13-JAN-1998

APPLICATOR'S MANUAL
FOR
ALUMINUM PHOSPHIDE
PELLETS, TABLETS, & BAGS

FOR CONTROL OF INSECTS IN STORED GRAIN, PROCESSED FOODS, FEEDS AND NON-FOOD COMMODITIES, INCLUDING TOBACCO

RESTRICTED

DANGER POISON

KEEP OUT OF REACH OF CHILDREN

GUARANTEE
Aluminum Phosphide 60%

READ THE ENTIRE LABEL AND APPLICATOR'S MANUAL BEFORE USING

REGISTRATION NO: 25317
PEST CONTROL PRODUCTS ACT - PELLETS

OR

REGISTRATION NO: 25318
PEST CONTROL PRODUCTS ACT - TABLETS

OR

REGISTRATION NO: 25319
PEST CONTROL PRODUCTS ACT - BAGS

Distributed by:
PESTOP, INC.
2-11455-201A Street
Maple Ridge, B.C. V2X 0Y3
(604) 460-2000

Manufactured by:
MIDLAND FUMIGANT CO. INC.
1805 South 2nd Street
Leavenworth, Kansas 66048
(913) 651-3900

THIS PRODUCT IS ACCOMPANIED BY AN APPROVED LABEL AND APPLICATOR'S MANUAL. READ AND UNDERSTAND THE ENTIRE LABELLING. ALL PARTS OF THE LABELLING ARE EQUALLY IMPORTANT FOR SAFE AND EFFECTIVE USE OF THIS PRODUCT. CALL THE MANUFACTURER OR DISTRIBUTOR IF YOU HAVE ANY QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABELLING.

REFER TO THIS APPLICATOR'S MANUAL FOR DETAILED PRECAUTIONS, RECOMMENDATIONS AND DIRECTIONS FOR USE.

ALUMINUM PHOSPHIDE PELLETS, TABLETS, AND BAGS ARE NONCOMBUSTIBLE, BUT EXPOSURE TO MOIST AIR OR WATER RELEASES FLAMMABLE AND TOXIC PHOSPHINE (HYDROGEN PHOSPHIDE) GAS. SPONTANEOUS IGNITION MAY RESULT IF CONTACTED BY WATER, ACIDS, OR OTHER LIQUIDS.

HYDROGEN PHOSPHIDE-AIR MIXTURES AT CONCENTRATIONS ABOVE THE LOWER FLAMMABLE LIMIT MAY IGNITE SPONTANEOUSLY. IGNITION OF HIGH CONCENTRATIONS OF HYDROGEN PHOSPHIDE CAN PRODUCE A VERY ENERGETIC REACTION. EXPLOSIONS CAN OCCUR UNDER THESE CONDITIONS AND MAY CAUSE SEVERE PERSONAL INJURY. NEVER ALLOW THE BUILD-UP OF HYDROGEN PHOSPHIDE TO EXCEED EXPLOSIVE CONCENTRATIONS. DO NOT CONFINE SPENT OR PARTIALLY SPENT DUST FROM METAL PHOSPHIDE FUMIGANTS, AS THE SLOW RELEASE OF HYDROGEN PHOSPHIDE FROM THIS MATERIAL MAY RESULT IN THE FORMATION OF AN EXPLOSIVE ATMOSPHERE.

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1. INTRODUCTION

Aluminum phosphide fumigants are used to protect stored commodities from damage by insects. Fumigation of stored products with aluminum phosphide in the manner prescribed in the labelling does not contaminate the marketed commodity.

Aluminum phosphide and other metal phosphide fumigants are acted upon by atmospheric moisture to produce hydrogen phosphide (phosphine, PH3) gas. Aluminum phosphide tablets and pellets contain aluminum phosphide (AIP) as their active ingredient and will liberate hydrogen phosphide via the following chemical reaction:

$$AIP + 3H_2O \rightarrow AIOH_3 + PH_3$$

Hydrogen phosphide gas is highly toxic to insects, 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.

Aluminum Phosphide also contains ammonium carbamate which liberates ammonia and carbon dioxide as follows:

$$NH_2COONH_4 \rightarrow 2NH_3 + CO_2$$

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

Aluminum Phosphide is prepared in three forms: tablets, pellets, and bags. The rounded tablets weigh approximately 3 grams and release 1 gram of hydrogen phosphide gas. They are about 16 mm in diameter and are bulk packaged in resealable aluminum flasks containing 100 or 500 tablets each. The pellets weigh approximately 0.6 grams and release 0.2 gram of hydrogen phosphide gas. They are about 10 mm in diameter and are packaged in resealable flasks containing about 1660 pellets.

The bags weigh 34 grams each and release 11 grams of hydrogen phosphide gas. They are packaged in metal containers of ten, or one hundred bags to the container. The bags are packaged in an oxygen-free environment.

Upon exposure to air, Aluminum Phosphide pellets, tablets, and bags begin to react with atmospheric moisture to produce small quantities of hydrogen phosphide gas. This reaction starts slowly, gradually accelerates and then tapers off again as the aluminum phosphide is spent. Aluminum Phosphide 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 temperature conditions. For example, when moisture and temperature of the fumigated commodity are high, decomposition of Aluminum Phosphide may be complete in less than 3 days. However, at lower ambient temperatures and relative

humidity levels, decomposition of Aluminum Phosphide may require 5 days or more. After decomposition, Aluminum Phosphide leaves a gray-white powder composed almost entirely of aluminum hydroxide and other approved inert ingredients. This will cause no problems if the fumigant has been added directly to commodities such as grain or bulk animal feed. However, the spent powder must usually be retrieved for disposal after space fumigations. If properly exposed, the spent Aluminum Phosphide will normally contain only a small amount of unreacted Aluminum Phosphide and may be disposed of without hazard. While not considered a hazardous waste, partially spent residual powder from incompletely exposed Aluminum Phosphide will require special care. Precautions and instructions for further deactivation and disposal will be given later in this manual.

Aluminum Phosphide 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. Containers of Aluminum Phosphide bags cannot be resealed for future use. Storage and handling instructions will be given in detail later in this Applicator's Manual.

A summary of safety recommendations is outlined below:

SAFETY RECOMMENDATIONS SUMMARY

1. Carefully read the labelling and follow instructions explicitly.

2. Never fumigate alone from inside the storage structure.

3. Person supervising must be a licensed fumigator and personnel assisting must be trained and appropriately licensed in the use of aluminum phosphide. Never allow uninstructed personnel to handle Aluminum Phosphide. Observe all provincial pesticide legislation requirements.

4. If Aluminum phosphide is to be applied from within the structure to be fumigated, approved respiratory protection must be worn by all personnel in the structure.

5. Wear dry gloves of cotton or other breathable material if contact with aluminum phosphide tablets, pellets, bags, or dust is likely. Aerate used gloves and other contaminated clothing in a well ventilated area prior to laundering. Wash hands thoroughly after using aluminum phosphide.

6. Never open fumigant containers in a flammable atmosphere. It is preferable to open them in open air, near a fan or other

appropriate ventilation which will rapidly exhaust contaminated air.

7. Exposure to hydrogen phosphide must never exceed the eight hour Time-Weighted Average (TWA) of 0.3 ppm or the 15 minute Time-Weighted Short-Term Exposure Limit (STEL) of 1.0 ppm.

8. Do not allow aluminum phosphide to contact liquids, or to pile up.

9. Dispose of empty containers and spent residual dust in a manner consistent with the label instructions.

10. Post warning placards on fumigated areas.

11. Prior to fumigation, notify appropriate company employees.

12. Hydrogen phosphide fumigants are not to be used for vacuum fumigations.

13. Fumigated areas must be aerated to 0.3 ppm hydrogen phosphide or less prior to reentry by unprotected workers.

14. Finished foods and feeds which have been fumigated with aluminum phosphide must be aerated for 48 hours prior to offering to the end consumer.

15. Transport of incompletely aerated commodities to a new site is permissible by rail or ship only, and the new storage site must be placarded if its concentration in phosphine is above 0.3 ppm. Trucks, vans, trailers and similar transport vehicles cannot be moved over public roads or highways until they are aerated and the warning placards removed. If workers must handle incompletely aerated commodity, or are indoors (eg. an enclosed elevator head) they are to wear appropriate respiratory protection (see Respiratory Protection section).

16. Keep containers of aluminum phosphide tightly closed except while removing product for application.

17. Phosphine will corrode copper and precious metals at high concentrations or humidities. Protection or removal of wiring, sensitive equipment or precious metals is recommended under these conditions.

