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Please read instructions on reverse before completing form. Form Approved. OMB No. 2070-0060. Approval expires 2-28-95

EPA United States Environmental Protection Agency Washington, DC 20460

[ ] Registration
[ ] Amendment
[X] Other

OPP Identifier Number: 230224 XXXXXXXXXX

Application for Pesticide - Section I

1. Company/Product Number	2. EPA Product Manager	3. Proposed Classification
43743-2	C. Welch	[ ] None [X] Restricted
4. Company/Product (Name) GASTOXIN Fumigation Pellets	PM# 21	

5. Name and Address of Applicant *(Include ZIP Code)*
Bernardo Chemicals, LTD.
P.O. Box 1632
Turlock, CA 95381

[ ] *Check if this is a new address*

MAIL TO:
ROBERT M. SIELATY
2001 Jeff Davis Hwy. #1010
Arlington, VA 22202-3603

6. **Expedited Review.** In accordance with FIFRA Section 3(c)(3)(b)(i), my product is similar or identical in composition and labeling to:
EPA Reg. No. _____
Product Name _____

Section - II

[ ] Amendment - Explain below.
[ ] Resubmission in response to Agency letter dated _____
[X] Notification - Explain below.
[ ] Final printed labels in response to Agency letter dated _____
[ ] "Me Too" Application.
[ ] Other - Explain below.

NOTIFICATION MAR 6 1997

Explanation: Use additional page(s) if necessary. (For section I and Section II.)

Notification of change of packaging and address change per PR Notice 95-2. This notification is consistent with the provisions of PR Notice 95-2 and EPA regulations at 40 CFR 152.46, and no other changes have been made to the labeling or the confidential statement of formula of this product. I understand that it is a violation of 18 U.S.C. Sec. 1001 to willfully make any false statement to EPA. I further understand that if this notification is not consistent with the terms of PR Notice 95-2 and 40 CFR 152.46, this product may be in violation of FIFRA and the company may be subject to enforcement action and penalties under sections 12 and 14 of FIFRA.

Section - III

1. Material This Product Will Be Packaged In:

Child-Resistant Packaging	Unit Packaging	Water Soluble Packaging	2. Type of Container
[ ] Yes* [X] No	[ ] Yes [X] No	[ ] Yes [X] No	[X] Metal [ ] Plastic [ ] Glass [ ] Paper [ ] Other (Specify) _____
* *Certification must be submitted*	If "Yes" Unit Packaging wgt. / No. per container	If "Yes" Package wgt / No. per container	

3. Location of Net Contents Information	4. Size(s) Retail Container	5. Location of Label Directions
[X] Label [ ] Container	2.2 lbs.	[ ] On Label [X] On Labeling accompanying product

6. Manner in Which Label is Affixed to Product: [ ] Lithograph [ ] Paper glued [ ] Stenciled [ ] Other _____

Section - IV

1. Contact Point *(Complete items directly below for identification of individual to be contacted, if necessary, to process this application.)*

Name	Title	Telephone No. (Include Area Code)
Robert M. Sielaty	Company Representative	703-415-4600

Certification

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law.

6. Date Application Received (Stamped)

2. Signature	3. Title
Robert M. Sielaty	Company Representative
4. Typed Name: Robert M. Sielaty	5. Date: February 26, 1997

EPA Form 8570-1 (Rev. 8-94) Previous editions are obsolete. White - EPA File Copy (original) Yellow - Applicant Copy

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 application/worker 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, re-entry 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 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.

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

(Continued on right panel)

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

For retail sale to and use only by Certified Applicators for those uses covered by applicators certification or persons trained in accordance with the attached product manual working under the direct supervion and in the physical presence of the Certified Applicator who must be available on site or on the premises. Read and follow the label and Bernardo Chemicals Ltd. product manual which contain complete instructions for the safe use of this product.

gastoxin®
FUMIGATION PELLETS

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

DANGER POISON PELIGRO

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

STATEMENT OF PRATICAL TREATMENT

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 PELLETS 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 PELLETS 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.

Manufactured by:
CASA BERNARDO LTDA.
Rod. Pe. Manoel da Nóbrega, Km 65
Gleba 37 - Pque. Ind. Imigrantes
Samaritá - S.V. - São Paulo - BR
Tel.: (13) 460-1212
Telex: 13 2324 CBLS BR

Sold by:
BERNARDO CHEMICALS LTD.
P. O. BOX 1632
TURLOCK CA 95381
Phone: (209) 634-1191
Fax: (209)634-1192

EPA EST. Nº 43743-BR-01 EPA REG. Nº 43743-02-AA

Contents: 12 Pouches: Each With - 1660 Pellets
Net Weight: 2.2 lbs (996 grs).

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

If 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 flasks to a sound metal container which should be sealed and properly labeled as aluminum phosphide. Transport the damaged container to an area suitable for pesticide storage for inspection. Further instructions and recommendations may be obtained, if required, from Bernardo Chemicals Ltd.

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 alloys, and precious metals such as gold and silver are susceptible to corrosion by phosphine. Thus, small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gears, communication devices, computers calculators and other electrical equipment should be protected or removed before fumigation.

STORAGE AND DISPOSAL

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

Unreacted or partially reacted aluminum phosphide is acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use or according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. For especific instructions, see Spill and Leak Procedures.

Some local and states waste disposal regulations may vary from the following recommendations. Disposal procedures should be reviewed with appropriate authorities to ensures compliance with local regulations. Contact your state Pesticide or Environmental Control Agency or Hazardous Waste Specialist at the nearest EPA Regional Office for guidance.

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

If properly exposed, the residual dust remaining after a fumigation with aluminium phosphide will be grayish-white and contain only a small amount of unreacted material. However, residual dust from incompletely exposed aluminum phosphide will require special care.

WARRANTY

Seller does not make warranties expressed or implied on the usage of this product other than those directed on the label.
Customer assumes all risks in handling and use of this material contrary to label requirements.

BATCH Nº: 01452301
MANUFACTURING DATE: JANUARY/97
EXPIRY DATE: MAY/97

NOTIFICATION MAR 6 1997

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RESTRICTED USE PESTICIDE DUE TO ACUTE INHALATION TOXICITY OF HIGHLY TOXIC HYDROGEN PHOSPHIDE (PHOSPHINE, PH_3) GAS

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

APPLICATION PROCEDURES FOR gastoxin® TABLETS AND gastoxin® PELLETS

HYDROGEN PHOSPHIDE FUMIGANTS FOR USE AGAINST LISTED INSECTS WHICH INFEST LISTED RAW AGRICULTURAL COMMODITIES, ANIMAL FEED, PROCESSED FOODS, NONFOOD PRODUCTS AND STORED TOBACCO.

