PRECAUTIONARY STATEMENTS

Detia® Tablets react with atmospheric moisture to form and release the poisonous gas phosphine (Syn: Hydrogen Phosphide). The reaction begins about 3 hours after exposure to air. Atmospheric and/or commodity temperature dictates the rate and duration of the reaction.

HAZARDS TO HUMANS: DANGER

Wear gloves when handling. Open containers in well ventilated areas, preferably outside. Do not breathe vapors. Do not breathe dust. Do not get tablet dust in eyes or on hands, skin or clothing. Do not eat, drink or smoke while handling. Wash hands thoroughly with soap and water after handling. Have available a gas mask and canister approved by the U.S. Department of Interior, Bureau of Mines, for phosphine protection.

PHYSICAL OR CHEMICAL HAZARDS: Spontaneous ignition may result if tablets come into contact with water or other liquids. Phosphine reacts corrosively with copper, brass, gold and other precious metals.

SYMPTOMS OF PHOSPHINE POISONING: Sensation of cold, diarrhea, gastric pains, acute indigestion, dizziness, dry cough, loss of appetite, intense thirst, vomiting, enlarged pupils, choking attacks, reeling.

ANTIDOTE-FIRST AID: Any of the above may be taken as symptoms of phosphine poisoning. At first warning take victim to fresh air immediately. **CALL A DOCTOR!** Lay the victim down, keep warm with blankets. Supply pure oxygen and maintain respiration, artificially if necessary, until the doctor arrives. If the tablets or the tablet dust has been swallowed, **call a physician or Poison Control Center.** Drink 1 or 2 glasses of water and induce vomiting by touching back of throat with finger, or, if available, by administering syrup of Ipecac. Do not induce vomiting or give anything by mouth to an unconscious person

SELLER MAKES NO WARRANTY, EXPRESSED OR IMPLIED, CONCERNING THE USE OF THIS PRODUCT OTHER THAN INDICATED ON THE LABEL. BUYER ASSUMES ALL RISK OF USE AND OR HANDLING OF THIS MATERIAL WHEN SUCH USE AND OR HANDLING IS CONTRARY TO LABEL INSTRUCTIONS

RPC 7, 81

RESTRICTED USE PESTICIDE:
For Retail Sale To And Use Only By Certified Applicators Or Persons Under Their Direct Supervision And Only For Those Uses Covered By The Certified Applicator's Certification

Detia

TABLETS

Fumigant For Use Against Insects Which Infest Listed Raw Agricultural Commodities And Animal Feeds

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

KEEP OUT OF REACH OF CHILDREN

DANGER-POISON

Statement of Practical Treatment

If Swallowed: **Call a physician or Poison Control Center.** Drink 1 or 2 glasses of water and induce vomiting by touching back of throat with finger, or, if available, by administering syrup of Ipecac. Do not induce vomiting or give anything by mouth to an unconscious person.

If Inhaled: Remove victim to fresh air, immobilize and keep warm. Sustain breathing, artificially if necessary. **CALL A PHYSICIAN IMMEDIATELY.**

See Side Panels for Additional First Aid Procedures

Manufactured by: Detia Freyberg, GMBH
P.O. Box 9
5941 Laudenbach
F.R. of Germany

Distributed by: Research Products Company
Box 1057
Salina, Kansas 67401

EPA Establishment No. 33982WG01
EPA Registration No. 2548-62

Net Contents: 500 Tablets

Net Weight: 1500 grams (3 lbs. 4.8 ozs.)

ENVIRONMENTAL HAZARDS

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.

DIRECTIONS FOR USE

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

Refer to the instruction booklet titled "APPLICATION PROCEDURES FOR DETIA® PELLETS AND DETIA® TABLETS" for detailed use instructions. Used as directed therein Detia® Tablets will aid in the control of granary weevil, rice weevil, lesser grain borer, red flour beetle, Indian meal moth, saw toothed grain beetle, confused flour beetle, bean weevil, and their pre-adult stages (egg-larvae-pupae).

STORAGE AND DISPOSAL

STORAGE: Store in dry, locked ventilated room or building. Protect from moisture, open flames, heat, acids and other chemicals. Never store near homes or living quarters.

PESTICIDE DISPOSAL
Pesticide or rinsate that cannot be used according to label instructions must be disposed of according to Federal, State or Local procedures under the Resource Conservation and Recovery Act.

DISPOSAL OF EMPTY CONTAINERS
METHOD 1: Triple rinse with soapy water (or equivalent) and offer for recycling or reconditioning, or dispose of in a sanitary landfill, or by other approved state and local procedures.

METHOD 2: Expose residual aluminum phosphide to atmospheric conditions as recommended in labeling. Dispose in a sanitary landfill or by other approved state and local procedures.

The booklets "APPLICATION PROCEDURES FOR DETIA® PELLETS AND DETIA® TABLETS" and "INSTRUCTIONS FOR INTRANSIT FUMIGATION OF SHIPHOLDS WITH DETIA® GAS EX-B, DETIA® PELLETS AND DETIA® TABLETS" are a part of labeling. They contain specific use instructions concerning the fumigation of listed **Raw Agricultural Commodities, Animal Feeds, Processed Feeds, Non-Food Products** and **Stored Tobacco;** information concerning dosage and exposure, and other information necessary to properly use Detia® Tablets.

ACCEPTED
OCT 6 1981
Under the Federal Insecticide, Fungicide, and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 2548-62

APPLICATION PROCEDURES FOR

Detia PELLETS

AND

Detia TABLETS

ACCEPTED
OCT 6 1981
Under the Federal Insecticide, Fungicide, and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 2548-62

PHOSPHINE FUMIGANTS FOR USE AGAINST LISTED INSECTS WHICH INFEST LISTED RAW AGRICULTURAL COMMODITIES, ANIMAL FEEDS, PROCESSED FOODS, NON-FOOD PRODUCTS, AND STORED TOBACCO

Research Products Company
P.O. Box 1057
1835 E. North St.
Salina, Kansas 67401

EPA Establishment No. 33962WG01
EPA Registration No. 2548-63
EPA Registration No. 2548-62

RESTRICTED USE
PESTICIDE
For Retail Sale To And Use Only By Certified Applicators Or Persons Under Their Direct Supervision And Only For Those Uses Covered By The Certified Applicator's Certification

TABLE OF CONTENTS

INTRODUCTION

This brochure has been prepared as an aid in educating users of Detia® Pellets and Detia® Tablets.

The history of Detia® is long, dating back to the mid-1930's. In 1970 the first Detia® aluminum phosphide preparation was introduced into the United States, Detia® Gas EX-B. The manufacturer, Dr. Werner Freyberg, Chemische Fabrik, Weinheim, West Germany was the early pioneer in the development of phosphine as a fumigant.

Aluminum Phosphide preparations produce a poisonous and toxic gas. When used properly they are effective as an aid in controlling insect pests of stored raw agricultural commodities, processed foods, animal feeds, non-food products, and stored tobacco and are designed to accomplish specific objectives when used as directed

It is the intent of Research Products Company to provide information in this brochure which will be beneficial in the training of users.

IMPORTANT

Detia® Pellets and Detia® Tablets are to be used only by qualified adult personnel that meet the certification requirements stipulated in the Federal Insecticide, Fungicide, Rodenticide Act of 1972, as amended Neither product is to be used, stored or otherwise handled in or near homes or other residences. Neither product is to be used for any purpose or in any manner other than those consistent with labeling.

Important: Both the label on the container and this brochure must be read, studied and reviewed before using either Detia® Pellets or Detia® Tablets.