18. Tablets, pellets and/or their reacted residues must not come into contact with any processed food except that they may be added directly to processed brewer's rice, malt and corn grits used in the manufacture of beer.

19. Do not use aluminum phosphide containers for any purpose other than recycling or reconditioning.

20. Pre-exposure screening of employees to detect impaired pulmonary function is recommended. Any employees developing this condition should be referred for medical examination.

2. TOXICOLOGICAL INFORMATION

Aluminum phosphide tablets, pellets, bags, or dust will react with moisture from the air, acids and many other liquids to release hydrogen phosphide (phosphine, PH_3) 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 colour), 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 hyperaemia (excess of blood in a body part), small perivascular brain hemorrhages and brain edema (fluid in brain). Metal phosphide fumigants are poisonous if swallowed. 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 colour) 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/her own judgment:

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 intubation with a constant removal of edema fluid and oxygen over pressure 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. PRECAUTIONS

3.1 DANGER: Hazardous to Humans, Domestic Animals and Nesting Birds

Aluminum phosphide from aluminum phosphide tablets, pellets, bags, or dust may be fatal if swallowed. Do not get in eyes, on skin or on clothing. Do not eat, drink or smoke while handling aluminum phosphide fumigants. If a sealed container is opened, or if the material comes into contact with water, acids or other liquids these products will release hydrogen phosphide (phosphine, PH_3) which is an extremely toxic gas. If a garlic odour is detected, refer to the information on Industrial Hygiene Monitoring (Section 6.6) of this Applicator's Manual for appropriate monitoring procedures. Pure hydrogen phosphide gas is odourless; the garlic odour is due to a contaminant. Since the odour of hydrogen phosphide may not be detected under some circumstances, the absence of a garlic odour does not mean that dangerous levels of hydrogen phosphide gas are absent. Observe proper reentry procedures specified elsewhere in the labelling to prevent overexposure. In situations where ventilation of buildings is required following fumigation (e.g. warehouses), phosphine gas may pose a potential hazard to small birds (e.g. swallows) nesting on or near those structures. Therefore,

carefully inspect the outside of the structure prior to application of the fumigant to ensure the absence of nesting birds.

3.2 Physical and Chemical Hazards

Aluminum phosphide in tablets, pellets and partially spent dust will release hydrogen phosphide if exposed to moisture from the air or if it comes into contact with water, acids and many other liquids. Since hydrogen phosphide 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 hydrogen phosphide can produce a very energetic reaction. Explosions can occur under these conditions and may cause severe personal injury. Never allow the build-up of hydrogen phosphide to exceed explosive concentrations. Do not confine spent or partially spent metal phosphide fumigants as the slow release of hydrogen phosphide from these materials may result in formation of an explosive atmosphere. Aluminum phosphide fumigants should not be stacked or piled up or allowed to contact liquids. 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 aluminum 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, point the container away from the face and body and slowly loosen the cap. Although the chances for a flash are very remote, never open these containers in a flammable atmosphere. These precautions will also reduce the fumigator's exposure to hydrogen phosphide.

Pure phosphine (hydrogen phosphide) gas is practically insoluble in water, fats and oils, and is stable at normal fumigation temperatures. However, phosphine will corrode metals at high concentrations or humidities. Protection or removal of wiring, sensitive equipment or precious metals is recommended under these conditions. 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. Hydrogen phosphide will also react with certain metallic salts therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed.

4. PROTECTIVE CLOTHING

Wear dry gloves of cotton or other breathable material if contact

with aluminum phosphide tablets, pellets, bags, or dust is likely. Wear a loose fitting long sleeve shirt, long pants, shoes and socks. After fumigation activities, remove all protective clothing, aerate in a well ventilated area then wash thoroughly, separately, before re-use.

If aluminum phosphide tablets or pellets become trapped inside clothing, remove clothing, wash hands and exposed skin thoroughly, shower and change into clean clothing.

If application of fumigant is performed from within the structure to be fumigated, approved respiratory protection against phosphine must be worn during fumigation, by all personnel in the structure (see below).

5. RESPIRATORY PROTECTION

5.1 When Respiratory Protection Must Be Worn

NIOSH/MSHA approved respiratory protection must be worn if worker exposure limits cannot be met through engineering controls (such as forced air ventilation) and/or appropriate worker practices. For example, if application of the fumigant is performed from within the structure to be fumigated, approved respiratory protection is required to be worn by all personnel inside the structure. Respiratory protection is also required to be worn upon reentry into a partially aerated structure, (e.g. upon initiation of aeration or after aeration when testing for re-entry), and when attending to spills and leaks. When required, gas concentration measurements for safety purposes may be made using low level detector tubes*. See the section on Applicator and Worker Exposure for monitoring requirements.

The respiratory protection must fit properly, any obstruction to a proper fit should be removed (e.g., beard, long sideburns).

* Information on hydrogen phosphide (phosphine, PH_3) detector tubes may be obtained from your distributor.

5.2 Permissible Gas Concentration Ranges for Respiratory Protection Devices

A NIOSH/MSHA approved air-purifying full-face gas mask with a chin-style mounted canister approved for phosphine OR a NIOSH/MSHA approved supplied-air respirator with a full face piece must be used at levels up to 15 ppm, or to escape from levels up to 1500 ppm. Above this level, or in situations where the hydrogen phosphide concentration is unknown, a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) must be worn

and operated in a positive pressure mode.

5.3 Requirements for Availability of Respiratory Protection for outside applications

Respiratory protection must also be available for applications from outside the area to be fumigated such as addition of tablets, pellets or bags to automatic dispensing devices, or outdoor applications even if exposures above the permitted exposure limits are not expected. Observe Provincial pesticide regulations.

6. APPLICATOR AND WORKER EXPOSURE

6.1 Hydrogen Phosphide Exposure Limits

Exposure to hydrogen phosphide must never exceed the eight hour Time-Weighted Average of 0.3 ppm or the 15 minute Time-Weighted Short-Term Exposure Limit (STEL) of 1.0 ppm, for applicators and workers during application. Application is defined as the time period covering the opening of the first container, applying the appropriate dosage of fumigant and closing up the site to be fumigated. All persons in the treated site and in adjacent indoor areas are covered by this exposure standard. Periodic gas measurements should be made in the worker's breathing zone using phosphine detector tubes or another suitable detector, unless they are protected by a NIOSH/MSHA approved supplied air respirator operated in a positive pressure mode.

6.2 Application of Fumigant

Depending upon temperature and humidity, aluminum phosphide releases hydrogen phosphide gas slowly upon exposure to moisture from the air. If the fumigator's exposure exceeds the eight hour TWA of 0.3 ppm, or the STEL of 1.0 ppm, approved respiratory protection must be worn. If aluminum phosphide is to be applied from within the structure to be fumigated, approved respiratory protection must be worn by all personnel inside the structure. When required, gas concentration measurements for safety purposes may be made using low level detector tubes. See the information on Industrial Hygiene Monitoring in Section 6.6 of this Applicator's Manual.

6.3 Leakage from Fumigated Sites

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

in the occupied areas must be sufficient to meet exposure standards.

6.4 Aeration and Reentry

If the area is to be entered after fumigation, it must be aerated until the level of hydrogen phosphide 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 of hydrogen phosphide. Do not allow reentry into treated areas by any person before this time unless protected by an approved respirator. A NIOSH/MSHA approved self-contained breathing apparatus with a positive pressure mode must be worn during testing of the phosphine level and during initiation of aeration, if re-entry of the fumigated structure is necessary.

Adhere to provincial ambient air quality criteria standards and monitor downwind gas levels. Ensure that the deactivation area is secure and placarded to prevent public and unauthorized worker access.

6.5 Handling Un-Aerated Commodities

Exposure to hydrogen phosphide must never exceed the eight-hour Time-Weighted-Average of 0.3 ppm or the 15 minute Time-Weighted Short-Term Exposure Limit (STEL) of 1.0 ppm during moving, storage or processing of incompletely aerated commodities.

6.6 Industrial Hygiene Monitoring

Periodic gas measurements should be made in the worker's breathing zone using phosphine detector tubes or another suitable detector, unless they are protected by a NIOSH/MSHA approved supplied air respirator operated in a positive pressure mode.

