

ACCEPTED
 NOV 13 1987
 Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, for the pesticide registered under EPA Reg. No. 2548-63

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DETIA PELLETS LABEL --- 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 accompanying 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) PELLETS

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

Active Ingredient: Aluminum Phosphide.....57%
 Inert Ingredients:.....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. **NOV 2 1987**

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 PELLETS IS INHALED: Get exposed person to fresh air. Keep warm and make sure person can breathe freely. If breathing has stopped, give artificial respiration by mouth-to-mouth or other means of resuscitation. Do not give anything by mouth to an unconscious person.

IF THE PELLETS OR THEIR DUST ARE SWALLOWED: Drink or administer one or two glasses of water and induce vomiting by touching back of throat with finger, or if available, administer syrup of ipecac. Do not give anything by mouth if victim is unconscious or not alert.

IF PELLETS OR THEIR DUST GET 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 THE PELLETS GETS IN EYES: Flush with plenty of water. Get medical attention.

See side panels for additional precautionary statements.

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

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

EPA Establishment No. 33982MG01 Net Contents:
EPA Registration No. 2548-63 Net Weight:

LEFT PANEL

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

KEEP OUT OF REACH OF CHILDREN
DANGER/POISON

Aluminum phosphide in pellets or their dust can be fatal if swallowed. Do not get in eyes, in nose, on skin or on clothing. Do not eat, drink or smoke while handling aluminum phosphide fumigants. When the container is opened Detia(R) Pellets 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 "Industrial Hygiene Monitoring" on page of the accompanying product manual for appropriate

05100 monitoring procedures. Pure hydrogen phosphide gas is odorless;
 05150 the odor is due to a contaminant. Since an odor may not be
 05200 detected under certain circumstances, the absence of a garlic
 05250 odor does not mean that hydrogen phosphide gas is absent.
 05300 Observe proper application, aeration, reentry and disposal
 05350 procedures specified elsewhere in the labeling to prevent
 05400 overexposure.

05450
 05500 FREQUENT EXPOSURE TO LOW CONCENTRATIONS ABOVE PERMISSIBLE LEVELS
 05550 OVER A PERIOD OF DAYS OR WEEKS MAY CAUSE POISONING.

05600
 05650 NOTE TO PHYSICIAN

05700
 05750 Aluminum phosphide in pellets or their dust reacts with moisture
 05800 from the air, water, acids, and many other liquids to release
 05850 hydrogen phosphide (phosphine) gas. Mild exposure by inhalation
 05900 causes malaise (indefinite feeling of sickness), ringing of
 06000 ears, fatigue, nausea and pressure in chest which are relieved
 06050 by removal to fresh air. Moderate poisoning causes weakness,
 06100 vomiting, epigastric pain (pain just above the stomach), chest
 06150 pain, diarrhea and dyspnea (difficulty in breathing). Symptoms
 06200 of severe poisoning may occur within a few hours or up to
 06250 several days, resulting in pulmonary edema (fluid in lungs) and
 06300 may lead to dizziness, cyanosis (blue or purple skin color),
 06350 unconsciousness and death.

06400 In sufficient quantity, hydrogen phosphide affects the liver,
 06450 kidneys, lungs, nervous system and circulatory system.
 06500 Inhalation can cause lung edema (fluid in lungs) and hyperemia
 06550 (excess of blood in a body part), small perivascular brain
 06600 hemorrhages and brain edema (fluid in brain). Ingestion can
 06650 cause lung and brain symptoms, but damage to the viscera (body
 06700 cavity organs) is more common. Hydrogen phosphide poisoning may
 06750 result in (1) pulmonary edema, (2) liver elevated serum GOT, LDH
 06800 and alkaline phosphatase, reduced prothrombin, hemorrhage and
 06850 jaundice (yellow skin color) and (3) kidney hematuria (blood in
 06900 urine) and anuria (abnormal or lack of urination). Pathology is
 06950 characteristic of hypoxia (oxygen deficiency in body tissue).
 07000 Treatment is symptomatic.

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 07200 CLASSIFIED BY UNDERWRITERS LABORATORIES, INC. (R) AS TO FIRE
 07250 HAZARD ONLY WHEN USED SPECIFICALLY AS DIRECTED IN THE SEPARATE
 07300 INSTRUCTIONS THAT ARE PART OF THE PRODUCT LABELING. DETIA
 07350 PELLETS ARE NONCOMBUSTIBLE, BUT EXPOSURE TO MOIST AIR OR WATER
 07400 RELEASES FLAMMABLE AND TOXIC PHOSPHINE GAS. SPONTANEOUS
 07450 IGNITION MAY RESULT IF CONTACTED BY WATER, ACIDS OR CHEMICALS.
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RIGHT PANEL

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DIRECTIONS FOR USE

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

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The booklets "Application Procedures for Detia(R) Pellets and Detia(R) Tablets" and "Instructions for Intransit Fumigation of Ship Holds with Detia(R) Pellets and Tablets" are a part of labeling. Refer to them for application procedures and other information necessary to properly use Detia(R) Pellets.

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THIS PRODUCT IS ACCOMPANIED BY THE LABELING LISTED ABOVE. READ AND UNDERSTAND THE ENTIRE LABELING. ALL PARTS OF THE LABELING ARE EQUALLY IMPORTANT FOR SAFE AND EFFECTIVE USE OF THIS PRODUCT. CALL RESEARCH PRODUCTS COMPANY OR EPA IF YOU HAVE ANY QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABELING.

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Refer to product labeling for use restrictions to protect ENDANGERED SPECIES.

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STORAGE AND DISPOSAL

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STORAGE

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Flasks should be stored in a dry, well ventilated area, away from heat and under lock and key. Post as a pesticide storage area. Do not contaminate water, food or feed by storing pesticides in the same areas used to store these commodities.

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Do not store in buildings where humans or domestic animals reside. Refer to the booklet "Application Procedures for Detia(R) Pellets and Detia(R) Tablets" for additional storage instructions.

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DISPOSAL OF UNREACTED OR PARTIALLY REACTED PELLETS (From spills, leaking flasks or other sources)

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Unreacted or partially reacted Detia(R) Pellets are acutely hazardous. Improper disposal of this product is a violation of federal law.

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If this product cannot be disposed of by ordinary use or according to labeling instructions, 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.

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Reacted pellets are not hazardous. For complete disposal, spill and leak procedures refer to the booklet "Application Procedures

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10450 for Detia(R) Pellets and Detia(R) Tablets".

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10650 DISPOSAL OF EMPTY FLASKS

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10750 METHOD ONE: Triple rinse flasks and stoppers with water. Then
10800 offer for recycling or reconditioning, or puncture and dispose
10850 of them in a sanitary landfill or other approved site or by
10900 other procedures approved by state and local authorities.
10950 Dispose of rinsate in a sanitary landfill or by other approved
11000 procedures.

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11100 METHOD TWO: Remove lids and place empty flasks outdoors or in
11150 structure being fumigated until residue in flasks is reacted.
11200 Puncture and dispose of them in a sanitary landfill or other
11250 approved site or by other procedures approved by state and local
1300 authorities.

