

43743-3

9/23/2003

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

OFFICE OF  
PREVENTION, PESTICIDES  
AND TOXIC SUBSTANCES

SEP 23 2003

Mr. Daniel M. Barolo  
Authorized Representative  
Casa Bernardo, LTDA  
7117 Marine Drive  
Alexandria, VA 22307

Subject: Revised Labeling to Require a FMP and Other MOA Revisions  
Gastoxin® Fumigation Tablets  
EPA Reg. No. 43743-1  
Gastoxin® Fumigation Pellets  
EPA Reg. No. 43743-2  
Gastoxin® Fumigation Sachets  
EPA Reg. No. 43743-3  
Your Application Received June 19, 2003

Dear Mr. Barolo:

The labeling referred to above, submitted in connection with registration under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, is acceptable subject to the comments listed below.

- The center panel of the container labeling must include the Skull and Crossbones Symbol. Draft labeling submitted to, and accepted by, the Agency should indicate that this symbol is present since this is the labeling that is stamped and placed on the Agency's website. This requirement also applies to the front page of the Applicator's Manual.
- In the Applicator's Manual, the Note to Physician needs two corrections. Under the second item numbered 2, the third sentence is incomplete and is missing the words "are recommended." It should read: "On progressive edema of lungs, immediate intubation with a constant removal of edema fluid and oxygen over-pressure respiration, as well as any measures required for shock treatment **are recommended.**" Additionally, the third sentence of item number 3 is missing the words "is recommended," ie. "After swallowing, emptying of the stomach by vomiting, flushing of the stomach with diluted potassium


permanganate solution or a solution of magnesium peroxide until flushing liquid ceases to smell of carbide is **recommended**.” We note that the Note to Physician sections of the three container labels are shortened versions of the Note to Physician section of the Applicator’s Manual. They should be identical.

- In section 10.1 of the Manual, please define the acronym “STELs”.
- In section 10.3, delete the instruction appearing in parentheses regarding availability of SCBA, “(for example, at a fire station or rescue squad)”. It is unlikely that a rescue squad would be willing to lend its equipment. Therefore, SCBA must be present at the site as part of the mandatory equipment for use of PH3.
- In section 14.1 of the Manual, the abbreviation “na” appears twice in the text. We believe these are typographical errors and thus should be deleted.
- Under section 18, Aeration of Fumigated Commodities, Tobacco (18.3), delete the last sentence which refers to tolerance levels.
- Correct the second sentence of section 19 to read “These include, **but are not limited to:** company policy....”
- The Applicator’s Manual does not include a section on “Transportation Exemption.” We believe this is an inadvertent omission and that this information should follow section 20.1, “Transport Designations.”
- As requested by some state representatives, please insert the words “and follow” in the first sentence of section 21, “Fumigation Management Plan”. The sentence should read:
 

“The certified applicator is responsible for working with the owners and/or responsible employees of the structure and/or area to be fumigated to develop **and follow** a Fumigation Management Plan (FMP).”
- In section 22.1; Farm Bins, there are some typographical errors in item no. 8. Please make the appropriate corrections
- In section 22.3; Vertical Storage, add the phrase “and any openings” to the last sentence of item 4, ie. “Prior to the fumigation, seal the vents near the bin top **and any openings** which connect to adjacent bins.”
- In section 22.4; Mills, Food Processing Plants and Warehouses, we believe that the correct number of pellets should be 150 (not 75) in item no. 8. This is based on the information that 1 tablet is approximately equivalent to 5 pellets. If this is correct, please revise the sentence.

- Section 22.5; Railcars, Containers, etc. has a reference to section 6 at the end of the second paragraph for information on placarding. This is incorrect, it should be section 16.
- Section 22.7.4; Intransit Fumigation of Transport Units, etc. references section 21.5 for application procedures (last sentence). This reference should be section 22.5.
- In the directions for use for burrowing pest control, revise the first sentence under 26.1 to read: "Gastoxin pellets or tablets may be applied to underground burrow systems..." rather than "This product may be applied..." The Application Manual covers the pellet, tablet and sachet products, however, the sachets are not registered for use against rodents, therefore, these use directions should specify just pellets and tablets.
- The Disposal Instructions under section 27 incorrectly references section 11 for Spill and Leak Procedures. Please change it to section 28.
- The Spill and Leak Procedures in section 28.1 refers to wet deactivation as section 11.2 (see last paragraph). The correct number of the section for wet deactivation instructions is 28.2. Please revise this paragraph.
- On the last page, delete the final sentence: "The EPA has determined that proper disposal of aluminum phosphide will cause no unreasonable adverse effects to the environment."

The Memorandum of Agreement between the Agency and the Registrants of phosphine based fumigants requires that within six (6) months of receiving stamped and approved labels from the Agency, all phosphine products released for shipment shall bear the amended and approved labels and be accompanied by the Applicator's Manuals. Additionally, please submit two (2) copies of the finished, corrected labeling to the Insecticide-Rodenticide Branch of the Registration Division prior to releasing the product for shipment. A stamped copy of the label is enclosed for your records. If you have any questions regarding this action, please contact me at (703) 305-7546.

Sincerely,  
  
 Dan Kenny  
 Product Manager 1  
 Insecticide-Rodenticide Branch  
 Registration Division (7505C)

Enclosure

4/18

ACCEPTED  
with COMMENTS  
In EPA Letter Dated  
Sept. 23, 2003

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act,  
as amended, for the pest  
registered under EPA Reg.

43743-3

CENTER PANEL  
RESTRICTED USE PESTICIDE  
DUE TO ACUTE INHALATION TOXICITY  
OF HYDROGEN PHOSPHIDE (Phosphine, PH<sub>3</sub>) GAS

FOR RETAIL SALE TO DEALERS AND CERTIFIED APPLICATORS ONLY. FOR USE BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION, AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION. REFER TO THE DIRECTIONS IN THIS APPLICATOR MANUAL FOR REQUIREMENTS OF THE PHYSICAL PRESENCE OF A CERTIFIED APPLICATOR.

GASTOXIN®  
FUMIGATION SACHETS

FOR USE AGAINST LISTED INSECTS, WHICH INFEST STORED COMMODITIES, SPECIFIED PROCESSED FOODS, AND ANIMAL FEEDS

ACTIVE INGREDIENT - ALUMINUM PHOSPHIDE.....	57 %
INERT INGREDIENTS.....	43 %
TOTAL.....	100%

KEEP OUT OF REACH OF CHILDREN  
DANGER/PELIGRO - POISON

FIRST AID

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

If inhaled:

- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, begin artificial respiration immediately, preferably by mouth-to-mouth.
- Keep warm and make sure person can breath freely.
- Contact a poison control center or doctor for treatment advise.
- Do not give anything by mouth to an unconscious person.

If swallowed:

- Call a Poison control center or doctor immediately for treatment advise.
- Have person drink one or two glasses of water and induce vomiting by touching back of throat with finger, or if available administer syrup of ipecac.
- Do not give anything by mouth to an unconscious person.

If on skin or clothing:

- Brush or shake material off clothes and shoes in a well-ventilated area.
- Allow clothes to aerate in a ventilated area prior to laundering.
- Do not leave contaminated clothing in occupied and/or confined areas such as automobiles, vans, motel rooms, etc.
- Wash contaminated skin thoroughly with soap and water.

If in eyes:

- Hold eye open and rinse slowly and gently with water for 15 - 20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact CHEMTREC 1-800-424-9300 for emergency medical treatment.

See side panel for additional precautionary statements.

Manufactured for:  
BERNARDO CHEMICALS INC.  
P O BOX 1632

Telephone (209) 634-1191  
Fax (209) 634-1192

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TURLOCK, CA 95381

Contents: 10 Sachets  
Net Weight ( 340 g)( 12 oz.)

EPA Reg. No. 43743-3  
EPA EST No. 43743-BRA-01

LEFT PANEL

**PRECAUTIONARY STATEMENTS**

**Hazards To Humans And Domestic Animals**

**DANGER: GASTOXIN® Sachets** or dust can 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. When a sealed container is opened, allowing material to come in contact with moisture, water or acids, toxic phosphine gas will be released. If a garlic odor is detected, for appropriate monitoring procedures, refer to section on Industrial Hygiene Monitoring in the Applicator Manual. 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 overexposure.

**Physical and Chemical Hazards**

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

It is recommended that you open aluminum phosphide products in open air or near a fan, which exhausts outside immediately. Never open in flammable atmosphere because on rare occasions it may flash. When opening, point the container away from the face and body. These precautions will also reduce the applicators exposure to hydrogen phosphide (phosphine) gas.

Pure hydrogen phosphide (phosphine) gas is practically insoluble in water, fats and oils, and is stable at normal fumigation temperatures. However, it may react with certain metals and cause corrosion, especially at higher temperatures and relative humidity's.

Metal such as copper, brass, and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by phosphine, especially at high temperatures and humidity. Thus items such as small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, forklifts, temperature monitoring systems, electrical switchgear, communication devices, computers, calculators, watches, and other electronic equipment should be protected or removed before fumigation. Hydrogen phosphide will also react with certain metallic salts and, therefore such items as photographic film, copying papers and some inorganic pigments, etc. should not be exposed.

**Note to Physician:** Aluminum phosphide in Sachets reacts 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 the chest, which is relieved by removal to fresh air. Moderate poisoning causes weakness, vomiting, pain just above the stomach, chest pain, diarrhea and dyspnea (difficulty in breathing). Symptoms of severe poisoning may occur within a few hours to several days, resulting in pulmonary edema (fluid in lungs) and may lead to dizziness, cyanosis (blue or purple skin color), unconsciousness, and death.

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

**DIRECTIONS FOR USE**

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

**General Information:** GASTOXIN® is a fumigant which when applied according to label instructions is activated by atmospheric humidity. GASTOXIN® has been found effective against many stored products insects and their pre-adult stages - that is eggs, larvae, and pupae. Refer to the Applicator's Manual for specific species and commodities, which may be fumigated.

**AN APPROVED APPLICATOR'S MANUAL ACCOMPANIES THIS PRODUCT. READ AND UNDERSTAND THE ENTIRE LABELING. ALL PARTS OF THE LABELING ARE EQUALLY IMPORTANT FOR SAFE AND EFFECTIVE USE OF THIS PRODUCT. CALL BERNARDO CHEMICALS OR EPA IF YOU HAVE ANY QUESTIONS, OR DO NOT UNDERSTAND ANY PART OF THIS LABELING.**

Refer to the Applicator's Manual for detailed precautions, recommendations and directions for use.