It is recommended that hydrogen phosphide exposures be documented in an operations log or manual for each site and operation where exposures may occur. The purpose of this monitoring is to prevent excessive exposures, to verify whether the appropriate respirator is being worn during fumigation within a structure and whether respiratory protection is required upon re-entry after aeration. This monitoring is mandatory although, once exposures have been adequately characterized, subsequent monitoring is not routinely required. However, spot checks should be made occasionally, especially if conditions change significantly or if an unexpected garlic odour is detected. Gas measurements should be made in the worker's breathing zone. Monitoring is not required for outdoor operations.

There are a number of devices on the market for the measurement of hydrogen phosphide gas levels for industrial hygiene purposes. One of these is the hydrogen phosphide detector tube used in conjunction with the appropriate hand-operated air sampling pump. These devices are reliable, portable, simple to use, do not require extensive training and are relatively rapid, inexpensive and accurate. Low level detector tubes are available which can detect 0.1 ppm and are suitable for industrial hygiene monitoring. Information on hydrogen phosphide (phosphine, PH_3)detector tubes may be obtained from your distributor.

7. FIRST AID

Symptoms of overexposure are headache, dizziness, nausea, difficult breathing, vomiting, and diarrhea. In all cases of overexposure, get medical attention immediately. Take victim to a doctor, emergency treatment facility or poison control centre, bringing this Applicator's Manual.

If the gas or dust from aluminum phosphide is inhaled: Get exposed person to fresh air. Keep warm and make sure person can breathe freely. If breathing has stopped, give artificial respiration by mouth-to-mouth or other means of resuscitation. Do not give anything by mouth to an unconscious person.

If aluminum phosphide pellets, tablets, bags or dust 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 dust or granules from aluminum phosphide get 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 dust from aluminum phosphide pellets, tablets, or bags gets in eyes:

Flush with plenty of water. Get medical attention.

8. PLACARDING OF FUMIGATED AREAS

The applicator must placard or post all entrances to the structures under fumigation with placards at least 35 cm long and

25 cm wide bearing:

1. The signal word DANGER in letters at least 7 cm high and the SKULL AND CROSSBONES symbol in red.

2. The statement "Area and/or commodity under fumigation, DO NOT ENTER".

3. The statement, "This sign may only be removed after the commodity is completely aerated (contains 0.3 ppm or less of phosphine). Transport of incompletely aerated commodities to a new site is permissible by rail or ship only, and the new storage site must be placarded if its concentration in phosphine is above 0.3 ppm. Trucks, vans, trailers and similar transport vehicles cannot be moved over public roads or highways until they are aerated and the warning placards removed. If workers must handle incompletely aerated commodity, or are indoors (eg. an enclosed elevator head) they are to wear appropriate respiratory protection."

4. The date and time fumigation begins and date and time which aeration can begin.

5. Name of fumigant used.

6. Name, address and telephone number of the applicator.

All entrances to the fumigated and deactivation areas 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 hydrogen phosphide or less. To determine whether aeration is complete, each fumigated site or vehicle must be monitored and shown to contain 0.3 ppm or less hydrogen phosphide gas in the air space around and, if feasible, in the mass of the commodity.

It is recommended that the persons responsible for removing placards be familiar with the physical, chemical and toxicological properties of hydrogen phosphide. They should also be knowledgeable in making gas concentration measurements, exposure limits and symptoms and first aid treatment for hydrogen phosphide poisoning.

9. DIRECTIONS FOR USE

9.1 General

9.1.1 The use of aluminum phosphide is Restricted due to the acute inhalation toxicity of hydrogen phosphide (phosphine, PH3) gas. These products are for retail sale to and use only by provincially licensed personnel for those uses covered by the applicator's certification, or workers trained in accordance with the Applicator's Manual and working under the direct supervision and in the physical presence of the certified applicator. Physical presence means on site or on the premises. Read and follow the label and this Applicator's Manual which contains complete instructions for the safe use of this pesticide.

9.1.2 Aluminum phosphide is a highly hazardous material and should be used only by individuals trained in its proper use. Before using, read and follow all label precautions and directions.

Additional copies of this Applicator's Manual are available from:

PESTOP, INC.
2-11455-201A Street
Maple Ridge, B.C. V2X 0Y3
(604) 460-2000

MIDLAND FUMIGANT CO. INC.
1805 South 2nd Street
Leavenworth, Kansas 66048
(913) 651-3900

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

9.1.3 At least two persons trained in the use of aluminum phosphide must be present during fumigation of structures 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 aluminum phosphide is applied from outside the area to be treated, unless Provincial pesticide regulations require otherwise.

Large scale (permit) fumigations may require the posting of guards to prevent entry into the area under fumigation. Refer to

Provincial pesticide regulations.

9.1.4 Shipholds, 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 they are aerated and the warning placards removed.

9.1.5 Do not fumigate commodities with aluminum phosphide when commodity temperature is below 5ÉC (40ÉF).

9.1.6 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., where required, and to decide how monitoring should be conducted to prevent excessive exposures.

9.1.7 Wear dry gloves of cotton or other breathable material while handling aluminum phosphide. Wash hands thoroughly after use.

9.1.8 Hydrogen phosphide gas may flash at concentrations above its flammable limit. Do not open aluminum phosphide containers in an explosive environment (eg. flour mill). It is preferable to open them in open air, near a fan or other appropriate ventilation which will rapidly exhaust contaminated air. These precautions will also reduce the applicator's exposure to hydrogen phosphide gas.

9.1.9 Contact with liquids should be carefully avoided when applying aluminum phosphide treatment of bulk commodities or space. Liquids in contact with unreacted aluminum phosphide will greatly accelerate the production of hydrogen phosphide gas which could result in a toxic and/or fire hazard.

9.1.10 Piling of large numbers of pellets, tablets, bags or dust from their fragmentation, 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 decreased efficacy as a result of poor gas release and may leave an active residual for disposal which contains considerable amounts of unreacted aluminum phosphide. Piling of product may also result in increased hazard of fire if water should come into contact with the mass of aluminum phosphide.

9.1.11 As much as is possible, protect unused aluminum phosphide from excessive exposure to atmospheric moisture during application and tightly reseal the aluminum flask prior to returning pellets or tablets to storage. Aluminum Phosphide bag

containers once opened cannot be resealed for future use.

9.1.12 Hydrogen phosphide gas may react with certain metals and their salts to produce corrosion. This gas is corrosive to copper, copper alloys and precious metals such as silver and gold. Sensitive equipment and items containing these elements should be removed or protected prior to fumigation with aluminum phosphide.

9.1.13 Do not allow aluminum phosphide or its residual dust to come into direct contact with processed foods or commodity packages intended for retailers except that aluminum phosphide may be added directly to processed brewer's rice, malt and corn grits used in the manufacture of beer.

9.1.14 If aluminum phosphide is to be applied from within the structure to be fumigated, approved respiratory protection must be worn by all personnel in the structure. For phosphine levels of up to 15 ppm a NIOSH/MSHA approved air-purifying full face gas-mask with a chin style mounted canister approved for phosphine OR a NIOSH/MSHA approved supplied air respirator with a full face piece must be worn.

In situations where the phosphine concentration is unknown or is greater than 15 ppm (eg. if reentry before complete aeration is necessary), a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) must be worn and operated in a positive pressure mode.

Respiratory protection need not be worn, but must be available for uses such as outdoor application, addition of pellets to automatic dispensing devices, etc., even if exposures above the allowable limits are not expected. Observe all provincial pesticide regulations.

9.1.15 Notify appropriate company employees prior to fumigation and provide relevant safety information to local officials (fire department, police. etc.) for use in the event of an emergency. Observe all Provincial pesticide regulations.

9.2 Pests Controlled Aluminum phosphide has been found effective against the following insects and their preadult stages-that is eggs, larvae and pupae. These include:

Almond moth	Flat grain beetle	Red flour beetle
Angiomas grain moth	Fruit flies	Rice weevil
Bean weevil	Grain moth	Rusty grain beetle

Cadelle	Granary weevil	Saw-toothed grain beetle
Cereal leaf beetle	OHairy fungus beetle	Spider beetles
Cigarette beetle	Hessian fly	Tobacco moth
Cockroaches	Indian meal moth	Yellow meal worm
Confused flour beetle	Khapra beetle	Flour beetle
Dermestid beetles	Maize weevil	Lesser grain borer
Dried fruit moth	Pink bollworm	Dried fruit beetle
Mediterranean flour moth	European grain moth	Raisin moth

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, unfavourable exposure conditions, etc. In addition, some insects are less susceptible to hydrogen phosphide than others. If maximum control is to be attained, extreme care must be taken in sealing, the higher dosages must be used, exposure periods lightened, proper application procedures followed and temperature and humidity conditions must be favourable.

