2548-59, PM-32

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 13 198

OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

Research Products Company
P.O. Box 1460
Salina, KS 67402-1460

SUBJECT: Aluminum and Magnesium Phosphide Registration Standard
Your letters of February 23 and March 4, 1987
EPA Reg. Nos. 2548-59
2548-62
2548-63
2548-67
2548-68
2548-69
2548-70
2548-73
2548-74

Gentlemen:

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

Enclosed for each product is stamped, approved labeling. Incorporate any comments noted on the labeling and submit five copies of finished printed labeling for our records.

Sincerely,

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

Enclosures

ACCEPTED
with COMMENTS
In EPA Letter Dated:

MAR 16 1987

Under the Federal Insecticide, Fungicide, and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 2548-59

DETIA GAS EX-B -- FRONT PANEL

RESTRICTED USE PESTICIDE
DUE TO ACUTE INHALATION TOXICITY OF HIGHLY
TOXIC HYDROGEN PHOSPHIDE (PHOSPHINE, PH3) GAS

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

Detia(R) GAS EX-B

A fumigant for the control of most stored product insects and their pre-adult stages.

Active Ingredients: Aluminum Phosphide	57%
Inert Ingredient:	43%
TOTAL	100%

KEEP OUT OF REACH OF CHILDREN

DANGER/PELIGRO-POISON

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

STATEMENT OF PRACTICAL TREATMENT

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

IF GAS OR DUST FROM Detia(R) GAS EX-B IS INHALED: Get exposed person to fresh air. Keep warm and make sure person can breathe freely. If breathing has stopped, give artificial respiration by mouth-to-mouth or other means of resuscitation. Do not give anything by mouth to an unconscious person.

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IF THE DUST FROM Detia(R) GAS EX-B IS SWALLOWED: Drink or administer one or two glasses of water and induce vomiting by touching back of throat with finger, or if available, administer syrup of ipecac. Do not give anything by mouth if victim is unconscious or not alert.

IF THE DUST FROM Detia(R) GAS EX-B GETS ON SKIN OR CLOTHING: Brush or shake material off clothes and shoes in well ventilated area. Allow clothes to aerate in a ventilated area prior to laundering. Do not leave contaminated clothing in occupied and/or confined areas such as automobiles, vans, motel rooms, homes, etc. Wash contaminated skin thoroughly with soap and water.

IF DUST FROM Detia(R) GAS EX-B GETS IN EYES: Flush with plenty of water. Get medical attention.

See side panels for additional precautionary statements.

CONTENTS	NET WT. EACH	TOTAL NET WT.
Active Bags(Normal Size).....	grams.....	grams (oz.)
Gas Protectant.....		grams

Manufactured by: Detia Freyberg, GMBH
P. O. Box 10
6947 Laudenbach
F.R. of Germany

Distributed by: Research Products Company
P. O. Box 1460
Salina, KS 67402-1460

EPA Establishment No. 33982WG01
EPA Registration No. 2548-59

LEFT PANEL

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

KEEP OUT OF REACH OF CHILDREN
DANGER/POISON

Aluminum phosphide in Detia(R) GAS EX-B can be fatal if swallowed. Do not get in eyes, in nose, on skin or on clothing. Do not eat, drink or smoke while handling aluminum phosphide fumigants. When the container is opened Detia(R) GAS EX-B will begin to release hydrogen phosphide (phosphine) which is an extremely toxic gas. Contact with water, acids and some other

4158

liquids will accelerate this reaction. If a garlic odor is detected, refer to section on ~~respiratory protection from~~ Industrial Hygiene Monitoring on page — of the attached product manual ~~applicator/worker exposure~~ for appropriate monitoring procedures. Pure hydrogen phosphide gas is odorless; the odor is due to a contaminant. Since an odor may not be detected under certain circumstances, the absence of a garlic odor does not mean that hydrogen phosphide gas is absent. Observe proper application, aeration, reentry and disposal procedures specified elsewhere in the labeling to prevent overexposure.

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

NOTE TO PHYSICIAN

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

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

CLASSIFIED BY UNDERWRITERS LABORATORIES, INC. AS TO FIRE HAZARD ONLY WHEN USED SPECIFICALLY AS DIRECTED IN THE SEPARATE INSTRUCTIONS THAT ARE PART OF THE PRODUCT LABELING. DETIA(R) GAS EX-B FUMIGANT POWDER IS NONCOMBUSTIBLE ITSELF BUT EXPOSURE TO MOIST AIR OR WATER RELEASES FLAMMABLE AND TOXIC PHOSPHINE GAS SPONTANEOUS IGNITION MAY RESULT IF CONTACT BY WATER, ACIDS OR CHEMICALS. 955P

5/158

07750
07800
07850 RIGHT PANEL
07900
07950 DIRECTIONS FOR USE
08000
08050 It is a violation of federal law to use this product in a
08100 manner inconsistent with its labeling.
08150
08200 The booklets "Application Procedures for Detia(R) GAS EX-B" and
08250 "Instructions for Intransit Fumigation of Ship Holds with
08300 Detia(R) GAS EX-B" are a part of labeling. Refer to them for
08350 application procedures and other information necessary to
08400 properly use Detia(R) GAS EX-B.
08450
08500
(550 THIS PRODUCT IS ACCOMPANIED BY THE LABELING LISTED ABOVE. READ
0-600 AND UNDERSTAND THE ENTIRE LABELING. ALL PARTS OF THE LABELING
08650 ARE EQUALLY IMPORTANT FOR SAFE AND EFFECTIVE USE OF THIS
08700 PRODUCT. CALL RESEARCH PRODUCTS COMPANY OR EPA IF YOU HAVE ANY
08750 QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABELING.
08800
08850
08900 STORAGE AND DISPOSAL
08950
09000 STORAGE
09050
09100 Cans should be stored in a dry, well ventilated area, away
09150 from heat and under lock and key. Post as a pesticide storage
09200 area. Do not contaminate water, food or feed by storing
09250 pesticides in the same areas used to store these commodities.
09300
(350 Do not store in buildings where humans or domestic animals
(400 reside. Refer to the "Application Procedures for Detia(R)
09450 GAS EX-B" for additional storage instructions.
09500
09550 DISPOSAL OF UNREACTED OR PARTIALLY REACTED Detia(R) GAS EX-B
09600 (From spills, leaking flasks or other sources)
09650
09700 Unreacted or partially reacted Detia(R) GAS EX-B is acutely
09750 hazardous. Improper disposal of this product is a violation of
09800 federal law.
09850
09900 If this product cannot be disposed of by ordinary use or
09950 according to labeling instructions, contact your state pesticide
10000 or environmental control agency or the hazardous waste
10050 representative at the nearest EPA regional office for guidance.
10100 Do not contaminate water by disposal.
10150
10200 Reacted Detia(R) GAS EX-B is not hazardous. For complete
10250 disposal, spill and leak procedures refer to the booklet
10300 "Application Procedures for Detia(R) GAS EX-B".
10350

6/59

10400
10450 DISPOSAL OF EMPTY CANS
10500
10550 Dispose of in a sanitary landfill or by other approved state or
10600 local procedures.
10650
10700 DISPOSAL OF BAGS
10750
10900 Refer to the booklet entitled "Application Procedures for
10850 Detia(R) GAS EX-B".
10900
10950 GENERAL
11000
11050 Consult federal, state and local disposal authorities for
11100 approved procedures other than those given above. Approved
11150 procedures vary for different types of generators.
11200
11250 *If in doubt concerning whether the dust is reacted and/or
11300 concerning proper disposal techniques contact Research Products
11350 Company.
"PC

ACCEPTED
with COMMENTS
In EPA Letter Dated:

MAR 16 1987

Under the Federal Insecticide, Fungicide, and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 2548-59

RESTRICTED USE PESTICIDE
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For retail sale to and use only by certified applicators for those uses covered by the applicator's certification or persons trained in accordance with ~~the attached~~ this product manual working under the direct supervision and in the physical presence of the certified applicator. Physical presence means on site or on the premises. Read and follow the label and the Research Products Company product manual which contains complete instructions for the safe use of this pesticide.