ABOUT THE PREPARATIONS

FORMULA

Aluminum Phosphide	57%
Inert Ingredients	43%
Total	100%

® Registered Trademark

DETIA® PELLETS: They consist primarily of a mixture of a very p
bamate and urea pressed into hard, nearly spherical pellets about 3/8"
each and will release about 0.2 grams of hydrogen phosphide. The hardne
is partially responsible for the delayed release of phosphine. The speed o
temperature and relative humidity. The greater each is, the faster the rel
gray-white powder remains comprised mostly of aluminum oxide hydrate,
tightly bound aluminum phosphide.

The pellets are packed in stoppered aluminum flasks holding 1660 pellets
is possible to remove only the number of pellets required.

DETIA® TABLETS: The tablets weigh 3 grams each and will release
are 4/5" in diameter and 1/5" thick. Decomposition of the tablets is slowe
screw-top cans holding 500 tablets each.

Both preparations react with atmospheric moisture to release hydrogen p
formula:

$$2\,AlP + 6\,H_2O \longrightarrow 2\,Al(OH)_3 +$$

WHAT IS HYDROGEN PHO

Hydrogen phosphide, more commonly known and referred to as phosphi
odor like that of decaying fish, garlic or commercial carbide. It is very
penetrating capability of hydrogen phosphide is great. The combination
and toxicity to insects accounts for its wide acceptance as a fumigant F
at 0.1 ppm for raw agricultural commodities and animal feeds and 0.01 p

USE PATTERN

COMMODITIES APPROVED FOR FUMIGATION: Both the
U.S. Environmental Protection Agency for the post harvest fumigation o
cessed foods, animal feeds, non-food products, and stored tobacco.

RAW AGRICULTURAL COMMODITIES

Rice, Wheat, Barley, Corn, Oats, Sorghum, Millet, Rye, Popcorn, Soy
Filberts, Pecans, Pistachio Nuts, Walnuts, Cashew, Brazil Nuts. Almond
Safflower Seeds, Seed and Pod Vegetables, (Adzuki Red Beans, Blacke
Beans, Green Split Peas, Lentils Peas, Lima Beans, Michigan Navy Bea
Split Urds). Sesame Seed. Flower Seed, Vegetable Seed, Grass Seed, D

PROCESSED FOODS

Cereal Flours, and Milled Fractions, Soybean Flour and Milled Fracti
Noodles, Pasta, Malt (processed grains), Bakery Mixes, Packaged Cereals
Cream of Wheat, Processed Coffee/Tea (roasted-dried), Prepared Co
Seasoning, Condiments (ground), Cookies, Crackers, Snack Foods, Ho
Creamers, Dried Powdered Milk, Processed Almonds, Brazil Nuts, Cash
Nuts, Walnuts, Dehydrated Potato Products, Dried Apples, Dried Peach
tots, Dried Eggs, Apricot Kernels, Primary Yeast, Dates, Figs, Prunes, R
tils, Dried Peas

ANIMAL FEED OR FEED INGREDIENTS

NON-FOOD PRODUCTS

Cotton (cloth and unprocessed), Feathers, Human Hair, Rubberized Hair,
Wood and Bamboo Products.

INSECTS WHICH CAN BE FUMIGATED WITH DETIA® PELLETS AND TABLETS:

Used as directed they will provide an aid in the control of granary weevil, rice weevil, maize weevil, lesser grain borer, saw toothed grain beetle, confused flour beetle, Indian meal moth, red flour beetle, bean weevil, cigarette beetle, cadelle, angoumois grain moth, yellow meal worm, Mediterranean flour moth, and dried fruit moth

Refer to the sections titled APPLICATION PROCEDURES for detailed use instruction

CAN THEY BE MISUSED

Yes! A misuse is any use that contributes to ineffective results or is likely to result in a situation that is dangerous or hazardous to life. Or, is a use inconsistent with labeling.

1. Dosage recommendations have been carefully calculated. Users should not exceed label recommendations. It is important to realize that a shortened exposure period cannot be compensated for with an increased dosage.

2. Hydrogen phosphide is a very volatile gas with a high vapor pressure. Even though extremely toxic to insects it is very necessary that any structure being fumigated be sealed as gas tight as possible. To miss sealing any single large opening will ruin a fumigation. To miss sealing only a very few small openings or cracks will materially affect results. Furthermore, any leakage could under certain circumstances endanger life.

3. They should never be used in such a manner as to allow for the build up of gas whereby the concentration in air would reach the lower ignition level of 1.79% by volume (17,900 ppm). Recommended dosage levels are far below that required to reach the lower limit.

4. In contact with water or other liquids they can undergo spontaneous heating and spontaneous ignition of the evolved phosphine. Therefore, never use pellets or tablets in a manner that might lead to contact with water or other liquids.

5. The release of hydrogen phosphide from both preparations is controlled by design. There is no safe way to accelerate the decomposition and reaction.

6. Hydrogen phosphide is capable of penetrating through a wide variety of dense and/or seemingly gas tight materials. Most masonry block walls, for example, will be penetrated given enough time. The end result could be an ineffective fumigation and the endangerment of life in adjoining rooms. The same would be true of poorly constructed wooden structures.

7. Hydrogen phosphide reacts corrosively with copper, brass, gold, and other precious metals. Thus, switch gear, communication devices, small electric motors, etc., should be protected or removed before fumigation. If removal is impossible some protection can be afforded by using vaseline on contact points or totally wrapping devices with heavy polyethylene film.

8. Detia® Pellets and Detia® Tablets must not be used so that they or their unreacted residues come in contact with any processed food, except processed brewer's rice, malt, and corn grits stored in breweries for use in the manufacture of beer.

APPLICATION PROCEDURES FOR BULK RAW AGRICULTURAL COMMODITIES [1]

FOREWORD. Pellets are particularly suited for the fumigation of bulk stored commodities in conventional grain elevator type vertical bins or silos. Such structures are invariably equipped to easily turn or transfer commodities from one bin to another. Tablets, on the other hand, are particularly suited for use in storage facilities that are not equipped to conveniently turn or transfer commodities. There are many such "flat storage" structures routinely used by commodity handlers. A typical example would be a metal or wood frame building.

The application procedure for pellets or tablets in vertical bins is to arrange for their uniform and continuous addition to the commodity stream as a bin is filled. The fumigation of flat storage with pellets or tablets involves their uniform distribution throughout the commodity mass using probes designed for such use or scattering them on the commodity surface. In either case a prerequisite to fumigation is a storage facility that can be properly sealed or otherwise prepared. Proper preparation is essential for two reasons, (1) to insure to the extent possible the effective control of insects and, (2) to protect man and other forms of life from hydrogen phosphide during the fumigation. Hydrogen phosphide is highly volatile and will penetrate through, given enough time, a variety of seemingly gas tight materials. As an example it will slowly diffuse through concrete. Diffusion through less dense materials will be faster. It is therefore imperative that all adjoining rooms, bins, silos or other enclosed spaces be evacuated while the fumigation is in process. As will be shown in the EXPOSURE GUIDE a fumigation will take several days.

Preparation will consist of at least the following steps:

Grain elevator type bins and silos: (1) Sealing of all tunnel outlets, spouts or gates with putty or caulking compound. In some cases it will be possible to use heavy polyethylene bags or film in combination with high tack masking or duct tape. (2) Sealing off any other connecting openings into the bins such as downspouts from other bins, vent holes into adjacent bins, atmospheric ventilators, and manways using gas tight materials. Do not use burlap bags, paper or other porous materials.

Flat storage. (1) Sealing of all openings such as aeration duct openings, vents, doors, spouts, and windows. (2) Sealing off any connecting downspouts, elevator legs or conveyors. (3) Locking or otherwise securing all entry ways.

