellets, tablets, and bags begin to react with atmospheric moisture to produce small quantities of phosphine gas. This reaction starts slowly, gradually accelerates and then tapers off again as the Magnesium Phosphide is spent. Magnaphos pellets react somewhat faster than do the tablets and bags. The rates of decomposition of the tablets, pellets and bags will vary depending upon moisture and

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temperature conditions. For example, when moisture and temperature of the fumigated commodity are high, decomposition of Magnaphos may be complete in less than 3 days. However at lower ambient temperatures and relative humidity levels, decomposition of Magnaphos may require 5 days or more. After decomposition, Magnaphos leaves a grey-white powder composed almost entirely of Magnesium hydroxide and other approved inert ingredients. If properly exposed, the spent Magnaphos will normally contain only a small amount of unreacted Magnesium Phosphide and may be disposed without hazard. While not considered a hazardous waste, partially spent residue from incompletely exposed Magnaphos will require special care. Precautions and instructions for further deactivation and disposal will be given later in the INVENTA CORPORATION Applicator's Manual.

Magnaphos pellets, tablets and bags are supplied in gas tight containers and their shelf life is unlimited as long as the packaging remains intact. Once opened for fumigation, the flasks of tablets and pellets may be tightly resealed and stored for future use. The Magnaphos bag container cannot be resealed for future use. Storage and handling instructions will be given in detail later in the INVENTA CORPORATION Applicator's Manual.

#### SAFETY RECOMMENDATION SUMMARY

1. Carefully read the labeling and follow instructions.
2. Never fumigate alone from inside the storage structure.
3. Person supervising must be a certified fumigator and the personnel assisting must be trained in the use of Magnesium Phosphide. Never allow uninstructed personnel to handle Magnesium Phosphide.
4. Approved respiratory protection must be available for the fumigation of structure from within.
5. Wear dry gloves of cotton or other materials if contact with Magnaphos tablets, pellets or bags is likely. Aerate used gloves and other contaminated clothing in a well ventilated area prior to laundering. Wash hands thoroughly after using Magnaphos.
6. Open fumigant containers in open air only. Never open in a flammable atmosphere.
7. Do not allow Magnaphos to contact water, or pile up.
8. Dispose of empty containers and spent residual dust in a manner consistent with the label instructions.
9. Post warning placards on fumigated areas.
10. Prior to fumigation, notify appropriate company employees. Provide to local officials (fire department, rescue

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squad, police etc.) on an annual basis relevant safety information for use in the event of an emergency .

11. Phosphine fumigants are not to be used for vacuum fumigants.
12. Exposure to phosphine must not exceed the eight hour TWA of 0.3 ppm during application, or a ceiling concentration of 0.3 ppm after application is completed.
13. Fumigated areas must be aerated to 0.3 ppm phosphine or less prior to reentry by unprotected workers.
14. Finished foods and feeds that have been fumigated with Magnaphos must be aerated for 48 hours prior to offering to the end use consumer.
15. Transfer of a treated commodity to another site without complete aeration is permissible provided that the new storage site is placarded if the phosphine concentration is above 0.3 ppm.
16. Keep containers of Magnaphos tightly closed except while removing product for application.
17. Protect materials containing metals such as copper, silver, gold and their alloys and salts from corrosive exposure to phosphine.
18. Tablets, pellets and bags must not come in contact with any processed food, except, that tablets and pellets may be added directly to processed brewers rice, malt and corn grits used in the manufacture of beer.
19. Do not use Magnesium Phosphide containers for any purpose other than recycling or reconditioning.
20. OSHA recommends preexposure screening of employees to detect impaired pulmonary function. They recommend that any employee developing this condition be referred for medical examination.

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### SECTION 2

#### PRECAUTIONARY STATEMENTS

##### A. HAZARDS TO HUMANS AND DOMESTIC ANIMALS

**DANGER:** Magnesium Phosphide powder, granules or tablets 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, extremely toxic

phosphine gas will be released. If a garlic odor is detected, refer to an APPLICATOR AND WORKER EXPOSURE Section of the INVENTA CORPORATION Applicator's Manual for appropriate monitoring procedures. Pure phosphine 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 phosphine gas is absent. Observe proper application, aeration, Reentry and disposal procedures specified elsewhere in the labeling and in this manual to prevent overexposure.

B. PRACTICAL TREATMENT STATEMENT

SYMPTOMS of overexposure to phosphine are headache, dizziness, nausea, difficult breathing, vomiting and diarrhoea. In all cases of overexposure, get immediate medical attention. Take the victim to a doctor or emergency treatment facility.

If the gas from Magnesium Phosphide is INHALED: Move exposed person to fresh air. Keep person 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.

If Magnesium Phosphide powder, granules, pellets or tablets are SWALLOWED: Drink or administer one or two glasses of water and induce vomiting by touching back of throat with finger, or if available, syrup of ipecac. Do not give anything by mouth if victim is unconscious or not alert.

If powder, granules, or tablets of Magnesium Phosphide get on SKIN: Brush material off clothes and shoes in a well ventilated area. Allow clothes to aerate in a ventilated area prior to laundering. Wash contaminated bare skin thoroughly with soap and water.

If in EYES; Flush with plenty of water,. Get medical attention immediately.

C. NOTE TO PHYSICIAN (We recommend that this Section be given to the attending Physician):

Magnesium Phosphide granules, powder, or tablets react with moisture in the air, acids, and many other liquids to release phosphine gas. Mild exposure by inhalation causes malaise, ringing of ears, fatigue, nausea, and pressure in the chest which is relieved by removal to fresh air.

Moderate poisoning causes weakness, vomiting, epigastric pain, chest pain, diarrhoea and dyspnea.

Severe poisoning may occur in a few hours, to several days, resulting in pulmonary edema and may lead to: dizziness, cyanosis, unconsciousness, and death.

In sufficient quantity, phosphine affects the liver, kidneys,

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lungs, nervous system and circulatory system. Inhalation can cause lung edema and hyperemia, small perivascular brain hemorrhages, and brain edema. Ingestion can cause lung and brain symptoms, but damage to the viscera 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; and (3) kidney hematuria and anuria. Pathology is characteristic of hypoxia. Frequent exposure over a period of days or weeks may cause poisoning. Treatment is symptomatic. For further information, contact the nearest National Poison Control Center.

D. PHYSICAL AND CHEMICAL HAZARDS

Magnesium Phosphide in tablets, pellets and partially spent dust will release phosphine gas if exposed to moisture from the air or if it comes into contact with water, acids and many other liquids. Piling of tablets, pellets, or dust from their fragmentation may cause a temperature increase and confine the release of gas so that ignition could occur.

