

1/20
JUN 29 1987

Bernardo Chemicals, LTD, Inc.
3133 Fleetwood Drive
Memphis, TN 38116

SUBJECT: Aluminum and Magnesium Phosphide Registration Standard
Your letter of June 19, 1987
EPA Reg. Nos. 43743-1 ✓
43743-2

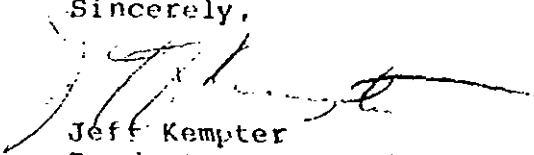
Attention: Flavio G. Simoes

Your submission has been reviewed and found to be acceptable for the products listed above.

Enclosed for each product is a stamped, approved label. Incorporate any comments noted and submit five copies of finished printed labels for our records.

The statement to appear on the shipping container and the sample placards which you submitted are fine, but I am not stamping them accepted since they are not part of labeling.

Sincerely,



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

Enclosure

BEST AVAILABLE COPY

ACCEPTED
with COMMENTS
in EPA Letter Dated:

JUN 29 1987

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

43743-1

**PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
KEEP OUT OF REACH OF CHILDREN**

DANGER - POISON

Aluminum phosphide powder, granules, or pellets 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 fumigant. If a sealed container is opened or if the material comes in contact with moisture, water, or acids, extremely toxic phosphine gas will be released. If a garlic odor is detected, refer to section on applicator/workers exposure 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 to prevent over exposure.

NOTE TO PHYSICIAN: Aluminum phosphide granules, powder, or pellets 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, diarrhea 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, 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 GGT, LDH and alkaline phosphatase, reduced prothrombin, hemorrhage and jaundice, and (3) kidney hemorrhage and anuria. Pathology is characteristic of hypoxia. Frequent exposure over a period of days or weeks may cause poisoning. Treatment is symptomatic.

ENVIRONMENTAL HAZARDS

This product is highly toxic to wildlife. 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.

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 mixing pesticides in the same areas used to store these commodities. Do not store in buildings inhabited by humans or domestic animals. Aluminum phosphide products shall not be placed in, or attached to packages intended for retailers.

DIRECTIONS FOR USE

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

Detailed use and disposal instructions for the fumigation of specified raw agricultural commodities, processed foods, animal feeds, tobacco, non food items, cereal mills, feed mills, and warehouse as well as for control of moles and burrowing rodents are to be found in the booklet entitled "Applicators Product Manual for use with GASTOXIN Tablets and GASTOXIN Pellets". Before using this product, read and follow all precautions and directions on the label and in the product manual.

SPILL AND LEAK PROCEDURES

A spill, other than accidental 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 aluminum phosphide. Water in contact with untraced pellets will greatly accelerate the production of phosphine gas which could result in a toxic indoor fire hazard. Wear cotton gloves

(continued on right panel).

**RESTRICTED USE PESTICIDE
DUE TO ACUTE INHALATION TOXICITY
HIGHLY TOXIC PHOSPHINE GAS**

For retail sale to and use only by Certified Applicators for those uses covered by label or persons trained in accordance with the attached product manual work instruction and in the physical presence of the Certified Applicator. Must be available on Read and follow the label and Bernardo Chemicals product manual which contain the safe use of this product.

gastoxin
FUMIGATION TABLETS

Active Ingredient 57% (Aluminum Phosphide)
Inert Ingredients 43%

DANGER



POISON



PRECAUCION AL USUARIO: Si usted no lee ingles, no use este producto hasta que se lo explique en castellano.

STATEMENT OF PRACTICAL TREATMENT

Symptoms of overexposure to phosphine are headache, dizziness, nausea, diarrhea and dyspnea. In all cases of overexposure get medical attention immediately. Do not attempt self-treatment.

IF THE GAS FROM ALUMINUM PHOSPHIDE IS INHALED: Get exposed person to an emergency treatment facility.

