PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

DANGER: Aluminum phosphide from DEGESCH **PHOSTOXIN®** Prepac tablets 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 gas which is an extremely toxic gas. If a garlic odor is detected, refer to the section on Industrial Hygiene Monitoring in the Applicator's Manual for appropriate monitoring procedures. Pure phosphine gas is odorless. The garlic odor is due to a contaminant. Since the odor of phosphine gas may not be detected under certain circumstances, the absence of a garlic odor does not mean that dangerous levels of phosphine gas are absent. Observe proper re-entry procedures specified elsewhere in the labeling to prevent overexposure.

Environmental Hazards: This product is very highly toxic to wildlife. Non-target organisms exposed to phosphine gas 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.

PHYSICAL AND CHEMICAL HAZARDS

Aluminum phosphide in **PHOSTOXIN®** Prepac Ropes will release phosphine gas if exposed to moisture from the air or if it comes into contact with water, acids and many other liquids. Piling of tablets, pellets or dust from their fragmentation may cause a temperature increase and confine the release of gas so that ignition could occur. It is preferable to open containers of aluminum phosphide products in open air as under certain conditions they may flash upon opening. Containers may also be opened near a fan or other appropriate ventilation which will rapidly exhaust contaminated air. When opening, point the pouch away from the face and body and tear or cut open. Although the chances for a flash are very remote, never open these containers in a flammable atmosphere. These precautions will also reduce the applicators exposure to phosphine gas.

Pure phosphine gas is practically insoluble in water, 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, 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. Phosphine will also react with certain metallic salts and, therefore, such items as photographic film, copying paper and some inorganic pigments, etc. should not be exposed. See Section 4.3 of the Applicator's Manual for more detailed Physical and Chemical Hazards.

NOTE TO PHYSICIAN

Aluminum phosphide fumigants react with moisture from the air, water, acids and many other liquids to release 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 hemorrhages 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 body tissue). Frequent exposure to sub-acute concentrations over a period of days or weeks may cause poisoning. Treatment is symptomatic.

The following measures are suggested for use by the physician in accordance with his own judgment.

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

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

In cases of severe poisoning (Intensive Care Unit recommended):

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

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.THIS PRODUCT IS FOR USE AGAINST INSECTS WHICH INFEST STORED COMMODITIES. FOR BURROWING RODENT APPLICATIONS: THE USE OF THIS PRODUCT IS STRICTLY PROHIBITED WITHIN 100 FEET OF ANY BUILDING WHERE HUMANS AND/OR DOMESTIC ANIMALS DO OR MAY RESIDE ON SINGLE AND MULTI-FAMILY RESIDENTIAL PROPERTIES AND NURSING HOMES, SCHOOLS (EXCEPT ATHLETIC FIELDS), DAYCARE FACILITIES AND HOSPITALS.

Refer to the Applicator's Manual for directions for use (e.g. pests controlled, specific commodities), precautions and restrictions.

RESTRICTED USE PESTICIDE
DUE TO HIGH ACUTE INHALATION TOXICITY OF PHOSPHINE 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 THE APPLICATOR'S MANUAL FOR REQUIREMENTS OF THE PHYSICAL PRESENCE OF A CERTIFIED APPLICATOR.

THE COMPLETE LABEL FOR THIS PRODUCT CONSISTS OF THE CONTAINER LABEL AND APPLICATOR'S MANUAL WHICH MUST ACCOMPANY THE PRODUCT. READ AND UNDERSTAND THE ENTIRE CONTAINER LABEL AND APPLICATOR'S MANUAL.

A FUMIGATION MANAGEMENT PLAN MUST BE WRITTEN FOR ALL FUMIGATIONS PRIOR TO ACTUAL TREATMENT.

CONSULT WITH YOUR STATE LEAD PESTICIDE REGULATORY AGENCY TO DETERMINE REGULATORY STATUS, REQUIREMENTS, AND RESTRICTIONS FOR FUMIGATION USE IN THAT STATE. CALL 540-234-9281/1-800-330-2525 IF YOU HAVE ANY QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABEL.

DEGESCH PHOSTOXIN®

PREPAC ROPE

Patent Nos. 3132067 and 4653644

FOR USE AGAINST INSECTS WHICH INFEST STORED COMMODITIES

ACTIVE INGREDIENT: ALUMINUM PHOSPHIDE	55.0%
INERT INGREDIENTS	45.0%
TOTAL	100.0%)

KEEP OUT OF REACH OF CHILDREN
DANGER - POISON - PELIGRO

FOR BURROWING RODENT APPLICATIONS: THE USE OF THIS PRODUCT IS STRICTLY PROHIBITED WITHIN 100 FEET OF ANY BUILDING WHERE HUMANS AND/OR DOMESTIC ANIMALS DO OR MAY RESIDE ON SINGLE AND MULTI-FAMILY RESIDENTIAL PROPERTIES AND NURSING HOMES, SCHOOLS (EXCEPT ATHLETIC FIELDS), DAYCARE FACILITIES AND HOSPITALS.

PRECAUCION AL USUARIO: Si usted no puede leer ingles, no use este producto hasta que el marbete le haya sido completamente explicado.
(**TO THE USER**: If you cannot read English, do not use this product until the label has been fully explained to you.)

FIRST AID

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

If inhaled:
- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance; then give artificial respiration, preferably by mouth-to-mouth, if possible.
- 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 sip a glass of water if able to swallow. Do not induce vomiting unless told to by a poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

If on skin or clothing:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

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.

Department of Agriculture
STATE OF HAWAII
LICENSED
PERIOD 2014-2016 LIC. NO.
8206.9

HOT LINE NUMBER

Have the product container, label or Applicator's Manual with you when calling a posion control center, doctor, or when going for treatment. **CONTACT 1-800-308-4856 FOR ASSISTANCE WITH HUMAN OR ANIMAL MEDICAL EMERGENCIES**. You may also contact Degesch America, Inc. — 540-234-9281/1-800-330-2525 or CHEMTREC — 1-800-424-9300 for all other chemical emergencies.

See side panels for additional precautionary statements.

Manufactured by:

D & D HOLDINGS, INC.
P.O. Box 116 • 153 Triangle Drive • Weyers Cave, Virginia 24486 USA
Telephone (540) 234-9281/1-800-330-2525 • FAX (540) 234-8225
Internet: www.degeschamerica.com Email: degesch@degeschamerica.com
EPA Est. No. 40285-VA-01 EPA Reg. No. 72959-8

Contents: Each DEGESCH Phostoxin Prepac Rope contains 1056 – 3g round tablets and will liberate 1056g of Phosphine gas. Two Prepac Ropes per pail.
Net Weight: 6336g (14.0 lbs.) per pail

Department of Agriculture
STATE OF HAWAII
LICENSED
PERIOD 2011-2013 LIC. NO.