In addition to the foregoing other steps must be taken such as notifying local authorities (fire, police, etc.), posting of danger signs, being certain first aid information and proper respiratory protection equipment is at the site, being certain that all adjoining facilities are evacuated, posted and locked, being certain of the recommended application procedures, and that operators have been trained and understand labeling.

DIRECTIONS/PELLETS: [2] Pellets are designed for use in automatic dispensers. (1) Determine dosage and pour the required number of pellets into the dispenser hopper. (2) Start transfer of the commodity. (3) Allow the bin to fill for a minute or so and then activate the dispenser. (4) Check the calibration to see that the proper addition rate has been achieved. (5) Upon completion of the transfer the dispenser should be empty. If a few pellets remain place them back in the pellet flask or, scatter them onto the surface of the commodity. (6) Close and seal the fill opening and post a danger sign.

[1] Detia® Pellets and Detia® Tablets may be used as described in this section for fumigating processed brewers rice, malt, and corn grits stored in breweries for use in the manufacture of beer.

[2] Tablets may also be used in specially designed automatic dispensers as described herein.

DIRECTIONS/TABLETS: When tablets are probed into commodities stored in flat storage, the procedure is more complicated than that for surface application or treatment of vertical bins and calls for more planning, organization and in practically every case several workers under the supervision of a coordinator. The basic procedure is to uniformly insert, or probe, the required number of tablets into the commodity pile with specially designed probes. It is essential that a pre-fumigation plan be adopted and followed. The following hypothetical situation is offered as a guide:

1. A building 50 ft. wide and 100 ft. long with grain leveled to a depth of 15 ft. will hold about 60,000 bushels and requires a minimum dosage of 3600 tablets at 60 per 1000 bushels.

2. Determine the area of the grain surface as square feet and divide by 50 (sq. feet) to determine the number of probe insertions required.

$$\frac{5000}{50} = 100 \text{ probes}$$

3. Divide the dosage by the number of probes to determine the number of tablets/probe.

$$\frac{3600 \text{ tablets}}{100 \text{ probes}} = 36 \text{ tablets/probe}$$

4. The depth of the grain minus 3 ft. produces the probe depth.

15' - 3' = 12', probe depth.

5. As the probe is withdrawn from a depth of 12 ft. tablets are dropped every 12 inches or so. By dividing the probe dosage (36) by the probe depth (12) produces the number of tablets to be dropped every 12 inches as the probe is withdrawn.

$$\frac{36}{12} = 3 \text{ tablets per drop}$$

6. Experience shows that two workers can make 15, 12 ft. probe insertions per hour including tablet drops during withdrawal. Even so, test probes to the required depth are suggested beforehand to determine exact probing conditions.

7. Tablets will begin to produce phosphine in quantity in about 3 hours. However, all work should be completed in 2 hours or less.

8. Thus, with the 2 hour working limit a two worker crew can be expected to make 30 insertions. With 100 insertions required it means 3 3, 2 worker crews.

$$\frac{100 \text{ probes}}{30 \text{ Crew Limit}} = 3\ 3, 2 \text{ worker crews}$$

9. This situation calls for 3 3, 2 worker crews. The common sense approach is to use 4 crews or 8 workers plus a coordinator for a total of 9. The basic requirements are now known, i.e. 100 insertions with 9 workers. The coordinator should then plot the grain surface and mark the insertion points, arrange for the placement of tablet containers at appropriate intervals and map out the path to be followed.

10. When all preparation has been made the probing begins. The coordinator should not actually take part as his responsibility is to coordinate, mark time and see that all work is according to plan.

11. Generally speaking gas masks need not actually be worn. One for each worker should be readily available, however, and on the job site in the event they are needed. It will be the job of the coordinator to periodically test the working atmosphere above the commodity surface for the presence of hydrogen phosphide using an appropriate testing device. If concentrations develop in the working atmosphere before probing is complete he must stop the work and see to it that gas masks are worn.

The hypothetical situation presented provided for a level surface and grain 15 ft. deep. With an unlevel commodity surface and/or deeper storage the task becomes more difficult. IT IS ENTIRELY POSSIBLE THAT SOME FLAT STORAGE UNITS CANNOT BE FUMIGATED BY PROBING DETIA® TAELETS. There may be several reasons.

1. Not enough head room to permit workers to operate the probes.

2. Highly peaked commodities or otherwise irregular surfaces that would over burden workers as they move about.

3. Storage so deep or so compacted that insertion of the probes to the lower depths is impossible, thus, preventing uniform distribution of the tablets.

4. Or, any other condition that will prevent application within the 2 hour working limit.

Unless the flat storage unit is tight by design and then properly sealed at the normal openings it will be necessary to cover the commodity surface with plastic film or other gas proof materials in order to obtain an effective fumigation. If this is not possible more suitable fumigants should be considered.

Tablets can also be used to SPOT FUMIGATE. The procedure is to determine the volume of the infested area, by probe sample, and then double it. Determine the dosage on the basis of the highest dosage permitted in labeling. Using probes insert the tablets uniformly throughout the "Spot". If the spot is close to or near the surface place poly film or other gas proof materials over the area following insertion of the tablets.

Spot fumigation is, at best, an inexact art and will provide only partial result.

DOSAGE AND EXPOSURE

Fumigation is more of an art than a science. There is no precise formula available to determine exact dosage requirements for a given set of conditions. It is known that hydrogen phosphide is highly toxic to insects at very low concentrations. This can be easily demonstrated under controlled laboratory conditions. Fumigation in the field is an entirely different matter, however, and calls for a close evaluation of existing conditions before a dosage is selected. There are many factors to consider but there are two that are basic: (1) Is the storage structure of such construction and design that it can be well sealed? (2) Can a uniform application of either pellets or tablets be accomplished?

A "yes" answer to both questions will permit the use of the lower dosages. A "no" to either question will call for higher dosages.

There is no way in this brochure to address every condition that will affect dosage. Therefore the dosage schedule to follow is presented only as a guide. It is up to the user to determine what dosage best matches the conditions at hand.

SUGGESTED DOSAGE SCHEDULE

	Per 1000 cu ft	Per 1000 Bu.
Pellets	100-330	124-415
Tablets	20-66	24-85

When tablets are used for flat storage fumigation it may be necessary to compensate for the expected loss of gas with increased dosages. Even under the best of circumstances a good deal of gas will be lost. If there happens to be high wind the gas loss will be even greater.

The establishment of the exposure period is a critical determination. For all practical purpose the temperature of the grain is the deciding factor. Not to be over-looked, however, is the importance of humidity. Both temperature and humidity influence the rate of decomposition. The higher each is the faster the release of hydrogen phosphide. As stated, however, from a practical standpoint the commodity temperature determines the exposure period.

In that connection the following table can be used as a guide for determining exposure periods.

EXPOSURE GUIDE

PELLETS

Commodity Temperature C°	F°	Required Exposure Period
4° & below	Below 40°	Do Not Fumigate
5° - 11°	40° - 53°	8 days (192 hrs.)
12° - 15°	54° - 59°	4 days (96 hrs.)
16° - 20°	60° - 68°	3 days (72 hrs.)
Above 20°	Above 68°	2 days (48 hrs.)

TABLETS

4° & below	Below 40°	Do Not Fumigate
5° - 11°	40° - 53°	10 days (240 hrs.)
12° - 15°	54° - 59°	5 days (120 hrs.)
16° - 20°	60° - 68°	4 days (96 hrs.)
Above 20°	Above 68°	3 days (72 hrs.)

As stated the foregoing table is a guide. Whenever possible exposure periods should be lengthened and not shortened. The key to effective results lies with correct dosage, long exposure periods, proper application, and well sealed storage structures.