APPLICATION PROCEDURES

FOR

Detia(R)

GAS EX-B

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

Research Products Company
Div. of McShares, Inc.
P. O. Box 1460
Salina, Kansas 67402-1460

EPA Establishment No. 33982WG01
EPA Registration No. 2548-59

I. INTRODUCTION

A. HISTORY

The history of Detia (R) pesticides is long, dating back to the mid-1930's. In 1970 Detia(R) Gas EX-B was introduced into the United States. Detia(R) Tablets and Detia(R) Pellets were introduced in 1977. The manufacturer, Detia Freyberg GMBH, West Germany was the early pioneer in the development of hydrogen phosphide as a fumigant gas.

B. PRODUCT DESCRIPTION

The Detia(R) Gas EX-B concept is one that permits the packaging of 57% aluminum phosphide preparation into paper bags which become an integral part of the concept. Therefore the bags should never be torn open during fumigation. Once the bags are removed from the original shipping container, a hermetically sealed metal can, they will begin slowly releasing hydrogen phosphide in the following way:

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

Warm, humid air accelerates the reaction while cool, dry air has the opposite effect. For example, when relative humidity and temperature to which the bags are exposed are high, decomposition of Detia(R) may be complete in 3 days. However at moderate temperatures and low humidities decomposition may require 7 days or more. This reaction starts slowly, gradually accelerates and then tapers off again as the aluminum phosphide is spent.

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

C. PRODUCT PACKAGING

The bag, in combination with the preparation, permits the controlled release of hydrogen phosphide. The tough, permeable paper used is an integral part of the total concept. There are two (2) basic bag shapes. One is referred to as "normal" and the other as "long narrow". Both contain exactly the same quantity of preparation.

34 grams.....57% Aluminum Phosphide
43% Inert Ingredients

Both release 11 grams of hydrogen phosphide when exposed to

moist air.

Normal bags are packed either 6 or 10 to a can and long narrow bags are packed 15 to a can. Detia(R) Gas EX-B is also packed as a long fabric strip (bag blanket) which is equivalent to 100 bags and as a short belt (bag belt) which is equivalent to 4 bags. There are 3 belts per can. The variety of package sizes and types provide for convenience of application in different sizes and types of storages.

The normal bag is especially well suited to fumigation of small spaces and small bulk storage such as rail cars. It may also be added directly to bulk raw agricultural commodities and other indicated commodities as bins are filled. In this instance the bags must be removed when the commodity is pulled from the bin.

The long narrow bags may be used as normal bags but are also designed to be inserted into bulk commodities by means of an eyelet in the bag and a special probe.

The "bag belt" (4 bags per belt) is specially designed to be probed into approved bulk commodities.

The "bag blanket" (100 bags per blanket) is well suited to large scale fumigations such as ship holds, large flat storage bins, and large space fumigations. The "bag blanket" is very quickly applied and retrieved after the fumigation.

The metal cans are hermetically sealed and are easily opened with a common strip key. Each can contains a secured gas-absorbing pouch that serves to absorb loose hydrogen phosphide liberated inside the can.

The shelf life of Detia(R) Gas EX-B is almost unlimited as long as the packaging remains sealed and intact.

D. WHAT IS HYDROGEN PHOSPHIDE?

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

E. SAFETY RECOMMENDATIONS

1. Carefully read the labeling and follow instructions explicitly.
2. Never work alone when applying fumigant from within the storage structure.
3. Never allow uninstructed persons to handle Detia(R).

4. Approved respiratory protection must be available for the fumigation of structures from within.
5. It is often desirable to open fumigant containers in open air or near a fan that exhausts outside immediately. Never open in a flammable atmosphere.
6. Do not allow Detia(R) to contact liquid water or to pile up.
7. Dispose of spent bags in a proper manner consistent with the label instructions.
8. Post "DANGER" signs on fumigated areas.
9. Notify appropriate company employees and provide relevant safety information to local officials annually for use in the event of an emergency.
10. Hydrogen phosphide fumigants are not to be used for vacuum fumigations.
11. Exposure to hydrogen phosphide must not exceed the 8 hour TWA of 0.3 ppm during application or a maximum concentration of 0.3 ppm after application is completed. This includes reentry into a structure.
12. Fumigated finished foods and feeds must be aerated 48 hours prior to offering to the end consumer.
13. Transfer of a treated commodity to another site without complete aeration (down to 0.3 ppm maximum) is permissible provided the new site is placarded.
14. Aerate contaminated clothing in well ventilated area prior to washing.
15. Keep containers sealed and intact until ready to begin applying fumigant.
16. Use all bags from opened cans.
17. OSHA recommends that the exposure screening of employees be conducted to detect impaired pulmonary function. OSHA recommends that any employees developing the above condition be referred for medical attention.

II. PRECAUTIONARY STATEMENTS

A. HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Keep Out of Reach of Children

DANGER--POISON

Aluminum phosphide in Detia(R) Gas EX-B can be fatal if swallowed. Do not get in eyes, in nose, on skin or on clothing. Do not eat, drink or smoke while handling aluminum phosphide fumigants. When the container is opened Detia(R) Gas EX-B will begin to release hydrogen phosphide (phosphine) which is an extremely toxic gas. Contact with water, acids and some other liquids will accelerate this reaction. If a garlic odor is detected, refer to section on ~~respiratory protection of applicator/worker exposure for~~ Industrial Hygiene Monitoring on page for appropriate monitoring procedures. Pure hydrogen phosphide gas is odorless; the odor is due to a contaminant. Since an odor may not be detected under certain circumstances, the absence of a garlic

odor does not mean that hydrogen phosphide gas is absent. Observe proper application, aeration, reentry and disposal procedures specified elsewhere in the labeling to prevent overexposure.

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

B. STATEMENT OF PRACTICAL TREATMENT

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

1. <u>If gas or dust from Detia(R) Gas EX-B is inhaled</u>: Get exposed person to fresh air. Keep warm and make sure person can breathe freely. If breathing has stopped, give artificial respiration by mouth-to-mouth or other means of resuscitation. Do not give anything by mouth to an unconscious person.

2. <u>If gas or dust from Detia(R) Gas EX-B is swallowed</u>: Drink or administer one or two glasses of water and induce vomiting by touching back of throat with finger, or if available, administer syrup of ipecac. Do not give anything by mouth if victim is unconscious or not alert.

3. <u>If the dust from Detia(R) Gas EX-B gets on skin or clothing</u>: Brush or shake material off clothes and shoes in well ventilated area. Allow clothes to aerate in a ventilated area prior to laundering. Do not leave contaminated clothing in occupied and/or confined area such as automobiles, vans, motel rooms, homes, etc. Wash contaminated skin thoroughly with soap and water.

4. <u>If dust from Detia(R) Gas EX-B gets in eyes</u>: Flush with plenty of water. Get medical attention.