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11400 GENERAL

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11500 Consult federal, state and local disposal authorities for
11550 approved procedures other than those given above. Approved
11600 procedures vary for different types of generators.
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11700 *If in doubt concerning whether the dust is reacted and/or
11750 concerning proper disposal techniques contact Research Products
11800 Company.

ACCEPTED

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Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, for this pesticide registered under EPA Reg. No. 2548-621-63

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RESTRICTED USE PESTICIDE
DUE TO ACUTE INHALATION TOXICITY OF HIGHLY
TOXIC HYDROGEN PHOSPHIDE (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 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
Dettia(R)
PELLETS
AND
Dettia(R)
TABLETS

HYDROGEN PHOSPHIDE FUMIGANTS
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

RECEIVED
EPA

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

NOV 1987

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I. INTRODUCTION

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A. HISTORY

00102 The history of Detia(R) pesticides is long, dating back to
 00103 the mid-1930's. In 1970 Detia(R) GAS EX-B was introduced into
 00104 the United States. Detia(R) Tablets and Detia(R) Pellets
 00105 were introduced in 1977. The manufacturer, Detia Freyberg
 00106 GMBH, West Germany was the early pioneer in the development
 00107 of hydrogen phosphide as a fumigant gas.

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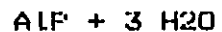
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B. PRODUCT DESCRIPTION

00110 Both Detia(R) Pellets and Detia(R) Tablets are a mixture of
 00111 aluminum phosphide (57% by weight), ammonium carbamate and
 00112 urea which is pressed into tablet and/or pellet form. The
 00113 nearly spherical pellets are about 3/8" in diameter and
 00114 weigh 0.6 grams each. The tablets are either disc shaped
 00115 (4/5" in diameter and 1/5" thick) or spherical in shape
 00116 (5/8" in diameter) and weigh 3.0 grams each. A pellet will
 00117 produce about 0.2 gram hydrogen phosphide, the tablet about
 00118 1.0 gram. Both react with atmospheric moisture to produce
 00119 hydrogen phosphide (PH₃) in the following way:

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00124 Warm, humid air accelerates the reaction while cool, dry air
 00125 has the opposite effect. For example, when moisture and
 00126 temperature of the fumigated commodity are high,
 00127 decomposition of Detia(R) may be complete in less than 3
 00128 days. However, at moderate temperatures and low humidities
 00129 decomposition may require 5 days or more. This reaction
 00130 starts slowly, gradually accelerates and then tapers off
 00131 again as the aluminum phosphide is spent.

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00133 Detia(R) Pellets and Tablets also contain ammonium carbamate
 00134 which liberates ammonia and carbon dioxide as follows:

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00138 These gases are essentially nonflammable and act as inerting
 00139 agents to reduce fire hazards. The ammonia gas also serves
 00140 as a warning agent.

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C. PRODUCT PACKAGING

00154 The tablets are packaged 500 to a flask. The pellets are
 00155 packaged 1660 to a flask.

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 00157 The aluminum flasks in which they are packaged are
 00158 resealable and seamless. Their shelf life is almost
 00159 unlimited as long as the packaging remains well sealed and
 00160 intact. Once opened, the flasks may be tightly resealed and
 00161 stored for future use.
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00163 D. WHAT IS HYDROGEN PHOSPHIDE?

00164 Hydrogen phosphide, more commonly referred to as phosphine,
 00165 is a colorless gas which is toxic to insects, humans, and
 00166 other forms of animal life. It is very mobile with a high
 00167 vapor pressure. Thus, the penetrating capability of hydrogen
 00168 phosphide is great. The combination of high molecular
 00169 activity, vapor pressure and toxicity to insects at low
 00170 dosages accounts for its wide acceptance as a fumigant.
 00171

00172 E. SAFETY RECOMMENDATIONS

- 00173 1. Carefully read the labeling and follow instructions
 00174 explicitly.
 00175 2. Never work alone when applying fumigant from within the
 00176 storage structure.
 00177 3. Never allow uninstructed persons to handle Detia(R).
 00178 4. Approved respiratory protection must be available
 00179 for the fumigation of structures from within.
 00180 5. Wear dry gloves made of cotton or other material when
 00181 contact with tablets, pellets or their dust is likely.
 00182 6. It is preferable to open fumigant containers in open air
 00183 or near a fan that exhausts outside immediately. Never
 00184 open in a flammable atmosphere.
 00185 7. Do not allow Detia(R) to contact liquid water or to
 00186 pile up.
 00187 8. Dispose of empty containers and spent residual dust in a
 00188 proper manner consistent with the label instructions.
 00189 9. Post "DANGER" signs on fumigated areas.
 00190 10. Notify appropriate company employees, and provide
 00191 relevant safety information to local officials annually
 00192 for use in the event of an emergency.
 00193 U 11. Hydrogen phosphide fumigants are not to be used for vacuum
 00194 fumigations.
 00195 12. Exposure to hydrogen phosphide must not exceed the
 00196 8 hour TWA of 0.3 ppm during application or a maximum
 00197 concentration of 0.3 ppm after application is completed.
 00198 This includes reentry into a structure.
 00199 13. Fumigated finished foods and feeds must be aerated
 00200 48 hours prior to offering to the end consumer.
 00201 U 14. Transfer of a treated commodity to another site without
 00202 complete aeration (down to 0.3 ppm maximum) is
 00203 permissible provided the new site is placarded.
 00204 15. Aerate contaminated clothing in well ventilated area
 00205 prior to washing.
 00206 16. Keep containers tightly closed except when removing
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- 00209 product.
- 00211 17. Do not reuse aluminum phosphide containers for any
- 00212 purpose other than recycling or reconditioning.
- 00213 18. OSHA recommends that the exposure screening of
- 00214 employees be conducted to detect impaired pulmonary
- 00215 function. OSHA recommends that any employees developing
- 00216 the above condition be referred for medical attention.
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II. PRECAUTIONARY STATEMENTS

A. HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Keep Out of Reach of Children
DANGER-POISON

- 00225
- 00226 Aluminum phosphide in pellets, tablets or their dust can be
- 00227 fatal if swallowed. Do not get in eyes, in nose, on skin or
- 00228 on clothing. Do not eat, drink or smoke while handling
- 00229 aluminum phosphide fumigants. When the container is opened,
- 00230 Deltia(R) Tablets or Pellets will begin to release hydrogen
- 00231 phosphide (phosphine) which is an extremely toxic gas.
- 00232 Contact with water, acids and some other liquids will
- 00233 accelerate this reaction. If a garlic odor is detected,
- 00234 refer to section on "Industrial Hygiene Monitoring" on page
- 00235 for appropriate monitoring procedures. Pure hydrogen
- 00236 phosphide gas is odorless; the odor is due to a contaminant.
- 00237 Since an odor may not be detected under certain
- 00238 circumstances, the absence of a garlic odor does not mean
- 00239 that hydrogen phosphide gas is absent. Observe proper
- 00240 application, aeration, reentry and disposal procedures
- 00241 specified elsewhere in the labeling to prevent
- 00242 overexposure.

FREQUENT EXPOSURE 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.