Sold by
BERNARDO CHEMICALS LTD.
4646 Poplar Avenue, Suite 217,
Memphis, TN 38117
Telephone: (901) 767-4822
Fax: (901) 767-4901

EPA Establishment No. 43743-BR-01
EPA Registration No. 43743-1
EPA Registration No. 43743-2

BCL-4 9/27/89

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I. INTRODUCTION

A. 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.

B. Product Description

Both **gastoxin®** Pellets and **gastoxin®** Tablets are a mixture of aluminum phosphide (57% by weight), ammonium carbamate and urea which is pressed into tablet and/or pellet form. The nearly spherical pellets are about 3/8" (9.5mm) in diameter and weigh 0.6 grams each. The tablets are either disc shaped 4/5" (20mm) in diameter and 1/5" (5.0mm) thick) or spherical in shape 5/8" (1 6 mm) in diameter) and weigh 3.0 grams each. A pellet will produce about 0.2 gram hydrogen phosphide, the tablet about 1.0 gram. Both react with atmospheric moisture to produce hydrogen phosphide (PH_3) in the following way:

$$ALP + 3\,H_2O \rightarrow AL(OH)_3 + PH_3\uparrow$$

Warm, humid air accelerates the reaction while cool, dry air has the opposite effect. For example, when moisture and temperature of the fumigated commodity are high, decomposition of **gastoxin®** may be complete in less than 3 days. However, at moderate temperatures and low humidities, decompostion may require 5 days or more. This reaction starts slowly, gradually accelerates and then tapers off again as the aluminum phosphide is spent.

gastoxin® Pellets and Tablets also contain ammonium carbamate which liberates ammonia and carbon dioxide as follows:

$$NH_2COONH_4 \rightarrow 2NH_3\uparrow + CO_2\uparrow$$

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

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

C. Product Packaging

The tablets are packaged 500 or 100 to a flask. The pellets are packaged 1660 to a flask.

Hydrogen phosphide, more commonly referred to as phosphine (PH_3), is a colorless gas which is toxic to insects, humans, and other forms of animal life. It is very mobile with a high vapor pressure. Thus, the combination of high molecular activity, vapor pressure and toxicity to insects at low dosages accounts for its wide acceptance as a fumigant.

D. Safety Recommendations

1. Carefully read the labeling and follow instructions explicitly.
2. Never work alone when applying fumigant within the storage structure.
3. Never allow uninstructed persons to handle **gastoxin®**.
4. Approved respiratory protection must be available for the application of fumigant within structures.
5. Wear dry gloves made of cotton or other similar material when contact with tablets, pellets or their dust is likely.
6. It is preferable to open fumigant containers in open air or near a fan that exhausts immediately outside. Never open in a flammable atmosphere.
7. Do not allow **gastoxin®** to contact liquid water or to pile up.
8. Dispose of empty containers and spent residual dust in a proper manner consistent with the label instructions.
9. Post "DANGER" signs on fumigated areas.
10. Notify appropriate company employees, and provide relevant safety information to local officials annually for use in the event of an emergency.
11. Hydrogen phosphide fumigants are not to be used for vacuum fumigations.
12. Exposure to hydrogen phosphide must not exceed the 8 hour TWA of 0.3 ppm during application or a maximum concentration of 0.3 ppm after application is completed. This includes reentry into structure.
13. Fumigated finished foods and feeds must be aerated 48 hours prior to offering to the end customer.
14. Transfer of a treated commodity to another site without complete aeration (down to 0.3 ppm maximum) is permissible provided the new site is placarded.
15. Aerate contaminated clothing in well ventilated area prior to washing.
16. Keep containers tightly closed except when removing product.
17. Do not reuse aluminum phosphide containers for any purpose other than recycling or reconditioning.
18. OSHA recommends that the exposure screening of employees be conducted to detect impaired pulmonary function. OSHA recommends that any employees developing the above condition be referred for medical attention.

II. PRECAUTIONARY STATEMENTS

A. HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Keep Out of Reach of Children

DANGER - POISON

Aluminum phosphide pellets, tablets or their dust can be fatal if swallowed. Do not get in eyes, in nose on skin or on clothing. Do not eat, drink or smoke while handling aluminum phosphide fumigants. When the container is opened **gastoxin®** Tablets or Pellets will begin to release hydrogen phoshide (phosphine) which is an extremely toxic gas. Contact with water, acids and some other liquids will accelerate this reaction. If a garlic odor is detected, refer to section on "Industrial Hygiene Monitoring" on page 28 for appropriate monitoring procedure. Pure hydrogen phosphide gas is odorless, the odor is due to a contaminant. Since an odor may not be detected under certain circumstances, the absence of a garlic odor does not mean that hydrogen phosphide gas is absent. Observe proper application, aeration, reentry and disposal procedures specified elsewhere in the labeling to prevent overexposure.

FREQUENT EXPOSURE TO CONCENTRATIONS ABOVE PERMISSIBLE LEVELS OVER A PERIOD OF DAYS OR WEEKS MAY CAUSE POISONING.

B. Statement of Practical Treatment

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

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

C. Note to Physician

Aluminum phosphide tablets, pellets or their dust reacts

7 7 22

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

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

The following measures are suggested for use by the physician in accordance with his own judgement:

1. In its milder to moderate forms (symptoms of poisoning may take up to 24 hours to make their appearance), the following is suggested:
   a. Complete rest 1-2 days during which the patient must be kept quiet and warm.
   b. If the patient suffers from vomiting or increased blood sugar, appropriate solutions should be administered. Treatment with oxygen is recommended as is the administration of cardiac and circulatory stimulants.
2. In cases of severe poisoning (intensive care unit recommended):
   a. Where pulmonary edema is observed, steroid therapy should be considered. Blood transfusions may be necessary.
   b. In case of manifest pulmonary edema, venesection should be performed under vein pressure control. Heart glycosides (I.V.) can be used in case of hemoconcentration. Venesection may result in shock. In the case of progressive edema of the lungs, immediately intubate and remove edema fluid and administer 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.
   c. If pellets or tablets are ingested, induce vomiting. Flush the stomach with a diluted potassium permanganate solution or a solution of magnesium peroxide until flushing liquid ceases to smell of carbide. Thereafter, apply carbomedicinals.

D. Physical and Chemical Hazards

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

It is preferable to open flasks of **gastoxin®** Tablets or Pellets in open air or near a fan which exhausts outside immediately. Never open in a flammable atmosphere because on rare occasions they may flash. When opening, point the container away from the face and body and slowly loosen the cap. These precautions will also reduce the applicator's exposure to hydrogen phosphide gas. Pure hydrogen phosphide gas is practically insoluble in water and oils and is stable at normal fumigation temperatures. However, it may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities. Metals such as copper, brass, and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by hydrogen phosphide. Thus, small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gear, communication devices, computers, calculators and other electronic or electrical equipment should be protected or removed before fumigation. In most cases all electronic equipment must be removed. Hydrogen phosphide gas will also react with certain metalic salts and therefore, sensitive items such as photographic film, some inorganic pigments, etc. should not be exposed.

III. DIRECTIONS FOR USE

A. General

1. It is a violation of federal law to use this product in a manner inconsistent with its labeling. **gastoxin®** Tablets and Pellets are Restricted Use Pesticides due to the acute inhalation toxicity of hydrogen phosphide (phosphine, PH_3) gas. For retail sale to and use only by certified applicators for those uses covered by the applicator's certification or persons trained in accordance with this product manual working under the direct supervision and in the physical presence of the certified applicator. Physical presence means on site or on the premises.