Always open containers of magnesium phosphide products outdoors or indoors. In the presence of appropriate mechanical ventilation as under certain conditions, they may flash upon opening. When opening, point the container away from the face and body and slowly loosen the cap. Although the chances for flash are very remote, never open the containers in a flammable atmosphere. These precautions will also reduce the applicator's exposure to phosphine gas.

Pure phosphine gas is practically insoluble in water, 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. Thus, small electric motors, smoke detectors, brass sprinkle 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.

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SECTION 3

DIRECTIONS FOR USE

A. GENERAL

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

1. Magnaphos tablets, pellets and bags are RESTRICTED USE PESTICIDE, due to the acute inhalation of phosphine gas. These products are for retail sale to and use only by certified applicators for uses covered by the applicators certification or person trained in accordance with the manual, working under the direct supervision and in the physical presence of the applicator. Physical presence means on site or on the premises. Read and follow the label and the manual which contains complete instructions for the safe use of this pesticide.

2. Magnaphos is a highly hazardous material and should be used only by individuals trained in its proper use. Before using read and follow the precautions and directions contained in the Magnaphos label and in the INVENTA CORPORATION Applicator's Manual.

Persons working with Magnaphos should be knowledgeable of the hazards of this chemical and trained in the use of required respiratory equipment and detector device, emergency procedures and use of the fumigant.

Additional copies of the INVENTA CORPORATION Applicator's Manual are available from:

INVENTA CORPORATION  
14, Phoenix Drive  
Mendham, NJ 07945

201-543-7239

3. At least two persons trained in the use of Magnesium phosphide must be present during fumigation of structure if entry into the structure is required for application of the fumigant. Two trained persons must also be present during reentry into fumigated or partially aerated structures. Only one trained person is required to be present when Magnaphos is applied from outside the area to be treated.

4. Ship holds, barges, containers on ships, railroad cars and containers shipped piggyback by railway may be fumigated intransit. However, trucks, vans, trailers and similar transport vehicles cannot be moved over public roads and highways until they are aerated and the warning placards removed.

5. Do not fumigate commodities with Magnaphos when commodity

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temperature is below 40 Deg F (5 Deg C).

6. The site to be fumigated must first be inspected to determine if it can be made sufficiently gas tight. Then a plan should be developed to provide for safe and efficient application of the fumigant to include emergency procedures etc. when required and to decide how monitoring should be conducted to prevent excessive exposures.

7. Wear dry gloves of cotton or other material while handling Magnaphos tablets, pellets, or bags. Wash hands thoroughly after use.

8. Phosphine gas may flash at concentrations above its flammable limit. Therefore, always open Magnaphos containers in open air and never in a flammable atmosphere. This precaution will not only prevent harm in the unlikely event of a flash but, will reduce the applicators exposure to phosphine gas.

9. Piling of tablets, pellets or bags or addition of water of Magnaphos may speed up the reaction, cause a temperature increase and confine the gas so that ignition could occur.

10. As much as is possible protect unused Magnaphos from excessive exposure to atmospheric moisture during application and tightly reseal the aluminium flask prior to returning tablets or pellets to storage. Magnaphos bag containers once opened cannot be resealed for future use.

11. Phosphine gas may react with certain metals and their salts to produce corrosion. Copper, copper alloys and precious metals such as silver and gold are susceptible to corrosion and items containing these elements should be removed or protected prior to fumigation with Magnaphos.

12. Do not allow Magnaphos or its residual dust to come in contact with processed foods or commodity packages intended for retailers except that Magnaphos tablets, pellets or bags may be added directly to processed brewers rice, malt and corn grits used in the manufacture of beer.

13. Respiratory protection approved for the concentration to which the fumigator will be exposed must be available if Magnaphos is to be applied from within the structure to be fumigated. Respiratory protection need not be available for uses such as outdoor application, addition of tablets or pellets to automatic dispensing devices, etc. If exposures above the TLV's will not be encountered. A NIOSH/MSHA approved, full-face gas mask phosphine canister combination may be used at levels up to 15 ppm. Above this level or in situations where the phosphine concentration is unknown a NIOSH/MSHA approved, self contained breathing apparatus (SCBA) or its equivalent must be used.

14. Notify appropriate company employees prior to fumigation. Provide to local officials (fire department, rescue squad, police

etc.) on annual basis relevant safety information for use in the event of an emergency.

B. EFFICACY

Magnophos has been found effective against the following insects and their preadult stages (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 weevil
- \* cigarette beetle       \*Hessian fly             \*saw-toothed grain beetle
- \* confused flour beetle \*Indian meal moth       \*Spider beetles
- \* Dermestid beetle       \*Khapra beetle           \*Tobacco moth
- \* dried fruit            \*lesser grain borer     \*yellow meal worm
- \* dried fruit moth       \*maize weevil

Although it is possible to achieve total control of the 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 susceptible to phosphine than others. If maximum control is to be attained, extreme care must be taken in sealing, the higher dosages must be used, exposure periods must be lengthened, proper application procedures followed and temperature and humidity must be favorable.

C. EXPOSURE CONDITIONS

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

Minimum Exposure Periods for Magnaphos

Temperature	Pellets	Tablets	Bags
below 40D F (5D C)	Do not fumi-	Do not fumi-	Do not fumi

	gate.	gate	-gate
40-50D F(5-12D C)	8 days(192hrs)	10 days(240hrs)	14 days(336 hrs).
54-59D F(12-15D C)	4 days (96hrs)	5 days (120hrs)	7 days(168 hrs).
60-68D F(16-20D C)	3 days (72 hrs)	4 days (96hrs)	4 days (96 hrs).
above 68D F(20D C)	2 days (48 hrs)	3 days (72 hrs)	3 days (72 hrs).

The length of the fumigation must be great enough to provide for adequate control of the insect pests which infest the commodity being treated. Additionally, the fumigation period should be long enough to allow for more or less complete reaction of Magnaphos with moisture so that little or no unreacted magnesium phosphide remains. This will minimise exposures during further storage and/or processing of the treated bulk commodities as well as reduce hazards in the disposal of partially spent magnesium phosphide products remaining after space fumigations. The proper length of the fumigation period will vary with exposure conditions since, in general, insects are more difficult to control at lower temperatures and the rate of phosphine gas production by Magnaphos is less at lower temperatures and humidities. 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 the gas is poor and insects are not subjected to lethal concentrations of phosphine. 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 time must be lengthened to allow for penetration of gas throughout the commodity when the fumigant is not uniformly added to the mass, for example, by surface application or shallow probing. This is particularly important in the fumigation of a bulk commodity contained in large storages. Remember, exposure periods in the table are minimum periods and may not be adequate to control all stored product pests under all conditions nor will they always provide for total reaction of Magnaphos, particularly if temperatures and commodity moisture levels or humidity are low during the fumigation.