IF THE GAS FROM ALUMINUM PHOSPHIDE IS SWALLOWED: Get exposed person to an emergency treatment facility. Do not give anything by mouth to an unconscious person. If breathing has stopped, give artificial respiration.

IF ALUMINUM PHOSPHIDE POWDER, GRANULES, OR PELLETS ARE SWALLOWED: Give one or two glasses of water and induce vomiting by touching back of throat with a spoon.

IF POWDER, GRANULES OR PELLETS OF ALUMINUM PHOSPHIDE GET ON SKIN: Wash contaminated bare skin thoroughly with soap and water.

IF IN EYES: Flush with plenty of water. Get medical attention.

Manufactured by:
CASA BERNARDO LIMITADA
Rod. Pda. M. de Nobrega, Ins. 65
Gleba 37 - Pq. Ind. Imigrantes
Samaritã - S.V. - S. Paulo - BR
Tel. (013) 32-8311
Telex: 331300 CBLS

Sold by:
BERNARDO CHEM
3133 Fairbrook Dr.
Memphis, TN 38111
Tel. (901) 596-1722
Telex: 533016

EPA EST. No 43743-RR-01
EPA REC. No 43743-01-AA

Contents: 500 Round Tablets - Net Weight: 3.3 lbs (1.500 kg)

ACCEPTED
with COMMENTS
in EPA Letter Dated:

MAR 16 1987

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

43743-1

PRODUCT MANUAL

FOR USE WITH

GASTOXIN ® TABLETS

AND

GASTOXIN ® PELLETS

EPA EST. NO. 43743-BR-01
EPA EST. NO. 43743-1-AA
EPA REG. NO. 43743-2-AA

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**PRODUCT MANUAL
FOR GASTOXIN TABLETS AND
GASTOXIN PELLETS**

INTRODUCTION

This booklet has been prepared to assist the user in the safe and effective handling of GASTOXIN® tablets and pellets. As all fumigants are toxic to man and animals if not properly used, all directions for use must be carefully followed. If this is done, the product can be safely handled and effective insect control will be obtained.

**PHYSICAL AND CHEMICAL PROPERTIES OF
GASTOXIN**

GASTOXIN® is a formulated product consisting of aluminum phosphide, ammonium carbamate, urea, and edible paraffin. Upon exposure to the atmosphere, the ammonium carbamate dissociates, forming ammonia, a pungent smelling warning gas, and carbon dioxide, a fire suppressant. Within from one to four hours the active gas hydrogen phosphide (phosphine) begins to evolve as the pellet or tablet slowly decomposes. Hydrogen phosphide has a carbide-like odor and can be readily smelled by most humans at a concentration in the range of 0.02 parts per million. It is a colorless gas with great penetration power due to its high volatility. ~~The threshold limit value for hydrogen phosphide is 0.3 parts per million.~~

GASTOXIN® is offered in two forms, tablets and pellets. The tablet is approximately 4/5 inch in diameter. It weighs three grams, and on decomposition releases one gram of hydrogen phosphide. Tablets are packaged either in gas tight tubes and cans or in resealable flasks. Each tube holds 20 tablets and each can holds 15 tubes. Each resealable flask holds 100 or 500 tablets in bulk. The pellet is spherical in form and approximately 3/8 inch in diameter. It weighs 0.6 grams, and on decomposition releases 0.2 grams of hydrogen phosphide. There are 1660 pellets packed in each resealable flask.

The rate of decomposition is dependent on temperature of the commodity and relative humidity of the atmosphere. At temperatures over 68°F. (20°C.) decomposition of both tablets and pellets is completed in approximately 72 hours. As temperature decreases, required exposure time is increased. Fumigation ~~should~~ not be attempted when commodity temperature is below 40°F. (5°C.)

Following decomposition of the tablets and pellets there remains a gray-white "dust" composed almost entirely of non-poisonous aluminum hydroxide, with a trace amount of the undecomposed aluminum phosphide. The "dust" is eliminated when treated raw agricultural commodities are moved, or it can be collected and properly disposed of following the treatment of processed foods.