C. NOTE TO PHYSICIAN

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

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

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

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

   a. Complete rest 1-2 days during which the patient must be kept quiet and warm.

   b. If the patient suffers from vomiting or increased blood sugar, appropriate solutions should be administered. Treatment with oxygen is recommended as is the administration of cardiac and circulatory stimulants.

2. In cases of severe poisoning (intensive care unit recommended):

   a. Where pulmonary edema is observed, steroid therapy should be considered and close medical supervision is recommended. Blood transfusions may be necessary.

   b. In case of manifest pulmonary edema, venesection should be performed under vein pressure control. Heart glycosides (I.V.) can be used in case of hemoconcentration. Venesection may result in shock. In the case of progressive edema of the lungs, immediately intubate and remove edema fluid and administer oxygen over-pressure respiration, as well as any measures required for shock treatment. In case of kidney failure, extracorporeal hemodialysis is necessary. There is no specific antidote known for this poisoning.

   c. If pellets or tablets are ingested, induce vomiting.

Flush the stomach with a diluted potassium permanganate solution or a solution of magnesium peroxide until flushing liquid ceases to smell of carbide. Thereafter, apply carbomedicinalis.

D. PHYSICAL AND CHEMICAL HAZARDS

Aluminum phosphide in Detia(R) Gas EX-B will release hydrogen phosphide gas if exposed to moisture from the air or if it comes into contact with water, acids or many other liquids. Piling of bags may cause a temperature increase and confine the release of gas so that ignition could occur.

It is often desirable to open cans of Detia(R) Gas EX-B in open air or near a fan which exhausts outside immediately. Never open in a flammable atmosphere because on rare occasions it may flash. When opening, point the container away from the face and body. These precautions will also reduce the applicator's exposure to hydrogen phosphide gas.

Pure hydrogen phosphide gas is practically insoluble in water and oils and is stable at normal fumigation temperatures. However, it may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities. Metals such as copper, brass and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by hydrogen phosphide. Thus, small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gears, communication devices, computers, calculators and other electronic or electrical equipment should be protected or removed before fumigation. In most cases all electronic equipment must be removed. Hydrogen phosphide gas will also react with certain metallic salts and therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed.

III. DIRECTIONS FOR USE

A. GENERAL

1. It is a violation of federal law to use this product in a manner inconsistent with its labeling. Detia(R) Gas EX-B is a Restricted Use Pesticide due to the acute inhalation toxicity of hydrogen phosphide (phosphine, PH3) gas. For retail sale to and use only by certified applicators for those uses covered by the applicator's certification or persons trained in accordance with ~~the attached~~ this product manual working under the direct supervision and in the physical presence of the certified applicator. Physical presence means on site or on the premises.

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

Additional copies of this manual are available from:

Research Products Company
P. O. Box 1460
Salina, Kansas 67402-1460
913-825-2181

3. At least two trained persons must be present when Detia(R) Gas EX-B is applied from within the space being treated or during reentry into a fumigated or partially aerated site. Only one trained person is required when the fumigant is applied from outside the area to be treated.

4. Prior to applying this product, you must inspect the storage structure to determine if it can be made sufficiently gas tight. Decide how personal exposure monitoring should be conducted. Notify appropriate company employees and provide relevant safety information to local officials annually for use in the event of an emergency. Apply this fumigant in an effective and safe manner including emergency procedures etc.

5. Shipholds, barges, containers on ships, railroad cars and containers shipped piggyback by rail may be fumigated intransit. However, fumigated trucks, vans, trailers and similar transport vehicles cannot be moved over public roads or highways until they are aerated.

6. The powder in Detia(R) Gas EX-B bags must not come into contact with any processed food with the EXCEPTION that it can be added directly to processed brewers rice, malt, and corn grits used in the manufacture of beer.

7. Protect copper, silver, gold and their alloys from corrosive exposure to hydrogen phosphide.

8. Do not fumigate commodities with this product when commodity temperature is below 40 degrees F (5 degrees C).

B. EFFICACY

Complete control of listed insect pests is frequently not achieved. Factors contributing to less than 100% control are gas leakage, poor gas distribution, unfavorable exposure conditions, etc. In addition, some insects are less susceptible to hydrogen phosphide than others. To maximize

control, extreme care must be observed in sealing, higher dosages must be used, exposure periods must be lengthened, proper application procedures must be followed, and temperature and humidity must be favorable.

C. USE PATTERN

1. INSECT PESTS

Detia Gas EX-B is registered with the U. S. Environmental Protection Agency as an aid in the control of the following insects:

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

2. COMMODITIES

Detia(R) Gas EX-B is registered by EPA for the fumigation of the following commodities.

a. Raw Agricultural Commodities

almonds
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
~~wild rice~~ delete

b. Processed Foods

The listed processed foods may be fumigated with Detia(R). Under no condition shall any processed food or bagged commodity come in contact with the residual dust from Detia(R) Gas EX-B except that Detia(R) may be added directly to processed brewers rice, malt and corn grits for use in the manufacture of beer.

Processed candy and sugar
Cereal flours and bakery mixes
Cereal foods (including cookies, crackers, macaroni, noodles, pasta, pretzels, snack foods and spaghetti)
Processed cereal grains (including milled fractions and packaged cereals)
Cheese and cheese by-products
Chocolate and chocolate products (assorted chocolate, chocolate liquor, cocoa, cocoa powder, dark chocolate coating and milk chocolate)
Processed coffee
Corn grits
Cured, dried and processed meat products and dried fish
Dates
Dried eggs and egg yolk solids
Dried milk, dried powdered milk, nondairy creamers, and nonfat dried milk
Dried or dehydrated fruits (apples, dates, figs,

peaches, pears, prunes, raisins and sultanas)
Figs
Malt
Peanuts
Processed herbs, spices, seasonings and condiments
Processed nuts (almonds, apricot kernels, Brazil nuts, cashews, filberts, pecans, pistachio nuts and walnuts)
Processed oats (including oatmeal)
Rice, (brewers rice grits, enriched and polished, wild rice)
Soybean flour and milled fractions
Processed tea
Dried and dehydrated vegetables (beans, carrots, lentils, peas, potato flour, potato products and spinach)
Yeast (including primary yeast)

c. Animal Feed and Feed Ingredients

d. Nonfood Products

Animal hide
Clothing
Processed or unprocessed cotton, wool and other natural fibers or cloth
Feathers
Furs
Human hair, rubberized hair, vulcanized hair, mohair
Leather products
Tobacco
Wood, cut trees, wood chips and wood and bamboo products
Paper and paper products
Dried plants and flowers
Seeds (grass seed, ornamental herbaceous plant seed and vegetable seed)
Straw or hay

D. DOSAGE GUIDE

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

DOSAGE RANGE: 2 to 13 bags per 1000 cu. ft.

NOTE: The maximum dosage allowed for dates, nuts and dried

fruits is 4 bags per 1000 cubic feet.

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

The wide dosage ranges listed above are designed to accommodate the variety of fumigation situations that might occur. The major factor in selecting dosage is the capability of the structure to hold hydrogen phosphide during the exposure period and thus obtain and sustain lethal concentrations throughout. It is more difficult to obtain penetration of gas throughout the structure in bulk stored commodities. An example of this is the treatment of grain stored in flat storage in which fumigant is probed or surface applied.