**STORAGE AND DISPOSAL**

Do not contaminate water, food or feed by storing pesticides in the same areas used to store these commodities.

**Storage Instructions**

- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Store GASTOXIN® in a dry, well ventilated area away from heat, under lock and key. Post as a pesticide storage area.</li> <li>2. Do not store in buildings where humans or domestic animals reside. Keep out of reach of children.</li> <li>3. GASTOXIN® Sachets are supplied in gas-tight metal containers. Do not expose the product to atmospheric moisture any longer than is necessary and use all contents of tin, after opening.</li> <li>4. The shelf life of GASTOXIN® is virtually unlimited as long as the containers are tightly sealed.</li> </ol> |
|---|

**Pesticide Disposal**

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

Unreacted or partially reacted GASTOXIN® is acutely hazardous. Improper disposal of excess pesticide is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. For specific instructions, see Disposal Instructions and Spill and Leak Procedures in the Applicator's Manual.

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

**Container Disposal**

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 landfill, by pouring it out onto the ground or by other approved procedures. It is permissible to remove lids and expose empty containers to atmospheric conditions until residue in the tin 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 GASTOXIN® Sachets will be a grayish-white powder and contain only a small amount of unreacted aluminum phosphide inside the Sachet. However, residual dust from incompletely exposed GASTOXIN® may require special care.

**Spill and Leak Procedures.**

**General Precautions and Directions**

A spill, other than incidental to application or normal handling, may produce high levels of gas and, therefore, attending personnel must wear SCBA or its equivalent when the concentration of hydrogen phosphide 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 GASTOXIN®. Water in contact with unreacted Sachets will greatly accelerate the production of hydrogen phosphide gas which could result in a toxic and/or fire hazard. Wear gloves of cotton or other material when handling aluminum phosphide.

Return all containers to cardboard case or other suitable packaging which as been properly marked according to DOT regulations.

Notify consignee and shipper of damaged cases.

If containers have been punctured or damaged so as to leak, the container may be temporarily repaired with aluminum tape or the GASTOXIN® may be transferred from the damaged tin 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. Refer to the Applicator's Manual for more detailed Spill and Leak procedures. Further information and recommendations may be obtained, if required, from BERNARDO CHEMICALS.

**WARRANTY:** Seller warrants that this product conforms to its commercial description and when used according to label directions under normal conditions of use, it is reasonable fit for the purposes stated on the label. Seller makes no other warranty, either express or implied, and Buyer assumes all risk should the product be used contrary to label instructions.

ACCEPTED  
with COMMENTS  
In EPA Letter Dated  
Sept. 23, 2003  
Under the Federal Insecticide,  
Fungicide, and Rodenticide Act,  
as amended, for the pesticide  
registered under EPA Reg. No.  
43743-1, -2, -3

8/48

**FINAL MASTER DRAFT LABEL**

(Cover)

**APPLICATOR'S MANUAL  
FOR  
GASTOXIN® ALUMINUM PHOSPHIDE  
PELLETS, TABLETS AND SACHETS**

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

**RESTRICTED USE PESTICIDE**  
DUE TO HIGH ACUTE INHALATION TOXICITY OF  
HYDROGEN PHOSPHIDE  
(PHOSPHINE, PH<sub>3</sub>) GAS

FOR RETAIL SALE TO DEALERS AND CERTIFIED APPLICATORS ONLY. FOR USE BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION, AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION. REFER TO THE DIRECTIONS IN THIS APPLICATOR MANUAL FOR REQUIREMENTS OF THE PHYSICAL PRESENCE OF A CERTIFIED APPLICATOR.

(Inside Page)

FOR USE AGAINST INSECTS WHICH INFEST STORED  
COMMODITIES AND CONTROL OF BURROWING PESTS

Active Ingredient: Aluminum Phosphide.....	57.0%
Inert Ingredients.....	43.0%
Total.....	100.0%

**KEEP OUT OF REACH OF CHILDREN  
DANGER - POISON - PELIGRO**

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



9/48

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

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

EPA ESTABLISHMENT NUMBER: 43743-BRA-01  
EPA REGISTRATION NOS. 43743-1, 43743-2, 43743-3

**WARRANTY**

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

DRAFT

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**1. FIRST AID**

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

**If inhaled:**

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

**If swallowed:**

- Call a poison control center or doctor immediately for treatment advice.
- Have person drink one or two glasses of water and induce vomiting by touching back of throat with finger, or if available administer syrup of ipecac.
- Do not give anything by mouth to an unconscious person.

**If on skin or clothing:**

- Brush or shake material off clothes and shoes in a well-ventilated area. Allow clothes to aerate in a ventilated area prior to laundering.
- Do not leave contaminated clothing in occupied and/or confined areas such as automobiles, vans, motel rooms, etc.
- Wash contaminated skin thoroughly with soap and water.

**If in eyes:**

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for further treatment advice

**HOT LINE NUMBER**

Have the product container or label or applicator's manual with you when calling a poison control center or doctor, or going for treatment. You may also contact CHEMTREC 1-800-424-9300 for emergency medical treatment.

**2. NOTE TO PHYSICIAN**

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

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

The following measures are suggested for use by the physicians in accordance with their own judgment:

In its milder forms, symptoms of poisoning may take some time (up to 24 hours) to make their appearance, and the following is suggested:

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

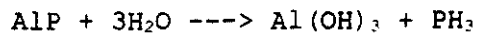
In case of severe poisoning (intensive care unit recommended):

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

**3. INTRODUCTION**

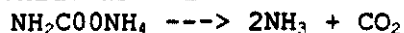
**GASTOXIN®** are used to protect stored commodities from damage by insects and for the control of burrowing pests. Fumigation of stored products with **GASTOXIN®** in the manner prescribed in the labeling does not contaminate the marketed commodity.

**GASTOXIN®** and other metal phosphide fumigants are acted upon by atmospheric moisture to produce phosphine gas. **GASTOXIN®** tablets, pellets and sachets contain aluminum phosphide (AlP) as their active ingredient and will liberate phosphine via the following chemical reaction:



Phosphine gas is highly toxic to insects, burrowing pests, humans, and other forms of animal life. In addition to its toxic properties, the gas will corrode certain metals and may ignite spontaneously in air at concentrations above its lower flammable limit of 1.8% (v/v). These hazards will be described in greater detail later on in this Applicator's Manual.

**GASTOXIN®** also contains ammonium carbamate, which liberates ammonia and carbon dioxide as follows:



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

**GASTOXIN®** is prepared in two spherical shapes and in 34g sachets. The rounded tablets are about 16mm in diameter and weigh approximately 3 grams and release 1 gram of phosphine gas. They are bulk packaged in resealable aluminum flasks containing 100 or 500 tablets each. The pellets are about 9mm in diameter and weigh approximately 0.6 gram and release 0.2 gram of phosphine gas. They are also packaged in resealable flasks containing about 1666 or 2500 pellets. Sachets weigh 34g and release approx. 11g of phosphine gas. Six (6) or ten (10) sachets are packed into a hermetically sealed metal can. A case contains 40 cans. The sachet chain, a strong, paper-like strip with 100 sachets affixed to it, is specifically designed for large scale fumigations. The Sachet Chains are packed in hermetically sealed can. A case contains 4 cans of Sachet Chains.

Upon exposure to air **GASTOXIN®** tablets, pellets and sachets begin to react with atmospheric moisture to produce small quantities of phosphine gas. This reaction starts slowly, gradually accelerates and then tapers off again as the aluminum phosphide is spent. **Gastoxin®** pellets react somewhat faster than do the tablets. The rates of decomposition of the tablets, pellets and sachets will vary depending upon moisture and temperature conditions. 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 lower ambient temperatures and humidity levels, decomposition of **GASTOXIN®** may require 5 days or more. After decomposition, **GASTOXIN®** leaves a gray-white powder composed almost entirely of aluminum hydroxide and other approved inert ingredients. This will cause no problems if the fumigant has been added directly to

a commodity such as grain. However, the spent powder must usually be retrieved for disposal after space fumigations, unless Sachets or Sachet Chains are used (spent powder is contained in sachet). If properly exposed, the spent **GASTOXIN®** will normally contain only a small amount of unreacted aluminum phosphide and may be disposed of without hazard. While **GASTOXIN®** is not considered a hazardous waste, partially spent residual dusts from incompletely exposed **GASTOXIN®** will require special care. Precautions and instructions for further deactivation and disposal are given under Section 27 of this Manual.

**GASTOXIN®** tablets, pellets and sachets are supplied in gas-tight containers and their shelf life is unlimited as long as the packaging remains intact. Once opened for fumigation, the aluminum flasks of tablets or pellets may be tightly resealed and stored for future use. In the case of sachets or sachet chains, once opened the sealed containers, all product must be used. Storage and handling instructions will be given in detail under Section 19.

**4. PRECAUTIONARY STATEMENTS**

**4.1 Hazards to Humans and Domestic Animals**

**DANGER:** Aluminum phosphide from **GASTOXIN®** tablets, pellets, sachets or dust may be fatal if swallowed. Do not get in eyes, on skin or on clothing. Do not eat, drink or smoke while handling aluminum phosphide fumigants. If a sealed container is opened, or if the material comes into contact with moisture, water or acids, these products will release phosphine, which is an extremely toxic gas. If a garlic odor is detected, refer to the Industrial Hygiene Monitoring instructions found elsewhere in this manual for appropriate monitoring procedures. Pure phosphine gas is odorless; the garlic odor is due to a contaminant. Since the odor of phosphine may not be detected under some circumstances, the absence of a garlic odor does not mean that dangerous levels of hydrogen phosphide gas are absent. Observe proper reentry procedures specified under section 15 to prevent overexposure.

**4.2 Physical and Chemical Hazards**

Aluminum phosphide in tablets, pellets, sachets and partially spent dust will release phosphine if exposed to moisture from the air or if it comes into contact with water, acids and many other liquids. Since phosphine may ignite spontaneously at levels above its lower flammable limit of 1.8-% v/v, it is important not to exceed this concentration. Ignition of high concentrations of phosphine can produce a very energetic reaction. Explosion can occur under these conditions and may cause severe personal injury. **Never allow the buildup of phosphine to exceed explosive concentrations.** Do not confine spent or partially spent metal phosphide fumigants as the slow release of phosphine from this material may result in formation of an explosive atmosphere. Aluminum phosphide tablets and pellets and sachets outside the containers should not be stacked or piled up or contacted with liquid water. This may cause a temperature increase, increase the rate of gas production and confine the gas so that ignition could occur.