NOTE THAT NEITHER THE PELLETS NOR TABLETS SHOULD BE USED WHEN COMMODITY TEMPERATURES ARE BELOW 40°F. At these temperatures the decomposition of the preparations is greatly retarded.

POST FUMIGATION PROCEDURES

FOREWORD: It will be important to always meet the minimum exposure requirements and to exceed them whenever possible. It is virtually impossible to achieve a "100% kill" of insects under field conditions. This is particularly true for the pre-adult stages - egg, larva and pupa. It is to the advantage of the user to leave the commodity "under gas" for as long as possible in order to increase the effectiveness of the fumigation.

Because there is no reason to have to aerate a bin or other structure it is not necessary to follow any set procedure such as removing seals, opening vents and doors, activating aeration devices (if present), etc. at a specified time. Once minimum exposure requirements have been met the commodity can be aerated, transferred or left alone at the option of the user.

Any remaining phosphine will dissipate rapidly to atmosphere once seals are removed and the commodity is disturbed by physical transfer or aeration whether forced or natural. In order to place the proposition in perspective consider that in a 30,000 bushel silo a total of perhaps 9,000 pellets will be applied (300 pellets x 30M). 9000 pellets will yield about 1800 grams of phosphine, or only about 4 pounds. During the exposure period there may be seepage and loss of phosphine. The percentage of loss will vary depending on the tightness of the structure. By the time exposure requirements have been met the concentration of phosphine will have been materially reduced. Aeration of the commodity will rapidly remove what is left whether by transfer or otherwise.

PROCEDURE — GRAIN ELEVATOR TYPE STORAGE

1. As a precautionary measure test working areas before work begins for phosphine using appropriate testing devices. If detected workers should wear appropriate respiratory protection equipment until all traces of gas have vanished.

2. Open doors and windows or otherwise create a draft through tunnels and other enclosed spaces beneath bins.

3. Unseal bin bottoms, activate conveyors and begin the transfer. The natural draft through tunnels in combination with air movement caused by the operation of conveying equipment, elevator legs, dust filters, etc. will quickly dilute any phosphine coming with the commodity from the bin.

4. Remove danger signs.

PROCEDURE — FLAT STORAGE

1. Working from outside remove all seals, open doors and windows and activate head space ventilation fans if present.

2. If aeration fans are present activate and operate for an hour or so.

3. Ventilate any tunnels or enclosed spaces beneath buildings.

4. Before allowing workers to enter the building test the working areas for phosphine. If detected continue aerating.

5. Remove danger signs.

Both tablets and pellets decompose leaving behind a gray-white dust like material. The dust will be automatically removed through aspiration and normal handling procedures when the commodity is moved or transferred.

DISPOSAL

The foregoing application procedures preclude the necessity of having to dispose of either untreated pellets or their dust-like remains. There are situations, however, when disposal or special handling may be necessary:

1. LEAKING FLASKS. Wearing a gas mask or suitable respirator (SEE SECTION ON SAFETY EQUIPMENT) transfer pellets to a sound flask, secure the stopper, arrange to use at the first opportunity.

2. SPILLS: Immediately pick up the pellets or tablets and place them back into the original container. Reseal it.

   If decomposition has begun evacuate the area, put on a gas mask or suitable respirator, sweep up the pellets, or their dust, and place into any available, dry receptacle. Take immediately to an open isolated area and bury.

APPLICATION PROCEDURES FOR SPACE FUMIGATIONS

INTRODUCTION

This section describes the recommended method for using DETIA® Pellets and/or DETIA® Tablets for space fumigations in buildings, warehouses, mills, food processing plants, atmospheric chambers, freight containers, van type trailers, tarped commodities and other static enclosures which can be sealed. Before proceeding with a fumigation be certain that all operators have carefully read this booklet and the label and have been fully trained in the use of the product.

IMPORTANT

There are at least four factors that materially affect a fumigation:

1. Dosage
2. Temperature and relative humidity
3. Exposure period
4. How well a storage structure is sealed

DOSAGE AND EXPOSURE

There is no precise formula available to determine exact dosage requirements for a given set of conditions. It is known that hydrogen phosphide is highly toxic to insects at very low concentrations. This can be easily demonstrated under controlled laboratory conditions. Fumigation in the field is an entirely different matter, however, and calls for a close evaluation of existing conditions before a dosage is selected. There are many factors to consider but there is one that is basic. Is the structure of such construction and design that it can be well sealed?

A "yes" answer will permit the use of the lower dosages. A "no" will call for higher dosages.

There is no way in this brochure to address every condition that will affect dosage. Therefore the dosage schedule to follow is presented only as a guide. It is up to the user to determine what dosage best matches the conditions faced.

SUGGESTED DOSAGE SCHEDULE
(non-tobacco space fumigations)

	per 1,000 cu. ft
Pellets	100 - 330
Tablets	20 - 66

The establishment of the exposure period is a critical determination. For all practical purposes the temperature inside the storage structure is the deciding factor. Not to be over-looked, however, is the importance of humidity. Both temperature and humidity influence the rate of decomposition. The higher each is the faster the release of hydrogen phosphide. As stated, however, from a practical standpoint the temperature determines the exposure period.

In that connection the tables on page 7 can be used as guides for determining exposure periods.

TOBACCO DOSAGE/EXPOSURE GUIDE

Tobacco Temperature Above 60°F

Temperature	Dosage: Pellets/ 1000 cu ft.	Dosage: Tablets/ 1000 cu. ft.	Minimum Exposure
Above 68°F	100	20	4 days
60° - 68°	100	20	6 days

Post Fumigation Aeration ..... Hogsheads ..... 3 days minimum
Bales ..... 2 days minimum

Tobacco Temperature: 40° - 59°F

Best results are achieved when tobacco is fumigated at temperatures above 60°F. However, where it is not possible to achieve these temperatures, fumigation at temperatures in the 40° — 59°F. range have provided satisfactory controls of the cigarette beetle larvae. Eggs and pupae of the cigarette beetle may survive a fumigation at these lower temperatures. The appropriate exposure periods for fumigation of tobacco are.

50°F - 59°F. ..... 7 days
40°F - 49°F ..... 14 days

NOTE: Warehouses and containers must be tightly sealed.

Post fumigation aeration time is a minimum of 4 days.

A WORD ABOUT SEALING

Storage structures and containers must be well sealed for good results. Poor sealing will ruin a fumigation.

There are many factors affecting a fumigation but most are minor compared to the four mentioned. Of particular importance is sealing. A single loose seal will materially affect the results. An overlooked opening will cause the fumigation to be a failure. Proper sealing cannot be over-emphasized.

Dosage, Temperature/Humidity and Exposure Period are very closely related. A deficiency in one area cannot be compensated for by another. Example...Minimum indicated exposure period cannot be compensated for with increased dosage.

It is important to compare the labeling with existing conditions and to follow labeling recommendations closely.