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

RECOMMENDED DOSAGES FOR SEVERAL TYPES OF FUMIGATIONS

TYPE OF FUMIGATION	DOSAGE RANGE (BAGS/1000 CU. FT.)
1. SPACE (INCLUDING PACKAGED COMMODITIES)	
A. MILLS, WAREHOUSES, ETC.	2 - 6
B. BAGGED COMMODITIES	3 - 6
C. DRIED FRUITS, NUTS AND DATES	2 - 4
D. STORED TOBACCO	2 - 4
2. BULK STORED COMMODITIES	
A. VERTICAL STORAGE	3 - 5
B. TANKS	4 - 6
C. FLAT STORAGE (LOOSE CONSTRUCTION)	5 - 13
D. FARM BINS	6 - 13
E. RAIL CARS	3 - 6
F. BUNKERS, TARPED GROUND STORAGE	3 - 6
G. BARGES	3 - 7
H. SHIPHOLDS	3 - 6

The upper dosages listed are recommended in structures that are

of loose construction and in bulk stored commodities.

E. SEALING

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

F. EXPOSURE GUIDELINES

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

TEMPERATURE TO WHICH FUMIGANT AND/OR INSECTS ARE EXPOSED	EXPOSURE PERIOD
Below 40°F	Do Not Fumigate
40°F - 49°F	14 days(336 hrs.)
50°F - 59°F	9 days(216 hrs.)
60°F - 77°F	5 days(120 hrs.)
Above 77°F	3 days(72 hrs.)

The length of the fumigation must be great enough so as to provide for adequate control of the insect pests which infest the commodity being treated. It is necessary to lengthen the fumigation at lower temperatures since insects are more difficult to kill under these conditions. In this regard, the temperature to which the insects are exposed is the critical factor.

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

When Detia(R) Gas EX-B is not uniformly added to a bulk commodity mass (i.e. surface application or shallow probing) exposure times must be substantially lengthened to allow penetration of gas throughout the commodity. As a "rule of thumb" a minimum of 1 day should be added to the exposure time listed on page for each 10 feet the gas must

penetrate downward. It is preferable to add 2 days for each 10 feet. Some structures can only be treated when completely tarped.

In addition the fumigation period should be long enough that the production of hydrogen phosphide has essentially ceased. This will minimize hazards in the disposal of spent aluminum phosphide products remaining. Temperature and humidity to which Detia(R) Gas EX-B is exposed are important to this determination since both lower temperatures and/or dry air retard gas release.

Consequently, exposure periods recommended in the table are minimum periods and may not be adequate to control all stored product pests under all conditions. This is particularly true at lower temperatures (below 60 degrees F). Nor will they always provide for the ceasation of the production of hydrogen phosphide when pellets or tablets are exposed to inadequate moisture levels.

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

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

G. APPLICATION PROCEDURES

1. GENERAL STATEMENT

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

2. APPLICATION PROCEDURES FOR DIRECT ADDITION OF DETIA(R) GAS EX-B BAGS TO BULK COMMODITIES

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

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

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

(1) Bags may be added to the commodity as the bin is filled, but must be removed as the bin is emptied. Detia(R) Pellets and Tablets are most suited to this application since they can be automatically added to the commodity and are not removed after the fumigation.

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

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

(4) Calculate the number of bags needed and the rate at which they must be added based upon the rate at which the bin will be filled.

(5) Detia(R) bags are applied by hand on the headhouse/gallery belt or into the fill opening. Add fumigant in as continuous a manner as possible to the commodity stream.

(6) Keep an accurate count of bags added since the bags must be removed when the bin is emptied. Bags can be removed by transfer of the commodity through a screen or scalperator.

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

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

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

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

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

(1) Check the storage for tightness.

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

(3) Determine dosage and exposure time. The dosage will depend in large part on a combination of the tightness of the seal, the application procedure and the grain depth. The poorer the seal and the farther the gas must penetrate to reach throughout the bin the higher the required dosage will be. For good results add the length of time required for the gas to penetrate throughout the bin to the exposure time given on page of this manual. To the extent possible, lengthen the exposure period. As a "rule of thumb" a minimum of 1 day should be added to the exposure time listed on page for each 10 feet the gas must penetrate downward. It is preferable to add 2 days for each 10 feet.

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

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

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

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

Surface application can be accomplished using individual bags or the 15 feet long "bag blanket" (100 bags per blanket). It is easier to retrieve the individual bags after the

fumigation if they are placed on a strip of Kraft paper. Better retention in the commodity mass may be attained by placing the bag blankets in a shallow trench and covering them with commodity. Bag blankets are quickly applied and easily retrieved, so they are ideal for large bulk storages. If necessary the bag blanket may be subdivided, but do not save a left over segment for a future fumigation.

(6) Shallow probing can be accomplished using the long narrow bag or "bag belt" (4 bags per belt). The long narrow bag can be probed in the commodity mass several feet by means of the eyelet in the bag and a special probe. A "locator" cord can be attached to each bag before insertion, leaving the loose end on the commodity surface. This use of the long narrow bag is particularly suited to small bins such as found on farms. When shallow probing is done in larger bins the bag belt is the desired device. A "locator" cord should also be attached to the bag belt for easy identification and removal of each belt. The bags or belts should be spaced as evenly as possible over the entire surface of the commodity.

(7) Arrange enough applicators and other workers to complete the job quickly enough to avoid exposure to hydrogen phosphide gas. The production of gas during application can be significantly retarded by conducting fumigations when temperatures in the bin are lowest, and other work practices. It is often advisable to wear approved respiratory protection during application of fumigant under hot and humid conditions, particularly when considerable time must be spent inside the structures being treated. Monitoring with a suitable detection device is required to assure that the 0.3 ppm 8 hour TWA is not exceeded. See "Industrial Hygiene Monitoring" section on page of this manual.

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

(9) Seal all remaining exits.

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

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

(12) Remove and dispose of bags prior to emptying bin or during emptying if the bags cannot be retrieved otherwise.

e. Procedures for Bunkers and Other Outdoor Tarped Commodities:

(1) See steps "3", "4", "5", and "6" in section "d" above.

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

(3) Surface or shallow probing may be done through slits in the tarp or the tarp can be spread over the commodity after application. Seal slits after application.

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

(5) Post "DANGER" placards.

(6) When possible remove bags prior to moving the commodity.

f. Procedures for Farm Storage:

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

(2) Sealing
Leakage is the single most important cause of failure in the treatment of farm bins. Since these bins are usually small by comparison they have a higher leakage area in proportion to their capacity. Most wooden granaries are so porous that they cannot be successfully fumigated unless they are completely covered with plastic sheeting or similar tarp. Steel bins are also usually of very loose construction and therefore require much attention to sealing. All vents and aeration ducts must be tightly sealed using 4 mil polyethylene sheeting or its equivalent. The plastic must be sealed directly to the metal with tape or other adhesive. It is not sufficient to "cinch up" the plastic as with a belt. The surface of the grain should be covered with plastic sheeting after Detia(R) has been applied. Tarping of the grain surface will greatly reduce leakage. Other sealing techniques are recommended i.e. closure of all

large cracks with caulking, foam insulation or other sealant. Sealing these cracks will greatly reduce the required dosage. Two mil or thicker plastic can be used for tarping the grain surface, however the plastic used on the outside of the bin should be at least 4 mil's. When an entire structure is tarped the plastic must be at least 6 mils thick to prevent excessive tearing during the fumigation.

(3) Dosage
Unless all the large cracks are sealed as described above the dosage recommended should be 8-16 bags per 1000 bu. (6-13 bags per 1000 cu. ft.) capacity of the space under the plastic tarp.