FORM 16441 (R4/2012)

STORAGE AND DISPOSAL

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

PESTICIDE STORAGE:

- Store **PHOSTOXIN®** in a dry, well ventilated area away from heat, under lock and key. Post as a pesticide storage area.
- Do not store DEGESCH **PHOSTOXIN®** Prepac Ropes in areas where temperature may exceed 130°+F.
- Do not store in buildings where humans or domestic animals reside. Keep out of reach of children.
- DEGESCH **PHOSTOXIN®** Prepac Ropes are supplied in 6.5 gallon gas-tight resealable metal pails.
- The shelf life of **PHOSTOXIN®** is virtually unlimited as long as the containers are tightly sealed.

PESTICIDE DISPOSAL:

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

Unreacted or partially spent **PHOSTOXIN®** 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 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.

Container Handling:

The metal pails are non-refillable containers. Do not reuse or refill this container. Offer for recycling, if available.Triple rinse pails and lids with water if they have been contacted by aluminum phosphide. 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 pails to atmospheric conditions until residue 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 **PHOSTOXIN®** will be a grayish-white powder. This will be a non-hazardous waste and contain only a small amount of unreacted aluminum phosphide. However, residual dust from incompletely exposed **PHOSTOXIN®** (so called "green dust") requires 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 phosphine gas and, therefore, attending personnel must wear self-contained breathing apparatus (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 **PHOSTOXIN®**. Water in contact with unreacted **PHOSTOXIN®** tablets or pellets will greatly accelerate the production of phosphine gas which could result in a toxic and/or fire hazard. Wear dry gloves of cotton or other material when handling aluminum phosphide.

Return all intact Prepac Ropes to their original pails. If the pails have been extensively damaged, the pouches may be placed in a metal container, or other suitable packaging. The new packaging should be properly marked according to DOT regulations.

Notify consignee and shipper of damaged cases. If aluminum foil pouches have been punctured or damaged so as to leak, they may be temporarily repaired with aluminum tape or the Prepacs may be transferred from the damaged pouch to a sound metal container which should be sealed and properly labeled as aluminum phosphide. **CAUTION:** These damaged and repaired pails may flash upon opening at some later time. Transfer the damaged containers to an area suitable for pesticide storage for inspection. Refer to the Applicator's Manual – Section 26 - for more detailed Spill and Leak procedures. Further instructions and recommendations may be obtained, if required, from D&D HOLDINGS, INC.

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. To the extent consistent with applicable law, the Seller makes no other warranty, either expressed or implied, and Buyer assumes all risks should the product be used contrary to label instructions.

RESTRICTED USE PESTICIDE

DUE TO HIGH ACUTE INHALATION TOXICITY OF PHOSPHINE 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'S MANUAL FOR REQUIREMENTS OF THE PHYSICAL PRESENCE OF A CERTIFIED APPLICATOR.

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APPLICATOR'S MANUAL

for

DEGESCH **PHOSTOXIN®**

TABLET PREPAC AND PREPAC ROPE

FOR USE AGAINST INSECTS WHICH INFEST STORED COMMODITIES

Active Ingredient: Aluminum Phosphide 55%
Inert Ingredients. 45%
Total 100%

KEEP OUT OF REACH OF CHILDREN

DANGER - POISON - PELIGRO

FOR BURROWING RODENT APPLICATIONS: THE USE OF THIS PRODUCT IS STRICTLY PROHIBITED WITHIN 100 FEET OF ANY BUILDING WHERE HUMANS AND/OR DOMESTIC ANIMALS DO OR MAY RESIDE ON SINGLE AND MULTI-FAMILY RESIDENTIAL PROPERTIES AND NURSING HOMES, SCHOOLS (EXCEPT ATHLETIC FIELDS), DAYCARE FACILITIES AND HOSPITALS.

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D & D HOLDINGS, INC.

P.O. Box 116 • 153 Triangle Drive
Weyers Cave, Virginia 24486 USA
Telephone: (540)234-9281/1-800-330-2525 • Fax: (540) 234-8225
Internet: www.degeschamerica.com
E-mail: degesch@degeschamerica.com

EPA Est. No. 40285-VA-001; 40285-VA-002; 40285-OR-001; 40285-LA-001; 36301-TX-001
EPA Reg. No. 72959-8 **PHOSTOXIN®** Prepac Rope
EPA Reg. No. 72959-9 **PHOSTOXIN®** Tablet Prepac
Form #17948 (R4/2012)

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1. FIRST AID

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

If inhaled:
- ➢ Move person to fresh air.
- ➢ If person is not breathing, call 911 or an ambulance; then give artificial respiration, preferably by mouth-to-mouth, if possible.
- ➢ Call a poison control center or doctor for treatment advice.

If swallowed:
- ➢ Call a poison control center or doctor immediately for treatment advice.
- ➢ Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to by a poison control center or doctor.
- ➢ Do not give anything by mouth to an unconscious person.

If on skin or clothing:
- ➢ Take off contaminated clothing.
- ➢ Rinse skin immediately with plenty of water for 15-20 minutes.
- ➢ Call a poison control center or doctor for treatment advice.

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, label or Applicator's Manual with you when calling a poison control center, doctor, or when going for treatment. **Contact 1-800-308-4856 FOR ASSISTANCE WITH HUMAN OR ANIMAL MEDICAL EMERGENCIES.** You may also contact Degesch America, Inc. — 540-234-9281/1-800-330-2525 or CHEMTREC — 1-800-424-9300 for all other chemical emergencies.

2. NOTE TO PHYSICIAN

Aluminum phosphide fumigants react 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, 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 hemorrhages 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 body tissue). Frequent exposure to concentrations above permissible levels over a period of days or weeks may cause poisoning. Treatment is symptomatic.

The following measures are suggested for use by the 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 patient suffer from vomiting or increased blood sugar, appropriate solutions should be administered. Treatment with oxygen breathing equipment is recommended as is the administration of cardiac and circulatory stimulants.

In cases of severe poisoning (Intensive Care Unit recommended):

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

3. PRODUCT INFORMATION

DEGESCH **PHOSTOXIN®** fumigants are used to protect stored commodities from damage by insects. Fumigation of stored products with **PHOSTOXIN®** in the manner prescribed in the labeling does not contaminate the marketed commodity.

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

$$AlP + 3H_2O \longrightarrow Al(OH)_3 + PH_3$$

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 (18,000 ppm). These hazards will be described in greater detail later on in this Applicator's Manual.