D. COMMODITIES WHICH MAY BE FUMIGATED WITH MAGNAPHOS.

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

1. Raw Agricultural Commodities, Animal Feed and Feed Ingredients.

Magnaphos Tablets, Pellets and Bags may be added directly to animal feed, feed ingredients and raw agricultural commodities stored in bulk. For those commodities not stored in bulk, Magnaphos may be placed in moisture permeable envelopes, on trays, in bags etc., and fumigated as with processed foods.

Raw Agricultural Commodities And Animal feed and Feed Ingredients  
Which May Be Fumigated With Magnaphos

- \* Almonds
- \* Animal feed
- \* Flower seed
- \* Grass seeds
- \* Sorghum
- \* Brazil nuts
- \* Cocoa beans
- \* Oats.
- \* Wheat
- \* Filberts
- \* Dates
- \* Soybeans
- \* Sesame seed
- \* Seed & Pod Vegetables
- \* Barley
- \* Corn
- \* Cotton seeds
- \* Pistashio nuts
- \* Popcorn
- \* Rice
- \* Rye
- \* Walnuts
- \* Peanuts
- \* Pecans
- \* Millet
- \* Safflower seed
- \* Sunflower seed
- \* Vegetable seeds
- \* Coffee beans

2. Processed Foods

The listed processed foods may be fumigated with Magnaphos. Under no conditions shall any processed food or bagged commodity come in contact with Magnaphos Tablets, Pellets, Bags or residual dust except that Magnaphos may be added directly to processed brewer's 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 byproducts
- \* Chocolate and chocolate byproducts (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, nondairy creamers, and nonfat dried milk.
- \* Dried or dehydrated fruits (apples, dates, figs, peaches, pears, prunes, raisins, and sultanas)
- \* Processed herbs, spices, seasonings, and condiments.
- \* Malt
- \* Processed nuts (almonds, apricot kernels, Brazil nuts, cashews, filberts, peanuts, pecans, pistachio nuts, and Walnuts )
- \* Processed oats including oatmeal
- \* Rice (brewers rice, grits, enriched and polished wild rice)
- \* Processed tea
- \* Dried and dehydrated vegetables (beans, carrots, lentils, peas, potato products and spinach)
- \* Yeast (including primary yeast)

E. Nonfood commodities, including Tobacco.

The listed nonfood items may be fumigated with Magnaphos. Tobacco and certain other of the nonfood commodities should not be

contacted by Tablets, Pellets and residual dust.

- \* Processed or unprocessed cotton, wool and other natural fibres or cloth,
- \* Clothing
- \* Straw and hay
- \* Feathers
- \* Human hair, rubberised hair, vulcanized hair and mohair
- \* Leather products, animal hides and furs
- \* Tobacco
- \* Wood, cut trees, wood chips and wood and bamboo products
- \* Paper and paper products
- \* Dried plants and flowers
- \* Seeds ( grass seed, ornamental herbaceous plant seed and vegetable seed)

E. RECOMMENDED DOSAGES

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 Magnaphos is required to treat a 30,000 bushel silo whether it is empty or full of grain unless, the surface of the commodity is sealed off by a tarpaulin. The following dosage ranges are recommended for bulk and space fumigations.

Dosage Guidelines For Fumigation With Magnaphos

Product	per 1000 cu ft.*	per 1000 bu.*
<u>Bags</u>	2 - 6	2 - 6
<u>Pellets</u>	100 - 725	120 - 900
<u>Tablets</u>	20 - 145	25 - 180

\* Dosage range for dates, nuts and dried fruits is 100 - 200 pellets, 20 - 40 tablets, 2 - 6 bags/1000 cu ft.; 125 - 250 pellets, 25 - 50 tablets, 2 - 6 bags/100 bu.

These dosages are not to be exceeded. It is important to be aware that a shortened exposure period cannot be fully compensated for with an increased dosage of phosphine. The wide range of dosages listed above is required to handle the variety of fumigation situations encountered in practice. Some what higher dosages are usually recommended under cooler, drier conditions, or where exposure periods are relatively short. However, the major factor in the 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 doses required to treat modern, well-sealed warehouses with the higher range, used for poorly constructed buildings that cannot be sealed adequately. In certain other fumigations, proper distributions 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 of grain stored in tall silos. Poor

gas distribution frequently results when the fumigant cannot be uniformly added to the grain and it may be treated by surface application. Although it is permissible to choose from the full range of dosages listed above, the following dosages are recommended for the various types of fumigations :

Recommended Magnaphos Dosages For Various Types of Fumigations

Type of Fumigation	Bags	Pellets	Tablets
1. Space			
Mills, warehouse etc.	2-6/1000cft.	100-300/1000cft.	20-60/1000cft
Bagged commodities	2-6/1000cft.	150-300/1000cft.	30-60/1000cft
Processed fruits & nuts	2-6/1000cft.	100-200/1000cft.	20-40/1000cft
Stored tobacco	2-6/1000cft	100-200/1000cft.	20-40/1000cft
2. Bulk stored commodities.			
Vertical storages	2-6/1000cft.	150-300/1000cft	30-60/1000cft
	2-6/1000cft.	200-375/1000cft.	40-75/1000cft
Tanks	2-6/1000cft.	150-350/1000cft.	30-70/1000cft
	2-6/1000cft.	200-450/1000cft.	40-90/1000cft.
Flat storages	2-6/1000cft	250-725/1000cft	50-145/1000cft
	2-6/1000cft.	300-900/1000cft	60-180/1000cft
Farm bins	2-6/1000cft.	350-725/1000cft.	70-145/1000cft
	2-6/1000cft	450-900/1000cft.	90-180/1000cft
Bunker & tarped ground storages	2-6/1000cft	150-400/1000cft.	30-80/1000cft.
	2-6/1000cft.	200-500/1000cft.	40-100/1000cft
Railcars	2-6/1000cft.	150-325/1000cft.	30-65/1000cft.
	2-6/1000cft.	200-400/1000cft.	40-80/1000cft.
Barges	2-6/1000cft	150-400/1000cft.	30-80/1000cft.
	2-6/1000cft.	200-500/1000cft.	40-100/1000cft
Shipholds	2-6/1000cft.	150-330/1000cft.	30-66/1000cft.
	2-6/1000cft.	200-375/1000cft.	40-75/1000cft.