It is preferable to open containers of aluminum phosphide products in open air as under certain conditions, they may flash upon opening.

Containers may also be opened near a fan or other appropriate ventilation that will rapidly exhaust contaminated air. When opening, invert the container several times then point the container away from the face and body and slowly loosen the cap. Although the chances for a flash are very remote, never open these containers in a flammable atmosphere. These precautions will also reduce the fumigator's exposure to hydrogen phosphide gas. Containers may be opened inside the structure to be fumigated provided worker's exposure to hydrogen phosphide gas does not exceed allowable limits.

Pure phosphine gas is practically insoluble in water, fats and oils, and is stable at normal fumigation temperatures. However, it may react with certain metals and cause corrosion, especially at higher temperatures and relative 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. Hydrogen phosphide will also react with certain metallic salts and, therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed. Immediately after addition of phosphine to the structure, turn off any lights and unessential electric equipment.

**GASTOXIN®** Tablets, pellets and sachets are Restricted Use Pesticides due to the acute inhalation toxicity of phosphine gas. Read and follow the label and the Applicator's Manual, which contains complete instructions for the safe use of the pesticide. Additional copies of this Manual are available from:

BERNARDO CHEMICALS  
P.O. BOX 1632  
TURLOCK, CA 95381-1632  
Telephone: 209-634-1191  
Fax: 209-634-1192  
WEB PAGE [www.casabernardo.com.br](http://www.casabernardo.com.br)

**5. PESTS CONTROLLED**

**GASTOXIN®** has been found effective against the following burrowing pests; insects and their preadult stages - that is, eggs, larvae and pupae:

- |                       |                     |  |
|-----------------------|---------------------|--|
| almond moth           | European grain moth | Mediterranean flour moth                               |
| Angoumois grain moth  | flat grain beetle   | pink bollworm  |
| bean weevil           | fruit flies         | raisin moth  |
| bees                  | granary weevil      | red flour beetle                                       |
| cadelle               | greater wax moth    | rice weevil  |
| cereal leaf beetle    | hairy fungus beetle | rusty grain beetle                                     |
| cigarette beetle      | Hessian fly         | saw-toothed grain beetle                               |
| confused flour beetle | Indian meal moth    | spider beetles   |
| dermestid beetles     | Khapra beetle       | tobacco moth   |
| dried fruit beetle    | lesser grain borer  | yellow meal worm                                       |
| dried fruit moth      | maize weevil        | Africanized & Honeybee<br>infested with/tracheal mites |
|                       |                     | Pea Weevil   |

- Woodchucks
- Yellowbelly marmots (rockchucks)
- Prairie dogs (except Utah prairie dogs, *Cynomys Parvidens*)

- Norway rats
- Roof rats
- Mice
- Ground squirrels
- Moles
- Voles
- Pocket gophers
- Chipmunks

Although it is possible to achieve total control of the listed burrowing and insect pests, this is frequently not realized in actual practice. Factors contributing to less than 100% control is leaks, poor gas distribution, unfavorable exposure conditions, etc. In addition, some insects are less susceptible to phosphine than others. If maximum control is to be attained, extreme care must be taken in sealing, higher dosages must be used, exposure periods lengthened, proper application procedures followed, and temperature and humidity conditions must be favorable.

**6. COMMODITIES, WHICH MAY BE FUMIGATED WITH GASTOXIN**

Gastoxin may be used for the fumigation of listed raw agricultural commodities, animal feed and feed ingredients, processed foods, tobacco and certain other nonfood items when their commodity temperature is above 40°F (5° C).

**6.1 Raw Agricultural Commodities, Animal Feed and Feed Ingredients**  
 Gastoxin tablets and pellets may be added directly to animal feed, feed ingredients and raw agricultural commodities stored in bulk. For these commodities not stored in bulk, Gastoxin may be placed in moisture permeable envelopes, on trays, etc., and fumigated as with processed foods. OR, use Gastoxin Sachets, especially developed for processed foods application and for fumigation of commodities without contact with the fumigant.

**Raw Agricultural Commodities and Animal Feed and Feed Ingredients  
 Which May Be Fumigated with GASTOXIN**

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

**6.2 PROCESSED FOODS**  
 Processed foods may be fumigated with **GASTOXIN SACHETS**. Under no condition shall any processed food or bagged commodity come in contact with GASTOXIN tablets, pellets or residual dust except that **GASTOXIN PELLETS/TABLETS** may be added directly to processed brewer's rice, malt,



and corn grits for use in the manufacture of

**Processed Foods Which May Be Fumigated With GASTOXIN**

- processed candy and sugar
- cereal flours and bakery mixes
- cereal foods (including cookies, crackers, macaroni, noodles, pasta, pretzels, snack foods and spaghetti)
- processed cereals (including milled fractions and packaged cereals)
- cheese and cheese byproducts
- chocolate and chocolate products (such as assorted chocolate, chocolate liquor, cocoa, cocoa powder, dark chocolate coating and milk chocolate products)
- processed coffee
- corn grits
- cured, dried and processed meat products and dried fish
- dates and figs
- dried eggs and egg yolk solids
- dried milk, dried powdered milk, nondairy creamers and nonfat dried milk
- dried or dehydrated fruits (such as apples, dates, figs, peaches, pears, prunes, raisins, citrus and sultanas)
- processed herbs, spices, seasonings and condiments
- malt
- processed nuts (such as almonds, apricot kernels, brazil nuts, cashews, filberts, macadamia nuts, peanuts, pecans, pistachio nuts, walnuts and other processed nuts)
- processed oats (including oatmeal)
- rice (brewer's rice grits, enriched and polished, wild rice)
- soybean flour and milled fractions
- processed tea
- dried and dehydrated vegetables (such as beans, carrots, lentils, peas, potato flour, potato products and spinach)
- yeast (including primary yeast)
- wild rice
- other processed foods

**6.3 Nonfood Commodities, Including Tobacco**

The listed nonfood items that may be fumigated with GASTOXIN Tablets, pellets or residual dust should not contact tobacco and certain other of the nonfood commodities, where Gastoxin Sachets are indicated for use.

**Nonfood Commodities Which May Be Fumigated With GASTOXIN**

- processed or unprocessed cotton, wool and other natural fibers or cloth, clothing
- straw and hay
- feathers
- human hair, rubberized hair, vulcanized hair, mohair
- leather products, animal hides and furs
- tobacco
- tires (for mosquito control)
- wood, cut trees, wood chips, wood and bamboo products
- paper and paper products
- dried plants and flowers
- seeds (such as grass seed, ornamental herbaceous plant seed and vegetable seed)
- other nonfood commodities

**7. Exposure Conditions**

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

<u>Temperature</u>	<u>Minimum Exposure Periods for GASTOXIN®</u>		
	<u>Pellets</u>	<u>Tablets</u>	<u>Sachets</u>
40°F (5°C)	Do not fumigate	Do not fumigate	Do not fumigate
40°-53°F (5-12°C)	8 days (192 hours)	10 days (240 hours)	14 days (336 hours)
54°-59°F (12-15°C)	4 days (96 hours)	5 days (120 hours)	9 days (216 hours)
60°-68°F (16-20°C)	3 days (72 hours)	4 days (96 hours)	5 days (120 hours)
above 68°F (20°C)	2 days (48 hours)	3 days (72 hours)	3 days (72 hours)

The fumigation must be long enough so as to provide for adequate control of the insect pests that infest the commodity being treated. Additionally, the fumigation period should be long enough to allow for more or less complete reaction of **GASTOXIN®** with moisture so that little or no unreacted aluminum phosphide remains. This will minimize worker exposures during further storage and/or processing of the treated bulk commodity as well as reduce hazards during the disposal of partially spent aluminum phosphide products remaining after space fumigations. The proper length of the fumigation period will vary with exposure conditions since, in general, insects are more difficult to control at lower temperatures, and the rate of phosphine gas production by **GASTOXIN®** is lower at lower temperatures and humidities.

It should be noted that there is little to be gained by extending the exposure period if the structure to be fumigated has not been carefully sealed or if the distribution of gas is poor and insects are not subjected to lethal concentrations of phosphine. Careful sealing is required to ensure that adequate gas levels are retained and proper application procedures must be followed to provide satisfactory distribution of phosphine gas. Application of additional **GASTOXIN** is recommended if phosphine concentrations drop below an effective level. If reentry into the treated structure is required follow the requirements for respiratory protection usage found under section 10 in this manual. Some structures can only be treated when completely tarped while others cannot be properly sealed by any means and should not be fumigated. Exposure times must be lengthened to allow for penetration of gas throughout the commodity when fumigant is not uniformly added to the commodity mass, for example, by surface application or shallow probing. This is particularly important in the fumigation of bulk commodity contained in large storage areas.

Remember, exposure periods recommended in the table are minimum periods and may not be adequate to control all stored products pests under all conditions nor will they always provide for total reaction of **GASTOXIN®**.

It is permissible and often desirable to use a low-flow recirculation system for phosphine gas in certain bulk storages. This method may be used in ship's holds, various types of flat storage and vertical storage bins.

Recirculation usually involves the application of fumigant to the surface of the commodity. The phosphine gas is then continuously or intermittently drawn out of the over space and blown into the bottom of the storage using specially designed low volume fans and duct work. This method facilitates the quick and uniform penetration of phosphine throughout the commodity. In some instances a reduced dosage may be used.

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**8. DOSAGE RATE GUIDELINES**

**Allowable and Recommended Dosages Rates**

Phosphine is a mobile gas and will penetrate to all parts of the storage structure. Therefore, dosage must be based upon the total volume of the space being treated and not on the amount of commodity it contains. The same amount of **GASTOXIN®** is required to treat a 30,000-bushel silo whether it is empty or full of grain unless, of course, a tarpaulin seals off the surface of the commodity. The following dosage ranges are recommended for bulk (per 1000 bushels) and space (per 1000 cu.ft) fumigations:

**8.1 Maximum Allowable Dosage Guidelines for Fumigation with **GASTOXIN®****

<u>Product</u>	<u>per 1000 cu.ft.*</u>
Pellets	725
Tablets	145
Sachets	2-13

\*NOTE: Maximum Dosage for dates, nuts & dried fruits is 200 pellets, 40 tablets, 4 sachets/1000 cu. ft.