PHOSTOXIN® also contains ammonium carbamate which liberates ammonia and carbon dioxide as follows:

$$NH_2COONH_4 \longrightarrow 2NH_3 + CO_2$$

These gases are essentially non-flammable and act as inerting agents to reduce fire hazards.

In addition to Pellets and Tablets, Degesch produces several packaged fumigant products using the **PHOSTOXIN**® formulation. The packaged products are designed for fumigation of space, bagged commodities, processed foods and other commodities or structures where contact with spent dust is not permitted or not desired.

The Degesch **PHOSTOXIN**® Tablet Prepac consists of a gas-permeable, polymeric fleece material containing 33 of the round tablets. A **PHOSTOXIN**® Tablet weighs approximately 3 grams each and will release 1 gram of phosphine gas. Each Tablet Prepac will liberate 33g of phosphine gas. The Prepac strips are sealed in gas-tight aluminum foil pouches which are then packed into covered metal pails, 48 Prepacs per pail. The pails are constructed to conform to UN and DOT packaging standards. Upon special request, "Mini" and "Maxi" Tablet Prepacs can be manufactured containing fewer or more than 33 tablets. Both sides of the Tablet Prepac are porous; however, it is recommended that they be applied so that the printed side can be seen. The Prepac provides for maximum access of air to the **Phostoxin**® tablets.

Likewise, the **PHOSTOXIN**® Prepac Rope consists of a gas-permeable blister pack fleece material containing 1056 -3 gram Degesch **PHOSTOXIN**® Tablets. The Rope measures roughly 8 inches wide by 21.5 feet long and is composed of 32 interconnected **PHOSTOXIN**® Tablet Prepacs. The Prepac Rope is arranged in 2 rows of 16 Prepacs. The standard Prepac Rope will liberate 1056g of phosphine gas. The Ropes are packed in gas-tight, 6.5 gallon metal pails, 2 Ropes per pail. The pails are constructed to conform to UN and DOT packaging standards. Upon special request, "Mini" Prepac Ropes can be manufactured containing less than 32 Prepacs. The standard Prepac Mini Rope consists of a gas-permeable blister pack fleece material containing 198 - 3g Degesch **PHOSTOXIN**® Tablets. The "Mini" rope measures approximately 4-1/2 inches wide by 7.5 feet long and is composed of 6 interconnected **PHOSTOXIN**® Tablet Prepacs. The standard "mini" Prepac Rope will liberate 198g of phosphine gas. The ropes are packed in gas-tight, 6.5 gallon metal pails, 12 mini ropes per pail. The pails are constructed to conform to UN and DOT packaging standards.

Upon exposure to air, **PHOSTOXIN**® Tablet Prepac and Prepac Rope 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. The rates of decomposition of the Prepacs and Rope will vary depending upon moisture and temperature conditions. For example, when moisture and temperature of the fumigated commodity are high, decomposition of **PHOSTOXIN**® may be complete in less than 3 days. However, at lower ambient temperatures and humidity levels, decomposition of **PHOSTOXIN**® may require 5 days or more. After decomposition, **PHOSTOXIN**® leaves a gray-white powder composed almost entirely of aluminum hydroxide and other inert ingredients. If properly exposed, the spent **PHOSTOXIN**® will normally contain only a small amount of unreacted aluminum phosphide and may be disposed of without hazard. While spent **PHOSTOXIN**® is not considered a hazardous waste, partially spent residual dust from incompletely exposed **PHOSTOXIN**® will require special care. Precautions and instructions for further deactivation and disposal will be given under Section 25 in this manual. **PHOSTOXIN**® Tablet Prepac and Prepac Rope are supplied in gas-tight metal pails and their shelf life is unlimited as long as the packaging remains intact. The aluminum foil pouches used to package the Tablet Prepac are not resealable and the entire contents of the pouch must be used once opened. Unused Prepac Rope may be resealed in its metal pail, being careful to minimize the exposure to air of the Rope to be repackaged.

4. PRECAUTIONARY STATEMENTS

4.1 Hazards to Humans and Domestic Animals

DANGER: Aluminum phosphide from **PHOSTOXIN®** or its 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 in Section 15.6 of 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 phosphine gas are not present. Observe proper re-entry procedures specified in Section 15.4 of this manual to prevent overexposure.

4.2 ENVIRONMENTAL HAZARDS

This product is very highly toxic to wildllife. Non-target organisms exposed to phosphine gas 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.

4.3 PHYSICAL AND CHEMICAL HAZARDS

Aluminum phosphide fumigants and partially spent dust will release phosphine gas if exposed to moisture from the air or if it comes into contact with water, acids and many other liquids. Since phosphine gas may ignite spontaneously at levels above its lower flammable limit of 1.8% v/v (18,000 ppm), it is important not to exceed this concentration. Ignition of high concentrations of phosphine gas can produce a very energetic reaction. Explosions can occur under these conditions and may cause severe personal injury. Never allow the buildup of phosphine gas to exceed explosive concentrations. Do not confine spent or partially spent metal phosphide fumigants as the slow release of phosphine gas from this material may result in formation of an explosive atmosphere. Aluminum phosphide fumigants 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, point the container away from the face and body. 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 phosphine gas.

If containers are opened inside the structure to be fumigated, air monitoring must be conducted to ensure worker's exposure to phosphine gas does not exceed the allowable limit of 8-hour Time Weighted Average (TWA) of 0.3 ppm or the 15-minutes Short-Term Exposure Limit (STEL) of 1.0 ppm phosphine.

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, 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. Phosphine gas will also react with certain metallic salts and, therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed. Immediately after addition of metal phosphide to the structure, turn off any lights and unessential electric equipment.

PHOSTOXIN® fumigants are Restricted Use Pesticides due to the high acute inhalation toxicity of phosphine gas. Read and follow the complete label which contains instructions for the safe use of this product. Additional copies of this Manual are available from:

DEGESCH AMERICA, INC.
153 TRIANGLE DRIVE P.O. BOX 116
WEYERS CAVE, VA 24486 USA
Telephone: (540)234-9281/1-800-330-2525
Fax: (540)234-8225
Internet: www.degeschamerica.com
E-mail: degesch@degeschamerica.com

DIRECTIONS FOR USE

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

5. PESTS CONTROLLED

PHOSTOXIN has been found effective against the following insects and their preadult stages that is, eggs, larvae and pupae:

almond moth
Angoumois grain moth
bean weevil
bees
cadelle
cereal leaf beetle
cigarette beetle
confused flour beetle
dermestid beetle
dried fruit beetle
dried fruit moth
European grain moth
flat grain beetle
fruit flies
granary weevil
greater wax moth
hairy fungus beetle
Hessian fly
Indian meal moth
Khapra beetle
lesser grain borer
maize weevil
pea weevil
Mediterranean flour moth
pink bollworm
raisin moth
red flour beetle
rice weevil
rusty grain beetle
sawtoothed grain beetle
spider beetles
tobacco moth
yellow mealworm
Africanized bees & honeybees infested with tracheal mites