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

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F. APPLICATION PROCEDURES

1. General Statement

Regardless of the type of storage to be treated, there are several important factors common to all application procedures. A number of these points have been covered in other sections of the INVENTA CORPORATION Applicator's Manual but are listed again in the following for completeness.

a. A plan should be devised for application, aeration and disposal of the fumigant to keep at a minimum any exposures to phosphine. See the requirements in the APPLICATOR AND WORKER EXPOSURE section of the INVENTA CORPORATION Applicator's Manual.

b. Magnaphos Tablets or Pellets should be applied to provide effective gas concentrations throughout the storage. When Tablets or Pellets are not applied uniformly to a bulk commodity (surface application in a tall silo or shipshold for example), exposure times should be lengthened to allow for penetration of gas throughout the storage.

c. The storage structure should be sealed to maintain a suitable gas concentration over the time period required for the control of insect pests.

d. Ideally, exposure periods should be long enough to provide for adequate control of insect pests and also more or less completely to react the fumigant.

e. Piling of large numbers of Tablets or Pellets, whether applied to a bulk commodity or for space fumigation, may prevent complete breakdown of the product by limiting its access to moist air. This can result in increased efficacy as a result of poor gas release and may leave an active residual for disposal which contains considerable amounts of unreacted magnesium phosphide. Piling of product may also result in increased hazard of fire if water should come into contact with the mass of magnesium phosphide.

f. Contact with water should be carefully avoided when applying magnaphos for the treatment of bulk commodities or space.

g. Magnesium phosphide fumigants should not be applied to confined spaces where the concentration of "phosphine" may build up to exceed its lower flammable limit.

h. Observe the precautionary and safety statements mentioned in the INVENTA CORPORATION Applicator's Manual.

NOTE: 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 magnesium phosphide products.

2. Fumigations of Farm Bins

Leakages is the single most important cause of failures in the treatment of farm storages. Since these storages are often small, they usually have a higher leakage area in proportion to their capacity. Most wooden storage structures are so porous that they cannot be successfully fumigated unless they are completely tarped. Do not fumigate storages which will be entered by humans or animals prior to aeration. Do not fumigate areas which house sensitive equipment containing copper or other metals likely to be corroded by phosphine gas. (See Physical and Chemical Hazards in the INVENTA CORPORATION Applicator's Manual)

Seal the bin as tightly as possible. It is recommended that the surface of the grain be covered with a tarpaulin after Magnaphos has been applied. Tarping the grain surface will greatly reduce the leak rate of the gas as well as reduce the amount of Magnaphos required. Only the volume below the tarp must be dosed. If not tarped, the entire volume of the storage must be treated, whether full or empty.

Magnaphos Tablets, Pellets or Bags may be scattered over the surface or probed into the grain using the rigid PVC pipe about 5 to 7 feet in length and having a diameter of 1 1/4 inches. Immediately cover the surface of the grain with a plastic tarpaulin. Place no more than 25 percent of the total dose at the bottom if the bin is equipped with aeration fans. CAUTION : Make sure that aeration duct is dry before adding Magnaphos. Addition of Magnaphos to water in an aeration duct may result in a fire. Seal the aeration fan with 4 mil. plastic sheeting.

Post fumigation warning signs on entrances to the bin and near the ladder.

Following aeration of the bin, the surface of the grain may be sprayed with an approved protectant to discourage reinfestation.

Fumigation of Flat Storages

a. Establish a plan for application of fumigant to the structure. Treatment of these types of storages may require considerable effort, therefore, sufficient manpower should be available to complete the work rapidly enough to prevent excessive exposure to phosphine gas. Vent flasks outside the storage, conduct fumigations during the cooler periods and employ other work practices to minimize exposures. It is often advisable to wear respiratory protection during application of fumigant to flat storages. Refer to the sections on APPLICATOR AND WORKER EXPOSURE AND RESPIRATORY PROTECTION in the INVENTA CORPORATION Applicator's Manual.

b. Seal any vents, cracks and other sources of leaks.

c. Apply Tablets, Pellets or Bags by surface application, shallow probing, or uniform addition as the bin is filled. Storages requiring more than 24 hours to fill should not be treated by addition of fumigant to the commodity stream as large quantities of phosphine may escape before the bin is completely sealed. Probes should be inserted vertically at intervals along the length and width of the flat storage. Pellets, Tablets or Bags may be dropped into the probes at intervals as it is withdrawn.

Surface application may be used if the bin can be sufficiently gas tight to contain the fumigant gas long enough for it to penetrate the commodity. In this instance, it is advisable to place about 25 percent of the dosages in the floor level aeration ducts. Check the ducts prior to addition of Magnaphos to make sure that they contain no water.

d. Tarping the surface of the commodity is often advisable, particularly if the overhead of the storage cannot be well sealed.

e. Lock all entrances to the storage and post fumigation warning placards.

4. Fumigation of Vertical Storages (Concrete Upright Bins And Other Silos In Which Grain Can Be Rapidly Transferred).

a. Close all openings and seal all cracks to make the structure as airtight as possible. Prior to the fumigation, seal the vents near the bin top which connects to the adjacent bins.

b. Pellets or Tablets may be applied continuously by hand or by an automatic dispenser on the headhouse/gallery belt or the fill opening as the commodity is loaded into the bin. An automatic dispenser may also be used to add Magnaphos into the commodity stream in the leg of the elevator.

c. Seal the bin deck openings after the fumigation has been completed.

d. Bins requiring more than 24 hours to fill should not be fumigated by continuous addition into the commodity stream. These bins must be fumigated by probing surface application, or other appropriate means. Exposure periods should be lengthened to allow for diffusion of gas to all parts of the bins if Magnaphos has not been applied uniformly throughout the commodity mass.

e. Place warning placards on the discharge gate and/or all entrances.