8-7-22

2. **gastoxin®** is a highly hazardous material and may be used only by individuals trained in its proper use. Before using, read and follow the label precautions and directions on the label and in labeling.

   Additional copies of this manual are available from:

BERNARDO CHEMICALS LTD.
4646 Poplar Ave
Memphis, TN 38117
Telephone: (901) 767-4822
Fax: (901) 767-4901

3. At least two trained persons must be present when **gastoxin®** Pellets or **gastoxin®** Tablets are applied from within the space being treated or during reentry into a fumigated or partially aerated site. Only one trained person is required when the fumigant is applied from outside the area to be treated.
4. Prior to applying this product, you must inspect the storage structure to determine if it can be made sufficiently gas tight. Decide how personal exposure monitoring should be conducted. Notify appropriate company employees and provide relevant safety information to local officials annually for use in the event of an emergency. Apply this fumigant in an effective and safe manner including emergency procedures, etc.
5. Ship holds, barges, containers on ships, railroad cars and containers shipped piggyback by rail may be fumigated intransit. However, fumigated trucks, vans, trailers and similar transport vehicles cannot be moved over public roads or highways until they are aerated.
6. Pellets and/or tablets or their reacted residues must not come into contact with any processed food with the EXCEPTION that both can be added directly to processed brewers rice, malt, and corn grits used in the manufacture of beer.
7. Protect copper, silver, gold, and their alloys from corrosive exposure to hydrogen phosphide.
8. Do not fumigate commodities with this product when commodity temperature is below 40 degrees F (5 degrees C).

B. Efficacy

Complete control of listed insect pests is frequently not achieved. Factors contributing to less than 100% control are gas leakage, poor gas distribution, unfavorable exposure conditions, etc. In addition, some insects are less susceptible to hydrogen phosphide than others. To maximize control, extreme care must be observed in sealing, higher dosages must be used, exposure periods must be lengthened, proper application procedures must be followed, and temperature and humidity must be favorable.

C. Use Pattern

1. **Insect Pests**

   Both **gastoxin®** pellets and tablets are registered with the U.S. Environmental Protection Agency as an aid in the control of the following:

almond moth	khapra beetle
angoumois grain moth	lesser grain borer
bean weevil	maize weevil
cadelle	Mediterranean flour moth
cereal leaf beetle	pink bollworm
cigarette beetle	raisin moth
confused flour beetle	red flour beetle
dermestid beetles	rice weevil
dried fruit beetle	rusty grain beetle
dried fruit moth	saw-toothed grain beetle
European grain moth	spider beetles
flat grain beetle	tobacco moth
fruit fly	yellow meal worm
granary weevil	Africanized bee
wax moth	honey bee infested
hairy fungus beetle	with tracheal mite
Hessian fly	Indian meal moth

2. **Commodities**

   Both **gastoxin®** Pellets and Tablets are registered by EPA for the fumigation of the following commodities.

   a. **Raw Agricultural Commodities**

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

   b. **Processed Foods**

   The listed processed foods may be fumigated with **gastoxin®**. Under no condition shall any processed food or bagged commodity come in contact with **gastoxin®** tablets, pellets or residual dust except that **gastoxin®** may be added directly to processed brewers rice, malt and corn grits for use in the manufacture of beer.

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

c. **Animal Feed and Feed Ingredients**

d. **Nonfood Products**

Animal hide
Clothing
Processed or unprocessed cotton, wool and other natural fibers or cloth
Feathers
Furs
Human hair, rubberized hair, vulcanized hair, mohair
Leather products
Tobacco
Wood, cut trees, wood chips and wood and bamboo products

Paper and paper products
Dried plants and flowers
Seeds (grass seeds, ornamental herbaceous plant seed and vegetable seed)
Straw or hay

D. Dosage Guide

Since hydrogen phosphide is a mobile gas and will penetrate to all parts of the storage structure, dosage must be based upon the total volume of the space being fumigated and not on the amount of bulk commodity it contains. For example, the same amount of **gastoxin®** is required to treat a 30,000 bushel silo whether it is full or not. The following dosage ranges are allowed for bulk and space fumigations.

DOSAGE GUIDE

PRODUCT	PER 1000 CU.FT. (28.32 CU.M.)	PER 1000 BU. STORAGE CAPACITY
Pellets	100-725	125-905
Tablets	20-145	25-180

NOTE: The maximum dosage allowed for dates, nuts, and dried fruits is 40 tablets or 200 pellets per 1000 cubic feet.

These dosages should not be exceeded. It is important to realize that shortened exposure period cannot be compensated for with an increased dosage.

The wide dosage ranges listed above are designated to accommodate the variety of fumigation situations that might occur. The major factor in selecting dosage is the capability of the structure to hold phosphine during the exposure period and thus obtain and sustain lethal concentrations throughout. It is more difficult to obtain penetration of gas throughout the structure in bulk stored commodities. An example of this is the treatment of grain stored in flat storage in which fumigant cannot be uniformly added to the grain but must be probed or surface applied.

Although it is permissible to choose from the full range of dosages listed above, the following dosage ranges are recommended for the various types of fumigations.

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RECOMMENDED DOSAGES FOR SEVERAL TYPES OF FUMIGATIONS

TYPE OF FUMIGATION	DOSAGE RANGE PELLETS	TABLETS	UNIT OF VOLUME*
1. Space (Including packaged Commodities)			
A. Mills, Ware houses, etc.	100-300	20-60	1000 CU. FT.
B. Bagged Commodities	150-300	30-60	1000 CU. FT.
C. Dried Fruits, Nuts and Dates	100-200	20-40	1000 CU. FT.
D. Stored Tobacco	100-200	20-40	1000 CU. FT.
2. Bulk Stored Commodities			
A. Vertical Storage	150-300	30-60	1000 CU. FT.
	200-375	40-75	1000 Bushels
B. Tanks	200-350	40-70	1000 CU. FT.
	250-450	50-90	1000 Bushels
C. Flat Storage (Loose Construction)	250-725	50-145	1000 CU. FT.
	325-900	65-180	1000 Bushels
D. Farm Bins	350-725	70-145	1000 CU. FT.
	450-900	90-180	1000 Bushels
E. Rail Cars	150-350	30-70	1000 CU. FT.
	200-450	40-90	1000 Bushels
F. Bunkers, Tarped Ground Storage	150-350	30-70	1000 CU. FT.
	200-450	40-90	1000 Bushels
G. Barges	150-400	30-80	1000 CU. FT.
	200-375	40-75	1000 Bushels
H. Shipholds	150-330	30-66	1000 CU. FT.
	200-413	40-83	1000 Bushels

*Volume or storage capacity of the area being treated

The upper dosages listed are recommended in structures that are of loose construction.