**The above maximum dosages are not to be exceeded.** It is important to be aware that a shortened exposure period cannot be fully compensated for with an increased dosage of phosphine.

Somewhat higher dosages are usually recommended under cooler, drier conditions or where exposure periods are relatively short. However, the major factor in selection of dosage is the ability of the structure to hold phosphine gas during the fumigation. A good illustration of this point is comparison of the low dosages required to treat modern, well-sealed warehouses with the higher range used for poorly constructed buildings that cannot be sealed adequately. In certain other fumigations, proper distribution of insecticidal concentrations of gas to reach all parts of the structure becomes a very important factor in dose selection. An example where this may occur is in the treatment of grain stored in tall silos. Poor gas distribution frequently results when the fumigant is added on top of the grain.

**8.2 Recommended **GASTOXIN®** Dosages for Various Types of Fumigation**

One (1) Gastoxin tablet or five (5) Gastoxin pellets will produce a concentration of 25 parts per million (ppm) of phosphine gas in a volume of 1000 cubic feet (1 gram PH<sub>3</sub>/1000 cu.ft. is equivalent to 25 ppm).

Although it is permissible to use the maximum dosage listed in 8.2, the following recommended dosage ranges can be used as a guideline for various types of fumigation.

When a dosage range is recommended, use the higher rate under conditions of severe infestation, lower temperature and other applicable variables.

<u>Type of Fumigation</u>	<u>Dosage Range</u>	
	<u>Pellets</u>	<u>Tablets</u>

1. Vertical Storages (such as silos, concrete bins, steel bins, etc.)	200-400/1000 bu. 150-700/1000 cu.ft.	40-180/1000 bu. 30-140/1000 cu.ft.
2. Farm Bins (Butler Type)	450-900/1000 bu. 350-725/1000 cu.ft.	90-180/1000 bu. 70-145/1000 cu.ft.
3. Bulk stored commodities in flat storage, bunkers and commodities stored on ground loosely piled under gas tight covering.	450-900/1000 bu. 350-725/1000 cu.ft.	90-180/1000 bu. 70-145/1000 cu.ft.
4. Packaged commodities (bagged grain, process foods, etc.) in sealable enclosures.	150-450/1000 cu.ft.	30-90/1000 cu.ft.
5. Nuts, dates or dried fruit in storage noxes.	100-200/1000 cu.ft.	20-40/1000 cu.ft.
6. Nuts, dates or dried fruit in bulk.	125-250/1000 bu. 100-200/1000 cu.ft.	25-50/1000 bu. 20-40/1000 cu.ft.
7. Railcars, containers, trucks vans and other transport vehicles,	225-500/1000 cu.ft.	45-145/1000 cu.ft.
8. Space fumigation such as cereal mills, feed mills, food processing plants & warehouses	100-300/1000 cu.ft.	20-60/1000 cu.ft.
9. Stored Tobacco	100-250/1000 cu.ft	20-50/1000 cu.ft
10. Non-food products	150-450/1000 cu.ft	30-90/1000 cu.ft.

**TYPE OF FUMIGATION**

**DOSAGE RANGE \*  
(Sachets/1000 cu.ft)**

A. Space (including packaged Commodities)	
A. Mills, Warehouses, etc	2-6
B. Bagged Commodities	3-6
C. Dried fruits, nuts, dates	2-4
D. Stored tobacco	2-4
B. Bulk Stored Commodities	
A. Vertical Storage	3-5
B. Tanks	4-6
C. Flat Storage (loose Construction)	5-13
D. Farm Bins	6-13
E. Rail Cars	3-6
F. Bunkers, Tarped Ground Storage	3-6
G. Barges	3-7
H. Ship Holds	3-6

\* volume or storage capacity of the area being treated. The upper dosages listed are recommended in structures that are of loose construction.

11. Stored beehives, supers and other beekeeping equipment for wax moth control and Africanized honeybees with tracheal mites and foulbrood.	150-225/1000 cu.ft	30-45/1000 cu.ft
12. Barges	300-900/1000 bu. 250-725/1000 cu.ft.	60-80/1000 bu. 50-145/1000 cu.ft.
13. Shipholds	200-400/1000 bu. 150-330/1000 cu.ft.	40-80/1000 bu. 30-66/1000 cu.ft.
14. Commodity in small containers	1-2 pellets per 10 cu.ft.	
15. Rodent burrows	10-20/per burrow	2-4/per burrow

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

#### **9. PROTECTIVE CLOTHING**

##### **GLOVES:**

Wear dry gloves of cotton or other material if contact with tablets, pellets, or dust is likely.

Gloves should remain dry during use.

Wash hands thoroughly after handling aluminum phosphide products.

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

#### **10. RESPIRATORY PROTECTION**

##### **10.1 WHEN RESPIRATORY PROTECTION MUST BE WORN**

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

##### **10.2 PERMISSIBLE GAS CONCENTRATION RANGES FOR RESPIRATORY PROTECTION DEVICES**

A NIOSH/MSHA approved full-face gas mask - phosphine canister combination may be used at levels up to 15 ppm or following manufacturers use conditions instructions for escape. Above 15 ppm or in situations where the hydrogen phosphide concentration is unknown, a NIOSH/MSHA approved, self-contained breathing apparatus (SCBA) must be worn. The NIOSH/OSHA Pocket Guide DHHS (NIOSH) 97-140 or the NIOSH ALERT - Preventing

Phosphine Poisoning and Explosions During Fumigation, lists these and other types of approved respirators and the concentration limits at which they may be used.

**10.3 REQUIREMENTS FOR AVAILABILITY OF RESPIRATORY PROTECTION**

If **GASTOXIN®** is to be applied from within the structure to be fumigated, an approved full-face gas mask - phosphine canister combination or (SCBA) or its equivalent must be available at the site of application in case it is needed. SCBA or its equivalent must be available locally (for example, at a fire station or rescue squad) if it is not available at the fumigation site.

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

If monitoring equipment is not available on a farm and application of **GASTOXIN®** fumigant cannot be made from outside the structure, an approved canister respirator must be worn during application from within the structure being treated. However, if entry into an on farm structure, that is under fumigation, is required you must wear a SCBA if the gas concentration is unknown or above the permissible limits.

**11. Requirements for Certified Applicator to be present and responsible for all workers as follows:**

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

**12. TRAINING REQUIREMENTS FOR RECEIPT OF IN TRANSIT VEHICLES UNDER FUMIGATION.**

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

This training must cover the following items found in this manual:

- a) How to aerate the vehicle and verify that it contains no more than 0.3 ppm phosphine.
- OR
- b) How to transfer the commodity to another storage area without prior

- aeration and ensure that worker safety limits are not being exceeded in the work zone.
- c) How to determine when respiratory protection must be worn.
- d) How to protect workers and nearby persons from exposure to levels above the 8-hour time weighted average (TWA) of 0.3ppm or the 15 minute TWA short term exposure limit (STEL) of 1.0ppm phosphine.
- e) Proper removal of placards from the vehicle.
- f) How to follow proper residual disposal instruction.

**13. GAS DETECTION EQUIPMENT**

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

**14. NOTIFICATION REQUIREMENTS**

**14.1 Authorities and on-site workers:**

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

**14.2 Incidents involving these products:**

Registrants must be informed of any incident involving the use of this product. Please call 209-634-1191 so Bernardo Chemicals can report the incident as per requirements of OSHA CFR 29.

**14.3 Theft of products:**

Report all thefts of product immediately to proper local officials.

**15. APPLICATOR AND WORKER EXPOSURE**

**15.1 Exposure Limits**

Exposure to phosphine must not exceed the 8-hour TWA of 0.3 ppm or the 15 minute TWA short-term exposure limit (STEL) of 1.0 ppm phosphine. All persons are covered by these exposure standards.

**15.2 Application of Fumigant**

At least two persons, a certified applicator and trained person, or two trained persons under the direct supervision of the certified applicator must be present during fumigation of structures when entry into the structure for application of the fumigant is required. Depending upon temperature and humidity, Gastoxin® tablets, pellets and sachets release phosphine gas slowly upon exposure to moisture from the air. In most cases, this release is 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

allowable limits, approved respiratory protection must be worn.

**15.3 Leakage from Fumigated Sites**

Phosphine is highly mobile and given enough time may penetrate seemingly gas-tight materials such as concrete and cinder block. Therefore, adjacent, enclosed areas likely to be occupied should be examined to ensure that significant leakage has not occurred. Sealing of the fumigated site and/or airflow in the occupied areas must be sufficient to bring down the phosphine concentration to a safe level of 0.3ppm or below.

**15.4 Aeration and Reentry**

If the structure is to be entered after fumigation, it must be aerated until the level of phosphine gas is 0.3 ppm or below. The area or site must be monitored to ensure that liberation of gas from the treated commodity does not result in the development of unacceptable levels ie, over industrial hygiene levels of phosphine. Do not allow reentry into treated areas by any person before the level of phosphine reaches 0.3ppm or below unless protected by an approved respirator.

**15.5 Handling Un-aerated Commodities**

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

REMEMBER transporting containers or vehicles under fumigation over public roads is prohibited.

**15.6 Industrial Hygiene Monitoring**

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

**15.7 ENGINEERING CONTROLS AND WORK PRACTICES**

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



**16. PLACARDING OF FUMIGATED AREAS**

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

1. The signal word DANGER/PELIGRO and the SKULL AND CROSSBONES symbol in red.
2. The statement "Structure and/or commodity under fumigation, DO NOT ENTER/NO ENTRE".
3. The Statement, "This sign may only be removed by a certified applicator or a person with documented training after the commodity is completely aerated (contains 0.3 ppm or less of phosphine gas). If incompletely aerated commodity is transferred to a new site, the new site must also be placarded if it contains more than 0.3 ppm. Workers exposure during this transfer must not exceed allowable limits.
4. The date the fumigation begins.
5. Name and EPA registration number of fumigant used.
6. Name, address and telephone number of the fumigation company and/or applicator.
7. A 24-hour emergency response telephone number.

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

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

**17. SEALING OF STRUCTURE**

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

As with all fumigations, it is required that sealing be inspected

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

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

**18. AERATION OF FUMIGATED COMMODITIES**

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

**18.1 FOODS AND FEEDS**

Tolerances for phosphine residues have been established at 0.1 ppm for animal feeds and 0.01 ppm for processed foods. To guarantee compliance with these tolerances, it is necessary to aerate these commodities for a minimum of 48 hours prior to offering them to the end consumer.