Although it is possible to achieve total control of the listed insect pests, this is frequently not realized in actual practice. Factors contributing to less than 100% control are leaks, poor gas distribution, unfavorable exposure conditions, etc. In addition, some insects are less susceptible to phosphine gas 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 PHOSTOXIN

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

6.1 Raw Agricultural Commodities and Animal Feed and Feed Ingredients Which May be Fumigated with DEGESCH PHOSTOXIN®

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

6.2 Processed Foods

Processed foods may be fumigated with **PHOSTOXIN® Tablet Prepacs and Prepac Ropes**. Under no condition shall any processed food or bagged commodity come in contact with **PHOSTOXIN®** tablets, pellets or residual dust except that **PHOSTOXIN®** may be added directly to processed brewer's rice, malt, and corn grits for use in the manufacture of beer. The Degesch Tablet Prepac and Prepac Rope are products specifically designed for the fumigation of commodities where contact with **PHOSTOXIN®** or its dust is not desired or not permitted.

Processed Foods Which May Be Fumigated With DEGESCH PHOSTOXIN®

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, non-dairy creamers and non-fat 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)
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 Non-Food Commodities Including Tobacco

The listed non-food items that may be fumigated with **PHOSTOXIN®**: Tobacco, psyllium seed and psyllium seed husks intended for drug use and certain other of the non-food commodities should not be contacted by tablets, pellets or residual dust.

Only lots of psyllium seed and psyllium seed husks destined for shipment to pharmaceutical manufacturers may be fumigated. Such dedicated lots may be fumigated in transport vehicles (truck trailers, railcars, containers) prior to shipment. In addition, psyllium seed and husks may be fumigated at other locations only under direct instructions from the pharmaceutical company.

Non-Food Commodities Which May Be Fumigated With DEGESCH PHOSTOXIN

Processed or unprocessed cotton, wool and other natural fibers or cloth, clothing
Straw and hay
Feathers
Human hair, rubberized hair, vulcanized hair and 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
Psyllium seed and psyllium seed husks
Dried plants and flowers
Seeds (such as grass seed, ornamental herbaceous plant seed and vegetable seed)
Other non-food commodities

7. EXPOSURE CONDITIONS FOR ALL FUMIGATIONS

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

Temperature	Minimum Exposure Periods for PHOSTOXIN® Tablet Prepac and Prepac Rope
40°F (5°C)	Do not fumigate
41°-53°F (5-12°C)	10 days (240 hours)
54°-59°F (12-15°C)	5 days (120 hours)

60°-68°F (16-20°C)	4 days (96 hours)
above 68°F (20°C)	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 **PHOSTOXIN®** 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 **PHOSTOXIN®** 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 gas. 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 **PHOSTOXIN®** is recommended if phosphine concentrations drop below an effective level. If re-entry into the treated structure is required, follow the requirements for manpower and respiratory protection usage found in Section 10 of 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 storages.

Remember, exposure periods recommended in the table are minimum periods and may not be adequate to control all stored products pests under all conditions nor will they always provide for total reaction of **PHOSTOXIN®.** 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 ductwork. This method facilitates the quick and uniform penetration of phosphine throughout the commodity. In some instances, a reduced dosage may be used. Please contact Degesch America, Inc. if assistance is required in designing the recirculation system.

8. DOSAGE RATES FOR COMMODITIES

Phosphine gas 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 **PHOSTOXIN®** 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 guidelines for bulk (per 1000 bushels) and space (per 1000 cu.ft.) fumigations:

8.1 Maximum Allowable Dosages for Fumigation with PHOSTOXIN® Tablet Prepac and Prepac Rope

The **PHOSTOXIN®** Tablet Prepac may be used at a maximum allowable dosage of one Tablet Prepac per 230 cu.ft. The maximum dosage of the Prepac for dates, nuts and dried fruits is one Prepac per 825 cu.ft. Although both sides of the Tablet Prepac are porous, it should be applied so that the printed side can be seen. The Prepac provides for maximum access of air to the **PHOSTOXIN®** tablets. The tablet Prepacs may also be probed below the surface of bulk feed or raw agricultural commodity if they are carefully secured and marked for easy retrieval after the exposure period.

The **PHOSTOXIN®** Prepac Rope may be used at a maximum allowable dosage of one rope per 7360 cu.ft. The maximum dosage of the Rope for dates, nuts and dried fruits is one rope per 26,500 cu.ft.

These dosages are not to be exceeded by application of the Tablet Prepac or Ropes to smaller volumes than allowed. It is important to be aware that a shortened exposure period cannot be fully compensated for with an increased dosage of phosphine gas.

Somewhat higher dosages, not to exceed the maximum dosage, 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 recommended to treat modern, well-sealed warehouses with the higher ranges used for poorly constructed buildings that cannot be sealed adequately. In certain other fumigations, proper distribution of lethal concentrations of phosphine gas reaching 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 the top of the grain. In such cases, the use of a low-flow recirculation system is recommended under these circumstances. Please contact Degesch America, Inc. if assistance is required in designing the recirculation system.

8.2 ADVISORY Dosages for Various Types of Fumigations

Thirty-two (32) **PHOSTOXIN®** Tablet Prepacs or one (1) **PHOSTOXIN®** Prepac Rope will produce a concentration of 25 parts per million (ppm) of phosphine gas (PH_3) in a volume of 1,056,000 cubic feet. (1 gram PH_3/1000 cu.ft. is equivalent to 25 ppm).

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

Do not exceed the maximum allowable rates specified above in Section 8.1.

	Volume Range (Cubic Feet)	
Types of Fumigation	Per Tablet Prepac	Per Prepac Rope
1. Space		
mills, warehouses, etc.	550 – 1650	17,600 – 52,800
bagged commodities	550 – 1100	17,600 – 35,200
processed dried fruits and nuts	825 – 1650	26,400 – 52,800
stored tobacco	825 – 1650	26,400 – 52,800
2. Bulk Stored Commodities		

vertical storage	550 – 1100	17,600 – 35,200
tanks	470 – 1100	15,040 – 35,200
flat storages (loose construction)	230 – 660	7,360 – 21,120
farm bins	230 – 470	7,360 – 15,040
bunkers & tarped ground storages	410 – 1100	13,120 – 35,200
railcars	510 – 1100	16,320 – 35,200
barges	230 – 660	7,360 – 21,120
shipholds	500 – 1100	16,000 – 35,200

Higher dosages of the Prepacs and Ropes should be considered 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. **PHOSTOXIN®** Prepac Ropes may be subdivided for treatment of smaller spaces or for application of exact dosages. The Prepac Rope may be cut with a knife, scissors or other sharp instrument. Care should be taken in cutting so that the fleece blisters are not damaged and **Phostoxin®** dust allowed to leak from the Prepac. It is recommended that only complete Prepacs of 33 tablet blisters each be cut from the Prepac Rope. Remaining portions of the cut Prepac Rope must be used immediately or returned to storage in its steel pail as quickly as possible.