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

KEEP OUT OF REACH OF CHILDREN

DANGER - POISON

Aluminum 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 aluminum phosphide fumigants. If a sealed container is opened, or if the material comes in contact with moisture, water or acids, extremely toxic phosphine gas will be released. If a garlic odor is detected, you must monitor to determine whether phosphine gas is

present above the acceptable exposure limits (see section on ^{applicator and worker exposure} ~~respiratory protection~~). Since an odor may 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 to prevent over-exposure.

Note to Physician: Aluminum phosphide granules, powder, tablets, or pellets react with moisture in the air, acids, and many other liquids to release phosphine gas. Mild 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, diarrhea 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.

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 effects the liver, kidneys, 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.

PRACTICAL TREATMENT STATEMENT

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

If the gas 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 powder, granules, 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 aluminum 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.

HOW GASTOXIN SHOULD BE STORED

Tablets and pellets are received in carton containing sealed tubes and cans or re-sealable flasks. As long as the tubes, cans, or flasks remain intact, the storage life of the product is unlimited. Storage should be in a dry locked, ventilated area and out of the reach of children and ~~irresponsible~~ persons.

7/20

HOW GASTOXIN SHOULD BE HANDLED

1. Make certain that the label is intact and legible.
2. Read the label.
3. Open containers of tablets or pellets only in open air.
4. Wear gloves when handling the product.
5. Do not smoke, eat, or drink when handling a pesticide.
6. Use entire contents of a tube once it is opened. Unopened tubes and resealable flasks may be returned to the locked storage area for later use.
7. Wash hands after use of the product.
8. Do no attempt to reuse empty container. Triple rinse with water, crush, and dispose of properly. Bury cans and stoppers. Flasks may be recycled.

PATTERN OF USE

REGISTERED USES: GASTOXIN tablets and pellets are registered with the U.S. Environmental Protection Agency for the post harvest fumigation of the following:

- a. Food/Feed, Nondomestic, Indoor Use (raw agricultural commodities)
- b. Food/Feed, Nondomestic, Indoor Use (animal feed)
- c. Food/Feed, Nondomestic, Indoor Use (processed commodities)
- d. Nonfood/Nonfeed and Food/Feed, Nondomestic, Outdoor Use (rodent control)

Raw Agricultural Commodities (can be treated by direct addition) - almonds, barley, brazil nuts, buckwheat, cashews, cocoa beans, coffee beans, corn, cottonseed, dates, flower seed, grass seed, millet, oats, peanuts, popcorn, rice, rye, safflower seed, seed and pod vegetables (except soybeans), sesame seed, sorghum, soybeans, sunflower seed, walnuts, wheat, and vegetable seed.

Processed Foods (can not be treated by direct addition) - assorted chocolate, bakery mixes, cereal flours and related milled fractions, cocoa powder, coffee, crackers, dried apples, dried apricots, dried carrots, dried egg, yolk solids, dried milk, dried peaches, dried pears, dried spinach, figs, macaroni, malt, milk chocolate, nondairy creamers, non-fat dried milk, noodles, packaged cereals, pasta, potato flour, pretzels, primary yeast, processed spices, prunes, raisins, sugar, sultanas, tea, and processed nutmeats.

Animal Feed and Feed Ingredients (can be treated by direct addition) - All.

Non-Foods - tobacco, cotton and wool fabrics, rubberized hair, wood, pelts, jute, paper, and sisal.

FOOD TOLERANCES

Such residues may not exceed 0.01 ppm on processed foods and 0.1 ppm on animal feed.

Tolerances are established for residues of phosphine in or on all raw agricultural commodities at 0.01 ppm resulting from preharvest treatment of pest burrows in agricultural and noncropland areas with aluminum phosphide.