(4) Additional Application Instructions
Probing bag bells or long narrow bags into the grain mass is the recommended method of application. Probe insertions should be scattered evenly over the surface. Place no more than 1/4 of the total dose in floor level aeration ducts. Be sure the inside of the aeration duct is dry before adding the bags. Addition of Detia(R) to water in an aeration duct can cause a fire. Seal the aeration fan as described above.

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

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

If monitoring equipment is not available, an approved canister respirator must be worn for indoor application. If an approved respirator is not available, application must be done from outside of the site to be fumigated. Also refer to all other precautions given in this manual.

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

3. APPLICATION PROCEDURES FOR SPACE FUMIGATIONS.

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

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

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

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

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

(4) Place bags on floor in systematic manner. It is not necessary to distribute the bags evenly over the entire floor. Do not toss bags into inaccessible areas. The bag blankets (100 bags per 15 foot long blanket) can be easily rolled out on the floor and retrieved. The bag blanket is well suited to large fumigations. If necessary the bag blanket may be subdivided, but do not save a left over segment for a future fumigation. Check to see that they have not piled up and that they are spread out evenly to minimize contact between the individual bags.

(5) Detia(R) Gas EX-B bags shall not be placed in or attached to commodity packages containing processed food. If placement of bags on the floor is not convenient they may be attached to a wall or other support. They may also be applied by taping the bags on cardboard with spacing between bags. Tape across the bag ends only. Specially designed discs or boards are available for this purpose from Research Products Company. If the Detia(R) Fumi-Board or Detia(R) Fumi-Disc is used, taping is not necessary.

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

(7) Seal all remaining exits.

(8) Placard and lock all entrances.

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

(10) Dispose of remaining bags. SEE "STORAGE AND DISPOSAL" on page of this manual. Avoid breathing the dust.

b. Procedures for Space Fumigations Under Tarps:

(1) General
Follow the pertinent instructions given immediately above in part "a".

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

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

(3) Additional Application Instructions
Bags may be applied under the edge of the tarp or

through slits. The bags should be protected from condensation or other source of water. The slits in the covering should be carefully taped to prevent loss of gas once the dose has been applied. Bags should not be piled or overlapped. Care should be taken to prevent the plastic tarp from covering the bags in such a way as to prevent contact with moist air or to confine the gas. Refer to other sections for dosage and exposure times.

(4) Additional Precautions

See appropriate precautions if the fumigation is conducted indoors as opposed to outdoors. Indoor fumigation precautions are handled as any other situation where the application is made from outside the area being fumigated. Workers may occupy adjacent indoor areas but they must be protected from overexposure to hydrogen phosphide by adequate sealing, ventilation or as a last resort, respiratory equipment.

Do not walk on stacks during the fumigation.

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

Follow precautions listed elsewhere in labeling.

(5) Aeration

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

4. APPLICATION PROCEDURES FOR RAIL CARS, CONTAINERS, TRUCKS AND OTHER SIMILAR VEHICLES

a. General

This section addresses fumigation of transport vehicles whether fumigated static or intransit. Rail cars and containers shipped piggyback by rail may be fumigated intransit, but it is not legal to move trucks, trailers, etc., over public roads or highways until they are aerated. See section "III.J" on page of this manual for recommendations on placarding, commodity aeration and training of persons authorized to remove placarding.

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

Rail cars, containers, trucks, and other transport vehicles loaded with bulk commodities to which Detia(R) bags may be added are treated in essentially the same way as any other storage facility. Detia(R) may be added as the vehicle is being filled, the dose may be scattered over the surface after loading has been completed or the bags may be probed below the surface. Surface application is not recommended for intransit fumigation. Carefully seal any vents, cracks or other leaks particularly if the fumigation is to be carried out intransit.

Detia(R) Gas EX-B bags shall not be placed in or attached to commodity packages containing processed food. If placement of bags on the floor is not convenient or if the vehicle is being fumigated intransit, they may be attached to a wall or other support. They may also be applied by taping the bags on cardboard with spacing between bags. Tape across the bag ends only. Specially designed discs or boards are available for this purpose from Research Products Company. If the Detia(R) Fumi-Board or Detia(R) Fumi-Disc is used, taping the bags is not necessary.

Instructions that follow suggest specific procedures for treatment of rail cars and containers when direct addition to the commodity is not used.

b. Procedures for Bulk Rail Cars -- Round Hatch

(1) Close and secure all hatch covers except those being utilized for the fumigation.

(2) Seal all other openings. Pay particular attention to vents.

(3) Clean the flange lip of hatch (or hatches) being utilized. If the commodity extends into the throat of the hatch, force it away to the extent possible.

(4) Open cans and insert bags into the pockets of a Detia(R) Fumi-Disc.

(5) Place the loaded Fumi-Disc into position, bag side up.

(6) Secure the Fumi-Disc into place with masking tape.

(7) Lower the cover into place and secure. Insert a "DANGER" placard into a clear plastic bag and tape it securely to the hatch cover.

(8) Insert "DANGER" placards into clear plastic bags and secure with masking tape near the ladder on each side of the car.

c. Procedures for Bulk Rail Cars -- Slot Hatch

(1) Fold the edges of a Fumi-Board to form a tray. The Fumi-Board is designed to "hang" in the hatch opening.

(2) Open cans and insert bags into pockets of Detia(R) Fumi-Board.

(3) Place the loaded Fumi-Board into position, bag side up.

.31/52

(4) Secure into place with masking tape.

(5) Lower the hatch covers and seal the edges with tape.

(6) Insert a "DANGER" placard into a clear plastic bag and tape it securely to the hatch cover.

(7) Insert "DANGER" placards into clear plastic bags and secure with masking tape near the ladder on each side of the car.

d. Procedures for Boxcars

(1) Close and secure one of the doors from the inside. Seal all openings and joints. If possible, caulk joints and drape entire doorway with polyethylene film, securing the edges to the inner wall, floor and ceiling with masking tape.

(2) Inspect the roof, floor and walls for holes and/or cracks. Seal all openings with either masking tape or caulking compound.

(3) If possible, drape remaining doorway with polyethylene film before door is closed. Secure edges to door jams and floor. Close door and secure. If doorway is draped with polyethylene it may not be necessary to seal the door from the outside. If doorway is not draped, seal all cracks, openings and joints with masking tape and/or caulking compound from the outside.

(4) Open cans and insert bags into pockets of Detia(R) Fumi-Disc or Fumi-Board.

(5) Place the loaded Fumi-Disc or Fumi-Board onto the load, bag side up. Secure it into place with tape:

(6) Or, nail it to the wall:

(7) Post "DANGER" placards by inserting into clear plastic bags and taping them to each door.

e. Procedures for Containers

Procedures for containers are essentially the same as boxcars except their door, tend to be more gas tight and they often have only a real door which must be sealed after application is completed.

5. APPLICATION PROCEDURES FOR INTRANSIT FUMIGATION OF SHIP HOLDS

a. General Information:

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

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

b. Pre-Voyage Fumigation Procedures and Precautions:

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

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

If it is determined that the design and configuration of the vessel does not allow for safe occupancy by the ship's crew throughout the duration of the fumigation/voyage, then the vessel will not be fumigated unless all crew members are removed from the vessel. The crew members will not be allowed to re-occupy the vessel until the vessel has been properly aerated and a determination has been made by the master of the vessel and the fumigator that the vessel is safe for occupancy.

(3) The person responsible for the fumigation must notify the master of the vessel, or his representative of the requirements relating to personal protection equipment*, low range detection equipment and that a person qualified in the use of this equipment must accompany the vessel with cargo under fumigation. Emergency procedures, cargo ventilation, periodic monitoring and inspections, and first aid measures must be discussed with and understood by the master of the vessel or his representative.