9. PROTECTIVE CLOTHING

GLOVES:

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

Gloves should remain dry during use.

Wash hands thoroughly after handling metal 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 is required when concentration levels of phosphine are unknown or when concentrations exceed permissible exposure limits.

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 phosphine gas concentration is unknown, a NIOSH/MSHA approved, SCBA must be worn. The NIOSH/OSHA Pocket Guide DHHS (NIOSH) 97-140 or the NIOSH ALERT–Preventing Phosphine Poisoning and Explosions During Fumigation, list 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 **PHOSTOXIN®** 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. Respiratory protection must also 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.

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 and also during the opening of the product containers. 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. AUTHORIZED TRAINING FOR RECEIPT OF IN-TRANSIT VEHICLES UNDER FUMIGATION

The trained person(s) must be trained by a certified applicator following the EPA accepted product Applicator's 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 an annual basis.

This training must cover the following items, each of which may be 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 during the transfer.

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 0.3 ppm or the 15 minute Short-Term Exposure Limit (STEL) of 1.0 ppm phosphine.

e. Proper removal of placards from the vehicle.

f. How to follow proper residual disposal instructions.

13. GAS DETECTION EQUIPMENT

There are a number of devices on the market for the measurement of phosphine gas at both industrial hygiene and fumigation levels. 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 to the officials a MSDS and complete label 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 PROSAR: 1-800-308-4856 or (540)234-9281/1-800-330-2525 so the incident can be reported to Federal and State Authorities.

14.3 Theft of Products

Immediately report to the local police department theft of metal phosphide fumigants.

15. APPLICATOR AND WORKER EXPOSURE

15.1 Exposure Limits

Exposures to phosphine must not exceed the 8-hour Time-Weighted Average (TWA) of 0.3 ppm or the 15-minute 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 when entry into the structure for application of the fumigant is required. Depending upon temperature and humidity, **PHOSTOXIN®** tablets 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 will exceed the allowable limits, approved respiratory protection must be worn.

15.3 Leakage from Fumigated Sites

Phosphine gas is highly mobile and given enough time may penetrate seemingly gastight materials such as concrete and cinderblock. Therefore, adjacent, enclosed areas likely to be occupied must be examined to ensure that significant leakage has not occurred. Sealing of the fumigated site and/or airflow into the occupied areas must be sufficient to meet exposure standards.

15.4 Aeration and Re-entry

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 (i.e. over industrial hygiene levels of phosphine). Do not allow re-entry into treated areas by any person before the level of phosphine reaches 0.3 ppm or below unless protected by an approved respirator.

15.5 Handling Unaerated 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 0.3 ppm 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 gas exposures must be documented in an operations log or manual at each fumigation area 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 protection 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 structure and/or commodity is completely aerated (contains 0.3 ppm or less of phosphine gas). If incompletely aerated commodity is transferred to a new storage structure, the new structure 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 into a fumigated area must be placarded. Where possible, place placards 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 or area is aerated down to 0.3 ppm phosphine gas or less. To determine whether aeration is complete, each fumigated structure or transport vehicle must be monitored and shown to contain 0.3 ppm or less of phosphine gas in the air space around and, if feasible, in the mass of the commodity.

17. SEALING OF STRUCTURES

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 affect 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 structure 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 levels above 0.3 ppm are found in an area where exposure to workers or bystanders may occur, the fumigator, using proper respiratory protective 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 SUFFICIENTLY SEALED 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 analyzed for residues using accepted analytical methods.

18.1 Foods and Feeds

Tolerances for phosphine gas 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 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 (72 hours) when fumigated in hogsheads and for at least two days (48 hours) when fumigated in other containers or until concentration is below 0.3 ppm. When plastic liners are used, longer aeration periods may be required to aerate the commodity down to 0.3 ppm.

19. STORAGE INSTRUCTIONS

Storage:

- Do not contaminate water, food or feed by storing pesticides in the same areas used to store these commodities.
- Store **PHOSTOXIN**® in a dry, well-ventilated area away from heat, under lock and key. Post as a pesticide storage area.
- Do not store **DEGESCH PHOSTOXIN**® Tablet Prepacs or Prepac Rope in areas where temperature may exceed 130°F.
- Do not store in buildings where humans or domestic animals reside. Keep out of reach of children.
- **DEGESCH PHOSTOXIN**® Tablet Prepacs and Prepac Rope are supplied in gas-tight pouches in a resealable metal pail. Once opened for fumigation, all Prepacs in the pouch must be used as the pouches cannot be resealed.
- The shelf life of **PHOSTOXIN**® is virtually unlimited as long as the containers are tightly sealed.

19.1 Labeling of Storage

The labeling of the storage area should take into account the needs of a variety of organizations. These should 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 must be locked:

1. Danger, Poison (with skull and cross bones)
2. Authorized Personnel Only
3. National Fire Protection Association (NFPA) Hazard Identification Symbols for the pesticide storage.

The NFPA has 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	₩

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 department 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

Identification No.:	UN 1397
Proper Shipping Name:	Aluminum phosphide
Hazard Class:	4.3 (6.1)
Packing Group:	PG I
Shipping Label:	Dangerous When Wet/Poison
Shipping Placard:	Dangerous When Wet

20.2 Transportation Special Permit:

Special Permit: DOT-SP11329

Purpose and Limitation: "…The motor vehicles used under the terms of this special permit are not required to be placarded…"

Modes of Transportation Authorized: Motor vehicle (Only private motor vehicles used in pest control operations are authorized to transport the packages covered by the terms of this special permit.)