INSECTS TO BE CONTROLLED

When used as directed, GASTOXIN will effectively control all life stages of the following pests; almond moth, angoumois grain moth, bean weevil, cadelle, cigarette beetle, confused flour beetle, dermestids, dried fruit beetle, dried fruit moth, European grain moth

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flat grain beetle, granary and rice weavils, Indian meal moth, lesser grain borer, Mediterranean flour moth, pink bollworm, raisin moth, red flour beetle, rusty grain beetle, saw-toothed grain beetle, and tobacco moth.

FOR CONTROL OF MOLES AND BURROWING RODENTS

GASTOXIN Tablets are also registered for usage on the control of Marmot sp. Wood chucks and Yellow-Belly Marmots (Rockchuck), Prairie Dogs (except Utah Prairie Dogs), Norway and Roof Rats, House Mice, Ground Squirrels, Moles, Voles, Gophers and Chipmunks.

DIRECTIONS FOR USE AGAINST BURROWING PESTS

Add from 2 to 4 GASTOXIN Tablets to the the burrow. seal tightly by shoveling soil over the entrance after first packing the opening with crumpled newspaper. This will prevent the soil from covering the GASTOXIN tablets and slowing down their action. Use lower rates in smaller burrows under moist soil conditions and higher rates in larger burrows when soil moisture is very low. Treat reopened burrows a second time 1 to 2 days after the initial treatment. For use on crop and noncrop lands.

ENVIRONMENTAL HAZARDS

This product is very highly toxic to wildlife. 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.

ENDANGERED SPECIES RESTRICTIONS

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.

File this section to p. 13

STATE (REGIONAL OFFICE FWS)	COUNTY (UNLESS SPECIFIED)	
Species		
ARIZONA (ALBUQUERQUE, N.M.)		
Black-footed ferret	STATEWIDE	
CALIFORNIA (PORTLAND, OR.)		
San Joaquin Kit-Fox	KERN	MERCED
	KINGS	MONTEREY
	TULARE	SAN JENITO
	FRESNO	SAN LUIS OBISPO
	VENTURA	SANTA BARBARA
Blunt-nosed Leopard Lizard	KERN	MADERA
	KINGS	MERCED
	FRESNO	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, N.M.)	
Black-footed ferret	STATEWIDE
NORTH DAKOTA (DENVER, CO.)	
Black-footed ferret	STATEWIDE
OKLAHOMA (ALBUQUERQUE, N.M.)	
Black-footed ferret	STATEWIDE
SOUTH DAKOTA (DENVER, CO.)	
Black-footed ferret	STATEWIDE
TEXAS (ALBUQUERQUE, N.M.)	
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 you.

PRECAUTIONS TO BE OBSERVED

General:

1. Never let GASTOXIN[®] tablets or pellets come in direct contact with liquid or water as this causes the immediate release of hydrogen phosphide.
2. GASTOXIN[®] should never be used under conditions which would allow the gas concentration to reach the lower level of flammability which is 1.79 per cent by volume (17,900 parts per million). When used according to label directions the amount of gas produced remains far below the lower flammability level.
3. Never confine the product in small gas-proof enclosures such as plastic bags. Such confinement could cause the gas concentration to reach the lower flammability level.
4. Take precautions in areas where copper, brass, or gold are present as corrosion may occur.
5. Never fumigate in areas containing electronic or telephone equipment, photographic film or copy paper. It may be possible to remove such items or protect them from exposure to the gas.
6. Suggested exposures should be observed. A shortened exposure period cannot be compensated for by increased dosage.
7. Hydrogen phosphide has great penetrating power and gas may slowly seep through concrete block walls. See that adjoining areas are not occupied during the fumigation period.
8. Hydrogen phosphide does not layer or stratify. Because of its high volatility and penetrating ability, the enclosure being treated must be sealed as tightly as possible if an effective fumigation is to be expected.

9. Disposal of the "dust" remaining after a space fumigation must be carefully and properly done. See section of DISPOSAL for further information.
10. For control of moles and rodents, observe that it should be for outdoor usage only: Do not use within 15 feet (5 meters) on inhabited structures. Do not apply to burrows which may open under or into occupied buildings.