- 00253
- 00254 U 1. If gas or dust from tablets or pellets is inhaled: Get
- 00255 exposed person + fresh air. Keep warm and make sure
- 00256 person can breathe freely. If breathing has stopped,
- 00257 give artificial respiration by mouth-to-mouth or other
- 00258 means of resuscitation. Do not give anything by mouth
- 00259 to an unconscious person.
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- 00262 U 2. If the pellets, tablets or their dust are swallowed:
- 00263 Drink or administer one or two glasses of water and induce
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vomiting by touching back of throat with finger, or if available, administer syrup of ipecac. Do not give anything by mouth if victim is unconscious or not alert.

3. If pellets, tablets or their dust gets on skin or clothing: Brush or shake material off 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. If dust from the pellets or tablets gets in eyes: Flush with plenty of water. Get medical attention.

C. NOTE TO PHYSICIAN

Aluminum phosphide tablets, pellets or their dust reacts 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:

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

It is preferable to open flasks of Detia(R) Tablets or Pellets in open air or near a fan which exhausts outside immediately. Never open in a flammable atmosphere because on rare occasions they may flash. When opening, point the container away from the face and body and slowly loosen the cap. These precautions will also reduce the applicator's exposure to hydrogen phosphide gas.

Pure hydrogen phosphide gas is practically insoluble in

00376 water and oils and is stable at normal fumigation
 00378 temperatures. However, it may react with certain metals and
 00379 cause corrosion, especially at higher temperatures and
 00380 relative humidities. Metals such as copper, brass and other
 00381 copper alloys, and precious metals such as gold and silver
 00382 are susceptible to corrosion by hydrogen phosphide. Thus,
 00383 small electric motors, smoke detectors, brass sprinkler
 00384 heads, batteries and battery chargers, fork lifts,
 00385 temperature monitoring systems, switching gears,
 00386 communication devices, computers, calculators and other
 00387 electronic or electrical equipment should be protected or
 00388 removed before fumigation. In most cases all electronic
 00389 equipment must be removed. Hydrogen phosphide gas will also
 00390 react with certain metallic salts and therefore, sensitive
 00391 items such as photographic film, some inorganic pigments,
 00392 etc., should not be exposed.

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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) Tablets and Pellets are Restricted Use Pesticides 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 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) Pellets or Detia(R) Tablets are applied from within the space being treated or during reentry into a fumigated or partially aerated site. Only one trained person is required when the fumigant is applied from outside the area to be treated.

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4. Prior to applying this product, you must inspect the storage structure to determine if it can be made sufficiently gas tight. Decide how personal exposure monitoring should be conducted. Notify appropriate company employees and provide relevant safety information to local officials annually for use in the event of an emergency. Apply this fumigant in an effective and safe manner including emergency procedures, etc.
5. Ship holds, barges, containers on ships, railroad cars and containers shipped piggyback by rail may be fumigated intransit. However, fumigated trucks, vans, trailers and similar transport vehicles cannot be moved over public roads or highways until they are aerated.
6. Pellets and/or tablets or their reacted residues must not come into contact with any processed food with the EXCEPTION that both can be added directly to processed brewers_rice_malt_and_corn_gelts used in the manufacture of beer.
7. Protect copper, silver, gold and their alloys from corrosive exposure to hydrogen phosphide.
8. Do not fumigate commodities with this product when commodity temperature is below 40 degrees F (5 degrees C).
- B. EFFICACY
Complete control of listed insect pests is frequently not achieved. Factors contributing to less than 100% control are gas leakage, poor gas distribution, unfavorable exposure conditions, etc. In addition, some insects are less susceptible to hydrogen phosphide than others. To maximize control, extreme care must be observed in sealing, higher dosages must be used, exposure periods must be lengthened, proper application procedures must be followed, and temperature and humidity must be favorable.
- C. USE PATTERN
1. INSECT PESTS
Both pellets and tablets are 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 | lesser grain borer |
| bean weevil | maize weevil |
| cadelle | Mediterranean flour moth |
| cereal leaf beetle | pink bollworm |
| cigarette beetle | raisin moth |
| confused flour beetle | red flour beetle |

00486	dermestid beetles	rice weevil
00488	dried fruit beetle	rusty grain beetle
00489	dried fruit moth	saw-toothed grain beetle
00490	European grain moth	spider beetles
00491	flat grain beetle	tobacco moth
00492	fruit fly	yellow meal worm
00493	granary weevil	Africanized bee
00494	greater wax moth	honey bee invested
00495	hairy fungus beetle	with tracheal mite
00496	Hessian fly	
00497	Indian meal moth	

2. COMMODITIES

Both Detia(R) Pellets and Tablets are registered by EPA for the fumigation of the following commodities.

a. Raw Agricultural Commodities

00506	almonds	pistachio nuts
00507	barley	popcorn
00508	Brazil nuts	rice
00509	cashews	rye
00510	cocoa beans	safflower seed
00511	coffee beans	sesame seed
00512	corn	seed & pod vegetables
00513	cottonseed	sorghum
00514	dates	soybeans
00515	filberts	sunflower seeds
00516	flower seed	triticale
00517	grass seed	vegetable seed
00518	millet	walnuts
00519	oats	wheat
00520	peanuts	
00521	pecans	

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 Detia(R) tablets, pellets or residual dust 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

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- 00542 Chocolate and chocolate products (assorted
- 00544 chocolate, chocolate liquor, cocoa, cocoa powder,
- 00545 dark chocolate coating and milk chocolate)
- 00546 Processed coffee
- 00547 Corn grits
- 00548 Cured, dried and processed meat products and dried
- 00549 fish
- 00550 Dates
- 00551 Dried eggs and egg yolk solids
- 00552 Dried milk, dried powdered milk, nondairy creamers,
- 00553 and nonfat dried milk
- 00554 Dried or dehydrated fruits (apples, dates, figs,
- 00555 peaches, pears, prunes, raisins and sultanas)
- 00556 Dried and dehydrated vegetables (beans, carrots,
- 00557 lentils, peas, potato flour, potato products
- 00558 and spinach
- 00559 Figs
- 00560 Malt
- 00561 Peanuts
- 00562 Processed herbs, spices, seasonings and condiments
- 00563 Processed nuts (almonds, apricot kernels, Brazil
- 00564 nuts, cashews, filberts, pecans, pistachio nuts and
- 00565 walnuts)
- 00566 Processed oats (including oatmeal)
- 00567 Rice (brewers rice grits, enriched and polished,
- 00568 wild rice)
- 00569 Soybean flour and milled fractions
- 00570 Processed tea
- 00571 Yeast (including primary yeast)
- 00572
- 00573 U c. Animal Feed and Feed Ingredients
- 00575
- 00576 U d. Nonfood Products
- 00578
- 00579 Animal hide
- 00580 Clothing
- 00581 Processed or unprocessed cotton, wool and
- 00582 other natural fibers or cloth
- 00583 Feathers
- 00584 Furs
- 00585 Human hair, rubberized hair, vulcanized hair, mohair
- 00586 Leather products
- 00587 Tobacco
- 00588 Wood, cut trees, wood chips and wood and bamboo
- 00589 products
- 00590 Paper and paper products
- 00591 Dried plants and flowers
- 00592 Seeds (grass seed, ornamental herbaceous plant seed
- 00593 and vegetable seed)
- 00594 Straw or hay
- 00595 Tires (for mosquito control)
- 00596
- 00597