E. Sealing

There are many factors affecting a fumigation but most are minor compared to sealing. Proper sealing is necessary to insure effective control of insects and to protect man and other forms of life in adjoining enclosed areas from hydrogen phosphide during the fumigation. Proper sealing must include the closure of all openings except tiny holes or narrow cracks that are very difficult to seal. Maximum results, however, can be achieved if even these are sealed. Polyethylene sheeting and masking or duct tape are adequate sealing materials. Contact Bernardo Chemicals Ltd. for additional information.

F. Exposure Guidelines

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

Temperatures to Which Fumigation and/or Insects Are Exposed	Pellets	Tablets
Below 40 F (5 C)	Do Not Fumigate	Do Not Fumigate
40 F-53 F (5-12 C)	8 days (192 hrs)	10 days (240 hrs.)
54 F-59 F (12-15 C)	4 days (96 hrs.)	5 days (120 hrs.)
60 F-68 F (15-20 C)	3 days (72 hrs.)	4 days (96 hrs.)
Above 68 F (20 C)	2 days (48 hrs.)	3 days (72 hrs.)

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. It is necessary to lengthen the fumigation at lower temperatures since insects are more difficult to kill under these conditions. In this regard, the temperature to which the insects are exposed is the critical factor.

There is little to be gained by extending the exposure period if the structure to be fumigated has not been carefully sealed. Careful sealing is required to insure that adequate gas levels are retained. Proper application procedures must be followed to provide satisfactory distribution of hydrogen phosphide gas particularly in the fumigation of bulk commodity contained in large storages.

When pellets or tablets are not uniformly added to a bulk commodity mass (i.e. surface application or shallow probing) exposure times must be substantially lengthened to allow penetration of gas throughout the commodity. As a "rule of thumb" a minimum of 1 day should be added to the exposure time listed on this page for each 10 feet the gas must penetrate downward. It is preferable to add 2 days for each 10 feet. Some structures can only be treated when completely tarped.

In addition, the fumigation period should be long enough that the production of hydrogen phosphide has essentially ceased. This will minimize worker exposure during further storage and/or processing of the treated bulk commodity as well as reduce hazards in the diposal of spent aluminum phosphide products remaining after space fumigations. Temperature and humidity to which **gastoxin®** Pellets and Tablets are exposed are important to this determination since both lower temperatures and/or dry air retard gas release.

Consequently, exposure periods recommended in the table are minimum periods and may not be adequate to control all stored product pests under all conditions. This is particularly true at lower temperatures (below 60 degrees F). The minimum suggested time periods will not always provide for the cessation of the production of hydrogen phosphide when pellets or tablets are exposed to inadequate moisture levels. Grain at 70 F (21 C) and 12 percent moisture provides

more than adequate conditions for fumigation.

If the temperature to which the insects are exposed is warmer than the temperature to which the pellets or tablets are exposed (this may occur during a winter space fumigation), it may be possible to obtain an effective insect kill before the fumigant is totally spent. In this event it is permissible to conclude a space fumigation as soon as an effective kill has been achieved, however in this event the pellets or tablets must be deactivated prior to disposal. See deactivation instructions on page 29 of this manual.

Whenever possible, exposure periods should exceed minimum periods listed above. Remember, the key to effective results lies with correct dosage, long exposure periods, proper application procedures and well sealed enclosures.

G. Application Procedures

1. **General Statement**

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

2. **Application Procedures for Direct Addition of Pellets or Tablets to Bulk Commodities**

   a. **Commodities:** Listed raw agricultural commodities, seeds, wood chips, animal feed and malt and corn grits used in the manufacture of beer.

   b. **Storage Structures:** Bins, tanks, silos, granaries, flat storage, bunkers, bulk rail cars, etc.

   c. **Procedures for Vertical Storage:** (concrete upright bins and other silo type bins that can be quickly transferred)

      (1) For best results all cracks and openings with the exemption of fill openings should be closed or sealed prior to fumigating the bin. To this end, vents near the bin top connecting adjacent bins should be sealed prior to the fumigation. If the bin is entered to seal these openings after the fumigant has been added, proper respiratory protection must be worn.

      (2) Determine minimum exposure time based on commodity temperature and moisture. At commodity moistures of below 11.5%, exposure periods should be extended to obtain complete reaction of the fumigant.

      (3) Calculate the number of pellets or tablets needed and the rate at which they must be added based upon the rate at which the bin will be filled.

      (4) Pellets or tablets may be applied by hand or by automatic dispenser on the headhouse/gallery belt or into the fill opening. An automatic dispenser may also be used to add fumigant into the upleg of the elevator. Add fumigant in as

continuous a manner as possible to the commodity stream.

(5) Seal the bin deck openings after the application is complete.

(6) Vertical bins can also be fumigated by deep probing.

(7) Bins requiring more than 24 hours to fill should not be fumigated by direct addition as the bin is filled. These bins must be fumigated by probing, surface application, or other appropriate methods.

(8) Post "DANGER" placards on all entrances and on the discharge gate.

(9) Bins needn't be aerated until they are transferred. Workers must not be over exposed during this transfer.

d. **Procedures for Flat Storage:** (rectangular shaped bins, tanks, farm style bins and other horizontal bins)

(1) Check the storage for tightness.

(2) To the extent practical seal any vents, cracks or other sources of leaks.

(3) Determine application procedure to be used. This can include shallow probing, deep probing, uniform addition as the bin is filled, or surface application.

Bins requiring more than 24 hours to fill should not be fumigated by addition as the bin is filled since large quantities of gaseous fumigant may escape before the bin is finally sealed.

Probes should be inserted at horizontal intervals along the length and width of the bin. The number of pellets or tablets per probe is determined by dividing the total number of pellets or tablets by the total number of probings. Pellets or tablets will be dropped into the probes at intervals as the probe is withdrawn. Releasing all the fumigant into the probe at once may retard the production of hydrogen phosphide and might cause an ignition of gas trapped in the clump of pellets or tablets.

Surface application can be used if the bin can be made sufficiently gas tight to contain the fumigant long enough for it to penetrate throughout. In this instance it is advisable to place 1/4 of the dosage in the floor level aeration ducts. This fumigant must not contact liquid phase water.

(4) Determine dosage and exposure time. The dosage will depend in large part on a combination of the tightness of the seal, the application procedure and the grain depth. The poorer the seal and the further the gas must penetrate to

reach throughout the bin, the higher the required dosage will be. For good results add the length of time required for the gas to penetrate throughout the bin to the exposure time given on page 11 of this manual. To the extent possible, lengthen the exposure period. As a "rule of thumb" a minimum of 1 day should be added to the exposure time listed on page 11 for each 10 feet the gas must penetrate downward. It is preferable to add 2 days for each 10 feet.

Exposure periods listed on page 11 of this manual should also be lengthened at commodity moistures below 11.5% to obtain complete reaction of the fumigant.

(5) Arrange enough applicators and other workers to complete the job quickly enough to avoid excessive exposure to hydrogen phosphide gas. The production of gas during application can be significantly retarded by venting flasks outdoors, conducting fumigations when temperatures in the bin are lowest, and other work practices. It is often advisable to wear approved respiratory protection from start to finish. Monitoring with a suitable detection device is required to assure that the 0.3 ppm 8 hour TWA is not exceeded. See "Industrial Hygiene Monitoring" section on page 28 of this manual.