**18.2 NON-FOOD COMMODITIES**

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

**18.3 TOBACCO**

Tobacco must be aerated for at least three days (72hs) when fumigated in hogsheads or until concentration is below 0.3 ppm and for at least two days (48 hs) when fumigated in other containers. When plastic liners are used, longer aeration periods may be required to aerate the commodity down to 0,3ppm. If residues are less than tolerance levels, the commodity may be shipped to the consumer regardless of the above holding periods.

**19. STORAGE INSTRUCTIONS**

GASTOXIN® tablets/pellets/sachets must be stored in a dry, well-ventilated area away from heat, under lock and key. Post as a pesticide storage area. Do not contaminate food, water or feed by storing pesticides in the same areas used to store these commodities. Do not store in buildings where humans or domestic animals may reside. Keep out of reach of children.

**19.1 Labeling of Storage**

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

1. Danger, Poison (with skull and cross bones)
2. Authorized Personnel Only
3. Pesticide Storage NFPA Hazard Identification Symbols

The National Fire Protection Association (NFPA) developed Hazard Identification Symbols. This standardized system is designed to provide,

at a glance the information regarding the health, fire and reactivity hazards associated with hazardous materials. The following are the hazard categories and degree of hazard for aluminum phosphide:

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

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

**20. TRANSPORTATION INSTRUCTIONS**

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

**20.1 TRANSPORT DESIGNATIONS**-The following transport designations apply to aluminum phosphide

Proper Shipping Name: Aluminum phosphide,  
Hazard Class: 4.3  
Identification No.: UN 1397  
Packing Group: PG I  
Shipping Label: Dangerous When Wet/Poison  
Shipping Placard: Dangerous When Wet

**21. FUMIGATION MANAGEMENT PLAN**

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

1. Inspect the site to determine its suitability for fumigation.
2. When sealing is required, consult previous records for any changes to the structure, seal leaks, and monitor any occupied adjacent buildings to ensure safety.
3. Prior to each fumigation, review any existing FMP, MSDS, Applicators Manual and other relevant safety procedures with company officials and appropriate employees.
4. Consult company officials in the development of procedures and appropriate safety measures for nearby workers that will be in and around the area during application and aeration.
5. Consult with company officials to develop an appropriate monitoring plan that will confirm that nearby workers and bystanders are not exposed to levels above the allowed

limits during application, fumigation and aeration. This plan must also demonstrate that nearby residents will not be exposed to concentrations above the allowable limits.

6. Consult with company officials to develop procedures for local authorities to notify nearby residents in the event of an emergency.
7. Confirm the placement of placards to secure entrance into any area under fumigation.
8. Confirm the required safety equipment is in place and the necessary manpower is available to complete a safe effective fumigation.
9. Written notification must be provided to the receiver of a vehicle that is fumigated in transit.

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

In addition to the plan, the applicator must read the entire label and follow its directions carefully. If the applicator has any questions about the development of a FMP contact the supplier for further assistance.

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

### GUIDANCE FOR PREPARATION OF A FUMIGATION MANAGEMENT PLAN

#### Purpose

A Fumigation Management Plan (FMP) is an organized, written description of the required steps involved to help ensure a safe, legal, and effective fumigation. It will also assist you and others in complying with pesticide product label requirements. The guidance that follows is designed to help assist you in addressing all the necessary factors involved in preparing for and fumigating a structure and/or area.

This guidance is intended to help you organize any fumigation that you might perform **PRIOR TO ACTUAL TREATMENT**. It is meant to be somewhat prescriptive, yet flexible enough to allow the experience and expertise of the fumigator to make changes based on circumstances which may exist in the field. By following a step-by-step procedure, yet allowing for flexibility, safe and effective fumigation can be performed.

Before any fumigation begins, carefully read and review the label and the Applicator's Manual. This information must also be given to the appropriate company officials (supervisors, foreman, safety officer, etc.) in charge of the site. Preparation is the key to any successful fumigation. If you do not find specific instructions for the type of fumigation that you are to perform listed in this Guidance Document you will want to construct a similar set of procedures using this document as your guide or contact Bernardo Chemicals for assistance. Finally, before any fumigation begins you must be familiar with and comply with all applicable federal, state and local laws. The success and future of fumigation are not only dependent on your ability to do your job but also by carefully following all rules, regulations, and procedures required by governmental agencies.

#### A CHECKLIST GUIDE FOR A FUMIGATION MANAGEMENT PLAN

29/10

This checklist is provided to help you take into account factors that must be addressed prior to performing all fumigations. It emphasizes safety steps to protect people and property. The checklist is general in nature and cannot be expected to apply to all types of fumigation situations. It is to be used as a guide to prepare the required plan. Each item must be considered. However, it is understood that each fumigation is different and not all items will be necessary for each fumigation site.

A. PRELIMINARY PLANNING AND PREPARATION

1. Determine the purpose of the fumigation.
  - a. Elimination of insect infestation
  - b. Elimination of rodent infestation
  - c. Plant pest quarantine.
2. Determine the type of fumigation, for example
  - a. Space; tarp, mill, warehouse, food plant or outdoor area
  - b. Vehicle; railcar, truck, van, container
  - c. Commodity; raw agricultural or processed foods or non food
  - d. Type of storage vertical silo, farm storage, flat storage, etc.
  - e. Vessels; ship or barge. In addition to the Applicator's Manual, read the US Coast Guard Regulations 46CFR 147A.
3. Fully acquaint yourself with the site and commodity to be fumigated, including.
  - a. The general structure layout, construction (materials, design, age, maintenance), of the structure fire or combustibility hazards, connecting structures and escape routes, above and below ground, and other unique hazards or structure characteristics. Prepare, with the owner/operator/person in charge. Draw or have a drawing or sketch of structure to be fumigated, delineating features, hazards, and other structural characteristics
  - b. The number and identification of persons who routinely enter the area to be fumigated (ie. Employees, visitors, customers, etc.)
  - c. The specific commodity to be fumigated, its mode of storage, and its condition.
  - d. The previous treatment history of the commodity, if available.
  - e. Accessibility of utility service connections.
  - f. Nearest telephone or other means of communication, and mark the location of these items on the drawing/sketch.
  - g. Emergency shut-off stations for electricity water and gas. Mark the location of these items on the drawing/sketch.
  - h. Current emergency telephone numbers of local Health, Fire, Police, Hospital and Physician responders.
  - i. Name and phone number (both day and night) of appropriate company officials.
  - j. Check, mark and prepare the points of fumigation application locations if the job involves entry into the structure for fumigation.
  - k. Review labeling and Applicator's Manual.
  - l. Exposure time considerations.
    1. Product (tablet and pellet and sachet) to be used.

- 2. Minimum fumigation period, as defined and described by the label use directions.
- 3. Down time required to be available
- 4. Aeration requirements
- 5. Cleanup requirements, including dry or wet deactivation methods, equipment, and personnel needs, if necessary.
- 6. Measured and recorded commodity temperature and moisture.
- m. Determination of dosage
  - 1. Cubic footage or other appropriate space/location calculations.
  - 2. Structure sealing capability and methods.
  - 3. Label recommendations
  - 4. Temperature, humidity, wind
  - 5. Commodity/space volume
  - 6. Past history of fumigation of structure
  - 7. Exposure time.

**B. PERSONNEL**

- 1. Confirm in writing that all personnel in and around the area to be fumigated have been notified prior to application of the fumigant. Consider using a checklist each one initials indicating they have been notified.
- 2. Instruct all fumigation personnel to read the Applicator's Manual and about the hazards that may be encountered; and about the selection of personal protection devices, including detection equipment.
- 3. Confirm that all personnel are aware of and know how to proceed in case of an emergency situation.
- 4. Instruct all personnel on how to report any accident and/or incidents related to fumigant exposure. Provide a telephone number for emergency response reporting.
- 5. Instruct all personnel to report to proper authorities any theft of fumigant and/or equipment related to fumigation.
- 6. Establish a meeting area for all personnel in case of emergency.

**C. MONITORING**

- 1. Safety
  - a. Monitoring of phosphine conditions must be conducted in areas to prevent excessive exposure and to determine where exposure may occur. Document where monitoring will occur.
  - b. Keep a log or manual of monitoring records for each fumigation site. This log must at a minimum contain the timing, number of readings taken and level of concentrations found in each location.
  - c. When monitoring document even if there is no phosphine present above the safe levels. In such cases, subsequent monitoring is not routinely required. However spot checks should be made occasionally, especially if conditions significantly change.
  - d. Monitoring must be conducted during aeration and corrective action must be taken if gas levels exceed the allowed levels in an area where bystanders and/or nearby residents or domestic animals may be exposed.

**2. Efficacy**

- a. Phosphine readings should be taken from within the fumigated structure to insure proper gas concentrations. If the phosphine levels have fallen below the targeted level the fumigators, following proper entry procedures may reenter the structure and add additional product.
- b. All phosphine readings should be documented.

#### D. NOTIFICATION

1. Confirm all local authorities (fire departments, police departments, etc.) have been notified as per label instructions, local ordinances if applicable, or instructions of the client.
2. Prepare written procedure ("Emergency Response Plan") which contains explicit instructions, names, and telephone numbers so as to be able to notify local authorities if phosphine levels are exceeded in an area that could be dangerous to bystanders and or domestic animals.
3. Confirm that the receiver of in transit vehicles under fumigation have been notified and are trained according to Section 12 of this applicator manual.

#### E. SEALING PROCEDURES

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

#### F. APPLICATION PROCEDURES & FUMIGATION PERIOD

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

#### G. POST-APPLICATION OPERATIONS

1. Provide watchmen when you cannot secure the fumigation site from entry by unauthorized persons during the aeration process.
2. Aerate in accordance with structural limitations.
3. Turn on ventilating or aerating fans where appropriate.
4. Use a suitable gas detector before reentry to determine fumigant concentration.
5. Keep written records of monitoring to document completion of aeration.
6. Consider temperature when aerating.

- 7. Insure aeration is complete before moving vehicle into public roads.
- 8. Remove warning placards when aeration is complete.
- 9. Inform business/client that employees/other persons may return to work or otherwise be allowed to reenter the aerated structure.