II. DOSAGE GUIDE

00598 Since hydrogen phosphide is a mobile gas and will penetrate
 00599 to all parts of the storage structure, dosage must be based
 00601 upon the total volume of the space being fumigated and not
 00602 on the amount of bulk commodity it contains. For example,
 00603 the same amount of Dettia(R) is required to treat a 30,000
 00604 bushel silo whether it is full or not. The following dosage
 00605 ranges are allowed for bulk and space fumigations.
 00606

00607
 00608
 00609 **DOSAGE GUIDE**
 00610

00611 PRODUCT	00611 PER 1000 CU. FT.	00611 PER 1000 BU.
00613 U -----	-----	00613 STORAGE CAPACITY
00614 PELLETS	100 - 725	125 - 905
00615 TABLETS	20 - 145	25 - 180

00617
 00618 **NOTE:** The maximum dosage allowed for dates, nuts and dried
 00619 fruits is 40 tablets or 200 pellets per 1000 cubic feet.
 00620

00621
 00622
 00623 These dosages should not be exceeded. It is important to
 00624 remember that shortened exposure period cannot be compensated
 00625 for with an increased dosage.
 00626

00627 The wide dosage ranges listed above are designed to
 00628 accommodate the variety of fumigation situations that might
 00629 occur. The major factor in selecting dosage is the
 00630 capability of the structure to hold hydrogen phosphide
 00631 during the exposure period and thus obtain and sustain
 00632 lethal concentrations throughout. It is more difficult to
 00633 obtain penetration of gas throughout the structure in bulk
 00634 stored commodities. An example of this is the treatment of
 00635 grain stored in flat storage in which fumigant cannot be
 00636 uniformly added to the grain but must be probed or surface
 00637 applied.
 00638

00639 Although it is permissible to choose from the full range of
 00640 dosages listed above, the following dosage ranges are
 00641 recommended for the various types of fumigations.
 00642

00643
 00644 **RECOMMENDED DOSAGES FOR SEVERAL TYPES OF FUMIGATIONS**
 00645

00646 TYPE OF FUMIGATION	00646 DOSAGE RANGE		00646 UNIT OF VOLUME*
00648 U	00648 PELLETS	00648 TABLETS	
00649 U 00651 1. SPACE (INCLUDING PACK- 00652 AGED COMMODITIES) 00653 A. MILLS, WAREHOUSES,	100-300	20-60	1000 CU. FT.

00655	ETC.			
00656	B. BAGGED COMMODITIES	150-300	30-60	1000 CU. FT.
00658	C. DRIED FRUITS, NUTS	100-200	20-40	1000 CU. FT.
00659	AND DATES			
00660	D. STORED TOBACCO	100-200	20-40	1000 CU. FT.
00661				
00662	2. BULK STORED COMMODITIES			
00663	A. VERTICAL STORAGE	150-300	30-60	1000 CU. FT.
00664		200-375	40-75	1000 BUSHELS
00665				
00666	H. TANKS	200-350	40-70	1000 CU. FT.
00667		250-450	50-90	1000 BUSHELS
00668				
00669	C. FLAT STORAGE	250-725	50-145	1000 CU. FT.
00670	(LOOSE CONSTRUCTION)	325-900	65-180	1000 BUSHELS
00671				
00672	D. FARM BINS	350-725	70-145	1000 CU. FT.
00673		450-900	90-180	1000 BUSHELS
00674				
00675	E. RAIL CARS	150-350	30-70	1000 CU. FT.
00676		200-450	40-90	1000 BUSHELS
00677				
00678	F. BUNKERS, TARPED	150-350	30-70	1000 CU. FT.
00679	GROUND STORAGE	200-450	40-90	1000 BUSHELS
00680				
00681	G. BARGES	150-400	30-80	1000 CU. FT.
00682		200-375	40-75	1000 BUSHELS
00683				
00684	H. SHIPHOLDS	150-330	30-66	1000 CU. FT.
00685		200-413	40-83	1000 BUSHELS

*Volume or storage capacity of the area being treated.

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

E. SEALING

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

F. EXPOSURE GUIDELINES

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00709 The following table may be used as a guide in determining
 00710 the minimum length of the exposure period at the indicated
 00711 temperatures.

00712	00713	00714	00715 U	00716	00717	00718	00719	00720	00721	00722	00723	00724
	TEMPERATURE TO WHICH	PELLETS		TABLETS								
	FUMIGANT AND/OR											
	INSECTS ARE EXPOSED	-----		-----								
	Below 40 F	Do Not Fumigate		Do Not Fumigate								
	40 F - 53 F	8 days(192 hrs.)		10 days(240 hrs.)								
	54 F - 59 F	4 days (96 hrs.)		5 days (120 hrs.)								
	60 F - 68 F	3 days(72 hrs.)		4 days(96 hrs.)								
	Above 68 F	2 days(48 hrs.)		3 days(72 hrs.)								

00725 The length of the fumigation must be great enough so as to
 00726 provide for adequate control of the insect pests which
 00727 infest the commodity being treated. It is necessary to
 00728 lengthen the fumigation at lower temperatures since insects
 00729 are more difficult to kill under these conditions. In this
 00730 regard, the temperature to which the insects are exposed is
 00731 the critical factor.

00732 There is little to be gained by extending the exposure
 00733 period if the structure to be fumigated has not been
 00734 carefully sealed. Careful sealing is required to ensure
 00735 that adequate gas levels are retained. Proper application
 00736 procedures must be followed to provide satisfactory
 00737 distribution of hydrogen phosphide gas particularly in the
 00738 fumigation of bulk commodity contained in large storages.
 00739

00740 When pellets or tablets are not uniformly added to a bulk
 00741 commodity mass (i.e. surface application or shallow probing)
 00742 exposure times must be substantially lengthened to allow
 00743 penetration of gas throughout the commodity. As a "rule of
 00744 thumb" a minimum of 1 day should be added to the exposure
 00745 time listed above for each 10 feet the gas must penetrate
 00746 downward. It is preferable to add 2 days for each 10 feet.
 00747 Some structures can only be treated when completely tarped.
 00748

00749 In addition, the fumigation period should be long enough
 00750 that the production of hydrogen phosphide has essentially
 00751 ceased. This will minimize worker exposure during further
 00752 storage and/or processing of the treated bulk commodity as
 00753 well as reduce hazards in the disposal of spent aluminum
 00754 phosphide products remaining after space fumigations.
 00755 Temperature and humidity to which Dettia(R) Pellets and
 00756 Tablets are exposed are important to this determination
 00757 since both lower temperatures and/or dry air retard gas
 00758 release.
 00759

00760 Consequently, exposure periods recommended in the table are
 00761 minimum periods and may not be adequate to control all stored
 00762 product pests under all conditions. This is particularly
 00763

00764 true at lower temperatures (below 60 degrees F). Nor will
00765 they always provide for the cessation of the production of
00766 hydrogen phosphide when pellets or tablets are exposed to
00767 inadequate moisture levels. Grain at 70 degrees F and 12
00768 percent moisture provides more than adequate conditions for
00769 fumigation.