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

MINIMUM EXPOSURE PERIODS FOR ALUMINUM PHOSPHIDE

Temperature	Exposure Period
below 5EC (40EF)	Do not fumigate*
5E - 12EC (40E - 53EF)	10 days (240 hours)
13E- 15E C (54E - 59E F)	5 days (120 hours)
16E - 20EC (60E - 68EF)	4 days (96 hours)
above 20EC (68EF)	3 days (72 hours)

* If the temperature drops below 5EC during a fumigation, deactivate the aluminum phosphide at the end of the treatment period as detailed in the Spill and Leak Procedures. (Sec. 13).

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. Additionally, the fumigation period

should be long enough to allow for complete reaction of aluminum phosphide with moisture so that little or no unreacted aluminum phosphide remains. This will minimize worker exposures during further storage and/or processing of the treated bulk commodity as well as reduce hazards in the disposal of partially spent aluminum 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 hydrogen phosphide gas production 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 gas is poor and insects are not subjected to lethal concentrations of hydrogen phosphide. Careful sealing is required to ensure that adequate gas levels are retained and proper application procedures must be followed to provide satisfactory distribution of hydrogen phosphide 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 or shallow probing. This is particularly important in the fumigation of bulk commodity contained in large storages.

Remember, exposure periods recommended in the table are minimum periods and may not be adequate to control all stored products pests under all conditions nor will they always provide for total reaction of aluminum phosphide particularly if temperatures and commodity moisture levels or humidity are low during the fumigation.

9.4 Commodities Which May be Fumigated with aluminum phosphide. Aluminum phosphide may be used for the fumigation of raw agricultural commodities, animal feed, processed foods, tobacco and certain other non-food items.

9.4.1 Raw Agricultural Commodities, Animal Feeds and Processed Foods

Aluminum phosphide may be used for the treatment of grain pests in stored barley, cocoa beans, coffee beans, corn, cotton seeds, dates, dried peas, lentils, millet, nuts in shells, oats, peanuts, popcorn, rice, rye, sorghum, soybeans, sunflower seeds, triticale, wheat, all processed foods and feeds.

Aluminum phosphide may also be used to fumigate bagged, packaged

or treated cereal, grass, sorghum or small legume seeds destined for planting use only. Pellets or tablets may be added directly to animal feed, and raw agricultural commodities stored in bulk. For those commodities not stored in bulk, fumigation using aluminum phosphide bags are recommended. Under no condition shall any processed food or bagged commodity come in direct contact with aluminum phosphide pellets, tablets or residual dust except that aluminum phosphide may be added directly to processed brewer's rice, malt and corn grits for use in the manufacture of beer.

9.4.2 Non-Food Commodities, Including Tobacco

The following non-food items may be fumigated with aluminum phosphide:

Dried Plants and Flowers

Feathers

Human Hair, Rubberized Hair, Vulcanized Hair, Mohair Leather Products, Animal Hides and Furs

Paper and Paper Products

Processed or Unprocessed Cotton, Wool and Other Natural Fibres or Cloth, Clothing

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

Straw and Hay

Tobacco

Wood and Wood Products

(Tobacco and other non-food commodities should not be contacted by pellets, tablets or residual dust.)

9.5 Recommended Dosages

Hydrogen phosphide 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 aluminum phosphide is required to treat a 1092 kL (30,000 bushel) silo whether it is empty or full of grain unless, of course, 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 Fumigations with Aluminum Phosphide Pellets, Tablets, and Bags

Product	per 100 m3*	per 100 tonnes*
Pellets	350-2560	480-3600
Tablets	70-500	100-720
Bags	7-45	9-65

* Dosage rates for dates, nuts & dried fruits is 350-700 pellets or 70-140 tablets/100m3 or 500-1000 pellets/100 tonnes or 100-200 tablets/100 tonnes, for bags 7 - 13 bags/100m3 or 9 -18 bags/100 tonnes.

These dosages are not to be exceeded. It is important to be aware that a shortened exposure period cannot be fully compensated by an increased dosage of aluminum phosphide.

The wide range of dosages listed above is required to handle the variety of fumigation situations encountered in practice. Somewhat higher dosages are usually recommended under cooler, drier conditions or where exposure periods are relatively short. However, the major factor in selection of dosage is the ability of the structure to hold hydrogen phosphide gas during the fumigation. Modern, well-sealed warehouses may be treated with a low dosage, while more poorly constructed buildings may require the upper end of the dosage range. 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 of grain stored in tall silos. Poor gas distribution frequently results when the fumigant cannot be uniformly added to the grain and it must be treated by surface application. In order to reduce the odds of overdosing, it is recommended that a careful inspection of the site to be fumigated is performed prior to application of the fumigant, including an assessment of the ability of the structure to hold the fumigant and a measure of the temperature and humidity inside the structure. The dosage should be based on the results of that inspection.

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 Aluminum Phosphide Dosages tor Various Types of

Fumigations

Type of Fumigation	Pellets	Tablets	Bags
1. Space			
Mills, Warehouses, etc. Bagged Commodities Processed Fruits & Nuts Stored Tobacco	350-1060/100m3 530-1060/100m3 350-700/100m3 350-700/100m3	70-200/100m3 100-200/100m3 70-140/100m3 70-140/100m3	6-18/100m3 9-18/100m3 6-13/100m3 6-13/100m3
2. Bulk Stored Commodities Vertical Storages	530-1060/100m3 800-1500/100 tonnes	100-200/100m3 160-300/100 tonnes	9-18/100m3 14-27/100 tonnes
Tanks	530-1060/100m3 800-1800/100 tonnes	100-250/100m3 160-360/100 tonnes	9-22/100m3 14-32/100 tonnes
Flat Storages (loose construction)	880-2560/100m3 1800-3600/100 tonnes	250-500/100m3 360-720/100 tonnes	22-45/100m3 32-66/100 tonnes
Grain Bins	880-2560/100 m3 1800-3600/100 tonnes	250-500/100m3 360-720/100 tonnes	22-45/100 m3 32-66/100 tonnes
Bunkers and Tarped Ground Storages	530-1400/100m3 800-2000/100 tonnes	100-280/100m3 160-400/100 tonnes	9-25/100m3 14-36/100 tonnes
Railcars	530-1150/100m3 800-1500/100 tonnes	100-230/100m3 160-300/100 tonnes	9-20/100m3 14-27/100 tonnes
Shipholds	530-1170/100m3	100-230/100m3	9-20/100m3

The higher end of the dosage ranges may be required for 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 hydrogen phosphide gas.

9.6 Application Procedures

9.6.1 General Statement

Regardless of the type of storage or structure 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 this Applicator's Manual but are listed again in the following for completeness.

1. A plan should be devised for application, aeration and disposal of the fumigant so as to keep to a minimum any exposures to hydrogen phosphide. See the requirements for Industrial Hygiene Monitoring under the Applicator and Worker Exposure section of this Applicator's Manual.

2. Aluminum phosphide pellets ,tablets, or bags should be applied so as to provide effective gas concentrations throughout the storage. When pellets, tablets, or bags are not applied uniformly to a bulk commodity (surface application in a tall silo or ship's hold, for example), exposure times should be lengthened to allow for penetration of gas throughout the storage.

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

4. Exposure periods should be long enough to provide for adequate control of insect pests and also complete reaction of the fumigant.

5. Piling of large numbers of pellets, tablets, or bags 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 decreased efficacy as a result of poor gas release and may leave an active residual for disposal which contains considerable amounts of unreacted aluminum phosphide. Piling of product may also result in increased hazard of fire if water should come into contact with the mass of aluminum phosphide.

6. Contact with liquids should be carefully avoided when applying aluminum phosphide for treatment of bulk commodities or space.

7. Aluminum phosphide fumigants should not be applied to confined spaces where the concentration of hydrogen phosphide may build up to exceed its lower flammable limit.

8. Observe the precautionary and safety statements mentioned elsewhere in this manual.

9. Aluminum phosphide will corrode certain metals, especially at high concentrations and humidities. Protection or removal of wiring, sensitive equipment or precious metals is recommended under these conditions.