APPLICATION PROCEDURES ..... Buildings, Warehouses, Mills, Food Processing Plants

1 Read the label and labeling

2 Determine dosage and collect all necessary materials

3 Seal all doors, windows, vents,and other openings except for door being used to enter and leave Use any combination of masking tape, caulking compound, polyethylene film or other equivalent materials to achieve a tight seal. The structure should be sealed as gas tight as possible Be certain that all passageways, vents, electrical conduits, etc to connecting buildings are locked and/or tightly sealed

4 Post danger signs in prominent locations and on all ground level doors Be certain entrances are securely locked

The recommended method of applying DETIA® Pellets and/or Tablets is to pour them from their flasks onto sheets of paper Shallow trays can also be used

The floor area selected for placement of the paper must be dry, clean and unobstructed Determine beforehand the ultimate distribution pattern, and establish a plan for eventual placement of pellets or tablets Place the paper sheets according to pellet or tablet distribution plan

You are now ready to begin placement of the pellets or tablets Very large buildings may require several operators to achieve placement in the time allotted The total elapsed time from when flasks are first opened and when placement is complete at warm temperatures should be approximately ½ hour per floor of building Full face gas masks with canisters meeting the specifications of MESA/NIOSH or the U S. Bureau of Mines for phosphine should be immediately available

5 When fumigating multiple story buildings, each floor is considered separately with respect to dosage, and pellets or tablets are placed on each floor Placement should begin with the uppermost floor and end with the ground floor

6. Pour and/or place the pellets or tablets onto the paper in a single layer.

7. Vacate building, seal doors and secure with a lock.

8. Check for leakage of gas.

POST FUMIGATION PROCEDURE

1. Exposure period should correspond to instructions herein with respect to temperature.

2. Open as many doors, vents, windows, etc. as possible without entering the storage structure.

3. Enter after approximately two hours and systematically open any additional doors, louvers, vents, or windows to permit good ventilation. Operators should work in pairs and wear specified gas masks.

4. Activate any power ventilation systems.[1] Permit building to air out for several hours.

5. Determine for the presence of phosphine gas using appropriate gas detection equipment Operators should work in pairs wearing specified gas masks.

6. When free of gas remove danger signs.

7. Aeration of Tobacco — Above 60°F aerate hogsheads for a minimum of three days Bales require a minimum of two days. Below 60°F aerate for a minimum of four days

[1]Activate power ventilation from outside as a first step, if possible.

APPLICATION PROCEDURES ..... Containers, static van type trailers, atmospheric chambers, and other sealable enclosures.

1 Read the label and labeling

2 Determine dosage and collect all necessary materials

3. Seal doors, vents, cracks, and other openings except for the door being used for entry and exit. Use any combination of masking tape, caulking compound, polyethylene film or other equivalent materials to achieve a tight seal The container should be sealed as gas tight as possible.

4 Post danger signs on all sides and/or doors

5 The total elapsed time from when flasks are first opened and when placement is complete at warm temperatures should be approximately ½ hour or less Full face gas masks with canisters meeting the specifications of MESA/NIOSH or the U S Bureau of Mines for phosphine should be immediately available

6 Pour and/or place pellets or tablets in a single layer into trays or similar devices and place inside storage structure

7. Vacate storage structure, seal doors and secure with locks.

8 Do not move trucks, vans, or trailers during fumigation. They must be completely aerated before movement is allowed

POST FUMIGATION PROCEDURE

1 Exposure period should correspond to instructions herein with respect to temperature.

2 Open doors

3 After one half hour determine for the presence of phosphine gas using appropriate gas detection equipment.

4 When free of phosphine remove danger signs.

APPLICATION PROCEDURES..... Tarped Commodities

1 Read the label and labeling

2 Consolidate commodities to be fumigated

3 Calculate cubic footage of each group of commodities Refer to Suggested Dosage Schedule on page 6.

4. Collect all necessary materials ie. polyethylene film, danger signs, paper plates, tape or other materials for sealing Two mil polyethylene film can be used inside, but for outside fumigations the tarp should be at least 4 mil When fumigating outside, black polyethylene film is preferable if the tarp is to be re-used. Equivalent materials may be used in place of those named above

5 Spread the tarp over the commodities Tarps may be spliced together with tape, heat sealing, bonding glue, or tarp clamps.

6. Secure the tarp lightly to the floor with masking tape, bonding glue, sand snakes or other equivalent methods leaving a small section loose for insertion of fumigant.

Place the tarp under commodities that are placed on porous surfaces such as wood.

7. Post a danger sign on all four sides

8. Pour and/or place pellets or tablets in a single layer into trays or similar devices and place under tarp.

9. Seal the opening which was left for insertion of Detia® Pellets or Tablets.

10. Normally, work may continue around tarped commodities during the fumigation. The O S H A. time weighted average is 3 ppm. However, it will be necessary to test for phosphine at regular intervals during the exposure period.

POST FUMIGATION PROCEDURE

Tarped Commodities Inside Building

1. Exposure period should correspond to instructions herein with respect to temperature.

2. Evacuate building and post danger signs on entrances.

3. Open as many doors, vents, windows, etc. as possible.

4. Activate any power ventilation systems.

5. Remove tarps from commodities. Operators should work in pairs wearing specified gas masks.

6. Permit building to air out.

7. Determine for the presence of phosphine gas using appropriate gas detection equipment. Operators should work in pairs and wear specified gas masks.

8. When free of gas remove danger signs.

Tarped Commodities Outside Building

1. Exposure period should correspond to instructions herein with respect to temperature.

2. Remove tarps from commodities.

3. Permit aeration for 30-minutes prior to moving commodities.

NOTE: Aerate all fumigated commodities for at least 48 hours before offering to consumer. Note specific aeration instructions for tobacco.

DISPOSAL

Dry Method: The pellets and tablets react with atmospheric moisture during the exposure period and produce hydrogen phosphide (phosphine). During the process the tablets/pellets decompose to form a dust that must be disposed.

If sheets of paper were used, fold-up in such a way to form a "package". Avoid spillage of the dust as the package is removed. It is permissible to place the paper/dust packages into dry, re-usable containers such as metal or fiber drums to facilitate transport of the dust to an appropriate burial site.

If re usable trays or similar devices were used, instead of sheets of paper, pour the dust into the transport container.

Wet Method: An alternate to the Dry Method is to slurry the dust with water. The recommended procedure is to fill a receptacle about ⅔ full with water. Large quantities of dust may require 55 gallon oil drums. Add about 2½ by volume of any ordinary liquid detergent. Mix the detergent and water together without creating suds. The objective is to mix the dust with the water which will require agitation as the dust is slowly added.

In either case avoid contact with and/or breathing of the dust. Consult the label for other precautions.

APPLICATION PROCEDURES FOR INTRANSIT FUMIGATION OF RAILCARS BULK LOADED WITH RAW AGRICULTURAL COMMODITIES

BOXCARS

After the car is loaded, scatter the required number of tablets or pellets uniformly onto the surface. As distribution is made, force them a few inches under the surface by either stepping on them or pushing them under by hand.

HOPPER CARS

After the car is loaded, uniformly scatter the tablets or pellets onto the surface. It may require forcing the commodity away from the fill opening in order to expose the surface.

Railcars should be sealed to reduce leakage. Danger signs must be secured to the car in conspicuous locations.

APPLICATION PROCEDURES FOR INTRANSIT FUMIGATION OF RAILCARS LOADED WITH ALL OTHER APPROVED COMMODITIES

A maximum of two tablets or ten pellets may be placed in each pocket of moisture permeable envelopes. Affix envelopes securely inside car. The residue collected after fumigation may be buried or mixed into soapy water. Refer to page 6 and 7 for dosage and exposure period.

Railcars should be sealed to reduce leakage. Danger signs must be secured to the car in conspicuous locations.

ABOUT DANGER SIGNS

Research Products Company furnishes signs that are considered appropriate. Refer to the illustration below.

Fumigated areas must be placarded on all entrances with signs containing at least the signal word DANGER and the "Skull and Crossbones" and the words "Area under fumigation, do not enter until completely aerated," the date of fumigation, name of the fumigant used, emergency telephone number for contact, and the name and address of the fumigator. Do not remove warning signs until the fumigated area is completely aerated and safe for entry, as indicated by a suitable detector.

DANGER-POISON

KEEP AWAY

Area Under Fumigation, do not enter until completely aerated.

Date: By (name and address):

Phone: Fumigant.