**22. APPLICATION PROCEDURES**

A FMP must be devised for application, during fumigation, aeration and disposal of the fumigant so as to keep to a minimum any exposures to phosphine and to help assure adequate control of the insect pests.

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

**22.1 FARM BINS**

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

- 1. Read the label, Applicator's Manual, MSDS and related safety material.
- 2. Inspect the bin to determine if you can fumigate effectively.
- 3. If the bin is located in an area where nearby workers and/or bystanders or domestic animals would be exposed to phosphine gas because of leakage from the bin:
  - (i) Develop a monitoring procedure that will confirm if leakage from the bin is above the allowable limits in an area that would affect nearby workers or bystanders.
  - (ii) Advise local authorities when and where you will be fumigating. Provide and review with them the MSDS, Applicator's Manual and other relevant safety information.
- 4. If the bin is in an isolated area on private property (i) and (ii) above are not required.
- 5. Seal the bin as tightly as possible. It is recommended that the surface of the grain be covered with poly after **GASTOXIN®** has been applied. Tarping the grain surface will greatly reduce the leak rate of the gas as well as reduce the amount of **GASTOXIN®** required. Only the volume below the tarp must be dosed. If not tarped, the entire volume of the storage must be treated, whether full or empty.
- 6. Using the applicator's manual calculate the dosage of tablets or pellets or sachets to be applied based on type of structure, its sealing properties, content type, weather, and commodity temperature and moisture content of the commodity and length of



fumigation.

- 7. **GASTOXIN®** tablets or pellets may be scattered over the surface or probed into the grain using a rigid PVC pipe about 5 to 7 feet in length and having a diameter of 1-1/4 inches. In the case of sachets, the dosage recommendation earlier mentioned in this manual should be observed.
- 8. Use about 20-50 tablets or 100-250 pellets per probe. Probe the dosage uniformly over the surface. In the case of sachets, pls follow the dosage recommendations mentioned in this manual.
- 9. Immediately cover the surface of the grain with a plastic tarpaulin.
- 10. Place no more than 25 percent of the total dose at the bottom if the bin is equipped with aeration fans. **Caution:** Make sure that the aeration duct is dry before adding **GASTOXIN®**. Addition of **GASTOXIN®** to water in an aeration duct may result in a fire.
- 11. Seal the aeration fan with 4-mil plastic sheeting.
- 12. Place placards on all entrances to the bin and near the ladder.
- 13. Following aeration of the bin, the surface of the grain may be sprayed with an approved protectant to discourage reinfestation.

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

**22.2 FLAT STORAGE**

Treatment of these types of storages often require considerable physical effort. Therefore, sufficient manpower should be available to complete the work rapidly enough to prevent excessive exposure to phosphine gas. Vent flasks outside the storage, conduct fumigations during cooler periods, and employ other work practices to minimize exposures. It is likely that respiratory protection will be required during application of fumigant to flat storages. Refer to the sections on Applicator and Worker Exposure and Respiratory Protection.

- 1. Inspect the site to determine its suitability for fumigation.
- 2. Determine if the structure is in an area where leakage during fumigation or aeration would adversely effect nearby workers or bystanders if concentrations were above the permitted exposure levels.
- 3. Develop an appropriate Fumigation Management Plan. (Refer to FMP guidelines.)
- 4. Consult previous records for any changes to the structure. Seal vents, cracks and other sources of leaks.
- 5. Using the applicators manual, determine the length of the

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

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

Storages requiring more than 24 hours to fill should not be treated by addition of fumigant to the commodity stream as large quantities of hydrogen phosphide may escape before the flat storage is completely sealed.

Probes should be inserted vertically at intervals along the length and width of the flat storage. Pellets or tablets may be dropped into the probe at intervals as it is withdrawn.

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

7. Placement of plastic tarp over the surface of the commodity is often advisable, particularly if the overhead of the storage cannot be well sealed.
8. Lock all entrances to the storage and post fumigation warning placards.
9. **SACHETS:** The "Sachet Chain" is particularly well suited for the larger bulk storages due to the ability of being able to roll it out onto the grain surface. As earlier noted each "Sachet Chain" contains 100 sachets. The "sachet chain" may tend to slide off the surface of the grain when the grain is packed. This tendency can be effectively prevented by placing the "Sachet Chains" into shallow trenches and covering them with the commodity. Locator cords attached to the "Sachet Chains" will aid in their retrieval when the fumigation is complete. An eyelit is provided, for this purpose, at each end of the "Sachet Chain". The efficient application and retrieval techniques, that may be employed with the "Sachet Chain" minimizes applicator phosphine exposures. For this, and other reasons, the "Sachet Chain" is ideal for the fumigation of the larger bulk commodity storage. If necessary, the "Sachet Chain" may be subdivided, but do not attempt to retain any segments for use at a later date.

### 22.3 VERTICAL STORAGES (concrete upright bins and other silos in which grain can be rapidly transferred)

1. Inspect the site to determine its suitability for fumigation.
2. Determine if the structure is in an area where leakage during fumigation or aeration would expose nearby workers or bystanders to concentrations above the permitted levels.

3. Develop an appropriate Fumigation Management Plan. (Refer to FMP guidelines.)
4. Consult previous records for any changes to the structure. Close openings and seal cracks to make the structure as airtight as possible. Prior to the fumigation, seal the vents near the bin top which connect to adjacent bins.
5. Using the applicator manual, determine the length of the fumigation and Calculate the dosage of tablets or pellets to be applied, based upon the volume of the building, air and/or commodity temperature and the tightness of the structure.
6. Pellets or tablets may be applied continuously by hand or by an automatic dispenser on the headhouse/gallery belt or into the fill opening as the commodity is loaded into the bin. An automatic dispenser may also be used to add **GASTOXIN®** into the commodity stream in the up leg of the elevator. Sachets may be added to the commodity as the bin is filled, but must be removed as the bin is emptied. If Sachets are utilized, calculate the number of sachets needed and the rate at which they must be added based upon the rate at which the bin will be filled.
7. Seal the bin deck openings after the fumigation has been completed.
8. Bins requiring more than 24 hours to fill should not be fumigated by continuous addition into the commodity stream. Probing, surface application, or other appropriate means may fumigate these bins. Exposure periods should be lengthened to allow for diffusion of gas to all parts of the bin if **GASTOXIN®** has not been applied uniformly throughout the commodity mass.
9. Place warning placards on the discharge gate and on all entrances.

#### 22.4 MILLS, FOOD PROCESSING PLANTS AND WAREHOUSES

1. Inspect the site to determine its suitability for fumigation.
2. Determine if the structure is in an area where leakage during fumigation or aeration would expose nearby workers or bystanders if concentrations were above the permitted exposure levels.
3. Develop an appropriate Fumigation Management Plan. (Refer to Fumigation Management Plan guidelines.)
4. Using the applicator manual, determine the length of the fumigation and calculate the dosage of tablets, pellets or sachets to be applied based upon volume of the building, air and/or commodity temperature and the general tightness of the structure.
5. Read the directions found under Gastoxin Physical and Chemical Hazards and remove or cover any of the listed items that can Become damaged from exposure to phosphine gas.
6. Consult previous records for any changes in the structure. Carefully seal and placard the space to be fumigated.

7. 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 for tablets or pellets. This is not required for sachets or sachet chains.

8. Spread GASTOXIN® tablets or pellets on the sheets at a density no greater than 30 tablets per sq. ft. or 75 pellets per sq. ft. This corresponds to slightly more than one-half flask of tablets or one-half flask of pellets per 3'x4' sheet. Check to see that GASTOXIN® pellets or tablets have not piled up and that these are spread out evenly to minimize contact between the individual tablets or pellets.

9. When sachets are used, place these on the floor in systematic manner. It is not necessary to distribute the sachets evenly over the entire floor. Do not toss sachets into inaccessible areas. Check to see that they have not piled up and that they are spread out evenly to minimize contact between the individual sachets.

10. The "Sachet Chains" can be easily rolled out onto the floor and retrieved following the fumigation. The Sachet Chain is particularly well suited for large fumigations. If necessary, the Sachet Chain may be subdivided, but do not retain segments for fumigations at any later date, use immediately. After application, check to see that the chains have been spread evenly and are completely unrolled. Also insure that piling of the chains has not occurred.

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

11. Turn off any lights within the treated area and shut off all electrical motors not essential to operations of the storage. Doors leading to the fumigated space must be closed, sealed, and placarded with warning signs.

12. Upon completion of the exposure period, windows, doors, vents, etc., should be opened and the fumigated structure allowed to aerate. The structure should not be entered without proper PPE unless gas readings have been taken and the concentration is below the allowable limits. Gas concentration readings may be taken using low level detector tubes or similar devices to ensure safety of personnel who reenter the treated area.

13. Collect the spent dust from tablets or pellets or spent sachets and dispose of same, with or without further deactivation. Refer to Disposal Instructions in this manual.

14. Remove fumigation warning placards from the aerated structure.

**22.5 RAILCARS, CONTAINERS, TRUCKS, VANS, AND OTHER TRANSPORT VEHICLES**

Railcars and containers, trucks, vans, and other transport vehicles shipped piggyback by rail may be fumigated intransit. However, the aeration of railcars, railroad boxcars, containers and other vehicles is prohibited en-route. It is not legal to move trucks, trailers, containers, vans, etc., over public roads or highways until they have

been aerated.

Transport vehicles loaded with bulk commodities to which **GASTOXIN®** tablets or pellets or sachets may be added directly are treated in essentially the same way as any other flat 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 in-transit. See Section 6 of this Applicator's Manual for recommendations on placarding.

***GASTOXIN® SACHETS** are recommended for the treatment of transport vehicles or similar storages containing processed foods for which no direct contact is allowed with tablets or pellets. Sachets may be added as the vehicle is being filled,, the dose may be scattered over the surface after loading has been completed or the sachets may be probed below the surface . Surface application is not recommended for intransit fumigation. Sachets shall not be placed in or attached to commodity packages containing processed food. If placement of sachets on the floor is not convenient or if the vehicle is being fumigated intransit, they may be attached to a wall or other support. They may be applied by taping the sachets on cardboard with spacing between sachets. Tape across the sachet ends only.*

The Shipper and/or the fumigator must provide written notification to the receiver of railcars, railroad boxcars, shipping containers and other vehicles, which are being fumigated in-transit. A copy of the applicator's Manual must precede or accompany all transportation containers or vehicles. If the applicator manual is sent with the transport vehicle it must be placed securely on the outside of the vehicle.