10. FOR ALL TYPES OF FUMIGATIONS, IF APPLICATION OF FUMIGANT IS TO BE PERFORMED FROM WITHIN THE STRUCTURE TO BE FUMIGATED, APPROVED RESPIRATORY PROTECTION MUST BE WORN BY ALL PERSONNEL IN THE STRUCTURE. APPROVED RESPIRATORY PROTECTION MUST BE WORN IF RE-ENTRY OF THE TREATED AREA IS NECESSARY BEFORE COMPLETE AERATION (refer to the Respiratory Protection and the Applicator and Worker Exposure sections

for approved respiratory protection).

The following instructions are intended to provide general guidelines for typical fumigations:

9.6.2 Fumigation of Mills, Food Processing Plants and Warehouses

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

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

3. Place trays or sheets of Kraft paper or foil, up to 1 m2 (12 square feet) in area, on the floor throughout the structure to hold aluminum phosphide pellets or tablets.

4. Spread aluminum phosphide on the sheets at a density no greater than 75 pellets or 30 tablets, per 0.1 m2 (square foot). This corresponds to slightly more than one-half flask of pellets or tablets per 1 m^2 sheet. Check to see that the aluminum phosphide has not piled up and that it is spread out evenly to minimize contact between the individual pellets or tablets.

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

6. The fumigation period usually lasts from 3 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. Do not enter the structure without appropriate respiratory protection until the phosphine concentration is 0.3 ppm or below. 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.

7. Collect the spent aluminum phosphide dust and dispose of it, with or without further deactivation, following recommendations given under Disposal Instructions.

8. Remove fumigation warning placards only after aeration is complete (See Sec. 8, Placarding of Fumigated Areas) .

9.6.3 Fumigation of Vertical Storages (concrete upright bins and other silos in which grain can be rapidly

transferred)

1. 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 connect to adjacent bins.

2. Place warning placards on the discharge gate and on all entrances.

3. Pellets or tablets may be applied continuously by hand. Pellets may also be applied by an automatic dispenser on the headhouse/gallery belt or into the fill opening as the commodity is loaded into the bin.

   CAUTION: Know how to calibrate the dispenser to deliver the appropriate dosage. To prevent accidental poisoning, ensure that no aluminum phosphide remains in the hopper of the automatic dispenser once the commodity has been transferred.

4. Seal the bin deck openings after the pellets or tablets have been dispensed.

5. 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 bin if aluminum phosphide has not been applied uniformly throughout the commodity mass.

9.6.4 Fumigation of Flat Storages (Flat Houses)

1. 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 hydrogen phosphide gas. Vent flasks outside the storage, conduct fumigations during cooler periods and employ other work practices to minimize exposures. Wear respiratory protection during application. Refer to the sections on Applicator and Worker Exposure (Sec. 6) and Respiratory Protection (Sec. 5).

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

3. Post fumigation warning placards.

4. Apply pellets ,tablets, or bags by surface application, shallow probing, deep probing or uniform addition of pellets or tablets as the bin is filled.

Storages requiring more than 24 hours to fill should not be treated by addition of fumigant of pellets or tablets to the commodity stream as large quantities of hydrogen phosphide 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 or tablets may be dropped into the probe at intervals as it is withdrawn.

Surface application may be used if the bin can be made 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 dosage in the floor level aeration ducts. Check the ducts prior to addition of aluminum phosphide to make sure that they contain no liquid water.

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

6. Lock all entrances to the storage.

9.6.5 Fumigation of Grain Bins

Leakage is the single most important cause of failures in the treatment of grain bins. 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 using plastic sheeting or tarpaulins of at least 4 mil thickness. Thicker poly sheeting is recommended to reduce the potential for loss of fumigant. Do not fumigate storages which will be entered by humans or animals prior to aeration.

Seal the bin as tightly as possible. It is recommended that the surface of the grain be covered with plastic sheeting after aluminum phosphide has been applied. Tarping the grain surface will greatly reduce the leak rate of the gas as well as reduce the amount of aluminum phosphide 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.

A recirculation system (like T.A.R.S.)which draws gas from above the grain and introduces it to the grain mass will help to establish a uniform hydrogen phosphide concentration throughout the storage.

Place fumigation warning signs on entrances to the bin and near

the ladder.

Aluminum phosphide tablets, pellets, or bags may be scattered over the surface or probed into the grain. Spread the dose uniformly over the surface. Use of PVC pipe about 2 metres in length and having a diameter of 32 mm. Use 100 - 250 pellets or 20 - 50 tablets per probe.

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 the aeration duct is dry before adding aluminum phosphide. Addition of aluminum phosphide to liquid in an aeration duct may result in a fire.

Seal the aeration fan with plastic sheeting of 4 mil thickness or greater. Thick poly sheeting of not less than 4 mil is recommended to reduce the potential for loss of fumigant.

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

9.6.6 Bunker and Tarpaulin Fumigations

When possible, conduct tarpaulin fumigations outside. Do not conduct outdoor fumigation of commodities in the proximity of wildlife areas.

Use of plastic sheeting or tarpaulins to cover commodities is one of the easiest and least expensive means for providing relatively gas tight enclosures which are very well suited for fumigation. The volume of these enclosures may vary widely from a few cubic feet, for example, a fumigation tarpaulin placed over a small stack of bagged commodity, to a plastic bunker storage capable of holding 22000 kL (600,000 bushels) of grain or more.

An enclosure suitable for fumigation may be formed by covering bulk or packaged commodity with poly sheeting. The sheets may be taped together to provide a sufficient width of material to ensure that adequate sealing is obtained. If the material rests on soil or flooring of wood or other porous material, it should be repositioned onto poly prior to covering for fumigation. The plastic covering of the pile may be sealed to the floor using sand or water snakes, by shovelling soil or sand onto the ends of the plastic covering or by other suitable procedures. The polycovering should be reinforced by tape or other means around any sharp corners or edges in the stack so as to reduce the risk of tearing. Use plastic sheeting or tarpaulins of at least 4 mil thickness. Thicker poly sheeting is recommended to reduce the potential for loss of fumigant.

PLACE WARNING PLACARDS AT CONSPICUOUS POINTS ON THE ENCLOSURE.

Pellets or tablets may be applied to the tarped stack or bunker storage of bulk commodity through slits in the poly covering. Probing or other means of dosing may be used. Avoid application of large amounts of aluminum phosphide at any one point. It should be added below the surface of the commodity if condensation or other source of moisture is likely to form beneath the sheeting. The slits in the covering should be carefully taped to prevent loss of gas once the dose has been applied.

Bags are recommended for the treatment of bagged commodities and processed foods although pellets or tablets on trays or sheets of Kraft paper may also be used. Pellets, tablets, or bags and their reacted residues must not come into contact with any processed food except that they may be added directly to processed brewer's rice, malt and corn grits used in the manufacture of beer. Care should be taken to see that the plastic sheeting is not allowed to cover the aluminum phosphide and prevent contact with moist air or confine the gas. Distribution of hydrogen phosphide gas is generally not a problem in the treatment of bagged commodities and processed foods. However fumigation of larger bunker storages containing bulk commodities will require proper application procedures to obtain adequate results.

9.6.7 Fumigation of Railcars, Containers, Trucks, Vans and Other Transport Vehicles

Railcars and containers, trucks, vans and other transport vehicles shipped piggyback by rail may be fumigated in transit. However, it is not legal to move trucks, trailers, containers, vans, etc., over public roads or highways until they have been aerated and the warning placards removed.

Transport vehicles loaded with bulk commodities to which aluminum phosphide tablets may be added directly are treated in essentially the same way as any other flat storage facility.

Aluminum phosphide may be added as the vehicle is being filled, the dose may be scattered over the surface after loading has been completed or the tablets may be probed below the surface. Carefully seal any vents, cracks or other leaks, particularly if the fumigation is to be carried out in-transit. See Section 8 of this Applicator's Manual for recommendations on placarding. Both doors of box cars should be placarded. Place fumigation warning placards on both sides of hopper cars near the ladders and atop the hatches to which aluminum phosphide has been applied. Attach a packet of information for the consignee (available from MIDLAND FUMIGANT CO. INC., 1805 South 2nd Street, Leavenworth, Kansas

66048-913-651-3900 or your distributor). If the transport vehicle is to be shipped under fumigation. Notify the consignee. Bags are recommended for the treatment of transport vehicles or similar storages containing processed foods for which no direct contact is allowed with pellets or tablets.

Proper handling of treated railcars, containers and other transport vehicles shipped piggyback by rail, at their destination is the responsibility of the consignee. The consignee must be familiar with the properties of hydrogen phosphide fumigants, worker exposure limits and symptoms and first aid treatment for hydrogen phosphide poisoning and must know how to make gas concentration measurements.