All printing in red on white backing.

Whether users make their own signs or obtain them from outside sources, the format and content of the illustrated placard should be followed.

EFFECTIVENESS — WHAT TO EXPECT

There is nothing absolute when it comes to predicting what percentage of an insect population will be killed as the result of fumigation. To expect a "100% kill", meaning all stages of insect life, is unrealistic and seldom achieved under practical field conditions. Literally interpreted a "100% kill" means every egg, larva, pupa and adult has been killed. A more realistic view is that something less than 100% of a given population will be killed. From a practical viewpoint it is not unrealistic to expect, say, a 95% kill. There will be times when effectiveness approaches 100% — there will be others when effectiveness is more on the order of 90%.

To fall below 90% usually means that something unexpected happened such as the sudden appearance of a high, sustained wind during the exposure period. Another example would be the unexpected interruption of a silo filling process whereby the silo was only, say ½ full when the process was stopped and not resumed. The net effect would be that of diluting the ultimate gas concentration to undesirable levels.

The dosages for Detia® Pellets and Detia® Tablets are tied closely to exposure time and tightly sealed storage structures, and have taken into account many of the conditions normally found in the field. It would be impossible, however, to address every situation. In very unusual circumstances it would be best to consult with Research Products Company and determine if it is even possible to fumigate and expect good results. Depending on the exact situation it may mean transferring the commodity to a more suitable structure. In others it may mean selecting a more suitable fumigant.

Of critical importance is to meet minimum exposure requirements and whenever possible to exceed them. As a general rule the pre-adult stages are more difficult to kill than the adults. In this regard it is advantageous to lengthen exposure periods.

FIRST AID

HYDROGEN PHOSPHIDE IS TOXIC TO ALL FORMS OF ANIMAL LIFE. Exposure through inhalation produces clear symptoms of poisoning such as a piercing sensation in the chest, dizziness, nausea, vomiting, a prolonged feeling of faint and a rapid on-set of stupor. At the first warning that someone has been affected by phosphine —

1. Take the person to fresh air immediately and call a doctor.
2. Lay the person down and keep warm with blankets.
3. Maintain respiration, artificially if necessary.

If for some reason the pellets or tablets are swallowed symptoms of severe poisoning will be quickly noticed. Usually heavy vomiting followed by unconsciousness. Call a physician or Poison Control Center. Drink 1 or 2 glasses of water and induce vomiting by touching back of throat with finger, or, if available, by administering syrup of ipecac. Do not induce vomiting or give anything by mouth to an unconscious person. Repeat until vomit is clear. DO NOT DELAY! TAKE THE PERSON TO A HOSPITAL AS FAST AS POSSIBLE. TAKE THIS BOOKLET WITH YOU AS WELL AS THE CONTAINER WITH THE LABEL INTACT. PRESENT BOTH TO THE ATTENDING PHYSICIANS.

NOTE TO PHYSICIAN

Complete rest for patient: 1 - 2 days—no activity—keep patient warm. Intravenous glucose injections (as normal practice) if patient suffers from nausea and vomiting. If, however, an increase in the blood sugar is found, isotonic salt solutions (physiological salt — or Ringer's solution without glucose) must be injected instead.

Inhalation of oxygen or oxygen/carbon dioxide is usually successful. Use of cardiac and circulatory stimulants normally advisable.

In extremely serious cases of poisoning, blood transfusions are recommended. In no circumstances must an anti-dotal use be made of fats, oils(castor oil), butter or milk.

Phosphine (PH_3) poisoning is not known to be chronic; phosphine action is reversible and symptoms will disappear by themselves.

SAFETY EQUIPMENT

It is normally not necessary to actually wear a gas mask when applying Detia® Pellets or Detia® Tablets because the initial gas release from either is delayed by design. However, suitable respiratory protection equipment should be immediately available and close by.

There are a number of suppliers of respiratory protection equipment. Irrespective of the supplier chosen, be certain to specify canisters for protection against phosphine gas and approved by MESA/NIOSH or the U. S. Bureau of Mines. Consult your supplier concerning the limitations of the equipment selected.

NOTE: The use of respiratory protection equipment must comply with any and all Federal, State or local regulations. Consult the proper authorities for detailed information.

GAS DETECTION EQUIPMENT

All users of fumigants should have, as standard equipment, gas detection devices designed specifically for the type or kind of fumigant being used. And, they should establish inflexible policies concerning their routine use.

There are several reliable devices marketed. One of which is the Drager MultiGas Detector. It is a portable, simple device and does not require intensive training or elaborate supporting equipment to operate. Furthermore it is inexpensively adaptable to remote monitoring procedures and will measure concentrations of phosphine in air in trace amounts of 0.1 ppm on up.

There are other devices equally as reliable. Consult your local suppliers of such equipment or contact Research Products Company for more information.

INSTRUCTIONS

FOR

INTRANSIT FUMIGATION

OF SHIPHOLDS WITH

Detia®

DETIA® GAS EX-B, DETIA® PELLETS, AND DETIA® TABLETS

RESTRICTED USE
PESTICIDE
For Retail Sale To And Use Only By Certified Applicators Or Persons Under Their Direct Supervision And Only For Those Uses Covered By The Certified Applicator's Certification

EPA Establishment No. 33982WG01
EPA Registration No. 2548-59
EPA Registration No. 2548-63
EPA Registration No. 2548-62

ACCEPTED
OCT 6 1981
Under the Federal Insecticide, Fungicide, and Rodenticide Act as amended for the pesticide registered under EPA Reg. No. 2548-62

7/81 RPC

INTRODUCTION

Detia® Gas EX-B, Detia® Tablets and Detia® Pellets are fumigant preparations containing 57% aluminum phosphide (by weight) which when removed from their original shipping containers will liberate Hydrogen Phosphide (phosphine). The reaction between atmospheric moisture and the aluminum phosphide will continue for several days depending on climatic conditions.

IMPORTANT

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

2. Detia® Gas EX-B (EPA Reg. No. 2548-59), Detia® Tablets (EPA Reg. No. 2548-62) and Detia® Pellets (EPA Reg. No. 2548-63) are classified by the U.S. Environmental Protection Agency as RESTRICTED USE PESTICIDES, for retail sale to and use only by Certified Applicators or Persons Under Their Direct Supervision And Only for Those Uses Covered by The Certified Applicator's Certification.

3. For additional information refer to labels and booklets entitled "APPLICATION PROCEDURES FOR DETIA® PELLETS AND DETIA® TABLETS", "DETIA GAS EX-B INSTRUCTION BOOKLET", and "PROPER HANDLING FIRST AID AND DISPOSAL OF DETIA® GAS EX-B A PHOSPHINE FUMIGANT".

4. 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.

PROCEDURES

Bulk Dry Cargo Vessels

Prefumigation Procedures

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

2. Determine fumigation suitability of vessel (ship) and be certain that the hold or holds to be fumigated are of such sealable construction to permit an in-transit fumigation without danger to the crew during the application and subsequent voyage.

3. Excluding the main hatch opening, seal all other openings to the hold using suitable, water proof, gas tight materials. Lock and or otherwise secure all openings, manways, etc. normally used to enter the hold. Post appropriate "DANGER" signs on same.