(6) It is often advisable as an additional sealing measure to cover the commodity with plastic tarps.

(7) Seal all remaining exits.

(8) Post "DANGER" placards on and lock all entrances.

(9) The bin needn't be aerated unless reentry is required. Consult safety procedures listed elsewhere in labeling.

e. **Procedures for Bunkers and Other Outdoor Tarped Commodities:**

(1) See steps "3" and "4" in section "d" above.

(2) When tarps are being spread over ground storage they should be glued, clamped or other wise sealed together. Sand or water snakes can be used for a ground seal.

(3) Application may be made through slits in the tarp or the tarp can be spread over the commodity after application. Seal slits after application.

(4) Post "DANGER" placards.

(5) This is an outdoor application so safety monitoring and respiratory equipment are not required.

f. **Procedures for Rail Cars, Containers, Trucks and Other Transport Vehicles:**

Rail cars, containers, trucks, and other transport

vehicles loaded with bulk commodities to which **gastoxin®** Tablets or Pellets may be added are treated in essentially the same way as any other storage facility. **gastoxin®** 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 or pellets may be probed below the surface. Carefully seal any vents, cracks, or other leaks particularly if the fumigation is to be carried out intransit. It is not legal to move trucks, trailers, etc. over public roads or highways until they are aerated. See section "III.J" on page 25 of this manual for recommendations on placarding, commodity aeration and training of persons authorized to remove placarding.

Notify the consignee if the commodity is to be shipped under fumigation. If the consignee is unfamiliar with proper handling of fumigated rail cars, it is recommended that they be provided with the necessary information.

g. **Procedures for Farm Storage:**

(1) **General**

Since on farm storage is almost always flat storage, refer to "Procedures for Flat Storage" on page 13 of this manual. The instructions which follow provide additional guidance.

(2) **Sealing**

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

entire structure is tarped the plastic must be at least 6 mils thick to prevent excessive tearing during the fumigation.

(3) **Dosage**
Unless all the large cracks are sealed as described above the dosage recommended should be 90-180 tablets or 450-900 pellets per 1000 bu. capacity of the space under the plastic tarp.

(4) **Additional Application Instructions**
Probing tablets or pellets into the grain mass is the recommended method of application. Probe insertions should be scattered evenly over the surface. A rigid PVC pipe, about 5 to 7 feet long and 1 1/4 inch diameter can be used. In this event, use about 20-50 tablets or 100-250 pellets per probe. The fumigant is gradually released into the probe as it is withdrawn from the grain. Releasing all the fumigant into the probe at once may retard the production of hydrogen phosphide and might cause an ignition of gas trapped in the clump of pellets or tablets. Place no more than 1/4 of the total dose in floor level aeration ducts. Be sure the inside of the aeration duct is dry before adding the pellets or tablets. Addition of **gastoxin®** to water in an aeration duct can cause a fire. Seal the aeration fan as described above.

(5) **Additional Precautions**
Do not fumigate bins that will be entered by humans or animals prior to aeration. Do not fumigate areas which house equipment containing copper, or other metals which will be corroded by hydrogen phosphide. This includes electrical and electronic equipment.

Place "DANGER" placards on entrances to the bin and near the ladder. See section on "PLACARDING OF FUMIGATED AREAS" on page 25 of this manual.

If monitoring equipment is not available, an approved SCBA 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. Also refer to all other precautions given in this manual.

(6) **Post Aeration Treatment**
It is good practice to spray the grain surface with an approved insecticide protectant to retard re-infestation and to fog the space above the grain to kill existing adult flying insects.

3. **Application Procedures for Space Fumigations**

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

(1) Determine the dosage of tablets or pellets to be applied based upon the following parameters for space fumigation:

The volume of the structure
The air and/or commodity temperature
The general tightness of the structure to be fumigated.

(2) Determine exposure period based on the "Exposure Guide" on page 11 of this manual.

(3) Seal all openings except for the door being used to enter and leave. Pay particular attention to openings to connecting or adjacent structures.

(4) Place trays or sheets of Kraft paper or foil, up to 12 sq. ft. (1.1 sq. M) in area, on the floor throughout the structure to hold **gastoxin®** Tablets or Pellets.

(5) Spread **gastoxin®** on the sheets at a density no greater than 20 tablets per sq. ft. or 100 pellets per sq. ft. This corresponds to roughly one half flask of tablets or one half flask of pellets per 3' x 4' sheet. Check to see that they have not piled up and that they are spread out evenly to minimize contact between the individual tablets or pellets.

(6) Pellets and tablets may also be applied in moisture permeable envelopes to fumigate commodities. When fumigating in this way the envelopes must be fastened to a substanial support. Place no more tha 10 pellets nor more than 2 tablets into one envelope. **gastoxin®** Pellets and Tablets shall not be placed in or attached to commodity packages intended for retailers.

(7) When fumigating multiple story buildings, each floor is considered a separature enclosure. Application should begin with the top floor and end with the ground floor.

(8) Seal all remaining exits.

(9) Placard and lock all entrances.

(10) Aerate the structure upon completion of the exposure period. Standard aeration time and practices should be developed using a low level detection device. Practices will vary widely at diferent sites but will usually include opening windows, doors, and vents and activating any ventilation equipment. Reentry of unaerated structure must be done in pairs wearing appropriate respiratory equipment.

(11) Dispose of remaining dust from tablets or pellets SEE "STORAGE AND DISPOSAL" on page 28 of this manual. Avoid breathing the dust.

b. **Procedures for Space Fumigation Under Tarps:**

(1) **General**

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

Use of plastic sheeting or tarpaulins to provide a fumigation enclosure is one of the easiest and least expensive means for providing relatively gas tight enclosures which are very well suited for fumigation. Plastic tarps are penetrated only very slowly by hydrogen phosphide gas, and tight coverings are readily formed from the sheets. The volume of these enclosures may vary wildely.

(2) **Sealing**

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

(3) **Additional Application Instructions**

Tablets or pellets may be applied under the edge of the tarp or through the slits. The pellets or tablets should be protected from condensation or other source of water. The slits in the covering should be carefully taped to prevent loss of gas once the dose has been applied. Pellets or tablets must be placed in a single layer. Care should be taken to prevent the plastic tarp from covering the pellets or tablets in such a way as to prevent the plastic contact with moist air or to confine the gas. Refer to other setions for dosage and exposure time.

(4) **Additional Precautions**

See appropriate precautions if the fumigation is conducted indoors as opposed to outdoors. Indoor fumigation precautions are handled as

any other situation where the application is made from outside the area being fumigated (i.e. the adding of pellets or tablets to a dispenser for uniform addition to grain). Workers may occupy adjacent indoor areas but they must be protected from overexposure to hydrogen phosphide by adequate sealing, ventilation or as a last resort, respiratory equipment.

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

Follow precautions listed elsewhere in labeling.