Transfer without aeration:

Railcars, containers and other transport vehicles shipped piggyback by rail, containing commodities under fumigation may be transferred to a storage area without prior aeration. The consignee must:

1. Ensure that worker exposure levels are not exceeded, and

2. Ensure that the storage area into which the unaerated railcar, container or transport vehicle shipped piggyback is transferred, is placarded if it contains more than 0.3 ppm hydrogen phosphide.

Transfer with aeration:

The consignee must:

1. Aerate the railcar, containers or other transport vehicles shipped piggyback by rail, containing commodities under fumigation and verify that it contains no more than 0.3 ppm hydrogen phosphide.

2. Remove the fumigation warning placard after aeration is completed.

3. Ensure that worker safety limits have not been exceeded.

4. Transfer the fumigated commodity from the railcar, or containers and other transport vehicles shipped piggyback.

5. Dispose of spent fumigant.

9.6.8 Fumigation of Ships

9.6.8.1 General Information

1. IMPORTANT: Shipboard, in-transit ship or shiphold fumigation is also governed by Transport Canada Ship Safety Regulations. Refer to and comply with those Regulations and Ship Safety Bulletins prior to fumigation. In Canada, fumigations must be carried out under the direction of a "Fumigator-in-Charge" as indicated in these regulations. No person shall fumigate in-transit or permit in-transit fumigation in a Canadian flag ship. The decision to fumigate- in-transit on Non-Canadian flag vessels is at the discretion of the master (see Ship Safety Bulletin 13/93).

2. Aluminum phosphide pellets, tablets, and bags are classified as restricted use pesticides due to the acute inhalation toxicity of hydrogen phosphide (phosphine, PH3) gas. These products are for retail sale to and use only by provincially licensed personnel for those uses covered by the applicator's certification, or workers trained in accordance with the Applicator's Manual and working under the direct supervision and in the physical presence of the certified applicator. (Physical presence means on site or on the premises.) Read and follow the label and the Applicator's Manual which contains complete instructions for the safe use of this pesticide.

9.6.8.2 Pre-Voyage Fumigation Procedures

1. Before fumigation is commenced, a notification of intention to fumigate must be given to the nearest Transport Canada Ship Safety office (generally, no less than 24 hours in advance). Similarly, a notice must be given for vessels in-transit of Canadian waters and stopping at a Canadian Port. Prior to fumigating a vessel for in- transit cargo fumigation, the master of the vessel, or his/her representative, and the fumigator must determine whether the vessel is suitably designed and configured so as to allow for safe occupancy by the ship's crew throughout the duration of the fumigation. If it is determined that the design and configuration of the vessel does not allow for safe occupancy by the ship's crew throughout the duration of the fumigation, then the vessel must not be fumigated unless all crew members are removed from the vessel. The crew members must not be allowed to reoccupy the vessel until the vessel has been properly aerated to 0.3 ppm or below 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/her representative, of the requirements: 1) relating to the use of personal respiratory protection equipment*; 2) relating to the use of detection

equipment; and 3) that a person qualified in the use of this equipment must accompany the vessel with cargo under fumigation. Emergency procedures, cargo ventilation, periodic monitoring and inspections, and first aid measures must be discussed with and understood by the master of the vessel or his/her representative.

* Personal respiratory protection means a NIOSH/MSHA approved air purifying full face gas-mask with a chin style mounted canister approved for phosphine OR a NIOSH/MSHA approved supplied-air respirator with a full face piece for phosphine levels up to 15 ppm. A self-contained breathing apparatus (SCBA) must be worn and operated in a positive pressure mode when phosphine levels are above 15 ppm or at unknown concentrations.

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 as described in Sec. 8 of this Applicator's Manual. A watchman must be posted at the gangway to keep unnecessary persons from boarding.

5. If the fumigation is not completed and the vessel aerated before the manned vessel leaves port, the Fumigator-in-Charge shall ensure that there be on board the vessel during the voyage: 1) at least four NIOSH/MSHA approved self-contained breathing apparatus (SCBA)* and four additional air bottles or combination supplied-air respirators; 2) two gas detection devices (when these devices require re-arming after use, the ship shall be equipped with 10% more spare tubes than are required to conduct the required testing for the duration of the voyage); and 3) a person qualified in their operation. If the fumigated area of the vessel has to be re-entered before complete aeration approved respiratory protection must be worn.

* The total number of SCBA on board a vessel need not exceed 6, including those already on board for fire fighting, etc. and required by other regulations.

6. During fumigation, the Fumigator-in-Charge shall ensure that a qualified person using gas or vapour detection equipment routinely tests spaces adjacent to spaces containing

fumigated cargo and all regularly occupied spaces for fumigant leakage. For fumigation-in-transit, the vessel must remain alongside for a minimum of 24 hours, or the Fumigator-in-Charge must sail with the ship and remain on board for a minimum of 24 hours once fumigation has commenced. 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/her representative, of the leakage so that corrective action can be taken. At the end of the 24 hour period, final gas readings should be made and a clearance certificate issued.

7. Review with the master, or his/her representative, the precautions and procedures for during the voyage. Clear written instructions must be given to the master of the ship, to the receiver of the cargo and to the authorities at the discharging port as to how any powdery residues are to be disposed of.

9.6.8.3 Application Procedures for Bulk Dry Cargo Vessels and Tankers

Apply pellets, tablets, or bags by scattering uniformly over the commodity surface, or they may be shallow or deep probed into the commodity mass.

Immediately after application of the fumigant, close and secure all hatch covers, tank tops, butterworth valves, manways, etc.

9.6.8.4 In Transit Fumigation of Containers Aboard Ships

In transit fumigation of containers on ships is also governed by Transport Canada Ship Safety Regulations. Refer to and comply with these regulations prior to fumigation.

No fumigation of containers is to be commenced while the unit is on board a ship. The vessel Master must be notified and correct procedures regarding shipping documents, placarding and transport and stowage of containers under fumigation must be observed.

Application procedures for fumigation of raw commodities or processed foods in containers and other transport vehicles are described in Section 9.6.7.

9.6.8.5 Precautions and Procedures During Voyage

Using appropriate gas detection equipment, routinely 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 re-occupied.

Do not enter fumigated areas except under emergency conditions. If necessary to enter a fumigated area, appropriate personal respiratory protection equipment must be used. Never enter fumigated areas alone. At least two persons wearing the required breathing apparatus should enter, and at least one other person, wearing personal respiratory protection equipment, should be available to assist in case of an emergency.

9.6.8.6 Precautions and Procedures During Discharge

If necessary to enter a treated area 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 safety equipment, unless fumigant concentrations are at or below 0.3 ppm, as indicated by a suitable detector.

9.6.9 Fumigations in Small Sealable Enclosures

Excellent results may be attained in the treatment of small enclosures since it is often possible to control the temperature during fumigation and also to make the enclosure virtually gas tight. Take care not to overdose during these fumigations. A single aluminum phosphide pellet will treat a space of from 0.04 - 0.28 m3 (1.4 to 10 cubic feet). [From 0.19 - 1.42 m^3 (6.9 to 50 cubic feet) may be fumigated with a single aluminum phosphide tablet]. [From 2.09 - 15.62m^3 (75.9 - 550 cubic feet) may be fumigated with a single aluminum phoshide bag.]

10. AERATION OF FUMIGATED COMMODITIES

10.1 Foods and Feeds

Many pesticidal chemicals are poisonous and may leave a toxic residue in the area to which they are applied. Health Canada has established maximum residue limits of such pesticidal chemicals that may remain on raw agricultural products, animal feeds and processed foods. To guarantee compliance with these tolerances, it is necessary to aerate these commodities for 48 hours prior to offering them to the end consumer. It is the user's responsibility to see that there is no residue on such crops in excess of these amounts. The instructions in this Applicator's Manual are based on the best available information, and if followed carefully, should not leave excessive residues.

10.2 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. Tobacco fumigated in containers with plastic liners will probably require longer aeration periods to reach 0.3 ppm.

11. STORAGE INSTRUCTIONS

1. Store Aluminum phosphide 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.

2. Do not store in buildings where humans or domestic animals reside. Keep out of reach of children.

3. Aluminum phosphide pellets and tablets are supplied in gas-tight, resealable aluminum flasks. Do not expose the product to atmospheric moisture any longer than is necessary and seal tightly before returning opened flasks to storage. Aluminum phoshide bags containers cannot be resealed for future use.