PROTECTIVE CLOTHING

Wear dry gloves when handling unpackaged tablets or pellets. Wash hands thoroughly after use before smoking or eating.

APPLICATOR AND WORKER EXPOSURE

Depending upon 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 apply.

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 controls such as forced air ventilation should be the primary means used to meet this exposure standard.

If the fumigant is applied from outside of an enclosed indoor area (for example, a railroad car or an automatic dispenser located outside of an enclosed 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 an 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 a structure, an approved canister respirator must be worn for indoor application. 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 odor is detected.

If the exposure limits cannot be met through engineering controls (such as forced air ventilation), a full-face cannister respirator approved by NIOSH/MSHA for aluminum 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 a confined space, an SCBA respirator must also be available either on site or locally such as at a fire station or rescue squad. The 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. Two trained persons must be present during application indoors or during reentry into an un-aerated space.

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 un-aerated or partially aerated space, etc. Monitoring should be performed as described above to assure that this exposure limit is not exceeded. If exposures 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 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.

Use SCBA equipment such as the MARK II manufactured by Survivair or the Ultralite manufactured by Mine Safety Appliance Co. Use direct reading gas detection equipment such as a Draeger or Auer detector. The devices consist of a pump designed to draw a specific volume of air, and a graduated glass tube filled with a chemical that reacts with phosphine. In use, the gas laden air is drawn through the tube and the concentration can then be read from the amount of discoloration that results. There are two types of tubes: high range for assessing the effectiveness of a treatment, and low range for assuring the safety of the workers involved.

PLACARDING OF AREAS

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

1. The signal word DANGER/PELIGRO and the SKULL and CROSSBONES symbols in red.
2. The statement, "Area or commodity under fumigation, DO NOT ENTER/NO ENTRE".
3. The statement, "Area and/or ~~commodity~~ This sign may only be removed after the commodity is aerated (contains 0.3 ppm or less phosphine gas). If incompletely aerated commodity is transferred to a new site, the new site must also be placarded and workers must not be exposed to more than 0.3 ppm phosphine."

- 4. The date and time fumigation begins and is completed.
- 5. Name of fumigant used.
- 6. Name, address and telephone number of the applicator.

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

Do not remove a placard until the treated 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.~~ *omit*

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.

AERATION OF FUMIGATED COMMODITIES FOR TOLERANCE PURPOSES

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 48 hours prior to offering them to the end consumer. Tobacco must be aerated for at least three days when fumigated in hogsheads. As an alternative to these aeration periods, each container of a treated commodity may be analyzed 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.

PHYSICAL/CHEMICAL HAZARDS

Aluminum 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 aluminum phosphide products outdoors or indoors, in the presence of 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 these 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 alloy, 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 batterychargers, fork lifts, temperature monitoring systems, switching gears communication devices, computers calculators and other electrical equipment should be protected or removed before fumigation.

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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.

DIRECTIONS FOR DISPOSAL OF SPENT RESIDUE FROM ALUMINUM PHOSPHIDE

In open areas, small amounts of completely spent residual dust may be disposed of on site by burial or by spreading over the land surface away from inhabited buildings.

Spent residual dust, bags or other packaging containing spent aluminum phosphide may also be collected and disposed of at a sanitary landfill, incinerator or other approved sites or by other procedures approved by federal, state or local authorities.

For 2 to 3 kg (4 to 7 lbs.) of spent dust from 2 to 3 flasks of aluminum phosphide may be collected for disposal in a 1-gallon bucket. Larger amounts, up to 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 kg. 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

DIRECTIONS FOR DEACTIVATION OF PARTIALLY SPENT RESIDUES FROM ALUMINUM 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 aluminum phosphide, and confinement of the gas may result in a flash.

Partially spent product must be deactivated further prior to ultimate disposal. This is especially 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 aluminum 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 container. The container 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 so as to thoroughly wet all of the spent aluminum phosphide. This must be done in the open air and not within an enclosed space. Residue from aluminum phosphide tablets or pellets should be mixed into no less than about 10 gallons of water-detergent solution for each case of material used.