(5) **Aeration**

Precautions must be taken to assure that exposure to hydrogen phosphide in excess of allowed limits does not occur both during the fumigation and aeration.

4. **Application Procedures for Intransit Fumigation of Ship Holds**

a. **General Information**

(1) Shipboard fumigation is also regulated by the U.S. Coast Guard Regulations 46 CFR 147A.

(2) This product is toxic to fish. Keep out of lakes, streams, and other aquatic environments. Do not contaminate water by cleaning equipment or disposal of wastes.

b. **Pre-Voyage Procedures and Precautions**

(1) Refer to and comply with the regulations and procedures found in U.S. Coast Guard Regulation, 46 CFR 147A.

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

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/voyage, then the vessel will not be fumigated unless all crew members are removed from the vessel. The crew members will not be allowed to re-occupy the vessel until the vessel has been properly aerated and a determination has been made by the master of the vessel and the fumigator that the vessel is safe for occupancy.

(3) The person responsible for fumigation must notify the master of the vessel, or his representative of the requirements relating to personal protection equipment*, low range detection equipment and that a person qualified in the use of this equipment must accompany the vessel

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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.

(4) Seal all openings to the cargo hold or tank using suitable water proof, gas tight materials. Lock and/or otherwise secure all openings, manways, etc. used to enter the hold. Post appropriate "DANGER" placards on same.

(5) On tankers the over-space pressure relief system of each tank must be sealed by (1) the closing of appropriate valves and (2) sealing the openings into the over space with gas tight materials.

(6) Contact appropriate authorities.

(7) 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 a 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.

(8) During the fumigation or until a manned vessel leaves port or the cargo is aerated, the person in charge of the fumigation shall insure that a qualified person using gas or vapor detection equipment test spaces adjacent to the fumigated cargo area and all regularly occupied spaces for fumigant 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.

(9) Review with the master, or his representative, the voyage precautions and procedures.

*Personal protection equipment means a respirator or gas mask fitted with a canister designed for phosphine gas which is approved by NIOSH/MSHA. A gas mask and canister is approved for use up to 15 ppm. Above 15 ppm or at unkown concentrations a SCBA or its equivalent must be used.

c. **Procedures for Bulk Dry Cargo Vessels and Tankers:**

(1) Apply either the tablets or pellets by scattering them uniformly onto the commodity surface utilizing as much of the total surface area as possible, or insert them uniformly into the commodity mass by hand or with probes to any depth desired.

(2) Close and secure hatch covers, tank tops, butterworths, etc. immediately following application.

d. **Voyage Precautions and Procedures:**

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

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

(2) If hydrogen phosphide is detected, evacuate the space or area, locate and seal off the source of the leak wearing appropriate respiratory protection equipment. Ventilate the area before allowing occupants to return.

(3) Do not enter fumigated holds or tanks.

(4) Do not open, ventilate or aerate the fumigated holds during the voyage.

e. **Precautions and Procedures During Discharge:**

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

f. **Personal Protective Equipment and Monitoring:**

(1) Fully loaded holds on dry bulk carriers are considered an outdoor fumigation.

(2) Tanker holds which must be entered to fumigate and partially loaded holds on dry bulk carriers are fumigated from within the area being treated.

(3) See sections "I" and "M" on page 25 and 27 of this manual for requirements.

(4) If hydrogen phosphide is detected a minimum of two qualified persons on ship should wear the gas mask and canister described above while aerating the area and locating and sealing the leak.

5. **Application Procedures for Intransit Fumigation of Containers on Ships**

a. When fumigating bulk commodities to which direct addition of pellets or tablets is not allowed or package commodities, refer to section "3.a" on page 16 of this manual. Do not place tablets loosely on trays or sheets of paper or foil since movement of

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the container may disrupt the correct placement of pellets or tablets. Instead they must be applied in moisture permeable envelopes as described in section "3.a.(6)," page 17.

b. When fumigating a commodity by direct addition of pellets or tablets, refer to section "2.f" on page 14 of this manual.

c. Intransit fumigation of containers on ships is regulated by Coast Guard Regulation 46 CFR 147A and the applicator or shipper must obtain and comply with U.S. Coast Guard Special permit No. 2-75. Contact the Coast Guard or Bernardo Chemicals Ltd. for additional information.

d. Comply with general precautions given in labeling.

6. **Application Procedures for Fumigation of Barges**

a. **General**

Since barge fumigation is a type of flat storage fumigation as well as having similarities in common with a ship, refer to sections "Procedures for Flat Storage on page 13 and "Application Procedures for Intransit Fumigation of Ship Holds" on page 19.

Barge information is regulated by the U.S. Coast Guard Regulations 46 CFR 147A as modified by U.S. Coast Guard Special Permit 2-75. The shipper or fumigator must posses this permit prior to fumigating. To obtain this permit contact

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

b. **Sealing**

Special care must be taken in determining whether a barge is suitable for fumigation. Excessive leakage may occur through poorly sealed hold covers.

7 **Application Procedures for Fumigation of Rodent and Mole Burrows**

a. **List of Burrowing Pests**

gastoxin® Tablets and Pellets may be used out of doors only for the control of the following burrowing rodents and moles; marmot sp. - woodchucks and yellow-belly marmots (rockchucks), prairie dogs (except Utah prairie dog). Norway and roof rats, mice, ground squirrels, moles (except in Indiana and North Carolina), voles, gophers (except in North Carolina) and chipmunks (except in California).

b. **Application Instructions**

Add from 1 to 4 **gastoxin®** Tablets or 5 to 20 **gastoxin®** Pellets to each burrow opening. Seal tightly by shoveling soil over the entrance. Place the pellets or tablets far enough down the burrow that the soil used to plug the burrow doesn't cover the pellets or tablets, slowing down their action. Where

possible, subsurface tunnels or runways should be treated every 5 to 10 feet with a dose of 2 to 4 tablets or 10 to 20 pellets. Use lower rates in smaller burrows, in tight soils, under moist soil conditions and higher rates in larger burrows, in porous soils and/or when soil moisture is low. In extremely dry or porous soil, it is sometimes not possible to obtain satisfactory results. This is particularly true in instances where the burrow systems are extensive such as moles or gophers. It is always better not to fumigate during extended periods of dry weather. Treat reopened burrows and fresh runways a second time 1 to 3 days after the initial treatment.

gastoxin® may be used out of doors only, for control of burrowing pests. Do not use within 15 feet (5 meters) of inhabited structures. Do not apply to burrows which may open under or into occupied buildings.

c. **Environmental Hazards**

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

d. **Endangered Species Restrictions**

The use of **gastoxin®** in a manner that may kill or otherwise harm an endangered or threatened species or adversely modify their habitat is a violation of federal law. 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. Use of this product in the areas listed below is prohibited without first contacting and obtaining permission from the Endangered Species Specialist at the nearest regional offices of the U.S. Fish and Wildlife Service (FWS).

Areas Inhabited by Endangered or Threatened Species

(1) Black-footed ferret — States of Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah and Wyoming.

(2) Blunt-nosed leopard lizard — Counties of Kern, Kings, Fresno, Madera, Merced, and Tulare in the state of California.