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

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

(6) Contact appropriate authorities.

(7) If the fumigation is not completed and the vessel aerated before the manned vessel leaves port, the person in charge of the vessel shall insure that at least two units of personal protection equipment and one gas or vapor detection device and a person qualified in their operation be on board the vessel during the voyage.

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

If leakage of the fumigant is detected, the person in charge of the fumigation shall take action to correct the leakage or shall inform the master of the vessel or his representative, of the leakage so that corrective action can be taken.

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

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

c. <u>Procedures for Bulk Dry Cargo Vessels and Tankers</u>:

(1) Calculate dosage on the basis of cargo hold volume. Dosage is always calculated for total hold volume irrespective of the commodity tonnage in the hold.

Detia(R) Gas EX-B.....2-6 bags per 1000 cubic feet

(2) Procedure for Detia(R) Gas EX-B (Bag Blanket)

(a) After a hold has been filled or completed, dig a shallow trench approximately 15 feet long and 2 feet wide for each blanket being used. Maintain at least a two foot separation between trenches and

stay in from side walls at least 10 feet.

(b) Open bag blanket containers one at a time; remove the blanket; unroll it until fully extended and position into the trench. Cover with the commodity.

(3) Procedure for Detia(R) Gas EX-B (individual bags) After a hold has been filled or completed, open containers and distribute bags uniformly onto commodity surface with spacing between each. Do not place bags within 10 feet of side walls. Step on each after placement or probe bags into the commodity to any depth desired.

(4) Procedure for Detia(R) Gas EX-B (Bag Belt) After a hold has been filled or completed, open containers and begin inserting (probing) bag belts into the commodity mass with spacing between. Do not probe within 10 feet of sidewalls. Attach a "locator" cord to each belt before insertion, leaving the loose end on the commodity surface.

(5) Observe closing of hatch covers closely. Stop the closing if the cover snags a bag blanket, individual bag, or bag belt. Reposition the blanket, bag or belt and resume closing.

d. Voyage Precautions and Procedures:

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

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

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

(3) Do not enter fumigated holds or tanks.

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

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

f. Personal Protective Equipment and Monitoring:

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

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

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

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

6. APPLICATION PROCEDURES FOR INTRANSIT FUMIGATION OF CONTAINERS ON SHIPS

a. When fumigating bulk commodities to which direct addition of this fumigant is not allowed or packaged commodities, refer to section "3.a" on page of this manual.

b. Intransit fumigation of containers on ships is regulated by Coast Guard Regulation 46 CFR 147A and the applicator or shipper must obtain and comply with U.S. Coast Guard Special permit No. 52-75. Contact the Coast Guard or Research Products Company for additional information.

c. Comply with general precautions given in labeling.

7. APPLICATION PROCEDURES FOR FUMIGATION OF BARGES

a. General
Since barge fumigation is a type of flat storage fumigation as well as having similarities in common with a ship, refer to the sections "Procedures for Flat Storage" on page and "APPLICATION PROCEDURES FOR INTRANSIT FUMIGATION OF SHIP'S HOLDS" on page .

01625 P Barge fumigation is regulate by the U. S. Coast Guard
01626 Regulations 46 CFR 147A as modified by U. S. Coast Guard
01627 Special Permit 2-75. The shipper or fumigator must posses
01628 this permit prior to fumigating. To obtain this permit
01629 contact

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

01633
01634 U b. Sealing
01636 Special care must be taken in determining whether a barge
01637 is suitable for fumigation. Excessive leakage may occur
01638 through poorly sealed hold covers.
01639

G H. PROTECTIVE CLOTHING

It is not necessary to wear gloves or other protective clothing. However, wear dry gloves of cotton or other material if contact with the dust is likely. Wash hands after use.

I. RESPIRATORY PROTECTION

1. WHEN RESPIRATORY PROTECTION MUST BE WORN

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

2. PERMISSIBLE GAS CONCENTRATION RANGES FOR RESPIRATORY PROTECTION DEVICES

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

3. REQUIREMENTS FOR AVAILABILITY OF RESPIRATORY PROTECTION

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

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

Respiratory protection need not be available for outdoor applications.

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

J. PLACARDING OF FUMIGATED AREAS

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

1. The signal word "DANGER/PELIGRO" and the SKULL and CROSSBONES symbol in red.
2. The statement, "Area and/or commodity under fumigation, DO NOT ENTER/NO ENTRE".
3. The statement "This sign may only be removed after the commodity is completely aerated (contains 0.3 ppm or less phosphine gas). If incompletely aerated commodity is transferred to a new site, the new site must also be placarded and workers must not be exposed to more than 0.3 ppm phosphine."
4. The date and time fumigation begins and is completed.
5. Name of fumigant used.
6. Name, address, telephone number of the applicator.

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

Do not remove a placard until the treated ~~area~~ commodity is aerated down to 0.3 ppm or less. To determine whether aeration is complete, each fumigated site or vehicle must be monitored and shown to contain 0.3 ppm or less hydrogen phosphide gas in the air space around and, when feasible, in the mass of the commodity.

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

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

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

K. GAS DETECTION EQUIPMENT

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

L. AERATION OF FUMIGATED COMMODITIES

1. FOODS AND FEEDS

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

2. TOBACCO

Tobacco must be aerated for at least three days (72 hours) when fumigated in hogsheads and for at least two days (48 hours) when fumigated in other containers. When plastic liners are used, longer aeration periods will probably be required to aerate the commodity down to 0.3 ppm.

3. As an alternative to these aeration periods, each container of a treated commodity may be analyzed for residues using accepted analytical methods. If residues are less than tolerance levels, the commodity may be shipped to the consumer regardless of the above holding periods.

M. APPLICATOR AND WORKER EXPOSURE

1. HYDROGEN PHOSPHIDE EXPOSURE LIMITS

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

After application is completed worker or applicator exposure must not exceed 0.3 ppm maximum concentration. Such exposures may occur because of leakage into enclosed areas from fumigation sites, during reentry or during transfer of unaerated commodity.

2. APPLICATION OF FUMIGANT

Depending upon temperature and humidity, Detia(R) Gas EX-B releases hydrogen phosphide gas slowly upon exposure to moisture from the air. This release is often slow enough to permit applicators to deposit fumigant in the desired areas and then vacate the premises without significant exposure to the gas. If the fumigator's exposure exceeds the 8 hour TWA of 0.3 ppm, approved respiratory protection must be worn. Gas concentration measurements for safety purposes must be made using low level detector tubes or other suitable low level detection equipment. See the "Industrial Hygiene Monitoring" section below. Information on hydrogen phosphide (phosphine, PH3) detector tubes may be obtained from Research Products Company.

It is often practical to wear approved respiratory protection from start to finish. This is particularly true when performing large space fumigations or when fumigating bulk stored commodities in flat storage buildings.

3. LEAKAGE FROM FUMIGATED SITES

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

4. AERATION AND REENTRY

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

5. HANDLING UNAERATED COMMODITIES

Transfer and processing of a treated commodity prior to complete aeration is permissible, however workers must not be exposed to hydrogen phosphide in excess of the permitted exposure limits.

6. INDUSTRIAL HYGIENE MONITORING

It is recommended that hydrogen phosphide exposure be documented in an operation log or manual for each site and operation where exposure may occur. The purpose of this monitoring is to prevent excessive exposure and to

4-1/52

determine when and where respiratory protection is required. This monitoring is mandatory although once exposures have been adequately characterized, subsequent monitoring is not routinely required. However, spot checks should be made occasionally, especially if conditions significantly change. Gas concentration measurements should be taken in the worker's breathing zone. Monitoring is not required outdoors.

or an unexpected garlic odor is detected.