4. Arrange for enough manpower to make application of the fumigant preparations in two hours or less (per hold).

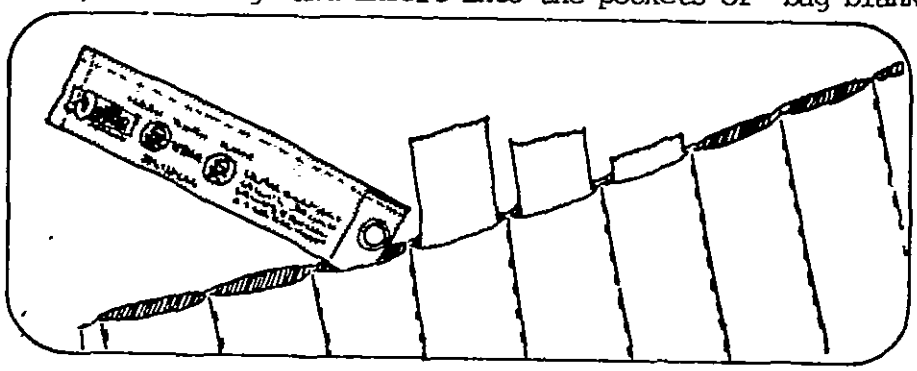
5. Contact appropriate authorities.

Application Procedures

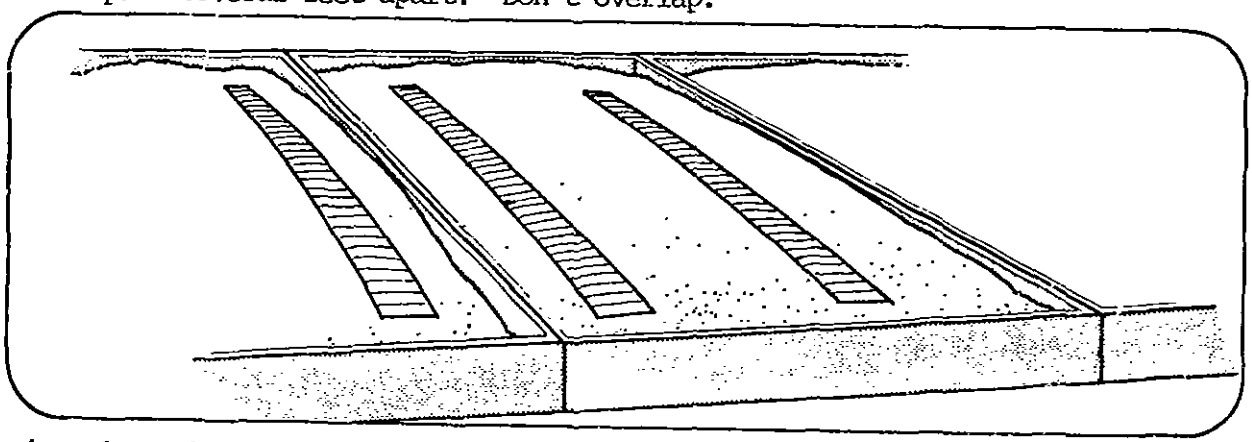
Detia® Gas EX-B....Method One.

1. Calculate dosage on the basis of 3 bags per 1000 cubic feet. Dosage is always calculated on total hold volume irrespective of the amount or quantity of commodity loaded into the hold.

2. Open cans, remove bags and insert into the pockets of "bag blankets":



3. Place the "bag blankets" fully extended onto the commodity surface. Space several feet apart. Don't overlap.



4. Close the hatch cover immediately after blankets are in place.

5. Post "DANGER" signs in prominent locations on the outside of the hatch cover.

Detia® Gas EX-B....Method Two.

This method utilizes pre-packed bag blankets (100 bags per can).

1. Open cans and remove the bag blankets.

2. Place the rolled-up blankets onto the commodity surface and unroll until fully extended.

3. See steps 3, 4, 5, under Method One.

Detia® Gas EX-B...Method Three.

In lieu of either Method One or Method Two the bags may be uniformly scattered onto the commodity surface or probed in to any depth desired, with spacing between each. These methods necessitate securing the bags to one or more continuous lengths of stout cord to facilitate easy removal at the port of discharge.

Detia® Tablets

1. Calculate dosage on the basis of 33 tablets per 1000 cubic feet. Dosage is always calculated for total hold volume irrespective of the amount or quantity of commodity loaded into the hold.

2. Apply the tablets by scattering them uniformly onto the commodity surface utilizing as much of the total surface area as possible. To reduce gas loss and in order to delay the generation of phosphine as long as possible it may be appropriate to step the tablets into the surface of the commodity, or, to probe them in to any depth desired.

3. See steps 4 and 5 under Detia® Gas EX-B Method One.

Detia® Pellets

1. Calculate dosage on the basis of 165 pellets per 1000 cubic feet. Dosage is always calculated for the total hold volume irrespective of the amount or quantity of commodity loaded into the hold.

2. See steps 2 and 3 under Detia® Tablets.

TANKERS

Prefumigation Procedure

1. Refer to and comply with the regulations found in U.S. Coast Guard Regulations 46 CFR 147A.

2. Determine fumigation suitability of vessel (ship) and be certain that the tank or tanks to be fumigated are of such sealable construction and/or integrity to permit an in-transit fumigation without danger to the crew during the application and subsequent voyage.

3. The overspace pressure relief system of each tank must be sealed by (1) the closure of appropriate valves, and (2) sealing the opening into the overspace with gas tight materials.

Application Procedures

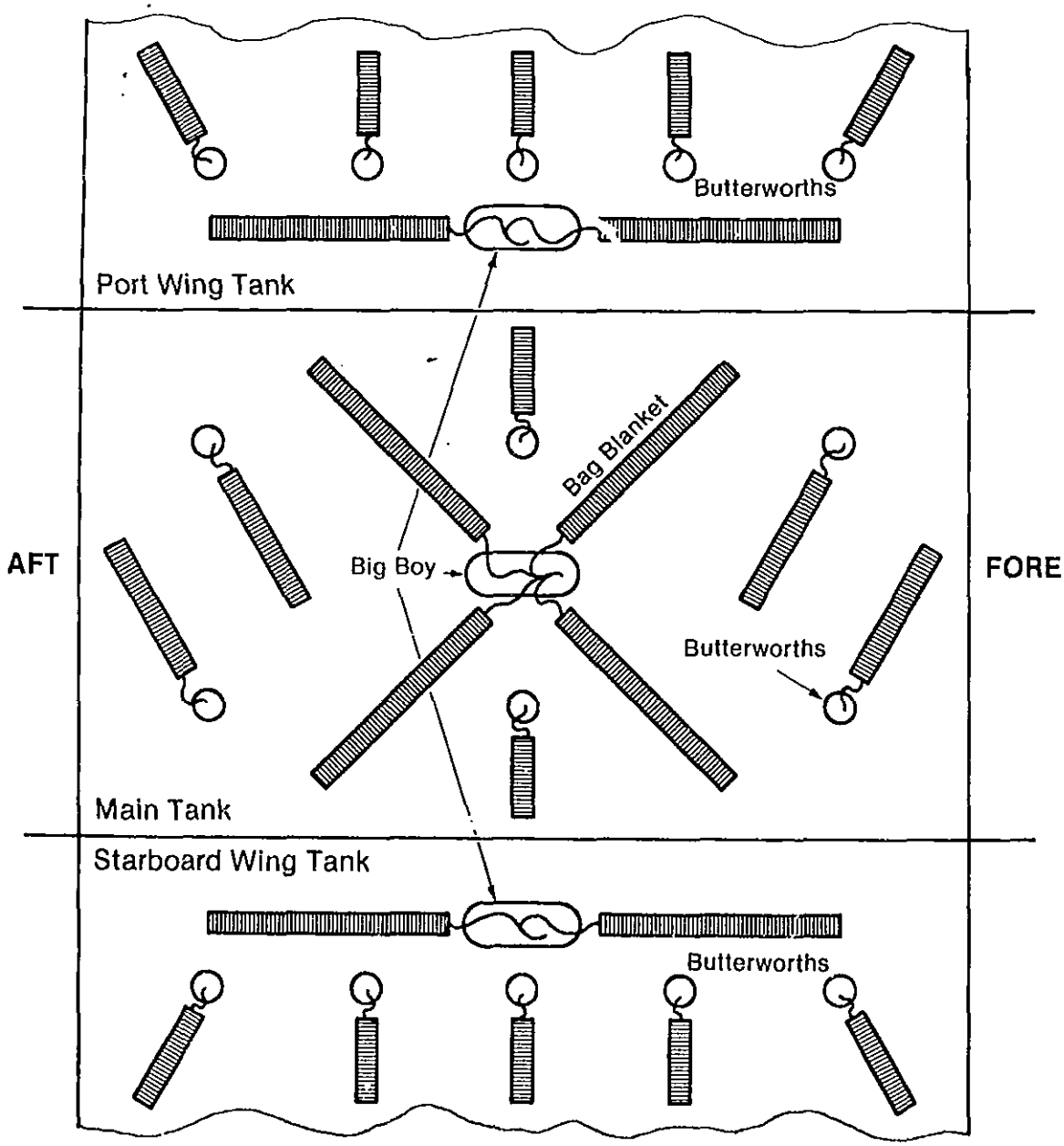
Detia® Gas EX-B....Method One.