(3) Desert tortoise — Washington county in the state of Utah.

(4) Eastern indigo snake — States of Georgia and Florida.

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(5) San Joaquin kit fox — Counties of Kern, Kings, Fresno, Merced, Monterey, San Benito, San Luis Obispo, Santa Barbara, Tulare and Ventura in the state of California.

e. **Special Local Restrictions**

(1) North Carolina
gastoxin® Tablets and Pellets may only be used for control of rats and mice in the state of North Carolina. Use against other pests is not permitted.

(2) Oklahoma
A special permit for black-tailed prairie dog control by poisoning is required in Oklahoma. Contact the Oklahoma State Department of Wildlife Conservation to obtain this permit.

(3) Wisconsin
A state permit is required for use of pesticides in Wisconsin to control small mammals, except rats or mice. Please contact your local Department of Natural Resources office for information.

(4) Indiana
Use of **gastoxin®** Tablets or Pellets for mole control is not legal in the state of Indiana.

(5) Missouri
A state permit is required for use of pesticides in Missouri to control small mammals, except rats and mice. Please contact the Missouri Department of Conservation office for information.

(6) Kansas
A special permit for black-tailed prairie dog control by poisoning is required in Kansas. Contact the Kansas Fish and Game Commission to obtain this permit.

(7) California
Use of **gastoxin®** Tablets and Pellets for chipmunk control is not legal in the state of California.

8. **Application Procedures For Fumigation of Beehives, Supers and Other Beekeeping Equipment**

gastoxin® Tablets and Pellets may be used for the control of the greater wax moth in stored beehives, supers and other beekeeping equipment and for the destruction of bees, Africanized bees, and diseased bees including those infested with tracheal mites and foulbrood. The recommended dosage for this use of 30-45 tablets or 150-225 pellets per 1000 cu. ft.

Fumigations may be performed in chambers at atmospheric pressure, under tarpaulins, etc., by placing the tablets or pellets on trays or in moisture permeable envelopes. Do not add more than 2 tablets or

10 pellets to each envelope. Honey from treated hives or supers may only be used for bee food.

H. Protective Clothing

Wear dry gloves made of cotton or other material when contact with tablets, pellets, or their dust is likely. Wash hands after use.

I. Respiratory Protection

1. When Respiratory Protection Must Be Worn

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

2. Permissible Gas Concentration Ranges for Respiratory Protection Devices

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

3. Requirements for availability of Respiratory Protection

Respiratory protection must be available at the site of application in case it is needed when applying **gastoxin®** from within the structure being fumigated. An approved full face gas mask - phosphine canister combination or self-contained breathing apparatus (SCBA) or its equivalent must be available at the site of application. If SCBA or its equivalent is not available at the application site, it must be available locally, for example, at a fire station or rescue squad.

Respiratory protection need not be available for application from outside the area to be fumigated such as addition of tablets or pellets to automatic dispensing devices, etc., if the exposures above the permitted exposure limit will not be encountered.

Respiratory protection need not be available for outdoor applications.

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

J. Placarding Fumigated Areas

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

1. The signal word "DANGER/PELIGRO" and the SKULL and CROSSBONES symbol in red.
2. The statement, "Area and/or commodity under

fumigation, DO NOT ENTER/NO ENTRE".

3. The statement "This sign may only be removed after the commodity is completely aerated (contains 0.3 ppm or less phosphine gas). If incompletely aerated commodity is transferred to a new site, the new site must also be placarded and workers must not be exposed to more than 0.3 ppm phosphine."
4. The date and time fumigation begins and is completed.
5. Name of fumigant used.
6. Name, address, telephone number of applicator.

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

Do not remove a placard until the treated commodity is aerated down to 0.3 ppm 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, when feasible, in the mass of the commodity.

Transfer of incompletely aerated commodity to a new site is permissable, however, the new storage must be placarded if it contains more than 0.3 ppm hydrogen phosphide.

Workers who handle incompletely aerated commodity must be informed and appropriate measures must be taken (i.e. ventilation or respiratory protection) to prevent exposures from exceeding the exposure limits for hydrogen phosphide.

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

K. Gas Detection Equipment

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

L. Aeration of Fumigated Commodities

1. Foods and Feeds
   Tolerances for hydrogen phosphide residues have been established at 0.1 ppm for animal feeds and 0.01 ppm for finished foods. To guarantee compliance with these tolerances, it is necessary to aerate these commodities for 48 hours prior to offering them to the consumer.
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. When plastic liners are used, longer aeration periods will probably be required to aerate the commodity down to 0.3 ppm.
3. 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.

M. Applicator and Worker Exposure

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

   After application is completed worker or applicator exposure must not exceed 0.3 ppm maximum concentration. Such exposures may occur because of leakage into enclosed areas from fumigation sites, during reentry or during transfer of unaerated commodity.
2. Application of Fumigant
   Depending upon temperature and humidity, **gastoxin®** Tablets and Pellets release hydrogen phosphide gas slowly upon exposure to moisture from the air. This release is often slow enough to permit applicators to deposit fumigant in the desired areas and then vacate the premises without significant exposure to the gas. If the fumigator's exposure exceeds the 8 hour TWA of 0.3 ppm, approved respiratory protection must be worn. Gas concentration measurements for safety purposes must be made using low level detector tubes or other suitable low level detection equipment. See the "Industrial Hygiene Monitoring" section below. Information on hydrogen phosphide (phosphine, PH_3) detector tubes may be obtained from Bernardo Chemicals Ltd.
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 occured. Sealing of the fumigated site and/or air flow in the occupied areas should be used to reduce exposure.

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.
5. **Handling Unaerated Commodities**
   Transfer and processing of a treated commodity prior to complete aeration is permissible, however, workers must not be exposed to hydrogen phosphide in excess of the permitted exposure limits.
6. ***Industrial Hygiene Monitoring***
   It is recommened that hydrogen phosphide exposure be documented in an operation log or manual for each site and operation where exposure may occur. The purpose of this monitoring is to prevent excessive exposure and to determine when and where respiratory protection is required. 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 significantly change or an unexpected garlic odor is detected. Gas concentration measurements should be taken in the worker's breathing zone. Monitoring is not required outdoors.
7. **Engineering Controls and Work Practices**
   If initial monitoring shows that workers are exposed to concentrations in excess of the permitted exposure limits then engineering controls (such as forced air ventilation) and/or appropriate work practices should be used where possible in an attempt to reduce exposure to below permitted limits.

N. Storage and Disposal

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

gastoxin® Tablets and Pellets are supplied in gas tight resealable, aluminum flasks. Do not expose the product inside flasks to atmospheric moisture any longer than is necessary. Seal tightly before returning opened flasks to storage. The shelf life of **gastoxin®** is virtually unlimited if the containers are tightly sealed.

Flasks should not be stored at sub-zero temperatures because this will increase the possibility of an ignition (flash) when opened.