Dispose of 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 onto 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 of dust in a toilet. Do not allow quantities of dry product residue from aluminum phosphide to be collected or stored without deactivation.

DIRECTIONS FOR USE

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

DOSAGE AND EXPOSURE INFORMATION

Hydrogen phosphide is an acute poison and is highly effective against insects. As is true with all fumigants, insect control depends on both dosage and exposure time. Hydrogen phosphide is effective at very low concentrations providing exposure time is long enough. As already stated however, exposure time cannot be shortened by increasing dosage. At very high concentrations, hydrogen phosphide can have a narcotic effect on insects which actually reduces mortality.

Because there are a number of factors which alter the effectiveness of a fumigant (e.g. temperature, tightness of seal, type of storage space), a range of dosages and exposure times are suggested. The user must assess the conditions under which the fumigation will be done and determine what dosage best suits his needs.

SUGGESTED DOSAGE SCHEDULE

Raw Agricultural Commodities, Bulk Animal Feeds (except Nuts) - 60-180 tablets or 120-300 pellets per 1000 bushels. Dosage for peanuts is 60-125 tablets per 1000 cubic feet; for nuts 30 tablets or 100-200 pellets per 1000 cubic feet of storage space.

Processed Foods - 30-60 tablets or 100-200 pellets per 1000 cubic feet of storage space.

Stored Tobacco - 20-30 tablets or 100-150 pellets per 1000 cubic feet of storage space.

Cereal mills, Feed Mills, and Warehouses - 20-30 tablets or 100-150 pellets per 1000 cubic feet of storage space.

For control of moles and burrowing rodents - 2-4 tablets per burrow.

SUGGESTED EXPOSURE TIMES (FOR ALL USES)

Commodity Temperature °F	°C	Exposure Time (Tablets)
*below 40	5	Do not fumigate (*except tobacco for export)
40-53	5-11	7-10 days
54-59	12-15	days
60-68	16-20	4 days pellets one day less
over 68	20	3 days

Remember: Efficacious results depend on proper dosage, adequate exposure times, correct application techniques, and well sealed enclosures.

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APPLICATION PROCEDURES

Use Directions:

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 product manual.

~~Persons applying this fumigant must complete an EPA approved training program for fumigants.~~

Delete

At least two trained persons must be present when it is applied from within a confined space 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 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°F (5°C). (Except tobacco for export)

FOR FUMIGATING SILO TYPE STORAGES

1. Calculate required number of tablets or pellets based on dosage selected and quantity of commodity to be treated.
2. Determine the amount of ventilation in both the basement and on the bin floor where the fumigant will be applied.
3. Open all containers outside the building.
4. Tablets may be applied to grain on the transfer belt by hand. Pellets are best applied using an automatic pellet dispenser. They may be dispensed into the up leg of the elevator from the work room floor, or onto the grain as it travels along the transfer belt on the bin floor.
5. Place a warning sign on the bin cover on the bin floor, and on the bin valve in the basement. Date the sign as to when the fumigation commenced.
6. Each day before work starts, the bin floor and basement should be checked for the presence of gas.
7. Elevator personnel may carry out their normal duties when GASTOXIN is used to treat grain in upright silo storage.

FOR FUMIGATING FLAT STORAGES

1. Make certain that structure is tight enough to be fumigated successfully. Seal structures as needed.
2. Make certain that there are no adjoining structures occupied by man or animals.
3. Determine quantity of tablets or pellets required.
4. During fumigant application leave all doors or other openings open to create a cross ventilation. Application can proceed for 2-4 hours or until the odor of phosphine is detected in the over-space.