Proper handling of treated railcars at their destination is the responsibility of the consignee. Upon receipt of the railcar, railroad boxcars, shipping containers and other vehicles a certified applicator and/or persons with documented training working under the supervision of a certified applicator must supervise the aeration process and removal of the placards.

**22.6 TARPAULIN AND BUNKER FUMIGATIONS**

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

- 1) Develop an enclosure suitable for fumigation by covering bulk or packaged commodities with poly sheeting. The sheets may be taped together to provide a sufficient width of material to ensure that adequate sealing is obtained. If the flooring upon which the commodity rests is of wood or other porous material, the commodity to be fumigated should be repositioned onto poly prior to covering for fumigation. The plastic covering of the pile may be sealed to the floor using sand or water snakes, by shoveling soil or sand onto the

ends of the plastic covering or by other suitable procedures. The poly covering should be reinforced by tape or other means around any sharp corners or edges in the stack so as to reduce the risk of tearing. Thinner poly, about 2 mil, is suitable for most indoor tarp fumigations and for sealing of windows, doors and other openings in structures. However, 4 mil poly or thicker is more suitable for outdoor applications where wind or other mechanical stresses are likely to be encountered.

- 2) Determine if the enclosure is in an area where leakage during fumigation or aeration would effect nearby workers or bystanders if concentrations were above the permitted exposure levels.
- 3) Develop an appropriate Fumigant Management Plan. (Refer to Fumigation Management Plan guidelines.)
- 4) Using the label, determine the length of the fumigation and calculate the dosage of tablets or pellets to be applied based upon volume of space under the tarp, air and/or commodity temperature.
- 5) Tablets or pellets may be applied to the tarped stack or bunker storage of bulk commodity through slits in the poly covering. Probing or other means of dosing may be used. Avoid application of large amounts of **GASTOXIN®** at any one point. The **GASTOXIN®** should be added below the surface of the commodity if condensation or other source of moisture is likely to form beneath the poly. The slits in the covering should be carefully taped to prevent loss of gas once the dose has been applied. ***GASTOXIN®** sachets and sachet chains are recommended for the treatment of bagged commodities and processed foods although tablets and pellets on trays or sheets of Kraft paper may be used.* Care should be taken to see that the poly is not allowed to cover the **GASTOXIN®** and prevent contact with moist air or confine the gas.
- 6) Distribution of phosphine gas is generally not a problem in the treatment of bagged commodities and processed foods. However, fumigation of larger bunker storages containing bulk commodity will require proper application procedures to obtain adequate results.
- 7) Place warning placards at conspicuous points on the enclosure.

**22.7 IN-TRANSIT SHIPHOLDS**

**22.7.1 General Information**

- 1. Important - In transit ship or shiphold fumigation is also governed by U.S. Coast Guard Regulation 46 CFR 147A, Interim Regulations for Shipboard Fumigation. Refer to this regulation prior to fumigation. For further information contact:

Commandant  
 U.S. Coast Guard  
 Hazardous Materials Standards Division  
 GMSO-3  
 Washington, DC 20593-0001

- 2. **GASTOXIN®** tablets, pellets and sachets are classified by EPA as restricted use pesticides due to the acute inhalation toxicity of hydrogen phosphide (phosphine, PH<sub>3</sub>) gas. These products are for use only by certified applicators for those uses covered by the applicator's certification or by persons trained in accordance with the Applicator's Manual working under the direct supervision of a certified applicator. The certified applicator must maintain visual and/or voice contact during application of the fumigant.

**22.7.2 Pre-Voyage Fumigation Procedures**

- 1. Prior to fumigating a vessel for in transit cargo fumigation, the master of the vessel, or his representative, and the certified applicator must determine whether the vessel is suitably designed and configured so as to allow for safe occupancy by the ship's crew throughout the duration of the fumigation. If it is determined that the design and configuration of the vessel does not allow for safe occupancy by the ship's crew throughout the duration of the fumigation, then the vessel 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 the master of the vessel and the certified applicator has made a determination that the vessel is safe for occupancy.
- 2. The certified applicator 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.

*\*Note: Personal protection equipment means a NIOSH/MSHA approved respirator or gas mask fitted with an approved canister for phosphine. The canister is approved for use up to 15 ppm. SCBA or its equivalent must be used above 15 ppm or at unknown concentrations.*

- 3. Seal all openings to the cargo hold or tank and lock or otherwise secure all openings, manways, etc., which might be used to enter the hold. The overspace pressure relief system of each tank aboard tankers must be sealed by closing the appropriate valves and sealing the openings into the overspace with gas-tight materials.
- 4. Placard all entrances to the treated spaces with fumigation warning signs.
- 5. If the fumigation is not completed and the vessel aerated before the manned vessel leaves port, the person in charge of the vessel shall ensure that 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.
- 6. During the fumigation or until a manned vessel leaves port or the cargo is aerated, the certified applicator shall ensure that a

qualified person using gas or vapor detection equipment tests spaces adjacent to spaces containing fumigated cargo 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.

- 7. Review with the master, or his representative, the precautions and procedures to follow during the voyage of a shiphold intransit fumigation.

**22.7.3 Application Procedures for Bulk Dry Cargo Vessels and Tankers**

- 1. Apply tablets or pellets by scattering uniformly over the commodity surface, or they may be shallow or deep probed into the commodity mass.
- 2. **Sachets and Sachet Chains:** Calculate dosage on the basis of cargo hold volume. Dosage is always calculated for total hold volume irrespective of the commodity tonnage in the hold. After hold has been filled or completed, open containers and distribute sachets uniformly onto the commodity surface with spacing between each. Do not place sachets within 10 feet of side walls. For addition of **GASTOXIN®** Sachet chains, after a hold has been filled and completed, dig a shallow trench approx. 15 feet long and 2 feet wide for each chain being used. Maintain at least a 2 foot space between trenches and do not trench closer than 10 feet from the side walls. Open the Sachet Chains one at a time, remove the chain, unroll it until fully extended and position it into the trench. Cover with the commodity.
- 3. Immediately after application of the fumigant, close and secure all hatch covers, tank tops, butterworth valves, manways, etc.

**22.7.4 Intransit Fumigation of Transport Units (Containers) Aboard Ships**

Intransit fumigation of transport units on ships is also governed by DOT RSPA 49 CFR 176.76(i) Transport Vehicles, Freight Containers, and Portable Tanks Containing Hazardous Materials and International Maritime Dangerous Goods Code P9025-1 Amdt. 27-94.

Application procedures for fumigation of raw commodities or processed foods in transport units (containers) are described in Section 21.5 of this manual.

**22.7.5 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 areas except under emergency conditions. If necessary to enter a fumigated area, appropriate personal protection equipment must be used (see below). Never enter fumigated areas alone. At least one other person, wearing personal protection equipment, should be available to assist in case of an emergency.



**22.7.6 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.

**23. BARGE**

Barge fumigation is also regulated by U. S. Coast Guard Regulation 46 CFR 147A as modified by U. S. Coast Guard Special Permit 2-75. This permit which must be obtained prior to the fumigation is available from:

Commandant  
 U. S. Coast Guard  
 Hazardous Materials Standards Div.  
 GMSO-3  
 Washington, DC 20593-0001

Leaks are a common cause of failures in the treatment of commodities aboard barges. Carefully inspect all hatch covers prior to application of GASTOXIN® and seal, if necessary. Notify consignee if the barge is to be fumigated in transit and provide safety instructions for receipt and unloading.

**24. SMALL SEALABLE ENCLOSURES**

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

**25. BEEHIVES, SUPERS AND OTHER BEE KEEPING EQUIPMENT**

GASTOXIN® tablets and pellets may be used for the control of the greater wax moth in stored beehives, supers, and other bee keeping 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 is 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.

**26. BURROWING PEST CONTROL**

**26.1 Use Restrictions**

This product may be applied to underground burrow systems located

in noncrop areas, crop areas, or orchards occupied by woodchucks, yellowbelly marmots (rockchucks), prairie dogs (except Utah prairie dogs, Cynomys Parvidens), Norway rats, roof rats, house mice, ground squirrels, moles, voles, pocket gophers, or chipmunks.

All treatments for control of these species in burrows must be made outdoors. Pellets or tablets must be applied directly to underground burrow systems. Before using Gastoxin tablets or pellets for burrowing pest control, read the applicable restrictions under Environmental Hazards, Endangered Species and Special Local Restrictions below.

This product may be used out of doors only for control of burrowing pests. THIS PRODUCT MUST NOT BE APPLIED INTO A BURROW SYSTEM THAT IS WITHIN 15 FEET (5 METERS) OF A BUILDING THAT IS, OR MAY BE, OCCUPIED BY HUMANS, AND/OR ANIMALS ESPECIALLY RESIDENCES. Document any burrows that open under or into occupied buildings, and do not apply to these burrows. In addition, check for any other source through which the gas may enter into occupied buildings as a result of application to burrows. If there is any way gas can move through pipes, conduits etc from burrows where you will be applying product do not apply to these burrows. Prior to treating a rodent burrow on a property containing an inhabited structure, the applicant must provide the customer (e.g. tenant, homeowner, or property manager) with a MSDS or appropriate sections of the Applicator's Manual.

**26.2 Application Directions:** - Use application procedures appropriate to the type of burrow system being treated. DOSAGE RATES MUST NOT BE EXCEEDED UNDER ANY CIRCUMSTANCES.

**26.2.1 For species with open burrow systems,** locate all entrances to each burrow system. Treatment of more than one entrance in a system is often desirable as systems often overlap and are not defined. Treat all entrances except for those you are sure connect to already treated entrances. Insert 2 to 4 tablets or 10 to 20 pellets into each entrance to be treated. Use the lower rates for smaller burrows and/or when soil moisture is high. Use the higher rates for larger burrow systems and when soil moisture is relatively low. Pack the treated entrance with crumpled paper and shovel soil to completely cover the paper. Using crumpled paper will prevent soil from covering the tablets or pellets and slowing down their action. Rocks, clods of soil, cardboard, etc. may be used for this purpose. Be sure to seal all untreated entrances by shoveling and packing soil and/or sod to completely seal the opening.