2. **Disposal of Unreacted or Partially Reacted Tablets or Pellets**
   (from spills, leaking flasks or other sources) Unreacted or partially reacted **gastoxin®** Pellets or **gastoxin®** Tablets are acutely hazardous. Improper disposal of these products is a violation of federal law. If these products cannot be disposed of by ordinary use or according to the instructions that follow, contact your state pesticide or environmental control agency or the hazardous waste representative at the nearest EPA regional office for guidance. Do not contaminate water by disposal.
   Some local and state waste disposal regulations may vary from the following recommendations. Disposal procedures should be reviewed with appropriate authorities to ensure compliance with local regulations.

   FOR SPECIFIC INSTRUCTIONS SEE "SPILL AND LEAK PROCEDURES" ON PAGE 31 OF THIS MANUAL.
3. **Disposal of Pellet or Tablet Dust Following a Space Fumigation**
   a. **General**
      If properly exposed, the residual dust remaining after a fumigation with **gastoxin®** will be a grayish white, spent, nonhazardous waste and will contain only a small amount of unreacted aluminum phosphide. However, residual dust from incompletely exposed pellets or tablets (See "Exposure Guide" on page 10 of this manual) will require special care. Confinement of partially spent residual dust, as in a closed container, or collection and storage of large quantities of this dust may result in a fire hazard. Small amount of hydrogen phosphide, and confinement of the gas may result in a flash. UNLESS IT CAN BE DETERMINED WITH CERTAINTY THAT THIS DUST IS SPENT IT MUST BE HELD FOR SEVERAL DAYS BEYOND THE REQUIRED EXPOSURE TIME PRIOR TO DISPOSAL OR THE WET METHOD (SEE BELOW) OF DEACTIVATION MUST BE USED. IF THE DUST RETAINS ANY OF ITS GREENISH COLOR THE WET METHOD IS RECOMMENDED.

   b. **Dry Method.**
      In open areas, small amounts (up to 5 flasks) of residual dust may be disposed of on site by burial or

by spreading over the land surface away from inhabited buildings. Up to 3 flasks of this residual dust (4 to 7 lbs.) may be collected in a one gallon bucket for holding or disposal. Larger amounts of residual dust may be collected in a porous cloth bag (burlap, cotton, etc.) for holding and/or transportation to a suitable disposal site. Do not put more than one half case (8 flasks of tablet or 10 flasks of pellets) of residual dust in each bag. Always transport these bags in an open vehicle. Do not pile bags. CAUTION: Do not use this method for dust that still retains some of its original greenish color. Never confine, dispose of or store residual dust in closed containers such as dumpsters, drums or plastic bags.

Spent residual dust from **gastoxin®** may be collected and disposed of at a sanitary landfill, approved pesticide incinerator or other approved sites or by other procedures approved by federal, state and local authorities.

Do not dispose of dust in a toilet.

c. **Wet Method**
Fill with an appropriate sized metal container 2/3 full with water. For each gallon of water add 1/4 cup of low sudsing detergent or surfactant. Use no less than 10 gallons of water/detergent solution for each case of spent material. Slowly pour the dust into the container as the water is stirred. Wear appropriate respiratory protection. DO NOT COVER THE CONTAINER AT ANY TIME. This must be done outdoors or in front of an adequate fan that exhausts immediately outside.

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

4. **Disposal of Empty Flasks**
   a. **Method One:** Triple rinse flasks and stoppers with water. Then offer for recycling or reconditioning, or puncture and dispose of them by other procedures approved by state and local authorities.
   b. **Method Two:** Remove lids and place empty flasks outdoors or in structures being fumigated until residue in flasks is reacted. Puncture and dispose of them in other procedures approved by state and local authorities.

O. Spill and Leak Procedures

1. **General**
A spill other than incidental to application or normal handling or punctured flasks, can produce high levels of gas, and therefore, attending personnel must wear a SCBA or its equivalent when the concentrations of hydrogen phosphide gas is unknown. If the concentration is known, other NIOSH/MSHA approved respiratory protection can be worn. Wear dry cotton gloves when handling spilled material

2. **Damage to Fiberboard Case**
Check aluminum flasks. If they are damaged handle as described below. If they are undamaged return them to cardboard cartons or other suitable packaging which complies with DOT regulations.

3. **Leaking Flask Procedures**
If aluminum flasks have been punctured or damaged causing a leak, the product may be immediately used, the container may be temporarily repaired with aluminum tape or the **gastoxin®** may be transferred from the damaged flask to a sound metal container which should be sealed and properly labeled as aluminum phosphide. Transport the damaged containers to an area suitable for pesticide storage for inspection. Further instructions and recommendations may be obtained, if required, from Bernardo Chemicals Ltd.

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

4. **Spill Procedures**
Do not flush spillage down drain with water. DO NOT use water at anytime to clean up a spill. Water in contact with unreacted tablets or pellets will rapidly accelerate the production of hydrogen phosphide gas and could cause spontaneous ignition of the gas. If the spill is only a few minutes old and is not contaminated by other materials, collect the spillage and place it back into original flask or other sound metal container and tighten the cap. If possible, use immediately. CAUTION: AN IGNITION MAY OCCUR WHEN THESE CONTAINERS ARE REOPENED.

If the spilled material is contaminated or has begun to visibly decompose, gather it up and place it into open top, perforated gallon cans and process immediately.

Do not add more than about one flask (2 to 3 lbs.) of spilled material to the bucket. If on-site deactivation is not feasible, these open containers should be transported in open vehicles to a suitable area away from occupied buildings. Wet or dry deactivation may then be carried out as described in the section immediately below.

5. **Deactivation and Disposal of Unreacted or Partially Reacted Tablets or Pellets**

   a. **Wet Method**

   Transport material by hand or in open vehicles to open air away from occupied structures. Fill a drum 2/3 full with water.

   Add 1/4 cup of low sudsing detergent or surfactant in each gallon of water. Each flask of tablets or pellets should be mixed with no less than 1 gallon of water/detergent solution. Slowly pour the material into the water as it is stirred. Stir occasionally thereafter for at least 36 hours. Wear appropriate respiratory protection. DO NOT COVER THE CONTAINER. IF THE CONTAINER IS COVERED THE HYDROGEN PHOSPHIDE BEING GENERATED WILL BE CONFINED AND WILL DECOMPOSE EXPLOSIVELY. The wet method of deactivation is the method of choice for quantities in excess of 5 flasks (10 to 15 lbs.) It is safe to dispose of this slurry.

   Dispose of the resulting deactivated slurry, with or without preliminary pouring out of excess water, at a sanitary landfill or other suitable burial site approved by local authorities. Where permissible this slurry may be poured into a storm sewer or out onto the ground

   b. **Dry Method**

   As an alternative to the wet method, when permissible small amounts (up to 5 flasks) of partially reacted or unreacted material may be spread out in an open, secure area away from occupied buildings to be deactivated by atmospheric moisture.

   NOTE: Never place pellets, tablets, their dust or the dust/water slurry in a confined container such as a closed drum or plastic bags. Any hydrogen phosphide generated will be confined and may decompose explosively.

GPM-1.DOC
GPM-2.DOC

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