00770
00771 If the temperature to which the insects are exposed is
00772 warmer than the temperature to which the pellets or tablets
00773 are exposed (i.e. may occur in a winter space fumigation),
00774 it may be possible to obtain an effective insect kill before
00775 the fumigant is totally spent. In this event it is
00776 permissible to conclude a space fumigation as soon as an
00777 effective kill has been achieved, however in this event the
00778 pellets or tablets must be deactivated prior to disposal.
00779 See deactivation instructions on page of this manual.

00780
00781 Whenever possible, exposure periods should exceed minimum
00782 periods listed on page . Remember, the key to
00783 effective results lies with correct dosage, long exposure
00784 periods, proper application procedures and well sealed
00785 enclosures.
00786
00787

00788 R G. APPLICATION PROCEDURES

00790 1. GENERAL STATEMENT

00791
 00792 The following instructions are intended to provide general
 00793 guidelines for typical fumigations. These instructions are not
 00794 intended to cover every type of situation nor are they meant to
 00795 be restrictive. Other procedures may be used if they are safe,
 00796 effective and consistent with the properties of aluminum
 00797 phosphide products.
 00798

00799 2. APPLICATION PROCEDURES FOR DIRECT ADDITION OF PELLETS OR
 00800 TABLETS TO BULK COMMODITIES.
 00801

00802 U a. Commodities: Listed raw agricultural commodities, seeds,
 00803 wood chips, animal feed and feed ingredients, and processed
 (0805 brewers rice, malt and corn grits used in the manufacture
 00806 of beer.
 00807

00808 U b. Storage Structures: Bins, tanks, silos, granaries, flat
 00809 storage, bunkers, bulk rail cars, etc.
 00810
 00811

00812 U c. Procedures For Vertical Storage: (concrete upright bins and
 00813 other silo type bins that can be quickly transferred)
 00814
 00815

00816 (1) For best results all cracks and openings with
 00817 the exception of fill openings should be closed
 00818 or sealed prior to fumigating the bin. To this
 00819 end, vents near the bin top connecting adjacent
 00820 bins should be sealed prior to the fumigation.
 00821 If the bin is entered to seal these openings
 00822 after the fumigant has been added, proper
 00823 respiratory protection must be worn.
 00824

00825 (2) Determine minimum exposure time based on commodity
 00826 temperature and moisture. At commodity moistures of
 00827 below 11.5%, exposure periods should be extended to
 00828 obtain complete reaction of the fumigant.
 00829

00830 (3) Calculate the number of pellets or tablets needed
 00831 and the rate at which they must be added based upon the
 00832 rate at which the bin will be filled.
 00833

00834 (4) Pellets or tablets may be applied by hand or by an
 00835 automatic dispenser on the headhouse/gallery belt or
 00836 into the fill opening. An automatic dispenser may also
 00837 be used to add fumigant into the upleg of the elevator.
 00838 Add fumigant in as continuous a manner as possible to
 00839 the commodity stream.
 00840
 00841

00842 (5) Seal the bin deck openings after the application is
 00843 complete.
 00844

00845 (6) Vertical bins can also be fumigated by deep

22/44

probing.

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

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

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

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

(1) Check the storage for tightness.

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

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

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

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

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

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

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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 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.

- (5) Arrange enough applicators and other workers to complete the job quickly enough to avoid excessive exposure to hydrogen phosphide gas. The production of gas during application can be significantly retarded by venting flasks outdoors, conducting fumigations when temperatures in the bin are lowest, and other work practices. It is often advisable to wear approved respiratory protection from start to finish. Monitoring with a suitable detection device is required to assure that the 0.3 ppm 8 hour TWA is not exceeded. See "Industrial Hygiene Monitoring" section on page of this manual.
- (6) It is often advisable as an additional sealing measure to cover the commodity with plastic tarps.
- (7) Seal all remaining exits.
- (8) Post "DANGER" placards on and lock all entrances.
- (9) The bin needn't be aerated unless reentry is required. Consult safety procedures listed elsewhere in labeling.

e. Procedures for Bunkers and Other Outdoor Tareed Commodities:

- (1) See steps "3" and "4" in section "d" above.
- (2) When tarps are being spread over ground storage they should be glued, clamped or otherwise sealed together. Sand or water snakes can be used for a ground seal.
- (3) Application may be made through slits in the tarp or the tarp can be spread over the

00957 commodity after application. Seal slits after
 00958 application.
 00959

00960 (4) Post "DANGER" placards.
 00961

00962 (5) This is an outdoor application so safety
 00963 monitoring and respiratory equipment are not
 00964 required.
 00965

00966 U f. Procedures for Rail Cars, Containers, Trucks, and
 00968 U Other Transport Vehicles:

00970 Rail cars, containers, trucks, and other transport
 00971 vehicles loaded with bulk commodities to which
 00972 Deltia(R) Tablets or Pellets may be added are treated
 00973 in essentially the same way as any other storage
 (00974 facility. Deltia (R) may be added as the vehicle is
 00975 being filled, the dose may be scattered over the
 00976 surface after loading has been completed or the
 00977 tablets or pellets may be probed below the surface.
 00978 Carefully seal any vents, cracks or other leaks
 00979 particularly if the fumigation is to be carried out
 00980 intransit. Remember, rail cars and containers
 00981 shipped piggyback by rail may be fumigated
 00982 intransit, but it is not legal to move trucks,
 00983 trailers, etc., over public roads or highways until
 00984 they are aerated. See section "III.J" on page
 00985 of this manual for recommendations on placarding,
 00986 commodity aeration and training of persons
 00987 authorized to remove placarding.
 00988

00989 Notify the consignee if the commodity is to be shipped
 00990 under fumigation. If the consignee is unfamiliar with
 00991 proper handling of fumigated rail cars, it is recommended
 00992 that they be provided with the necessary information.
 00993
 00994

00996 U g. Procedures for Farm Storage:
 00997

00998 (1) General

00999 Since on farm storage is almost always flat storage,
 01000 refer to "Procedures for Flat Storage" on page of
 01001 this manual. The instructions which follow provide
 01002 additional guidance.
 01003

01004 (2) Sealing

01005 Leakage is the single most important cause of
 01006 failure in the treatment of farm bins. Since
 01008 these bins are usually small by comparison they
 01009 have a higher leakage area in proportion to
 01010 their capacity. Most wooden granaries are so
 01011 porous that they cannot be successfully
 01012 fumigated unless they are completely covered
 01013 with plastic sheeting or similar tarp. Steel