NOTE: You must have a copy of this special permit with you during transportation. For a copy of this special permit contact:

DEGESCH AMERICA, INC.
153 Triangle Drive P. O. Box 116
Weyers Cave, VA 24486
Telephone: (540)234-9281/1-800-330-2525; Fax (540) 234-8225
Internet: www.degeschamerica.com
E-mail:degesch@degeschamerica.com

21. REQUIRED WRITTEN FUMIGATION MANAGEMENT PLAN

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). State, county and local authorities may also have specific requirements. The FMP must be written PRIOR TO EVERY treatment. The FMP is intended to ensure a safe and effective fumigation. The FMP must address characterization of the structure and/or area and include appropriate

monitoring and notification requirements, consistent with, but not limited to, the following:

1. For burrowing rodent applications: The use of this product is strictly prohibited within 100 feet of any building where humans and/or domestic animals do or may reside on single or multi-family residential properties and nursing homes, schools (except athletic fields), daycare facilities and hospitals.
2. Inspect the structure and/or area to determine its suitability for fumigation.
3. When sealing is required, consult previous records for any changes to the structure, seal leaks, and monitor any occupied adjacent buildings to ensure safety.
4. Prior to each fumigation, review any existing FMP, MSDS, complete label and other relevant safety procedures with company officials and appropriate employees.
5. 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.
6. 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.
7. Consult with company officials to develop procedures for local authorities to notify nearby residents in the event of an emergency.
8. Confirm the placement of placards to secure entrance into any area under fumigation.
9. Confirm the required safety equipment is in place and the necessary manpower is available to complete a safe and effective fumigation.
10. 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 complete label which includes the container label and the Applicator's Manual, and follow its directions carefully. If the applicator has any questions about the development of a FMP, contact DEGESCH AMERICA, INC. for further assistance.

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

STEPS FOR PREPARATION OF THE REQUIRED WRITTEN 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, which allows for flexibility, a safe and effective fumigation can be performed.

Before any fumigation begins, carefully read and review the complete label which includes the container 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 DEGESCH AMERICA, INC. for assistance. Finally, before any fumigation begins you must be familiar with and comply with all applicable federal, state and local regulations. The success of the fumigations are not only dependent on your ability to do your job but also upon carefully following all rules, regulations, and procedures required by governmental agencies.

A CHECKLIST GUIDE FOR A FUMIGATION MANAGEMENT PLAN

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 structure and/or area.

A. PRELIMINARY PLANNING AND PREPARATION

1. Determine the purpose of the fumigation:

    a. Elimination of insect infestation
    b. Plant pest quarantine

2. Determine the type of fumigation, for example:

    a. Space: tarp, mill, warehouse, food plant or outdoor area
    b. Transport Vehicle: railcar, truck, van or container
    c. Commodity: raw agricultural or processed foods or non-food
    d. Type of storage: vertical silo, farm storage, flat storage, etc.
    e. Vessel: ship or barge. In addition to the Applicator's Manual, read the U.S. Coast Guard Regulations 46CFR Part 147A.

3. Fully acquaint yourself with the structure 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 (i.e. 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. 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 the entire label which includes both the container label and Applicator's Manual.
l. Exposure time considerations:
    1. Product 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. Maximum allowable label dosage rates
    4. Temperature, humidity and wind
    5. Commodity/space volume
    6. Past history of fumigation of the structure
    7. Exposure time

B. PERSONNEL

1. Confirm in writing that all personnel in and around the structure and/or area to be fumigated have been notified prior to application of the fumigant. Consider using a checklist that each worker initials indicating they have been notified.
2. Instruct all fumigation personnel to read the Applicator's Manual. Fumigation personnel must be trained in the proper method of application, the hazards that may be encountered, and 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 an emergency.

C. MONITORING

1. Safety

   a. Monitoring phosphine concentrations 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 structure and/or area. 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 must be made occasionally, especially if conditions significantly change.

2. Efficacy
   a. For stationary structures, phosphine readings MUST be taken from within the fumigated structure to insure proper gas concentrations. If the phosphine concentrations have fallen below the targeted level the fumigators, following proper entry procedures may re-enter the structure and add additional product.
   b. All phosphine concentration readings must be documented.

D. NOTIFICATION

1. Confirm that 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 procedures ("Emergency Response Plan") which contain 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's Manual.

E. SEALING PROCEDURES
1. Sealing must be adequate to control the pests. Care should be taken to insure that sealing materials would remain intact until the fumigation is complete.
2. If the structure has been fumigated before, review the previous FMP for previous sealing information.
3. Make sure that construction/remodeling has not changed the building in a manner that will effect the fumigation.
4. Warning placards must be placed on every possible entrance to the fumigation structure.

F. APPLICATION PROCEDURES & FUMIGATION PERIOD

1. Plan carefully and apply all fumigants 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 the possibility of entry into the fumigated site by unauthorized persons cannot otherwise be assured.
5. When entering structures, always follow OSHA rules for confined spaces.
6. Document that the receiver of in-transit vehicles under fumigation has been notified.
7. Turn off any electric lights in the fumigated area of the structure as well as all non-essential electrical motors.

G. POST-APPLICATION OPERATIONS

1. Provide watchmen when the fumigation structure cannot be secured 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 re-entry into a fumigated structure to determine fumigant concentration.
5. Keep written records of monitoring to document completion of aeration.
6. Consider temperature when aerating.
7. Ensure that aeration is complete before moving a treated vehicle onto 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 re-enter the aerated structure.

22. APPLICATION PROCEDURES

A FMP must be written PRIOR to all applications.
A FMP must be devised to cover application and exposure period, aeration and disposal of the fumigant so as to keep to a minimum any human exposures to phosphine and to help assure adequate control of the insect pests.

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 complete label, which includes the Applicator's Manual, MSDS and related safety material.

2. Develop an appropriate Fumigation Management Plan.

3. Inspect the bin to determine if you can fumigate effectively.

4. 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:

   a. 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.

   b. Advise local authorities when and where you will be fumigating. Provide and review with them the MSDS,complete label and other relevant safety information.

5. If the bin is in an isolated area on private property, (a) and (b) above are not required.

6. Seal the bin as tightly as possible. It is recommended that the surface of the grain be covered with poly after **PHOSTOXIN**® has been applied. Do not place the Prepacs or Ropes directly under the tarp. First cover them with an inch or two of grain. This will prevent condensate from reaching the fumigant. Affix a tag or other device to the product to mark its location so that it may be easily retrieved at the end of the fumigation. Tarping the grain surface will greatly reduce the leak rate of the gas as well as reduce the amount of **PHOSTOXIN**® 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.

7. Do <u>not</u> place Prepacs or Ropes in aeration ducts at the bottom of the bin.

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

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

22.2 Flat Storages

Treatments of these types of storages often require considerable time and 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 Section 10 on Respiratory Protection requirements.

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 affect nearby workers or bystanders if concentrations were above the permitted exposure levels.

3. Develop an appropriate Fumigation Management Plan.

4. Consult previous records for any changes to the structure. Seal vents, cracks and other sources of leaks.

5. Using the Applicator's Manual, determine the length of the fumigation and calculate the dosage of Prepacs or Ropes to be applied based upon volume of the building, contents, air and/or commodity temperature and the general tightness of the structure.