5. Fumigation of Mills, Food Processing Plants and Warehouses.

a. Using the label calculate the length of the fumigation and dosage of the tablets, pellets or bags to be applied based upon volume of the building, air and/or commodity temperature and the general tightness of the structure.

b. Carefully seal and placard the space to be fumigated.

c. Place trays or sheets of kraft paper or foil, upto 12 sq.ft. (1.1 sq.M) in area, on the floor throughout the structure to hold Magnaphos Pellets or Tablets. Bags should be spread evenly on the floor. Use total floor space.

d. Spread Magnaphos on the sheets at a density no greater than 30 Tablets/sq.ft. This corresponds slightly more than one-half flask of Tablets or one-half flask of Pellets per 3' X 4" sheet. Check to see that Magnaphos has not piled up and that it is spread evenly to minimise contact between the individual Pellets, Tablets and Bags.

e. Doors leading to the fumigated space should be closed, sealed, locked, and placarded with warning signs.

f. The fumigated period usually lasts from 2 to 5 days, depending upon the temperature. Upon completion of the exposure period, windows, doors, vents etc., should be opened and the fumigated structure allowed to aerate for atleast 2 hours before entering. When required, gas concentration readings may be taken using low level detector tubes or similar devices to ensure safety of personnel who reenter the treated area. Refer to the section on APPLICATOR AND WORKER EXPOSURE in the INVENTA CORPORATION Applicator's Manual.

g. Collect the spent Bags, and Magnaphos dust and dispose off with or without further deactivation, following the recommendations given under DISPOSAL INSTRUCTIONS in the INVENTA CORPORATION Applicator's Manual.

h. Remove fumigation warning placards from the aerated structure.

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6. Fumigation of Railcars, Containers, Trucks, Vans and Other Transport Vehicles.

Railcars, Containers, Trucks, Vans and other transport vehicles loaded with bulk commodities to which Magnaphos Tablets, Pellets or Bags may be added directly are treated in essentially the same way as any other flat storage facility. Magnaphos may be added as the vehicle is being filled, the dose may be scattered over the surface after the loading has been completed or the tablets, pellets or bags may be probed below the surface, carefully seal any vents, cracks, or other leaks. Remember, railcars and other containers shipped piggyback by rail may be fumigated intransit, but it is not legal to move trucks, trailers, vans, etc., over public roads or highways until they are aerated. See PLACARDING OF FUMIGATED AREAS in the INVENTA CORPORATION Applicator's Manual. Notify the consignee if the commodity is to be shipped under fumigation with Magnaphos. If the consignee is unfamiliar with proper handling of treated railcars, it is recommended that they be provided with the necessary information.

7. Tarpaulin and Bunker Fumigations

Use of plastic sheeting or tarpaulins to cover is one of the easiest means for providing relatively gas tight enclosures which are very well suited for fumigation. Polyethylene tarps are penetrated only very slowly by phosphine gas, and tight coverings are readily formed from the sheets. The volume of these enclosures may vary widely from a few cubic feet, for example, a fumigation tarpaulin placed over a small stack of a bagged commodity, to a plastic bunker storage capable of holding 600,000 bushels of grain or more.

An enclosure suitable for fumigation may be formed by covering bulk or packaged commodity with polyethylene sheeting. The sheets may be taped together to provide a sufficient width of material to ensure that adequate sealing is obtained. If the flooring upon which the flooring rests is of wood or other porous material, it should be repositioned onto tarpaulin prior to covering for fumigation. The plastic covering of the pile may be sealed to the floor using sand or water snakes, by shoveling soil or sand onto the ends of the plastic covering or by other suitable procedures. The poly covering should be reinforced by tape or other sheeting, about 2 mil. is suitable for most indoor tarp fumigations and for sealing of windows, doors and other openings in structures. However, 4 mil. poly or thicker is more suitable for outdoor applications where wind or other mechanical stresses are likely to be encountered.

Tablets, pellets or bags may be applied to the tarped stack or bunker storage of bulk commodity through slits in the polyethylene covering. Probing or other means of dosing may be used. Avoid application of large amounts of Magnaphos at any one point. The Magnaphos should be added below the surface of the commodity if condensation or other source of moisture is likely to form beneath the poly. The slits in the covering should be

carefully taped to prevent loss of gas once the dose has been applied. Magnaphos bags has been recommended for the treatment of bagged commodities and processed foods although tablets and pellets on trays or sheets of kraft paper may be used. Care should be taken to see that the polyethylene sheeting is not allowed to cover the Magnaphos and prevent contact with moist air or confine the gas.

Distribution of phosphine gas is generally not a problem in the treatment of bagged commodities and processed foods. However, fumigation of larger bunker storages containing bulk commodity will require proper application procedures to obtain adequate results.

Place warning placards at conspicuous locations on the enclosure.

8. Fumigation of Ships.

a. General Information

IMPORTANT - shipboard, intransit ship or ship hold fumigation is also governed by U. S. Coast Guard Regulation 46 CFR 147A. Refer to this regulation prior to fumigation.

b. Pre-Voyage Fumigation Procedures

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 to allow for safe occupancy by the ships crew throughout the duration of the fumigation. If it is determined that the design and configuration of the vessel does not allow safe occupancy by the ships crew throughout the duration of the the fumigation, then the vessel will not be fumigated unless all the crew members are removed from the vessel. The crew members will not be allowed to reoccupy the vessel until the vessel has been properly aerated and a determination has been made by the master of the vessel and the fumigator that the vessel is safe for occupancy.
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 and (personal protection equipment means a NIOSH/MSHA approved respirator or gas mask fitted with an approved canister for phosphine. The canister is approved for use upto 15 ppm. SCBA or its equivalent must be used above 15 ppm or at unknown concentrations) and detection equipment. A person qualified in the use of this equipment must accompany the vessel with cargo under fumigation. Emergency procedure, 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 and lock or otherwise secure all openings, manways etc., which might be used to enter the hold. The overspace pressure

relief system of each tank aboard tankers must be sealed by closing the appropriate valves and sealing the openings into the overspace with gas tight materials.

4. Placard all entrances to the treated spaces with fumigation warning signs.
5. 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 atleast 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 the voyage.
6. 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 spaces adjacent to the areas containing fumigated cargo and all regularly occupied spaces for fumigation leakage. If leakage of the fumigant is detected, the person in charge of the fumigation shall take action to correct the leakage, or shall inform the master of the vessel, or his representative, of the leakage so that corrective action can be taken.
7. Review with the master, or his representative, the precautions and procedures for the voyage.

c. Application Procedures For Bulk Dry Cargo Vessels And Tankers

1. Apply tablets, pellets or bags by scattering uniformly over the commodity surface. The product may be shallow or deep probed into the commodity mass.
2. Immediately after the application of the fumigant, close and secure all hatch covers, tank tops, butterworth valves, manways, etc.

d. Intransit Fumigation of Containers Aboard Ships

Intransit fumigation of containers on ships is also governed by U.S. Coast Guard Regulation 46 CFR 147A as modified by the U. S. Coast Guard Special Permit 52-75. This permit which must be obtained prior to the fumigation is available from : U. S.Coast Guard, Hazardous Materials Branch, MTH-1, Washington DC, 20593-0001

Application procedures for the fumigation of raw commodities or processed foods in containers and other transport vehicles are described in the DIRECTIONS FOR USE section of the INVENTA CORPORATION, Applicator's Manual.

e. Precautions and Procedures During Voyage

1. Using appropriate gas detecting equipment, monitor spaces adjacent to areas containing fumigated cargo and all regularly occupied areas for fumigant

leakage. If leakage is detected, the area should be evacuated of all personnel, ventilated, and action taken to correct the leakage before allowing the area to be occupied.