- 01014 bins are also usually of very loose construction
 01015 and therefore, require much attention to sealing.
 01016 All vents and aeration ducts must be tightly
 01017 sealed using 4 mil polyethylene sheeting or its
 01018 equivalent. The plastic must be sealed directly
 01019 to the metal with tape or other adhesive. It is
 01020 not sufficient to "cinch up" the plastic as with
 01021 a belt. The surface of the grain should be
 01022 covered with plastic sheeting after Detia(R) has
 01023 been applied. Tarping of the grain surface will
 01024 greatly reduce leakage. Other sealing
 01025 techniques are recommended, i.e. closure of all
 01026 large cracks with caulking, foam insulation or
 01027 other sealant. Sealing these cracks will
 01028 greatly reduce the required dosage. Two mil or
 01029 thicker plastic can be used for tarping the
 01030 grain surface, however, the plastic used on the
 01031 outside of the bin should be at least 4 mils.
 01032 When an entire structure is tarped the plastic
 01033 must be at least 6 mils thick to prevent
 01034 excessive tearing during the fumigation.
 01035
- (3) Dosage
 01036 Unless all the large cracks are sealed as described
 01037 above the dosage recommended should be 90-180 tablets
 01038 or 450-900 pellets per 1000 bu. capacity of the space
 01039 under the plastic tarp.
 01040
 01041
- (4) Additional Application Instructions
 01042 Probing tablets or pellets into the grain mass
 01043 is the recommended method of application. Probe
 01044 insertions should be scattered evenly over the
 01045 surface. A rigid PVC pipe, about 5 to 7 feet
 01046 long and 1 1/4 inch diameter can be used. In
 01047 this event, use about 20-50 tablets or 100-250
 01048 pellets per probe. The fumigant is gradually
 01049 released into the probe as it is withdrawn from
 01050 the grain. Releasing all the fumigant into the
 01051 probe at once may retard the production of
 01052 hydrogen phosphide and might cause an ignition
 01053 of gas trapped in the clump of pellets or
 01054 tablets. Place no more than 1/4 of the total
 01055 dose in floor level aeration ducts. Be sure the
 01056 inside of the aeration duct is dry before adding
 01057 the pellets or tablets. Addition of Detia(R) to
 01058 water in an aeration duct can cause a fire.
 01059 Seal the aeration fan as described above.
 01060
 01061
- (5) Additional Precautions
 01062 Do not fumigate bins that will be entered by humans or
 01063 animals prior to aeration. Do not fumigate areas which
 01064 house equipment containing copper or other metals which
 01065 will be corroded by hydrogen phosphide. This includes
 01066
 01067

- 01068 electrical and electronic equipment.
 01069
 01070 Place "DANGER" placards on entrances to the bin and
 01071 near the ladder. See section on "PLACARDING OF
 01072 FUMIGATED AREAS" on page of this manual.
 01073
 01074 If monitoring equipment is not available, an approved
 01075 canister respirator must be worn for indoor
 01076 application. If an approved respirator is not
 01077 available, application must be done from outside of the
 01078 site to be fumigated. Also refer to all other
 01079 precautions given in this manual.
 01080
 01081 (6) Post Aeration Treatment
 01082 It is good practice to spray the grain surface with an
 01083 approved insecticide protectant to retard reinfestation
 01084 and to fog the space above the grain to kill existing
 01085 adult flying insects.
 01086
3. APPLICATION PROCEDURES FOR SPACE FUMIGATIONS.
- a. Procedures for Mills, Warehouses, Food Processing Plants,
Chambers, Trucks, Trailers, Containers and other Static
Sealable Enclosures
- (1) Determine the dosage of tablets or pellets to be
 applied based upon the following parameters for
 space fumigation:
- The volume of the structure
 - The air and/or commodity temperature
 - The general tightness of the structure to be
 fumigated.
- (2) Determine exposure period based on the "Exposure Guide"
 on page of this manual.
- (3) Seal all openings except for the door being used to
 enter and leave. Pay particular attention to openings
 to connecting or adjacent structures.
- (4) Place trays or sheets of Kraft paper or foil, up
 to 12 sq. ft. (1.1 sq. m) in area, on the floor
 throughout the structure to hold Detia(R) Tablets or
 Pellets.
- (5) Spread Detia(R) on the sheets at a density no
 greater than 30 tablets per sq. ft. or 75 pellets per
 sq. ft. This corresponds to slightly more than
 one half flask of tablets or one half flask of pellets
 per 3'x4' sheet. Check to see that they have not piled
 up and that they are spread out evenly to minimize
 contact between the individual tablets or pellets.

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- (6) Pellets and tablets may also be applied in moisture permeable envelopes to fumigate commodities. When fumigating in this way the envelopes must be fastened to a substantial support. Place no more than 10 pellets nor more than 2 tablets into one envelope. Dettia(R) Pellets and Tablets shall not be placed in or attached to commodity packages intended for retailers.
- (7) When fumigating multiple story buildings, each floor is considered a separate enclosure. Application should begin with the top floor and end with the ground floor.
- (8) Seal all remaining exits.
- (9) Placard and lock all entrances.
- (10) Aerate the structure upon completion of the exposure period. Standard aeration time and practices should be developed using a low level detection device. Practices will vary widely at different sites but will usually include opening windows, doors, and vents and activating any ventilation equipment. Reentry of an un aerated structure must be done in pairs wearing appropriate respiratory equipment.
- (11) Dispose of remaining dust from tablets or pellets. SEE "STORAGE AND DISPOSAL" on page 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

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01180 which the commodity rests is of wood or other porous
 01181 material, it should be repositioned onto plastic
 01182 sheeting prior to covering for fumigation. The plastic
 01183 covering of the pile may be sealed to the floor using
 01184 tape, glue, sand or water snakes, by shoveling soil or
 01185 sand onto the ends of the plastic covering or by other
 01186 suitable procedures. The plastic covering should be
 01187 reinforced by tape or other means around any sharp
 01188 corners or edges in the stack so as to reduce the risk
 01189 of tearing. Thinner sheeting, about 2 mils, is
 01190 suitable for most indoor tarp fumigations. However, 4
 01191 mil plastic or thicker is more suitable for outdoor
 01192 applications where wind or other mechanical stresses
 01193 are likely to be encountered.
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(1195 (3) Additional Application Instructions

01196 Tablets or pellets may be applied under the edge
 01197 of the tarp or through slits. The pellets or
 01198 tablets should be protected from condensation or
 01199 other source of water. The slits in the
 01200 covering should be carefully taped to prevent
 01201 loss of gas once the dose has been applied.
 01202 Pellets or tablets must be placed in a single
 01203 layer. Care should be taken to prevent the
 01204 plastic tarp from covering the pellets or
 01205 tablets in such a way as to prevent contact with
 01206 moist air or to confine the gas. Refer to other
 01207 sections for dosage and exposure times.
 01208

01209 (4) Additional Precautions

01210 See appropriate precautions if the fumigation is
 01211 conducted indoors as opposed to outdoors.
 01212 Indoor fumigation precautions are handled as any
 01213 other situation where the application is made
 01214 from outside the area being fumigated (i.e. the
 01215 adding of pellets or tablets to a dispenser for
 01216 uniform addition to grain). Workers may occupy
 01217 adjacent indoor areas but they must be protected
 01218 from overexposure to hydrogen phosphide by
 01219 adequate sealing, ventilation or as a last
 01220 resort, respiratory equipment.
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01222 Do not walk on stacks during the fumigation.