6. Apply Prepacs or Ropes by surface application or shallow probing. 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.

7. Placement of a plastic tarp over the surface of the commodity is often advisable, particularly if the overhead of the storage cannot be well sealed. Remember to cover the Prepac or Ropes with 2 or more inches of grain prior to placement of the tarp. Mark the location of the product so that it can readily be retrieved after the fumigation.

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

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.

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 and any openings which connect to adjacent bins.

5. Determine the length of the fumigation and calculate the dosage of Prepacs or Ropes to be applied based upon volume of the building, air and/or commodity temperature and the general tightness of the structure (See Section 8.2). These products may be suspended from the top of the bin or applied to the grain surface. If the surface is to be tarped, remember to bury the Prepacs or Ropes and to tag them for easy recovery.

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

7. 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.

4. Determine the length of the fumigation and calculate the dosage of Prepacs or Ropes to be applied based upon volume of the building, air and/or commodity temperature and the general tightness of the structure (See Section 8).

5. Read the directions found in Section 4.2 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. Spread **PHOSTOXIN®** Prepacs or Ropes on the floor or other appropriate surfaces. Do not allow the product to overlap or be covered in any way.

8. Doors leading to the fumigated space must be closed, sealed and placarded with warning signs.

9. 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.

10. Upon completion of the exposure period, open windows, doors, vents, etc. Allow the fumigated structure to aerate. Do not enter the structure without proper respiratory protection until 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 re-enter the treated area.

11. Collect the spent **PHOSTOXIN®** Prepacs and Ropes and dispose of them, with or without further deactivation. Refer to Disposal Instructions in this manual.

12. Remove fumigation warning placards from the aerated structure.

22.5 Railcars, Containers, Trucks, Vans and Other Transport Vehicles

Develop an appropriate Fumigation Management Plan.

Railcars, containers, trucks, vans and other transport vehicles shipped piggyback by rail may be fumigated in transit with Prepacs. However, transport vehicles are generally too small to be fumigated with Ropes. 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.

***PHOSTOXIN®** Prepacs or Fumi-Cel® plates 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.*

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

Care must be taken to seal all doors, hatches, vents, cracks or other leaks, particularly if the fumigation is to be carried out in transit. Prepacs may be mounted by taping them to a cardboard Fumi-Disc or other rigid material. Prepacs must be taped to the Fumi-Disc to prevent friction, which occurs during transit, from weakening or penetrating the fleece of the Prepac and subsequently allowing spent dust to contact the commodity.

Although the Tablet Prepac is porous on both sides, it is recommended that it be mounted so that the printed side can be seen. The Prepac provides for maximum access of air to the **Phostoxin**® tablets. Take care that tape is not applied to any of the fleece material covering the tablets. The Prepacs, thus mounted, may then be applied by securing the Fumi-Disc in the hatch or atop the load. If poly is applied to seal the hatch cover, do not allow it to sag and cover the Prepac. Several 3 to 4 inch spacers placed atop the Fumi-Disc may be used to ensure that the top fleece remains open to the air. Prepacs may be mounted onto nylon slings or cardboard racks fitted across the opening of slot-top hopper cars. As before, use caution to assure that poly material for sealing the hatches does not sag onto the Prepac.

Alternatively, the Prepac may be applied to the hopper car using the Degesch Fumi-Kap and Fumi-Bonnet. The Fumi-Kap, which is stretched over the hatch, is constructed with a gas permeable Remay fabric. The Prepacs are applied by taping them to the Fumi-Kap. The Fumi-Bonnet, fabricated from non-permeable poly, is then placed over the Fumi-Kap. Take care that the poly does not sag onto the Prepacs. If necessary, dig out the commodity so that a minimum headspace of one foot is established between the fumigant and the surface of the commodity. Close and secure the hatch cover.
Proper handling of treated railcars at their destination is the responsibility of the consignee. Upon receipt of the railcar, railroad boxcar, shipping container and other vehicles, a certified applicator and/or persons with documented authorized training must supervise the aeration process and removal of the placards.

Do not use **PHOSTOXIN**® Tablet Prepac or Prepac Rope in cars or other personal vehicles.

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 must 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 must 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 affect nearby workers or bystanders.

3. Develop an appropriate Fumigant Management Plan.

4. Using the guidance given under Section 7, Exposure Conditions, determine the length of the fumigation and calculate the dosage of Prepacs or Ropes to be applied based upon volume of space under the tarp, air and/or commodity temperature. Do not allow the Prepacs or Ropes to pile up or overlap. Remember to bury the Prepacs or Ropes with about two inches of grain, if a tarp is to be applied to the grain surface. Mark the product so that it can readily be retrieved for disposal at the end of the fumigation.

5. 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.

6. Place warning placards at conspicuous points on the enclosure.

22.7 In-Transit Shiphold Fumigation

Develop an appropriate Fumigation Management Plan.

22.7.1 General Information

Important: In-transit ship or shiphold fumigation is also governed by U.S. Coast Guard Regulation 46 CFR Part 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

22.7.2 Pre-Voyage Fumigation Procedures - A FMP must be written for all fumigations PRIOR TO ACTUAL TREATMENT.

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 vessel does not meet these requirements, then the vessel must not be fumigated unless all crew members are removed from the vessel. The crew members are not permitted to re-occupy the vessel until it has been properly aerated and the master of the vessel and the certified applicator have 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 any vessel containing 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 gastight 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 phosphine gas 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 phosphine gas detection equipment tests spaces adjacent to areas containing fumigated cargo as well as 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 in-transit fumigation.

22.7.3 Application Procedures for Bulk Dry Cargo Vessels and Tankers

1. DEGESCH **PHOSTOXIN** Prepac and Prepac Ropes may be applied directly atop the surface of the commodity if they are secured to prevent them from shifting during the voyage. They may also be applied in trenches or gently stepped into the commodity. If the product is buried, it should be attached to a cord or otherwise marked for easy retrieval.

2. Take care to ensure that the Ropes and Prepacs are spread out and are applied at least several feet apart. Do not apply the product in areas where contact with liquid water is likely.

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

22.7.4 In-Transit Fumigation of Transport Units (Containers) Aboard Ships

In-transit fumigation of transport units on ships is also governed by DOT RSPA 49 CFR Part 176.76(h) 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 22.5 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. 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

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. BARGES

Barge fumigation is also regulated by U.S. Coast Guard Regulation 46 CFR Part 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 **PHOSTOXIN**® and seal, if necessary. Placard the barge. Notify consignee if the barge is to be fumigated in transit.

24. BEEHIVES, SUPERS AND OTHER BEE KEEPING EQUIPMENT

Develop an appropriate Fumigation Management Plan.