4. The shelf life of aluminum phosphide is virtually unlimited as long as the containers are tightly sealed.

12. DISPOSAL

12.1 General

Pesticide wastes are toxic. Open dumping is prohibited. Do not discharge this product, or material containing this product, into natural waterways, wetlands (swamps, bogs, marshes, potholes, etc.) or municipal wastewater collection systems. Do not contaminate water, food or feed by disposal. Proper disposal of aluminum phosphide is required to ensure minimal impact on the environment.

Unreacted or partially reacted aluminum phosphide is acutely hazardous. If these wastes cannot be disposed of according to label instructions, contact the Provincial Regulatory Agency or the Manufacturer. See also Section 13 of this manual, Spill and Leak Procedures.

12.2 Product Container Disposal

The container must be cleaned prior to disposal. There are two options: 1) Triple rinse empty flasks and stoppers with water. Dispose of rinsate in a sanitary landfill, by pouring it out onto

the ground or by other approved procedures. 2) Remove lids and expose empty flasks to atmospheric conditions until residue in the flasks is reacted. This should be done outdoors, away from inhabited buildings.

Once the container is clean, it may be offered for recycling or reconditioning. Alternatively, it may be made unsuitable for further use and disposed of in a sanitary landfill, or by other procedures approved by provincial and local authorities.

12.3 Disposal of Spent Residual Dust from aluminum phosphide

12.3.1 Do not use these directions for incompletely exposed residual dust. See Sec.12.4. If properly exposed, the residual dust remaining after a fumigation with aluminum phosphide will be a greyish-white powder. This will be a nonhazardous waste and contain only a small amount of unreacted aluminum phosphide.

12.3.2 Spent residual dust from aluminum phosphide should be collected and disposed of at a sanitary landfill, incinerator or other approved sites.

12.3.3 From 2 to 3 kg (4 to 7 lbs) of spent dust of aluminum phosphide may be collected for disposal in a 4 litre bucket. Larger amounts 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 about 11 kg (25 lbs) of product in a single bag. Do not pile cloth bags together.

Caution: Do not collect dust in large drums, dumpsters, plastic bags or other containers where confinement may occur.

12.4 Deactivation of Partially-Spent Residual Dust from aluminum phosphide.

12.4.1 There are two forms of partially-spent residual dust. The most volatile of these is called "green dust”, due to its grey-green colour. “Green dust” can result when aluminum phosphide has not been exposed to the atmosphere for the recommended period of time (eg. when a fumigation is aborted after only 8 hours because the temperature has dropped below 5'C).

A second form of partially-spent residual dust can occur when aluminum phosphide is exposed under low temperature or humidity conditions. There may be some unreacted aluminum phosphide remaining in the dust, even if the product was exposed for the recommended period of time. Under these circumstances, the residual dust will have a grey-almost white appearance.

Partially spent dust must be further deactivated prior to ultimate disposal. This is especially true in the cases where “green dust” is present, or following a fumigation which has produced large quantities of partially spent material.

Caution: Confinement of partially spent residual dust, as in a closed container, or collection and storage of large quantities of dust may result in a fire hazard. Small amounts of hydrogen phosphide may be given off from unreacted aluminum phosphide, and confinement of the gas may result in a flash.

12.4.2 Extension of the fumigation period is the simplest method for further deactivation of “green” or partially spent dust prior to ultimate disposal.

12.4.3 “Green” or partially spent residual dust from aluminum phosphide may be deactivated as follows using the “Dry Method”.

Small amounts of partially spent dust, from 2 to 3 kg (4 to 7 lbs) may be deactivated by storage in a 4 litre bucket. Dust should be deactivated outdoors, in a dry location away from inhabited buildings. Larger amounts of dust (about 11 kg or 25 lbs) may be held for deactivation in porous cloth bags (burlap, cotton, etc.). Caution: Do not use cloth bags for the deactivation of "green dust". Placards should be posted, and the site secured to prevent unauthorized persons from tampering with the deactivating dust.

Once deactivated, the dust may be disposed of at an approved sanitary landfill. Caution: Transport the dust in open vehicles without stacking the buckets or piling the bags.

12.4.4 “Green” or residual dust from a phosphide may also be deactivated as follows using the "Wet Method":

Caution: Wear appropriate respiratory protection during wet deactivation of partially spent material. Do not cover the container being used for wet deactivation. This procedure should be performed in the open air and not in the fumigated structure.

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 container. A 2% solution (2000 ml in 100 litres) is suggested. The container should be filled with deactivating solution to within 5-7 cm of the top.

Residual dust is poured slowly into the deactivating solution and stirred so as to thoroughly wet all of the particles. Dust from aluminum phosphide pellets or tablets should be mixed into no less than about 40 litres of water/detergent solution for each

case (21 kg) of material used. Fill the drum with additional water to eliminate headspace.

Placards should be posted, and the site secured to prevent unauthorized persons from tampering with the drums. Allow the suspension to stand for 36 hours or more. Dispose of the deactivated dust/water suspension, with or without preliminary decanting, at an approved sanitary landfill. The deactivating solution may be poured onto the ground. Do not dispose of dust, slurry or deactivated solution by direct addition to sanitary or storm sewers.

13.SPILL AND LEAK PROCEDURES

13.1 General Precautions and Directions

This product is highly toxic to fish, birds and other forms of wildlife. Do not discharge directly to natural waterways, wetlands (swamps, bogs, marshes, potholes, etc.) or municipal wastewater collection systems. Do not contaminate water, food or feed by disposal. Proper disposal of aluminum phosphide is required to ensure minimal impact on the environment.

A spill, other than incidental to application or normal handling, may produce high levels of gas. When the concentration of hydrogen phosphide gas is 15 ppm or higher, or when the concentration of the gas is unknown, attending personnel must wear a NIOSH/MSHA approved SCBA, operated in a positive pressure mode. An approved supplied-air respirator with a full face piece or full-face gas mask with a phosphine canister may be worn if the level of gas is determined to be below 15 ppm. Wear dry gloves of cotton or other breathable material when handling aluminum phosphide.

Do not use water at any time to clean up a spill of Aluminum phosphide. Liquids in contact with unreacted pellets, tablets, or bags will greatly accelerate the production of hydrogen phosphide gas which could result in a toxic and/or fire hazard.

Return all intact aluminum flasks to fiberboard cases or other packaging which has been suitably constructed and marked according to T.D.G.A. 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 Aluminum phosphide may be transferred from the damaged flask to a sound metal container which should be sealed and properly labelled as aluminum phosphide. Transport the damaged containers to an area suitable for pesticide storage for inspection. Further

instructions and recommendations may be obtained from the manufacturer or your distributor.

If a spill has occurred which is only a few minutes old, collect the pellets or tablets and place them back into the original flasks, be sure to tighten the stopper. If the original flasks are damaged place the collected pellets or tablets in a sound metal container. Bags cannot be placed back into their original container, place bags in an open bucket and dispose of properly. Caution, these flasks may flash upon opening at some later time. When possible open flasks outdoors. Do not open flasks in an explosive environment (eg. flour mill).

If the age of the spill is unknown, or if the pellets of tablets have been contaminated with soil, debris, water, etc., gather up the spillage and place it into small open buckets having a capacity no larger than about 4 litres. Do not add more than about 1 to 1.5 kg (2 to 3 lbs) to the bucket. If on-site deactivation is not feasible, these open containers should be transported in open vehicles to a suitable area. Wet deactivation may then be carried out as described in 13.2.

13.2 Deactivation of Aluminum phosphide by the Wet Method

This is similar to the Sec.12.4.4 (Wet deactivation of partially-spent residual dust). The differences are that more water is required, and that any water which bubbles out of the drum is replaced.

13.2.1 Caution: Wear appropriate respiratory protection during wet deactivation of unexposed or incompletely exposed Aluminum phosphide Never place pellets or tablets or dust in a closed container such as a dumpster, sealed drum, plastic bag, etc., as flammable concentrations and a flash of hydrogen phosphide gas are likely to develop.

13.2.2 Deactivating solution is prepared by adding the approximate amount of low-sudsing detergent or surface active agent to water in a drum or other suitable container. A 2% solution (2000 ml in 100 litres) is suggested. The container should be filled with deactivating solution to within 5-7 cm of the top.

13.2.3 Add pellets, tablets or bags into the deactivating solution slowly. Stir to thoroughly wet all of the product. This procedure should be done in the open air. Pellets, tablets or bags should be mixed into no less than 57 litres of water/detergent solution for each case (21 kg) of material to be deactivated. Fill the drum with additional water to eliminate headspace.