01223 Place "DANGER" placards at conspicuous points on the
 01224 enclosure.
 01225

01226 Follow precautions listed elsewhere in labeling.
 01227

01228 (5) Aeration

01229 Precautions must be taken to assure that
 01230 exposure to hydrogen phosphide in excess of
 01231 allowed limits does not occur both during the
 01232
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fumigation and aeration.

4. APPLICATION PROCEDURES FOR INTRANSIT FUMIGATION OF SHIP HOLDS

a. General Information:

- (1) Shipboard fumigation is also regulated by the U.S. Coast Guard Regulations 46 CFR 147A.
- (2) This product is toxic to fish. Keep out of lakes, streams and other aquatic environments. Do not contaminate water by cleaning equipment or disposal of wastes.

b. Pre-Voyage 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

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- 01290 and/or otherwise secure all openings, manways, etc.
- 01291 used to enter the hold. Post appropriate "DANGER"
- 01292 placards on same.
- 01293
- 01294 (5) On tankers the over-space pressure relief system
- 01295 of each tank must be sealed by (1) the closing
- 01296 of appropriate valves and (2) sealing the
- 01297 openings into the over-space with gas tight
- 01298 materials.
- 01299
- 01300 (6) Contact appropriate authorities.
- 01301
- 01302 (7) If the fumigation is not completed and the vessel
- 1303 aerated before the manned vessel leaves port, the
- 01304 person in charge of the vessel shall insure that at
- (305 least two units of personal protection equipment and
- 01306 one gas or vapor detection device and a person
- 01307 qualified in their operation be on board the vessel
- 01308 during the voyage.
- 01309
- 01310 (8) During the fumigation or until a manned vessel
- 01311 leaves port or the cargo is aerated, the person in
- 01312 charge of the fumigation shall insure that a qualified
- 01313 person using gas or vapor detection equipment test
- 01314 spaces adjacent to the fumigated cargo area and all
- 01315 regularly occupied spaces for fumigant leakage.
- 01316
- 01317 If leakage of the fumigant is detected, the person in
- 01318 charge of the fumigation shall take action to correct
- 01319 the leakage or shall inform the master of the vessel or
- 01320 his representative of the leakage so that corrective
- (1321 action can be taken.
- 1322
- 01323 (9) Review with the master, or his representative, the
- 01324 voyage precautions and procedures.
- 01325
- 01326 *Personal protection equipment means a
- 01327 respirator or gas mask fitted with a canister
- 01328 designed for phosphine gas which is approved by
- 01329 NIOSH/MSHA. A gas mask and canister is approved
- 01330 for use up to 15 ppm. Above 15 ppm or at
- 01331 unknown concentrations a SCBA or its equivalent
- 01332 must be used.
- 01333
- 01334 U c. Procedures for Bulk Dry Cargo Vessels and Tankers:
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- 01336 (1) Apply either the tablets or pellets by scattering
- 01337 them uniformly onto the commodity surface utilizing as
- 01339 much of the total surface area as possible, or insert
- 01340 them uniformly into the commodity mass by hand or with
- 01341 probes to any depth desired.
- 01342
- 01343 (2) Close and secure hatch covers, tank tops,
- 01344

butterworths, etc. immediately following application.

d. Voyage Precautions and Procedures:

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

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

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

- (3) Do not enter fumigated holds or tanks.

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

e. Precautions and Procedures During Discharge:

If necessary to enter holds prior to discharge, test spaces directly above cargo surface for fumigant 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.

5. APPLICATION PROCEDURES FOR INTRANSIT FUMIGATION OF CONTAINERS

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6. APPLICATION PROCEDURES FOR FUMIGATION OF BARGES

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7. APPLICATION PROCEDURES FOR FUMIGATION OF RODENT AND MOLE BURROWS

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- a. When fumigating bulk commodities to which direct addition of pellets or tablets is not allowed or packaged commodities, refer to section "3.a" on page of this manual. Do not place tablets loosely on trays or sheets of paper or foil since movement of the container may disrupt the correct placement of pellets or tablets. Instead they must be applied in moisture permeable envelopes as described in section "3.a.(6)".
- b. When fumigating a commodity by direct addition of pellets or tablets, refer to Section "2.f." on page of this manual.
- c. Intransit fumigation of containers on ships is regulated by Coast Guard Regulation 46 CFR 147A and the applicator or shipper must obtain and comply with U.S. Coast Guard Special permit No. 52-75. Contact the Coast Guard or Research Products Company for additional information.
- d. Comply with general precautions given in Labeling.

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 HOLDS" on page .

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

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

b. Sealing

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

a. List of Burrowing Rats

Detia(R) Tablets and Pellets may be used out of doors only for the control of the following burrowing rodents and

01459 moles; marmot sp. - woodchucks and yellow-belly marmots
 01460 (rockchucks), prairie dogs (except Utah prairie dog),
 01461 Norway and roof rats, mice, ground squirrels, moles (except
 01462 in Indiana), voles, gophers and chipmunks (except in
 01463 California).
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01465 U

b. Application Instructions

01467 Add from 1 to 4 Detia(R) Tablets or 5 to 20 Detia(R)
 01468 Pellets to each burrow opening. Seal tightly by
 01469 shoveling soil over the entrance. Place the pellets
 01470 or tablets far enough down the burrow that the soil
 01471 used to plug the burrow doesn't cover the pellets or
 01472 tablets, slowing down their action. Where possible,
 01473 subsurface tunnels or runways should be treated
 01474 every 5 to 10 feet with a dose of 2 to 4 tablets or
 (01475 10 to 20 pellets. Use lower rates in smaller
 01476 burrows, in tight soils, under moist soil conditions
 01477 and higher rates in larger burrows, in porous soils
 01478 and/or when soil moisture is low. In extremely dry
 01479 or porous soil, it is sometimes not possible to
 01480 obtain satisfactory results. This is particularly
 01481 true in instances where the burrow systems are
 01482 extensive such as moles or gophers. It is always
 01483 better not to fumigate during extended periods of
 01484 dry weather. Treat reopened burrows and fresh
 01485 runways a second time 1 to 3 days after the initial
 01486 treatment.

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

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c. Environmental Hazards

01495 This product is highly toxic to wildlife. Non-target
 01496 organisms exposed to hydrogen phosphide gas in burrows will
 01497 be killed. Do not apply directly to water or wetlands
 01498 (swamps, bogs, marshes, and potholes). Do not contaminate
 01499 water by cleaning of equipment or disposal of wastes.
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d. Endangered Species Restrictions

01503 The use of Detia(R) ROTOX(R) in a manner that may
 01504 kill or otherwise harm an endangered or threatened
 01505 species or adversely modify their habitat is a
 01506 violation of federal laws. Before using this
 01507 pesticide on range and/or pastureland in the
 01508 counties listed below, you must obtain the PESTICIDE
 01509 USE BULLETIN FOR PROTECTION OF ENDANGERED SPECIES
 01510 for the county in which the product is to be used.
 01511 The bulletin is available from your county extension
 01512 agent, state fish and game office, or your pesticide
 01513 dealer. Use of this product in a manner
 01514 inconsistent with the PESTICIDE USE BULLETIN FOR