**26.2.2 For species with closed burrow systems,** (pocket gophers, and moles in some situations), locate the main underground runway by probing with a smooth-sided rod 12 to 18 inches from a fresh mound. For pocket gophers, begin probing on the flat side of the mound. A sudden reduction in soil resistance to the probe indicates that the main runway has been located. Once the main runway is located, remove the probe and apply 2 to 4 tablets or 10 to 20 pellets through the probe hole. Adjust treatment rate according to the level of soil moisture, using more pellets or tablets if the soil is relatively dry. Do not treat if soil is extremely dry or if there are no signs of recent gopher or mole activity. Make a tight seal to close probe hole by using a clod of soil or a sod plug to cover the hole or by using the heel of your shoe to push sod and/or

soil over the surface opening. If the probe hole is more than one inch in diameter, place crumpled paper in the hole before closing it with soil and/or sod. Two days after treatment, you may check area for residual pest activity by poking holes in main runways of burrow systems, flagging holes and inspecting them two days later. You should retreat all reclosed systems, on both sides of the plug.

**26.3 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.

**25.4 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 laws. Before using this pesticide on range and/or pastureland you must obtain the **PESTICIDE USE BULLETIN FOR PROTECTION OF ENDANGERED SPECIES** for the county in which the product is to be used. The bulletin is available from your County Extension Agent, State Fish and Game Office, or your pesticide dealer. Use of this product in a manner inconsistent with the **PESTICIDE USE BULLETIN FOR PROTECTION OF ENDANGERED SPECIES** is a violation of Federal laws.

Even if applicable county bulletins do not prohibit the use of this product at the intended site of application, you may not use this product for control of prairie dogs in the states of Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah or Wyoming unless a pre-control survey has been conducted. Contact the nearest U. S. Fish and Wildlife Service Endangered Species Specialist to determine survey requirements in your area. This survey must be in compliance with the Black-Footed Ferret Survey Guidelines, developed by the U.S. Fish and Wildlife Service, and a determination must be made in accordance with the Guidelines that black-footed ferrets are not present in the treatment area.

**CALIFORNIA (all endangered species)**

Fresno, Inyo, Kern, Kings, Madera, Merced, Monterey, San Benito, San Luis Obispo, Santa Barbara, Stanislaus and Tulare

See the U.S. EPA Interim Measurers Bulletin for your county. To obtain a copy of the bulletin, contact your county agricultural commissioner or visit the following website:

<http://www.cdpr.ca.gov/docs/es/index.htm> If there is no current bulletin available for your county, contact the U.S. Fish and Wildlife Service office in Portland, OR, to determine whether there are endangered species that might be adversely affected by your proposed use of **GASTOXIN®** and the steps you should take to mitigate any such risks.

**FLORIDA**

Statewide

**GEORGIA**

Appling, Atkinson, Bacon, Baker, Ben Hill, Bleckley, Berrien, Brantley, Brooks, Bryan, Bullock, Calhoun, Camden, Chandler, Charlton, Chatham, Clinch, Coffee, Colquitt, Cook, Crisp, Decatur, Dodge, Dooly, Dougherty, Early, Echols, Effingham, Emanuel, Evans, Glynn, Grady, Irwin, Jeff Davis, Jenkins, Johnson, Lanier, Laurens, Lee, Liberty, Long, Lowndes,

Macon, McCintosh, Miller, Mitchell, Montgomery, Pierce, Pulaski, Screven, Seminole, Telfair, Tattnall, Thomas, Tift, Toombs, Treutlen, Turner, Ware, Wayne, Wheeler, Wilcox and Worth.

**NEW MEXICO**

Hidalgo

**UTAH**

Beaver, Garfield, Iron, Kane, Piute, Sevier, Washington and Wayne

**WYOMING**

Albany

**26.4.1 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 burrowing (not insect 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.

**27. DISPOSAL INSTRUCTIONS**

**27.1 General**

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

Unreacted or partially reacted **GASTOXIN®** is acutely hazardous. Improper disposal of excess pesticide is a violation of Federal Law. If these wastes cannot be disposed of by use according to applicator manual instructions, contact your State Pesticide or Environmental Control

Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. For specific instructions, see Section 14 of this manual, Spill and Leak Procedures.

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

Triple rinse flasks and stoppers and tins with water. They may then be recycled or reconditioned, or punctured and disposed of in a sanitary landfill, or by other procedures approved by state and local authorities. Rinsate may be disposed of in a sanitary landfill by pouring it out onto the ground or by other approved procedures. It is also permissible to remove lids and expose empty flasks to atmospheric conditions until residue in the flasks is reacted. In this case 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 GASTOXIN® pellets or tablets or sachets will be a grayish-white powder. This will be a nonhazardous waste and contain only a small amount of unreacted aluminum phosphide. However, residual dust from incompletely exposed GASTOXIN®, (so called green dust) requires special care.

#### 27.2. DIRECTIONS FOR DEACTIVATION OF PARTIALLY SPENT RESIDUAL DUST FROM GASTOXIN®

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

**Residual dust from GASTOXIN® 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. A 2% solution (or 4 cups in 30 gallons) of detergent is suggested. The container should be filled with deactivating solution to within a few inches of the top.

Residual dust is poured slowly into the deactivating solution and stirred so as to thoroughly wet all of the particles. In the case of sachets, these are added slowly to the solution (see below). This should be done in the open air and not in the fumigated structure. Dust from GASTOXIN® tablets or pellets should be mixed into no less than about 10 gallons of water-detergent solution for each case of material used. Wear appropriate respiratory protection during wet deactivation of partially spent dust.

Dispose of the deactivated dust-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 out onto the ground. If the slurry has been held for 36 hours or more, it may be poured into a storm sewer.

In the case of sachets, there are two simplified wet deactivation methods:

Method One: fill an appropriate sized container with water a few inches from the top. Submerge sachets for 36 hours. A metal grid works well to

keep sachets submerged. Do not cover container. Wear appropriate respiratory protection. This must be done outdoors or in front of an adequate fan that exhausts outside. The water may be disposed of in a storm sewer or by pouring it out on the ground.

Method Two: Fill 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 1 gallon of water/detergent solutions for 60 GASTOXIN sachets. Open each sachet and dump the contents 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.

Disposal: In open areas, small amounts (up to 7.0kgs) of the spent sachets may be disposed of on site by burial of the sachets or by opening the sachets and spreading the dust over the land surface away from inhabited buildings.

Spent sachets may also 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.

**Caution:** A NIOSH/MSHA approved full-face gas mask - phosphine canister combination (if exposed to levels up to 15 ppm) or a Self Contained Breathing Apparatus (SCBA) (if exposure is unknown or above 15ppm) must be worn during wet deactivation of partially spent material. Do not cover the container being used for wet deactivation. Do not dispose of GASTOXIN® dust in a toilet.

Residual dust from GASTOXIN® may also be deactivated as follows using the "Dry Method."

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

Small amounts of partially spent dust, from 2 to 3 kg (4 to 7 lbs.) may be further deactivated by storage in a 1-gallon bucket. Larger amounts of dust (about 11 kg or 25 lbs.) may be held for deactivation in porous cloth bags (burlap, cotton, etc.). **Caution:** Transport these bags in open vehicles. Do not pile up the bags. Do not store "green dust" in bags.

**27.3 Directions for Disposal of Residual Dust from GASTOXIN®**

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

In open areas, small amounts of residual dust, up to about 5 to 8 kg may be disposed of on site by burial or by spreading over the land surface away from inhabited buildings.

Spent residual dust from GASTOXIN® 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. "Green dust" must be further deactivated before disposal at a landfill.

From 2 to 3 kg (4 to 7 lbs.) of spent dust of GASTOXIN® tablets,

pellets or sachets 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 in volumes more than about 11 kg or 25 lbs. in a single bag. Do not pile cloth bags together. Do not use this method for partially spent or "green" dust. Caution: Do not collect dust in large drums, dumpsters, plastic bags or other containers where confinement may occur.

**28. SPILL AND LEAK PROCEDURES**

**28.1 General Precautions and Directions**

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

Return all intact aluminum flasks/tins to fiberboard cases or other packaging which has been suitably constructed and marked according to DOT regulations. Notify consignee and shipper of damaged cases.

If aluminum flasks or tins have been punctured or damaged so as to leak, the container may be temporarily repaired with aluminum tape or the GASTOXIN® may be transferred from the damaged flask or tin 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 manufacturer or local authorities or Chemtrek (800)424-9300.

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

If the age of the spill is unknown or if the tablets and pellets or sachets have been contaminated with soil, debris, water, etc., gather up the spillage and place it into small open buckets having a capacity no larger than about 1 gallon. Do not add more than about one flask of spilled material, 1 to 1.5 kg (2 to 3 lbs.), to the bucket. If on-site, wet deactivation is not feasible, these open containers should be transported in open vehicles to a suitable area. Wet deactivation may then be carried out as described in 11.2. Alternatively, small amounts of spillage from 4 to 5 flasks (4 to 8 kg, 9 to 18 lbs.) may be spread out in an open area away from inhabited buildings to be deactivated by atmospheric moisture.

**28.2 DIRECTIONS FOR DEACTIVATION BY THE WET METHOD**

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

Deactivating solution is prepared by adding low sudsing detergent or surface-active agent to water in a drum or other suitable container. A 2% solution or 4 cups in 30 gallons is suggested. The container should

be filled with deactivating solution to within a few inches of the top.

The tablets or pellets or sachets should be poured slowly into the deactivating solution and stirred so as to thoroughly wet all of the product.

This should be done in the open air. **GASTOXIN®** Tablets or pellets or sachets should be mixed into no less than about 15 gallons of water-detergent solution for each case of material. Wear appropriate respiratory protection during wet deactivation.

Allow the mixture to stand, with occasional stirring, for about 36 hours. The resultant slurry will then be safe for disposal.

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

**Caution:** A NIOSH/MHS approved full-face mask - phosphine canister combination (if exposed to levels up to 15 ppm) or a Self Contained Breathing Apparatus (SCBA) (if exposure is unknown or above 15ppm) during wet deactivation of unexposed or incompletely exposed **GASTOXIN®**. Never place pellets, tablets, sachets or dust in a closed container such as a dumpster, sealed drum, plastic bag, etc., as flammable concentrations and a flash of phosphine gas are likely to develop.

The EPA has determined that proper disposal of aluminum phosphide will cause no unreasonable adverse effects to the environment.

**FOR ASSISTANCE, CONTACT:** Bernardo Chemicals (209) 634-1191 or  
CHEMTREC (800) 424-9300

June 2003.