PHOSTOXIN® Prepacs and Ropes 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 1-2 Prepacs per 1,000 cu.ft. or 1-2 Ropes per 32,000 cu.ft.

Fumigations may be performed in chambers at atmospheric pressure, under tarpaulins, etc., by placing the Prepac and Rope in the sealed storage area. Honey from treated hives or supers may only be used for bee food.

25. DISPOSAL INSTRUCTIONS

25.1 General

Do not contaminate water, food or feed by storage or disposal. Unreacted or partially reacted **PHOSTOXIN**® 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 complete 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 Section 26 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.

The metal pails are non-refillable containers. Do not reuse or refill. Offer

for recycling, if available. Triple rinse pails and lids with water if they have been contacted by aluminum phosphide. 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 pails to atmospheric conditions until residue 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 **PHOSTOXIN®** will be a grayish-white powder. This will be a non-hazardous waste and contain only a small amount of unreacted aluminum phosphide. However, residual dust from incompletely exposed **PHOSTOXIN®** (so called "green dust") requires special care.

25.2 Directions for Deactivation of Partially Spent PHOSTOXIN® Prepac and Ropes

Partially spent material 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. Confinement of partially spent aluminum phosphide may result in a fire or explosion hazard.

PHOSTOXIN® Prepac and Prepac Ropes may be "dry deactivated" by storing them in a locked, dry deactivation drum or similar ventilated container. These deactivation drums are available from DEGESCH America, Inc. The deactivation drum **must** be kept in a well-ventilated area that is protected from rain. As time permits, or when the container is full, take the Ropes and Prepacs to an approved site for disposal. Large numbers of partially spent Ropes or Prepacs stored in open containers may ignite if contacted by liquid water. Ropes and Prepacs may also be "dry deactivated" by spreading them out onto the ground in a secure, open area away from inhabited buildings to be deactivated by atmospheric moisture. Care should be taken to ensure that the fumigants are not carried away by the wind. If desired, they may be weighted down by several inches of sand or soil or by other suitable means. After deactivation, the spent material may be gathered for disposal at approved sites. Alternatively, wet deactivation may be carried out as described in the following:

PHOSTOXIN® Ropes and Prepacs may be deactivated by the "wet method". If the fumigant is not to be held until completely reacted by exposure to atmospheric moisture, it must be deactivated by 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 and maintained at this level.

In a well-ventilated area, out-of-doors, completely submerge the Ropes or

Prepacs in the deactivating solution. The Ropes or Prepacs may float to the surface, therefore, it is necessary to hold them under water by use of a suitable weight. **Caution:** Partially spent fumigant may ignite if allowed to float to the surface of the water.
The Ropes and Prepacs should be held under water in this manner for 36 hours. They may then be taken to an approved site for disposal. Dispose of the detergent solution at a sanitary landfill or other approved site or means. Where permissible, deactivating solution may be poured out onto the ground or it may be poured into a storm sewer.

Caution: Wear a NIOSH/MSHA approved full-face gas mask - phosphine canister combination if exposed to levels between 0.3 ppm to 15 ppm or a Self-Contained Breathing Apparatus (SCBA) if exposure is unknown or above 15 ppm. Refer to Section 10 of this Applicator's Manual for additional respiratory protection requirements. Do not cover the container being used for wet deactivation. Do not place Prepacs 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. Do not dispose of **PHOSTOXIN**® dust in a toilet.

26. SPILL AND LEAK PROCEDURES

26.1 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 self-contained breathing apparatus (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. Refer to Section 10 of this Applicator's Manual for additional respiratory protection requirements. Do not use water at any time to clean up a spill of **PHOSTOXIN**®. Water in contact with unreacted tablets or pellets 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 Prepac Ropes or Prepacs to their original steel pails. If the pails have been extensively damaged, the pouches may be placed in a metal container, or other suitable packaging. The new packaging should be properly marked according to DOT regulations. Notify consignee and shipper of damaged cases. If aluminum foil pouches have been punctured or damaged so as to leak, they may be temporarily repaired with aluminum tape or the Prepacs may be transferred from the damaged pouch to a sound metal container which should be sealed and properly labeled as aluminum phosphide. Transfer the damaged containers to an area suitable for pesticide storage for inspection. Further information and recommendations may be obtained, if required, from D&D HOLDINGS, INC. **Caution:** These damaged and repaired pails may flash upon opening at some later time.

In some spills, the product or its packaging may be so severely damaged that it cannot be stored for any appreciable length of time. If the product cannot be disposed of by use according to label instructions, it must be

further deactivated prior to ultimate disposal. Small amounts of spillage may be spread out on the ground in a secure, open area away from inhabited buildings to be deactivated by atmospheric moisture. Care should be taken to ensure that the Ropes or Prepacs are not carried away by the wind. If desired, they may be weighted down by several inches of sand or soil or by other suitable means. After deactivation, the spent Prepac Ropes may be gathered for disposal at approved sites. Alternatively, wet deactivation may be carried out as described in the following:

26.2 Directions for Deactivation of Prepac Ropes 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 Prepac Ropes are added slowly to the deactivating solution and stirred so as to thoroughly wet all of the **PHOSTOXIN®.** This should be done in the open air. Do not cover the container at any time. Prepac Ropes may float to the surface, therefore, it is necessary to hold them under water by use of a suitable weight. **Caution:** Partially spent Ropes may ignite if they are allowed to float to the surface of the water.

Allow the mixture to stand for about 36 hours. The Ropes will have reacted by this time and will then be safe for disposal.

The deactivated Prepac Ropes may then be disposed of at a sanitary landfill or other approved site. Dispose of the detergent solution at an approved site or by other approved procedures. Where permissible, the deactivation solution may be poured out onto the ground or it may be poured into a storm sewer.

Caution: Wear a full-face gas mask – phosphine canister combination if exposed to levels between 0.3 ppm to 15 ppm or a Self-Contained Breathing Apparatus (SCBA) if exposure is unknown or above 15 ppm during wet deactivation of incompletely exposed **PHOSTOXIN®**. See Section 10 of this Applicator's Manual for additional respiratory protection requirements. Never place Prepacs 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.

FOR ASSISTANCE CONTACT:

DEGESCH AMERICA, INC.
153 Triangle Drive
Weyers Cave, VA 24486 USA
Telephone: (540)234-9281/1-800-330-2525
Fax: (540)234-8225
Internet: www.degeschamerica.com
E-mail: degesch@degeschamerica.com

or

For HUMAN OR ANIMAL MEDICAL EMERGENCIES:
CALL PROSAR:1-800-308-4856

FOR ALL OTHER CHEMICAL EMERGENCIES:
CALL CHEMTREC: 1-800-424-9300