- 2. Do not enter fumigated areas except under emergency conditions. If necessary to enter a fumigated area, appropriate personal protection equipment must be used. Never enter fumigated areas alone. At least one other person, wearing personal protection equipment, should be available to assist in case of an emergency.

f. Precautions and Procedures During Discharge

- 1. If necessary to enter holds prior to discharge, test spaces directly above grain surface for fumigant concentration, using appropriate gas detection and personal safety 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.

9. Fumigation of Barges

Barge fumigations are also regulated by the U.S. Coast Guard regulation 46 CFR 147A as modified by U.S. Coast Guard Special Permit 2-75. This permit must be obtained prior to the fumigation and is available from: U.S. Coast Guard, Hazardous materials branch, MTH-1, Washington DC, 20593-0001

Leaks are a common cause of failure in the treatment of commodities aboard barges. Carefully inspect all hatch covers prior to application of Magnaphos and seal if necessary. Notify consignee if the barge is to be fumigated intransit.

10 Fumigations in Small Sealable Enclosures

Excellent results may be attained in the treatment of small enclosures since it is often possible to control the fumigation and also to make the enclosure virtually gas tight. Take care not to overdose during these fumigations. A single pellet will treat a space of from 1.4 to 10 cubic feet. From 6.9 to 50 cubic feet may be fumigated with a single Magnaphos tablet or 1 Magnaphos bag.

11. Treatment of Beehives, Supers And Other Beekeeping Equipment

Magnaphos tablets, pellets and bags may be used for the control of the greater wax moth in stored beehives, supers and other beekeeping equipment and for the destruction of bees, Africanised bees, and diseased bees including those infested with tracheal mites and foulbrood. The recommended dosage for this use is 30-45 tablets, 150-225 pellets or 3 bags per 1000 cu.ft. Fumigations may be performed in chambers at atmospheric pressure, under tarpaulins, etc., by



placing bags, tablets or pellets on trays or in moisture permeable envelopes. Do not add more than 2 tablets or 10 pellets to each envelope. Honey form treated hives or supers may only be used for bee food.

12. Burrowing Pest Control

a. List of burrowing pests

Magnaphos tablets, pellets and bags may be used out of doors only for the control of the following burrowing rodents and moles : Woodchucks, and yellow-belly Marmots (Rockchucks), Prairie dogs (except Utah Prairie dogs), Norway and roof rats, mice, ground squirrels, moles, voles, gophers and chipmunks.

b. Directions For Use

Add from 1-4 Magnaphos tablets, 5-20 pellets, or 2-6 bags to each burrow opening. Then seal tightly by shovelling soil over the entrance after first packing the opening with crumpled newspaper or something similar to prevent the soil from covering Magnaphos and slowing its action. Subsurface tunnels or runways should be treated every 5-20 feet with a dose of 2-4 tablets, 10-20 pellets and 2-6 bags. Use lower rates in smaller burrows in tight soils under moist soil conditions and higher rates in larger burrows in porous soils when soil moisture is low. Addition of several cups of water to the burrow prior to dosing with Magnaphos may improve efficacy in some porous soils. Treat reopened furrows and fresh runways a second time 1 to 3 days after the initial treatment. Magnaphos may be used out of doors only for control of burrowing pests. Do not use within 15 feet (5 meters) of inhabited structures. Do not apply to burrows which may open under or into occupied buildings. For use on all agricultural and non-cropland areas.

c. Environmental Hazards

This product is very highly toxic to wild life. Non-target organisms exposed to phosphine gas in burrows will be killed. Do not apply directly to water or wetlands (Swamps, bogs, marshes and potholes). Do not contaminate water by cleaning of equipment or disposal of wastes.

d. Endangered Species Restriction

The use of any pesticide in a manner that may kill or otherwise harm an endangered or threatened species or adversely modify their habitat is a violation of Federal Laws. The use of this product is controlled to prevent death or harm to endangered, or threatened species that occur in the following counties or elsewhere in their range.

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STATE (REGIONAL U.S. FISH & WILDLIFE OFFICE)

SPECIES

COUNTY

Arizona(Albuquerque,NM)	Black-footed ferret	Statewide
California(Portland,OR)	San Joaquin Kit-Fox	Fresno, Kern, Kings,Merced Monterey,San Benito, San Luis Obispo, Santa Barbara, Tulare, Ventura.
	Blunt nosed Leopard Lizard.	Fresno, Kern, Kings,Merced, Merced, Tulare
COLORADO(Denver,CO)	Black-footed Ferret	Statewide
FLORIDA(Atlanta,GA)	Eastern Indigo Snake	Statewide
GEORGIA(Atlanta,GA)	Eastern Indigo Snake	Statewide
KANSAS(Denver, CO)	Black-footed Ferret	Statewide
MONTANA(Denver, CO)	Black-footed Ferret	Statewide
NEBRASKA(Denver,CO)	Black-footed Ferret	Statewide
NEW MEXICO(Albuquerque,NM)	Black-footed Ferret	Statewide
NORTH DAKOTA(Denver,CO)	Black-footed Ferret	Statewide
OKLAHOMA(Albuquerque,NM)	Black-footed Ferret	Statewide
SOUTH DAKOTA(Denver,CO)	Black-footed Ferret	Statewide
TEXAS(Albuquerque,NM)	Black-footed Ferret	Statewide
UTAH(Denver, CO)	Desert Tortoise	Washington
	Black-footed Ferret	Statewide
WYOMING(Denver, CO)	Black-footed ferret	Statewide

Use of this product in the above areas is prohibited without first contacting and obtaining permission from the Endangered Species Specialist in the regional offices of the U.S. Fish and Wildlife Service (FWS) nearest to you.

e. Special Local Restrictions

1. North Carolina - Magnaphos Pellets, Tablets and Bags may only be used for the control of rats and mice in the state of North Carolina. Use against other pests is not permitted.
2. Oklahoma - A special permit for Black-tailed Prairie dog control by poisoning is required in Oklahoma. Contact the Oklahoma State Department of Wildlife Conservation to obtain this permit.
3. Wisconsin - A state permit is required for the use of pesticides to control small mammals, except rats and mice. Contact your local Department of Natural Resources for information.