7. ENGINEERING CONTROLS AND WORK PRACTICES

If initial monitoring shows that workers are exposed to concentrations in excess of the permitted exposure limits then engineering controls (such as forced air ventilation) and/or appropriate work practices should be used where possible in an attempt to reduce exposure to below permitted limits.

N. STORAGE AND DISPOSAL

1. STORAGE

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

The shelf life of Detia(R) is virtually unlimited if the containers are tightly sealed.

2. DISPOSAL OF UNREACTED OR PARTIALLY REACTED DETIA(R) GAS EX-B

(From spills, leaking cans or other sources) Unreacted or partially reacted Detia(R) Gas EX-B is acutely hazardous. Improper disposal of this product is a violation of federal law. If this product cannot be disposed of by ordinary use or according to the instructions that follow, contact your state pesticide or environmental control agency or the hazardous waste representative at the nearest EPA regional office for guidance. Do not contaminate water by disposal.

Some local and state waste disposal regulations may vary from the following recommendations. Disposal procedures should be reviewed with appropriate authorities to ensure compliance with local regulations.

FOR SPECIFIC INSTRUCTIONS SEE "SPILL AND LEAK PROCEDURES" ON PAGE OF THIS MANUAL.

3. DISPOSAL OF DETIA(R) GAS EX-B FOLLOWING A SPACE FUMIGATION

a. General

If properly exposed, the bags remaining after a fumigation will contain a grayish white, spent, nonhazardous waste and will contain only a small amount of unreacted aluminum phosphide. However, residual dust from incompletely exposed bags (See "EXPOSURE GUIDE" on page of this manual.) will require special care. Confinement of partially spent bags, as in a closed container may result in a fire hazard. Small amounts of hydrogen phosphide may be given off from the unreacted aluminum phosphide, and confinement of the gas may result in a flash. Unless it can be determined with certainty that the bags are spent they must be deactivated as described below prior to disposal.

All caps or underlined

b. Deactivation of Detia(R) Gas EX-B

(1) General

The methods below may be used for deactivating used or unused Detia(R) Gas EX-B regardless of the extent to which the aluminum phosphide has been consumed in the production of hydrogen phosphide.

(2) Dry Deactivation

Collect bags and place them into a ventilated holding container such as the specially equipped 55 gallon drum illustrated below, wire cage used for other hydrogen phosphide fumigants or other similar device. Store the bags in one of these devices until the bags are spent. Unused or partially spent bags can be spread out on the ground in a secure open area away from occupied buildings to be deactivated by atmospheric moisture. Care should be taken so that they are not carried away by the wind. Dry deactivation is the recommended procedure for unused or partially spent bags. If in doubt concerning whether the bags are spent contact Research Products Company.

Ignition may occur if large numbers of incompletely reacted bags are contacted by liquid water. This can occur in open or perforated storage containers. Therefore, such storage should be out of doors in a relatively isolated area protected from rain.

(3) Wet Deactivation -- Method One

Fill an appropriate sized container with water a few inches from the top. Submerge bags for 36 hours. A metal grid works well to keep bags submerged. Do not cover container. Wear appropriate respiratory protection. This must be

done outdoors or in front of an adequate fan that exhausts outside. The water may be disposed of in a storm sewer or by pouring it out on the ground.

(4) Wet Deactivation - Method Two
Fill an appropriate sized metal container 2/3 full with water. For each gallon of water add 1/4 cup of low sudsing detergent or surfactant. Use no less than 1 gallon of water/detergent solution for 60 Detia(R) bags. Open each bag and dump the contents into the container as the water is stirred. Wear appropriate respiratory protection. DO NOT COVER THE CONTAINER AT ANY TIME. This must be done outdoors or in front of an adequate fan that exhausts immediately outside.

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

Spent bags may also be collected and disposed of at a sanitary landfill, approved pesticide incinerator or other approved sites or by other procedures approved by federal, state and local authorities.

Do not dispose of dust in a toilet.

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

Never confine, partially spent bags or slurry in closed containers such as closed drums or plastic bags.

4. DISPOSAL DRUM
In lieu of immediate disposal it may be more practical, particularly in the case of smaller users, to collect reacted or unreacted bags and place them into a specially designed 55-gallon drum as illustrated.

Note the cone shaped, vented lid as well as the expanded metal false floor, the 10, 1 inch diameter holes evenly spaced around the bottom, the 5, 1 inch diameter holes in the bottom (not shown) and the locking device. The purpose of the drum is to provide a central, known collection point for bags. When full or at regular intervals the reacted bags can be transported directly to an approved disposal site.

The drum should be located in an open, secured area marked as the collection center for Detia(R) Gas EX-B. We recommend the drum also be marked "DANGER, POISONOUS GAS, KEEP AWAY." If the drum is used only for reacted bags "POISONOUS GAS" can be deleted.

5. DISPOSAL OF CANS

Dispose of cans in a sanitary landfill or by other approved state or local procedures.

0. SPILL AND LEAK PROCEDURES

1. GENERAL

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

2. DAMAGE TO FIBERBOARD CASE

Check cans. If they are damaged handle as described below. If they are undamaged return them to cardboard

cartons or other suitable packaging which complies with DOT regulations.

3. LEAKING FLASK PROCEDURES

If cans have been punctured or damaged causing a leak, the product may be immediately used, the container may be temporarily repaired with aluminum tape, the Detia(R) may be transferred from the damaged can to a sound metal container which should be sealed and properly labeled as aluminum phosphide, or it may be deactivated and disposed. See page of this manual for deactivation and disposal procedures. Transport the damaged containers to an area suitable for pesticide storage for inspection. Further instructions and recommendations may be obtained, if required, from Research Products Company.

Handle empty damaged containers as described under "DISPOSAL OF EMPTY CANS" above.

4. SPILL PROCEDURES

Since the formulation is placed in small, tough paper bags, a spill will be either bags or a small quantity of powder spilled from a punctured bag. Consequently, spills are not likely to constitute a frequent problem.

Do not flush spillage down drain with water. DO NOT use water at anytime to clean up a spill. Water in contact with unreacted Detia(R) will rapidly accelerate the production of hydrogen phosphide gas and could cause spontaneous ignition of the gas. If bags have just been spilled and have not been contaminated by other materials, collect the bags and use them or place them into a sound metal container and seal it or deactivate and dispose of them. If possible use immediately. CAUTION: AN IGNITION MAY OCCUR WHEN THESE CONTAINERS ARE OPENED.

If the spill is more than a few minutes old or has been contaminated with water, gather it up and place it into an open top can and deactivate it immediately.

If on-site deactivation is not feasible, these open containers should be transported in open vehicles to a suitable area away from occupied buildings. Wet or dry deactivation may then be carried out. See deactivation instructions on page of this manual.