1. Calculate dosage on the basis of 3 bags per 1000 cubic feet. Dosage is always calculated on the total tank volume irrespective of the amount of commodity loaded into the tank.

2. A portion of the total number of bags designated for each tank must be allotted for placement in each butterworth and main hatch opening according to the portion of the tank served by that opening.

3. Determine the length and number of bag blankets required for each tank and cut to length accordingly.

4. Open cans and begin inserting the bags into the blankets. As each blanket is filled position it on to the commodity surface, fully extended. This generally necessitates first rolling up the blanket, lowering it into the tank through the butterworth and then unrolling down the slope of the commodity. For those blankets being applied through the Big Boy it will mean entering the tank, selecting an unobstructed slope and unrolling. See diagram below showing a typical bag blanket placement scheme.



5. Secure each blanket with a stout cord. Tie or otherwise secure the loose end to each butterworth opening plus the Big Boy. Do not leave any slack in the cord.

6. Close, secure and seal each butterworth and the Big Boy immediately following placement of the blankets.

7. Post "DANGER" signs.

Detia® Gas EX-B....Method Two.

This method utilizes pre-packed bag blankets.

1. See steps 1 and 2 under method one for tankers.

2. Determine the length and number of bag blankets required for each butterworth and the Big Boy. Be certain that the selected blanket "path" is unobstructed.

3. Open cans and remove the bag blankets. Open only enough cans to accommodate one butterworth at a time.

4. Unroll the blanket and cut them to length. Form a new roll, lower into position and unroll down the slope of the commodity until fully extended.

5. Repeat Step 4 for each butterworth and the Big Boy.

6. See Steps 5, 6, and 7 under TANKERS, Method One.

Detia® Tablets

1. Calculate dosage on the basis of 33 tablets per 1000 cubic feet. Dosage is always calculated for total hold volume irrespective of the amount of commodity loaded into the hold.

2. Apply the tablets by scattering them uniformly onto the commodity surface utilizing as much of the total surface area as possible.

3. See steps 6 and 7 under TANKERS, Method One.

Detia® Pellets

1. Calculate dosage on the basis of 165 pellets per 1000 cubic feet. Dosage is always calculated for the total hold volume irrespective of the amount of commodity loaded into the hold.

2. See steps 2 and 3 under Detia® Tablets.

Post Fumigation Procedures

1. Until the ship leaves port it will be necessary to regularly monitor all areas and spaces of the ship for the presence of hydrogen phosphide (phosphine) using appropriate phosphine 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.

Check the tanks and/or holds for leaks and re-seal if necessary.

VOYAGE PRECAUTIONS AND PROCEDURES

Generally speaking crew members are free to move about the vessel in the usual manner. As a guide, however, the following minimum precautions should be followed:

1. DO NOT ENTER FUMIGATED HOLDS OR TANKS.
2. AT REGULAR INTERVALS MONITOR ALL SPACES AND AREAS CONSIDERED TO BE SAFE FOR OCCUPANCY USING APPROPRIATE GAS DETECTION EQUIPMENT.
3. IF PHOSPHINE IS DETECTED, EVACUATE THE SPACE OR AREA, LOCATE AND SEAL OFF THE SOURCE OF THE LEAK WEARING APPROPRIATE RESPIRATORY PROTECTION EQUIPMENT.
4. DO NOT OPEN OR OTHERWISE VENTILATE OR AERATE THE FUMIGATED HOLDS.

DISCHARGE PRECAUTIONS AND PROCEDURES

Upon arrival into the port of discharge holds or tanks may be opened. Any hydrogen phosphide in the free air space above the commodity will rapidly dissipate to atmosphere. There may be some gas remaining in the commodity mass itself which will disappear as discharge takes place.

If it is necessary for workers to enter holds the air space directly above the commodity mass should be tested for phosphine. If found in excess of allowed limits, it will be necessary to allow for additional aeration and/or ventilation.

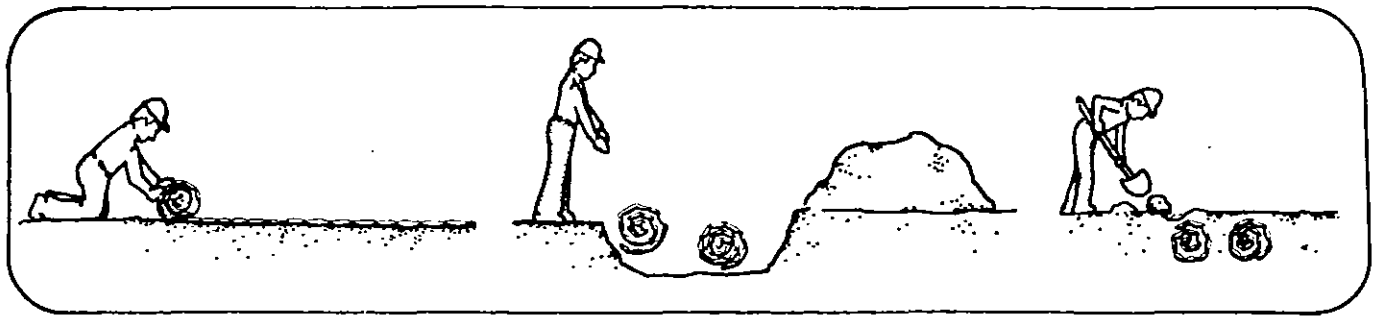
DISPOSAL OF SPENT FUMIGANT PREPARATIONS

Detia® Tablets: Not necessary.

Detia® Pellets: Not necessary.

Detia® Gas EX-B:

1. Remove from the commodity surface before discharge begins.
2. Roll up blankets and either burn or bury in an appropriate site. If individual bags were used collect and either burn or bury in an appropriate site.



PERSONAL PROTECTIVE EQUIPMENT

Because the release of phosphine from Detia® Pellets, Detia® Tablets, and Detia® Gas EX-B is delayed after exposure to air, it is usually not necessary for operators to wear gas masks. However, suitable respiratory protective equipment should be immediately available. Use full face masks with canisters meeting U.S. Bureau of Mines specifications for phosphine. Gloves should be worn when handling Detia® Pellets and Tablets.

GAS DETECTION EQUIPMENT

All users of fumigants should have, as standard equipment, gas detection devices designed specifically for phosphine. There are several devices readily available. Consult local suppliers of such equipment or contact Research Products Company for more information.

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