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Section 4  
AERATION OF FUMIGATED COMMODITIES

A. Foods and Feeds

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

B. Tobacco

Tobacco must be aerated for atleast three days (72 hours) when fumigated in hogshead and for atleast two days (48 hours) when fumigated in other containers. Tobacco fumigated in containers with plastic liners will probably require longer aeration periods to reach 0.3 ppm.

C. Alternatives

As an alternative to these aeration periods, each container of a treated commodity may be analysed for residues 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.

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Section 5  
PLACARDING OF FUMIGATED AREAS

The applicator must placard or post all all enterances to the fumigation 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 statement " This sign may only be removed after the commodity is completely aerated (contains 0.3 ppm or less phosphine gas) If completely 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 enterances to a fumigated area must be placarded. Where

possible placards should be placed in advance of the fumigation in order to keep unauthorised persons away. For railroad hopper cars, placarding 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 the placard until the treated commodity is completely aerated. To determine whether aeration is complete, each fumigated site or vehicle must be monitored 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. If 0.3 ppm or less phosphine is detected, the placard may be removed. However, if more than 0.3 ppm is detected, the placard must be transferred with the commodity to the new site. Workers who transfer or handle incompletely aerated commodity must be informed and appropriate measures must be taken (i.e. ventilation or respiratory protection) to prevent exposures from exceeding 0.3 ppm phosphine. It is recommended that the person removing the placard be trained. Training should cover physical, chemical and toxicological properties of phosphine; how to take gas readings; the exposure limits for phosphine; and symptoms of and first aid treatment for poisoning.

Section 6

PROTECTIVE CLOTHING

Wear dry gloves of cotton or other material when handling unpackaged Magnaphos Tablets, Pellets or Bags. Wash hands thoroughly after use and before smoking or eating. Aerate used gloves and other contaminated clothing in a well ventilated area prior to laundering.

For approved respiratory equipment and detection devices contact:

Mine Safety Appliance, Co.  
121 Gamma Drive  
P.O. Box 426  
Pittsburgh, PA 15230  
412-967-3000

Section 7

APPLICATOR AND WORKER EXPOSURE

Depending upon the temperature and humidity, this product will release phosphine gas slowly upon exposure to moisture from the air. However, because of the potential for applicators and workers to be exposed to phosphine gas during fumigation, the following exposure limits and respiratory protection requirements

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Exposure to phosphine gas may not exceed 0.3 ppm measured as an 8 hour time-weighted average (TWA) 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. Engineering control such as forced air ventilation should be the primary means used to meet this exposure standard.

If the fumigant is applied from outside of a confined or enclosed indoor area (for example, a railroad car or an automatic dispenser located outside of an enclosed indoor area), the applicator may apply the fumigant and immediately leave the area without being exposed to gas levels in excess of the standard. Therefore, neither monitoring nor respiratory protection equipment is needed during fumigation from outside an enclosed indoor area, such as addition of fumigant to automatic dispensing devices located outdoors, to burrows of rodents or moles away from buildings, to railroad cars located outside, etc.

If the applicator enters a confined or enclosed indoor area to fumigate, monitoring with a low level detection device is necessary. It is recommended that a sufficient number of readings must be taken where worker exposure is likely to occur in order to establish that the exposure standard is not exceeded. Adjacent indoor areas likely to be occupied, should be checked for leaks. If monitoring equipment is not available, on a farm and application cannot be done outside of a structure, an approved canister respirator must be worn during application from within an enclosed indoor area.

If an approved respirator is not available, application must be done from outside of the site to be fumigated. It is recommended that the applicator or employer document exposure readings in an operation log or manual for each fumigation site. Once exposures have been adequately characterized for a site, subsequent monitoring is not routinely required for each application. However, spot checks should be made, especially if conditions significantly change or if a garlic odour had been previously detected.

If the exposure limits cannot be met through engineering controls (such as forced air ventilation), a full face canister respirator approved by NIOSH/MSHA for Magnesium phosphide must be worn. This respirator may be used to enter an area with levels up to 15 ppm or to escape an area with levels up to 1500 ppm. Above these levels or where levels are unknown, a NIOSH/MSHA approved self contained breathing apparatus (SCBA), positive air pressure, type, must be used. The NIOSH/OSHA Pocket Guide, 8-85, DHEW/NIOSH 78-210 lists these and other types of approved respirators and their limits. A NIOSH/MSHA approved full-face canister respirator must be available on site if the fumigant is applied from within an enclosed indoor area. When the fumigant is applied from within

an enclosed indoor area, a SCBA is needed in the event that a spill, leak or rescue situation arises where the level of phosphine gas exceeds 15 ppm or is unknown.

After application, exposure for any person may not exceed 0.3 ppm phosphine (maximum concentration). Such exposures may occur if the commodity or space under fumigation leaks, when treated commodity is transferred or handled, if someone reenters an unaerated or partially aerated space, etc. Monitoring should be performed as described above to assure that this exposure limit is not exceeded. If exposure cannot be reduced to acceptable levels, the same respiratory protection requirements apply as above.

Because phosphine gas is highly mobile and may penetrate seemingly gas-tight materials such as concrete and cinder block, adjacent indoor areas likely to be occupied must be checked for leaks. Sealing of the fumigated site and/or airflow in the occupied areas must be sufficient to meet the exposure limit of 0.3 ppm (maximum concentration).

A treated commodity does not necessarily need to be aerated immediately, as it may be desirable to store it for a long period without aeration. However, a space or commodity must be aerated to 0.3 ppm or less phosphine in the worker's breathing zone before reentry is allowed. Reentry at higher levels requires the use of an approved respirator (see approved respirators described above).

Worker exposure during storage, transfer and handling of a treated commodity (raw, processed or finished) is covered by the exposure limit of 0.3 ppm (maximum concentration). Monitoring must be conducted as previously described to prevent overexposure at any time during these activities.

For approved respiratory equipment and detection devices contact:

Mine Safety Appliance, Co.

121 Gama Drive

P.O. Box 426

Pittsburgh, PA 15230

412-967-3000

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SECTION 8

STORAGE INSTRUCTIONS

Store Magphos in a dry, well ventilated area away from heat under lock and key. Post as 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.