13.2.4 Keep a water Supply on hand to top-up the drum as necessary. Placards should be posted, and the site secured to prevent unauthorized persons from tampering with the drums. Allow the mixture to stand, with occasional stirring, for 36 hours. The resultant slurry will then be safe for disposal.

13.2.5 Dispose of the slurry of deactivated material, with or without preliminary decanting, at an approved sanitary landfill. The deactivating solution may be poured onto the ground. Do not dispose of dust, slurry or deactivated solution by direct addition to sanitary or storm sewers.

FOR ASSISTANCE, CONTACT:

PESTOP, INC.
2-11455-201A Street
Maple Ridge, B.C. V2X 0Y3
(604) 460-2000

MIDLAND FUMIGANT CO. INC.
1805 South 2nd Street
Leavenworth, Kansas 66048
(913) 651-3900

OR

Canadian Transport Emergency Centre (CANUTEC)
Telephone: (613) 996-6666

14. NOTICE TO USER This controlled product is to be used only in accordance with the directions on this label. It is an offence under the Pest Control Products Act to use a control product under unsafe conditions.

15. NOTICE TO BUYER Seller's guarantee shall be limited to the terms set out on the label and, subject thereto, the buyer assumes the risk to persons or property arising from the use or handling of this product and accepts the product on that condition.

((LABEL))

ALUMINUM PHOSPHIDE

TABLETS

FOR CONTROL OF INSECTS IN STORED GRAIN, PROCESSED FOODS, FEEDS AND NON-FOOD COMMODITIES, INCLUDING TOBACCO

RESTRICTED

DANGER POISON

KEEP OUT OF REACH OF CHILDREN

GUARANTEE
Aluminum Phosphide 60%

READ THE ENTIRE LABEL AND APPLICATOR'S MANUAL BEFORE USING

REGISTRATION NO: 25318
PEST CONTROL PRODUCTS ACT

Contents: 500 Tablets - Net Weight: 1.5 kilos

Manufactured by:
MIDLAND FUMIGANT CO. INC.
1805 South 2nd Street
Leavenworth, Kansas 66048
(913) 651-3900

Distributed by:
PESTOP, INC.
2-11455-201A Street
Maple Ridge, B.C. V2X 0Y3
(604) 460-2000

NOTICE TO USER:

This control product is to be used only in accordance with the directions on this label. It is an offence under the Pest Control Products Act to use a control product under unsafe conditions.

NATURE OF RESTRICTION:

This product is for retail sale to and use only by appropriately provincially licensed persons for those uses covered by the applicator’s certification or persons trained in accordance with the Applicator’s Manual working under the direct supervision and in the physical presence of the certified applicator. Consult local pesticide regulatory authorities about use permits which may be required.

This product must be stored away from lodging for humans, animal quarters and normal work areas to avoid inadvertent exposure.

RESTRICTED USES:

For the treatment of space, grain pests in stored barley, cocoa beans, coffee beans, corn, cotton seeds, dates, dried peas, lentils, millet, nuts in shells, oats, peanuts, popcorn, rice, rye, sorghum, soybeans, sunflower seeds, triticale, wheat, all processed foods and feeds. Aluminum Phosphide may also be used to fumigate bagged, packaged or treated cereal, grass, sorghum or small legume seeds destined for planting use only. Even distribution throughout the commodity is essential for good results. Refer to the Applicator's Manual for detailed Precautions, Recommendations and Directions for Use.

The time of required exposure is as follows:

below 5EC	Do not fumigate
at 5E - 12EC	10 days are required
at 13 - 15 C	5 days are required
at 16E - 20EC	4 days are required
above 20EC	not less than 3 days

To guarantee compliance with tolerances for hydrogen phosphide residues, commodities must be aerated for 48 hours prior to offering them to the end consumer. For tobacco, aeration on hogsheads should be not less than three days; on any other type of storage, two days.

Phosphine gas may be hazardous to birds nesting on or near warehouses. Carefully inspect the outside of the structure prior to application of the fumigant to ensure the absence of nesting birds.

This product is not to be used for vacuum fumigations.

Phosphine will corrode certain metals, especially at high concentrations and humidities. Protection or removal of wiring, sensitive equipment or precious metals is recommended under these conditions.

The use of this product is RESTRICTED due to the acute inhalation toxicity of hydrogen phosphide (phosphine, PH) gas. This product is accompanied by an approved label and Applicator's Manual. READ AND UNDERSTAND THE ENTIRE LABELING. All parts of the labeling are equally important for safe and effective use of this product. Call the manufacturer if you have any questions or do not understand any part of this labeling.

PRECAUTIONS:

Forms Extremely Hazardous Vapour. Keep Out of Reach of Children. Do not ingest tablets or dust. Keep dust and granules out of eyes and away from skin and clothing. Do not eat, drink or smoke while handling Aluminum Phosphide.

Exposure to moist air or liquids releases flammable and toxic phosphine (hydrogen phosphide) gas. Spontaneous ignition may result if contacted by liquids such as water, acids, or chemicals.

Wear dry gloves of cotton or other breathable material when handling Aluminum Phosphide. Appropriate respiratory protection must be worn during all following operations: application of the fumigant from within a structure, initiation of aeration and after aeration when testing prior to re-entry, attending to spills and leaks. Fumigated areas must be aerated to 0.3 ppm hydrogen phosphide or less prior to re-entry by unprotected workers.

For hydrogen phosphide levels between 0.3-15 ppm, the minimum protection required is a NIOSH/MSHA approved air-purifying full-face gas mask with a chin style, front-or back-mounted canister approved for phosphine OR any NIOSH/MSHA approved self-contained breathing apparatus with a full facepiece. For hydrogen phosphide levels up to 50 ppm, any NIOSH/MSHA approved supplied-air respirator with a full facepiece and is operated in a positive pressure mode may be worn. In situations where the hydrogen phosphide concentration is unknown, or to escape from conditions which are immediately Dangerous to Life or Health (DLH), a NIOSH/MSHA approved self-contained breathing apparatus (SCBA) with a full facepiece must be worn and operated in a positive pressure mode.

If a beard or long sideburns interfere with the fit of respiratory protection, they must be shaven.

Keep available a NIOSH/MSHA approved SCBA with a positive pressure mode, to be used if it is necessary to re-enter a treated area before aeration is complete, or in situations where the level of phosphine is unknown.

When using an automatic dispenser to add Aluminum Phosphide to the commodity, know how to calibrate the dispenser to deliver the appropriate dosage. To prevent accidental poisoning, ensure that no Aluminum Phosphide remains in the hopper of the automatic dispenser once the commodity has been transferred.

DISPOSAL:

Refer to the Disposal instructions of the Applicator's Manual for proper disposal of used Aluminum Phosphide after fumigation is completed. Open dumping is prohibited. Do not discharge this product, or material containing this product, into natural waterways, wetlands (swamps, bogs, marshes, potholes, etc.) or municipal wastewater collection systems. Do not contaminate water, food or feed by disposal. Proper disposal of aluminum phosphide is required to ensure minimal impact on the environment.

TOXICOLOGICAL INFORMATION:

Aluminum phosphide tablets or dust particles react with moisture from the air, acids and many other liquids to release hydrogen phosphide (phosphine, PH) 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 colour), 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 hyperaemia (excess of blood in a body part), small perivascular brain hemorrhages and brain edema (fluid in brain). Metal phosphides fumigants are poisonous if swallowed. 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 colour) 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.

FIRST AID:

Symptoms of overexposure are headache, dizziness, nausea, difficult breathing, vomiting, and diarrhea. In all cases of overexposure, get medical attention immediately. Take victim to a doctor, emergency treatment facility or poison control centre, bringing the Applicator's Manual.

If the gas or dust from aluminum phosphide is inhaled: Get exposed person to fresh air. Keep warm and make sure person can breathe freely. If breathing has stopped, give artificial respiration by mouth-to-mouth or other means of resuscitation. Do not give anything by mouth to an unconscious person.

If aluminum phosphide tablets or dust 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 dust or granules from aluminum phosphide get 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 dust from pellets gets in eyes:

Flush with plenty of water. Get medical attention.

NOTICE TO BUYER:

Seller’s guarantee shall be limited to the terms set out on the label and subject thereto. The buyer assumes the risk to persons or property arising from the use or handling of this product and accepts the product on that condition.

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