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5. Apply the tablets or pellets by using a probe. Make probes every 4-5 feet horizontally across the grain in both directions. The number of tablets or pellets used per probe is determined by dividing the amount of fumigant to be used by the number of borings to be made. The fumigant is dropped in the probe at intervals as the pipe is withdrawn from the grain.
6. A plastic tarpaulin may be pulled over the grain surface following application of the fumigant. This reduces convection currents and increases the effectiveness of the fumigant. Care must be taken to see that the plastic is removed when the fumigation is completed. (No more than 5-6 days or sweating of the grain may occur).
7. Close and seal all external openings.
8. Placard and lock entrances.
9. Following the exposure period, open doors and windows creating a cross draft to aid in aeration.
10. Make certain all warning signs are removed when aeration is completed.

FOR FUMIGATION OF RAILCARS

1. Boxcars and hopper cars of bulk raw agricultural commodities and animal feeds are fumigated in the same manner as are silos or flat storages. The tablets or pellets may be added to the commodity as it flows into the railcar, be placed on the floor of the empty car, be placed on the surface of the commodity, or probed into the commodity after loading is completed.
2. Processed foods and bagged raw commodities and animal feeds are fumigated by placing the tablets or pellets in moisture permeable envelopes or on trays, which in turn are fastened to a substantial support within the car. Care must be taken to see that the fumigant or its reacted residue does not come in contact with processed foods.
3. Close and seal all hatches or doors. On hopper cars, make sure that the vents at the end of the car are sealed with masking tape. Placards approved by the Department of Transportation must be applied to each door of box cars and near the ladder on hopper cars as well as on the top hatch covers. Date signs as to when fumigation commenced and when the car may be opened.
4. Notify the consignee that the car is to be received under fumigation.

FOR FUMIGATION UNDER TARPAULINS

1. Cover the stack of product to be fumigated with polyethylene (1.5-2 mil is satisfactory). Secure the edges of the tarpaulin to the floor using sand snakes, tape, or other suitable material.
2. Spread tablets or pellets on trays and insert under the edge of the tarpaulin. Reseal tarpaulin to floor in that location.
3. Placard stack on all exposed sides indicating that fumigation is in progress. Date and sign warning placard indicating when cover may be removed.
4. Maintain adequate ventilation around stack at all times. If this is done, workers do not have to vacate the premises.
5. Following the exposure period, collect all residual "dust" and dispose of it according to label directions. Remove tarpaulins if desired, but at any rate, all warning signs must be removed and destroyed.

FOR FUMIGATION OF CEREAL MILLS, FEED MILLS, AND WAREHOUSES

1. Seal the enclosure to be treated using appropriate sealing materials (except exit door).
2. Where necessary, notify police and fire officials having jurisdiction over the area.
3. Determine dosage required and calculate the amount of fumigant needed. Open all containers out of doors.
4. Spread tablets or pellets onkraft paper trays laid on the floor, with application starting at the farthest point from the exit door.
5. Lock and seal exit door. Post guards if required.
6. Placard all entrances with warning signs.
7. Notify local hospital that fumigation is underway and explain the fumigant being used.
8. When fumigation is completed, open all doors and windows to commence aeration. It will be necessary to wear a gas mask if the building must be entered before aeration is complete.
9. Using gas detection devices, document that all gas is gone before turning structure back for reoccupancy.
10. Collect and properly dispose of all fumigant "dust". Remove and discard all warning placards.

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FOR INTRANSIT SHIP FUMIGATION

IMPORTANT

Shipboard, intransit ship or shiphold fumigation is also governed by U.S. Coast Guard Regulations. Refer to and comply with these regulations prior to fumigation.

PROCEDURES 3

Prefumigation 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 suitable designed and configured so as to allow for safe occupancy by the ship's crew throughout the duration of the fumigation. If it is determined that the design and configuration of the vessel does not allow for safe occupancy by the ship's crew throughout the duration of the fumigation, then the vessel will not be fumigated unless all crew members are removed from the vessel. The crew members will not be allowed to 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.

Intransit Ship Fumigation is to be in a separate compartment. Fumigant to be removed from this manual and stored separately.