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ACCEPTED
with COMMENTS
in EPA Letter Dated:

MAR 16 1987

Under the Federal Insecticide, Fungicide, and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 2548-59

INSTRUCTIONS FOR INTRANSIT FUMIGATION OF SHIP HOLDS WITH

DETIA(R)

GAS EX-B

RESTRICTED USE PESTICIDE
DUE TO ACUTE INHALATION TOXICITY OF HIGHLY TOXIC HYDROGEN PHOSPHIDE (PHOSPHINE, PH3) GAS

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

EPA Establishment No. 33982WG01
EPA Registration No. 2548-59

01700 P
01800 U a. Introduction
01850
01900 Detia(R) Gas EX-B is a fumigant preparation containing 57%
01950 aluminum phosphide (by weight) which when removed from its
02000 original container will liberate hydrogen phosphide
02050 (phosphine). The reaction between atmospheric moisture and
02100 aluminum phosphide which produces hydrogen phosphide will
02150 continue for several days depending on temperature and
02200 humidity to which the preparation is exposed. To be
02250 effective the cargo holds or tanks should remain sealed for
02300 the duration of the voyage.
02350
02400 U b. General Information
02500
02550 (1) Shipboard fumigation is also regulated by the U. S.
02600 Coast Guard regulations 46 CFR 147A.
02650
02700 (2) Detia(R) Gas EX-B (EPA Reg. No. 2548-59) is classified
02750 by the U. S. Environmental Protection Agency as a
02800 RESTRICTED USE PESTICIDE, DUE TO ACUTE INHALATION
02850 TOXICITY OF HIGHLY TOXIC HYDROGEN PHOSPHIDE (PHOSPHINE,
02900 PH3) GAS. For retail sale to and use only by certified
02950 applicators for those uses covered by the applicator's
03000 certification or persons trained in accordance with the
03050 attached product manual working under the direct
03100 supervision and in the physical presence of the
03150 certified applicator. Physical presence means on site
03200 or on the premises. Read and follow the label and the
03250 Research Products Company product manual which contains
03300 complete instructions for the safe use of this
03350 pesticide.
03400
03450 (3) This product is toxic to fish. Keep out of lakes,
03500 streams and other aquatic environments. Do not
03550 contaminate water by cleaning equipment or disposal of
03600 wastes.
03650
03700 (4) For additional information refer to product label and
03750 the booklet entitled "APPLICATION PROCEDURES FOR
03800 DETIA(R) GAS EX-B."
03850
03900 U c. Pre-Voyage Fumigation Procedures and Precautions:
04000
04050 (1) Refer to and comply with the regulations and procedures
04100 found in U. S. Coast Guard regulation, 46 CFR 147A.
04150
04200 (2) Prior to fumigating a vessel for intransit cargo
04250 fumigation, the master of the vessel or his
04300 representative, and the fumigator must determine whether
04350 the vessel is suitably designed and configured so as to
04400 allow for safe occupancy by the ship's crew throughout
04450 the duration of the fumigation/voyage.

04500
04550 If it is determined that the design and configuration of the
04600 vessel does not allow for safe occupancy by the ship's
04650 crew throughout the duration of the fumigation/voyage,
04700 then the vessel will not be fumigated unless all crew
04800 members are removed from the vessel. The crew members
04850 will not be allowed to re-occupy the vessel until the
04900 vessel has been properly aerated and a determination has
04950 been made by the master of the vessel and the fumigator
05000 that the vessel is safe for occupancy.
05050
05100 (3) The person responsible for the fumigation must notify
05150 the master of the vessel, or his representative, of the
05200 requirements relating to personal protection equipment*,
05250 low range detection equipment and that a person
05300 qualified in the use of this equipment must accompany
(50 the vessel with cargo under fumigation. Emergency
.400 procedures, cargo ventilation, periodic monitoring and
05450 inspections, and first aid measures must be discussed
05500 with and understood by the master of the vessel or his
05550 representative.
05600
05650 (4) Seal all openings to the cargo hold or tank using
05700 suitable, water proof, gas tight materials. Lock and/or
05750 otherwise secure all openings, manways, etc. used to
05800 enter the hold. Post appropriate "DANGER" placards on
05850 same.
05900
05950 (5) On tankers the over-space pressure relief system of each
06000 tank must be sealed by (1) the closing of appropriate
06050 valves and (2) sealing the openings into the over-space
06100 with gas tight materials.
(150
200 (6) Contact appropriate authorities.
06250
06300 (7) If the fumigation is not completed and the vessel
06350 aerated before the manned vessel leaves port, the person
06400 in charge of the vessel shall insure that at least two
06450 units of personal protection equipment and one gas or
06500 vapor detection device and a person qualified in their
06550 operation be on board the vessel during the voyage.
06600
06650 (8) During the fumigation or until a manned vessel leaves
06700 port or the cargo is aerated, the person in charge of
06750 the fumigation shall insure that a qualified person
06800 using gas or vapor detection equipment test spaces
06850 adjacent to the fumigated cargo area and regularly
06900 occupied spaces for fumigant leakage.
06950
07000 If leakage of the fumigant is detected, the person in charge
07050 of the fumigation shall take action to correct the
07100 leakage or shall inform the master of the vessel or his
07150 representative, of the leakage so that corrective

07200 action can be taken.
07250
07300 (9) Review with the master, or his representative, the
07350 voyage precautions and procedures.
07400
07500 *Personal protection equipment means a respirator or gas
07550 mask fitted with a canister designed for phosphine gas
07600 which is approved by NIOSH/MSHA. A gas mask and
07650 canister is approved for use up to 15 ppm. Above 15 ppm
07700 or at unknown concentrations a SCBA or its equivalent
07750 must be used.
07800
07850 d. Procedures for Bulk Dry Cargo Vessels and Tankers:
07900
08000 (1) Calculate dosage on the basis of cargo hold volume.
08050 Dosage is always calculated for total hold volume
08100 irrespective of the commodity tonnage in the hold.
08150
08200 Detia(R) Gas EX-B.....2-6 bags per 1000 cubic feet.
08250
08300 (2) Procedure for Detia(R) Gas EX-B (Bag Blanket)
08350
08400 (a) After a hold has been filled or completed, dig a
08450 shallow trench approximately 15 feet long and 2 feet
08500 wide for each blanket being used. Maintain at least
08550 a two foot separation between trenches and stay in
08600 from side walls at least 10 feet.
08650
08700 (b) Open bag blanket containers one at a time; remove
08750 the blanket; unroll it until fully extended and
08800 position into the trench. Cover with the commodity.
08850
08900 (3) Procedure for Detia(R) Gas EX-B (individual bags)
08950 After a hold has been filled or completed, open
09000 containers and distribute bags uniformly onto commodity
09050 surface with spacing between each. Do not place bags
09100 within 10 feet of side walls. Step on each after
09150 placement or probe bags into the commodity to any depth
09200 desired.
09250
09300 (4) Procedure for Detia(R) Gas EX-B (Bag Belt)
09350 After a hold has been filled or completed, open
09400 containers and begin inserting (probing) bag belts into
09450 the commodity mass with spacing between. Do not probe
09500 within 10 feet of sidewalls. Attach a "locator" cord to
09550 each belt before inserting, leaving the loose end on the
09600 commodity surface.
09650
09700 (5) Observe closing of hatch covers closely. Stop the
09750 closing if the cover snags a bag blanket, individual
09800 bag, or bag belt. Reposition the blanket, bag or belt
09850 and resume closing.
09900

U e. Voyage Precautions and Procedures:

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

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

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

(3) Do not enter fumigated holds or tanks.

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

U f. Precautions and Procedures During Discharge:

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

U g. Personal Protective Equipment and Monitoring:

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

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

(3) See sections "I" and "M" on pages of the manual titled "Application Procedures for Detia(R) Gas EX-B" for requirements.

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

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Div. of McShares, Inc.
P. O. Box 1460
Salina, Kansas 67402-1460
(913) 825-2181
Telex 417318 REPCO SAL