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Section 9

DISPOSAL INSTRUCTIONS

1 GENERAL DISPOSAL STATEMENTS

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

Unreacted or partially reacted Magnesium phosphide is acutely hazardous. Improper disposal of excess pesticide, or rinsate is a violation of Federal law. If these wastes cannot be disposed off by use according to label instructions, contact your state Pesticide or Environmental Control Agency, or The Hazardous Wastes representative or the nearest E.P.A. Regional office for guidance. For specific instructions, refer to the SPILL AND LEAK PROCEDURES

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 E.P.A. or Hazardous waste specialist at the nearest E.P.A. regional office.

Triple rinse the flask and stoppers with water. Then offer for recycling or reconditioning, or puncture, or dispose in a sanitary landfill or by other procedures approved by state and local authorities. Rinsate may be disposed off in a sanitary sewer, sanitary landfill or by other approved procedures. It is also permissible to remove lids and expose empty flasks outdoors until residue in the flasks is reacted. Then puncture and dispose off in a sanitary landfill or other approved site, or by other procedures approved by state or local authorities.

If properly exposed, the residual dust remaining after the fumigation with Magnesium phosphide will be greyish-white and contain only small amounts of unreacted material. However, residual dust from incompletely exposed Magnesium phosphide will require special care.

2. DIRECTIONS FOR DISPOSAL OF SPENT RESIDUES FROM MAGNESIUM PHOSPHIDE

In open areas small amounts of completely spent residual dust may be disposed off on site by burial or by spreading over the land surface away from inhabited buildings. Spent residual dust, Bags or other packaging containing spent Magnesium phosphide may also be collected and disposed off in a sanitary landfill, incinerator or other approved sites or by other procedures approved by Federal, state or local authorities. For 2-3 Kgs (4-7lbs) of spent dust from 2-3 flasks of Magnesium phosphide may be collected for disposal in a 1 gallon bucket. Larger amounts,



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upto about one-half case, may be collected in burlap, cotton or other types of porous cloth bags for transportation in an open vehicle to the disposal site. Do not collect dust from more than 7 flasks of tablets or 10 flasks of pellets ( about 11 Kgs or 25 lbs ) in a single bag. Do not pile cloth bags together. Do not collect dust, bags or other types of packaging in large drums, dumpsters, plastic bags or other containers where confinement may occur.

3. DIRECTIONS FOR DEACTIVATION OF PARTIALLY SPENT RESIDUES FOR MAGNESIUM PHOSPHIDE

Confinement of partially spent residues in a closed container, or collection and storage of large quantities of partially spent product may result in a fire hazard. Small amounts of phosphine may be given off from unreacted Magnesium phosphide, and confinement of the gas may result in a flash.

Partially spent product must be deactivated further prior to ultimate disposal. This is specially true in cases of incomplete exposure which has resulted in so called "green dust" or following a fumigation which has produced large quantities of partially spent material.

Residual dust from Magnesium phosphide may be deactivated as follows using the "wet method".

Deactivating solution is prepared by adding the appropriate amount of low sudsing detergent or surface active agent to water in a drum or other suitable containers. The containers should be filled with deactivating solution to within a few inches of the top.

Residual product is poured slowly into the deactivating solution and stirred to thoroughly wet all of the spent Magnesium phosphide. This must be done in the open air and not within an enclosed indoor area. Residue from Magnesium phosphide tablets or pellets should be mixed into no less than 10 gallons of water-detergent solution for each case of material used. Dispose off the deactivated residue-water suspension, with or without preliminary decanting at a sanitary landfill or other suitable site approved by local authorities. Where permissible, the slurry may be poured into a storm sewer or out on to the ground.

Respiratory protection is required during wet deactivation of partially spent material. Do not cover the container holding the slurry at any time. Do not dispose off dust in a toilet. Do not allow quantities of dry product residue from Magnesium phosphide to be collected or stored without deactivation.

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SECTION 10

SPILL AND LEAK PROCEDURES

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 may be known. Do not use water at any time to clean up a spill of Magnesium phosphide. Water in contact with unreacted tablets or pellets will greatly accelerate the production of phosphine gas which could result in a toxic and/or fire hazard. Wear cotton gloves when handling pesticides.

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

If aluminium flasks have been punctured or damaged to leak, the container may be temporarily repaired with aluminium tape or the Magnesium phosphide may be transferred from the damaged flask to a sound metal container which should be sealed and properly labelled as Magnesium phosphide. Transport the damaged container to an area suitable for pesticide storage for inspection. Further instructions and recommendations may be obtained, if required, from INVENTA CORPORATION.

If a spill has occurred which is only a few minutes old, collect the tablets and pellets and place them back into the original flasks, if intact, and stopper tightly. Place the collected tablets and pellets in a sound metal container if the original flasks are damaged. CAUTION: These flasks may flash upon opening at some later time.

If the age of the spill is unknown, or if the tablets and pellets have been contaminated with soil, debris, water, etc., gather up the spillage and place it in to small open buckets having a capacity no larger than about 1 gallon. Do not add more than about 1 flask of spilled material, 1 - 1.5 kgs (2 to 3 lbs), to the bucket. If on site, wet deactivation is not feasible, these open containers should be transported in open vehicles, to a suitable area away from inhabited buildings. Wet deactivation may then be carried out as described in the STORAGE AND DISPOSAL section of the INVENTA CORPORATION Applicator's Manual.

If the contaminated material is not completely reacted by exposure to atmospheric moisture, deactivate the product by the "Wet Method" as follows :

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Deactivation solution is prepared by adding the appropriate amount of low sudsing detergent or surface active agent to water in a drum or other suitable container. A 2% solution or 4 cups in 30 gallons is suggested. The container should be filled with deactivating solution to within a few inches of the top.

The tablets or pellets are poured slowly into the deactivating solution and stirred to thoroughly wet all of the product. This should be done in open air. Magnesium phosphide tablets or pellets should be mixed into no less than about 15 gallons of water-detergent solution for each case of spent material. Allow the mixture to stand, with occasional stirring for about 36 hours. The resultant slurry will then be safe to dispose off.

Dispose off the slurry of deactivated material, with or without preliminary decanting, at a sanitary landfill or other suitable site approved by local authorities. Where permissible, this slurry may be poured into a storm sewer or out on to the ground.

Respiratory protection is required during wet deactivation of the unexposed product. NEVER place pellets, tablets or dust or other formulations 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.

FOR ASSISTANCE CONTACT:

INVENTA CORPORATION  
14, Phoenix Drive  
Mendham, NJ 07945

201-543-7239

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