2. The person responsible for the fumigation must notify the Master of the vessel, or his representative, of the requirements relating to personal protection equipment *, detection equipment, and that a person qualified in the use of this equipment must accompany the vessel with cargo under fumigation. Emergency procedures, cargo ventilation, periodic monitoring and inspections, and first aid measures must be discussed with and understood by the Master of the vessel or his representative.
3. During the fumigation or until a manned vessel leaves port or the cargo is aerated, the person in charge of the fumigation shall insure a qualified person using gas or vapor detection equipment tests spaces adjacent to spaces 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.
4. If the fumigation is not completed and the vessel aerated before the manned vessel leaves port, the person in charge of the vessel shall insure that at least two units of personal protection equipment and one gas or vapor detection device, and a person qualified in their operation be on board the vessel during the voyage.

* Personal protection equipment means a gas mask or respirator for the fumigant, jointly approved by the Mining Enforcement and Safety Administration and the National Institute of Occupational Safety and Health.

CBPA cert. its requirements must be used.

PRECAUTIONS AND PROCEDURES DURING VOYAGE

1. Using appropriate gas detection 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 area except under emergency conditions. If necessary to enter a fumigated area, appropriate personal protection equipment must be used. NEVER enter fumigated area alone. At least one other person, wearing personal protection equipment, should be available to assist in case of an emergency.

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 safety equipment, unless fumigant concentrations are at safe levels, as indicated by a suitable detector.
2. Remove and dispose of all sealing materials and warning signs.

FIRST AID INSTRUCTIONS

Hydrogen Phosphide is a very toxic gas to all forms of animal life, and exposure to even small amounts should be prevented. Poisoning must result from ingesting or inhalation as hydrogen phosphide is not absorbed through the skin. It is also insoluble in water, fats, and oils.

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SYMPTOMS OF POISONING

Exposure to hydrogen phosphide produces symptoms of poisoning, the severity of which is dependent on the concentration involved. Mild poisoning results in fatigue, nausea, pressure or pain the chest, ringing in the ears, and uneasiness. As hydrogen phosphide is not a chronic poison, these symptoms will readily disappear with rest and fresh air.

Greater quantities of gas produce such symptoms as vomiting, stomach ache, diarrhea, disturbance in equilibrium, and dyspnea (difficulty in breathing). Very high concentrations quickly cause cyanosis (bluish-purple skin color), agitation, ataxia, anoxemia (subnormal blood oxygen content), unconsciousness, and death. Death can occur very quickly or be delayed several days as a result of pulmonary edema, and collapse, by paralysis of the central respiratory system. Because of heavy poisoning, disturbance in liver and kidney function (hematuria, proteinuria, uremia, jaundice), and arrhythmia can also occur.

FIRST AID TREATMENT: CALL A PHYSICIAN IMMEDIATELY

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

If the gas 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 powder, granules, 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 aluminum 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.

When exposure to low concentrations of hydrogen phosphide have been documented or suspected, the individual involved should rest for 24 hours and under no circumstances should he resume any work dealing with fumigation during that period.

ADVICE TO PHYSICIANS

To be used in accordance with his own best judgement.

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1. Mild cases of poisoning may not manifest themselves for up to 24 hours and the following is recommended:
 - a) Complete bed rest for 1-2 days during which time the patient should be kept warm and quiet.
 - b) As poisoning is not chronic, symptoms will disappear by themselves.
2. Severe poisoning will be readily apparent. Steroid therapy should be considered when pulmonary edema is observed, and close medical supervision is suggested. Blood transfusions may also be required.
3. In case of suicidal attempts by swallowing tablets or pellets, the stomach

should be flushed with a dilute solution of potassium permanganate or a solution of magnesium peroxide until flushing liquid ceases to smell of carbide. Thereafter administer carbo medicinalis.

NOTE:

This booklet is to be considered as supplemental labelling to GASTOXIN[®] Fumigation Tablets - E.P.A. REG. NO. 43743-1-AA and GASTOXIN Fumigation Pellets - E.P.A. REG. NO. 43743-2-AA.