01515 PROTECTION OF ENDANGERED SPECIES is a violation of
 01516 federal laws.
 01517
 01518 Even if applicable county bulletins do not prohibit
 01519 the use of this product at the intended site of
 01520 application, you may not use this product for
 01521 control of prairie dogs in the states of Arizona,
 01522 Colorado, Kansas, Montana, Nebraska, New Mexico,
 01523 North Dakota, Oklahoma, South Dakota, Texas, Utah or
 01524 Wyoming unless a pre-control survey has been
 01525 conducted. Contact the nearest U.S. Fish and
 01526 Wildlife Service endangered species specialist to
 01527 determine survey requirements in your area. This
 01528 survey must be in compliance with the black-footed
 01529 ferret survey guidelines, developed by the U.S. Fish
 (530 and Wildlife Service, and a determination must be
 531 made in accordance with the guidelines that
 01532 black-footed ferrets are not present in the
 01533 treatment area.
 01534
 01535 CALIFORNIA
 01536 Fresno, Inyo, Kern, Kings, Madera, Merced, Monterey,
 01537 San Benito, San Luis Obispo, Santa Barbara,
 01538 Stanislaus and Tulare
 01539
 01540 FLORIDA
 01541 Statewide
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 01543 GEORGIA
 01544 Appling, Atkinson, Bacon, Baker, Ben Hill, Bleckley,
 01545 Berrien, Brantley, Brooks, Bryan, Bullock, Calhoun,
 01546 Camden, Candler, Charlton, Chatham, Clinch, Coffee,
 (1547 Colquitt, Cook, Crisp, Decatur, Dodge, Dooly,
 01548 Daugherty, Early, Echols, Effingham, Emanuel, Evans,
 01549 Glynn, Grady, Irwin, Jeff Davis, Jenkins, Johnson,
 01550 Lanier, Laurens, Lee, Liberty, Long, Lowndes, Macon,
 01551 McCintosh, Miller, Mitchell, Montgomery, Pierce,
 01552 Pulaski, Screven, Seminole, Telfair, Tattnall,
 01553 Thomas, Tift, Toombs, Treutlen, Turner, Ware, Wayne,
 01554 Wheeler, Wilcox and Worth
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 01556 NEW MEXICO
 01557 Hidalgo
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 01559 UTAH
 01560 Beaver, Garfield, Iron, Kane, Plute, Sevier,
 01561 Washington and Wayne
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 01563 WYOMING
 01564 Albany
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 01566 U e. Special Local Restrictions
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- (1) NORTH CAROLINA
Detia(R) Tablets and Pellets may only be used for control of rats and mice in the state of North Carolina. Use against other pests is not permitted.
- (2) OKLAHOMA
A special permit for black-tailed prairie dog control by poisoning is required in Oklahoma. Contact the Oklahoma State Department of Wildlife Conservation to obtain this permit.
- (3) WISCONSIN
A state permit is required for use of pesticides in Wisconsin to control small mammals, except rats or mice. Please contact your local Department of Natural Resources office for information.
- (4) INDIANA
Use of Detia(R) Tablets or Pellets for mole control is not legal in the state of Indiana.
- (5) MISSOURI
A state permit is required for use of pesticides in Missouri to control small mammals, except rats and mice. Please contact the Missouri Department of Conservation office for information.
- (6) KANSAS
A special permit for black-tailed prairie dog control by poisoning is required in Kansas. Contact the Kansas Fish and Game Commission to obtain this permit.
- (7) CALIFORNIA
Use of Detia(R) Tablets and Pellets for chipmunk control is not legal in the state of California.

8. APPLICATION PROCEDURES FOR FUMIGATION OF BEEHIVES, SUPERS AND OTHER BEEKEEPING EQUIPMENT

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

Fumigations may be performed in chambers at atmospheric pressure, under tarpaulins, etc., by placing the tablets or pellets on trays or in moisture permeable envelopes. Do not add more than 2 tablets or 10 pellets to each envelope. Honey from treated hives or supers may only be used for bee food.

01624 Q H. PROTECTIVE CLOTHING

01625 Wear dry gloves made of cotton or other material when
01626 contact with tablets, pellets, or their dust is likely.
01627 Wash hands after use.
01628

01629 I. RESPIRATORY PROTECTION

01630 1. WHEN RESPIRATORY PROTECTION MUST BE WORN
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01632 NIOSH/MSHA approved respiratory protection must be worn
01633 during exposure to concentrations in excess of permitted
01634 limits or when concentrations are unknown.
01635

01636 2. PERMISSIBLE GAS CONCENTRATION RANGES FOR RESPIRATORY
01637 PROTECTION DEVICES
01638

01639 A NIOSH/MSHA approved, full face gas mask - hydrogen
01640 phosphide canister combination may be used at levels up
01641 to 15 ppm or to escape from levels up to 1500 ppm.
01642 Above this level or in situations where the hydrogen
01643 phosphide concentration is unknown, a NIOSH/MSHA
01644 approved, self-contained breathing apparatus (SCBA) or
01645 its equivalent must be used. The NIOSH/OSHA Pocket
01646 Guide, 8-85, DHEW/NIOSH 78-210, lists these and other
01647 types of approved respirators and the concentration
01648 limits at which they may be used.
01649

01650 3. REQUIREMENTS FOR AVAILABILITY OF RESPIRATORY PROTECTION
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01652 Respiratory protection must be available at the site of
01653 application in case it is needed when applying Deltia(R)
01654 from within the structure being fumigated. An approved
01655 full face gas mask - phosphine canister combination or
01656 self-contained breathing apparatus (SCBA) or its
01657 equivalent must be available at the site of application.
01658 If SCBA or its equivalent is not available at the
01659 application site, it must be available locally, for
01660 example, at a fire station or rescue squad.
01661

01662 Respiratory protection need not be available for
01663 application from outside the area to be fumigated such
01664 as addition of tablets or pellets to automatic
01665 dispensing devices, etc., if exposures above the
01666 permitted exposure limit will not be encountered.
01667

01668 Respiratory protection need not be available for outdoor
01669 applications.
01670

01671 If monitoring equipment is not available on a farm and
01672 application cannot be done from outside the structure,
01673 an approved canister respirator must be worn during
01674 application from within the enclosed indoor area.
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01676 J. FLAGGING OF FUMIGATED AREAS
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01678 The applicator must placard or post all entrances to the
 01679 fumigated area with signs bearing:
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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.

01693 All entrances to a fumigated area must be placarded. Where
 (01694 possible, placards should be placed in advance of the
 01695 fumigation in order to keep unauthorized persons away. For
 01696 railroad hopper cars, placarding must be placed securely on
 01697 both sides of the car near the ladders and next to the top
 01698 hatch into which the fumigant is introduced.
 01699

01700 Do not remove a placard until the treated commodity is
 01701 aerated down to 0.3 ppm or less. To determine whether
 01702 aeration is complete, each fumigated site or vehicle must be
 01703 monitored and shown to contain 0.3 ppm or less hydrogen
 01704 phosphide gas in the air space around and, when feasible, in
 01705 the mass of the commodity.
 01706

01707 Transfer of incompletely aerated commodity to a new site is
 01708 permissible, however, the new storage must be placarded if it
 (01709 contains more than 0.3 ppm hydrogen phosphide.
 01710

01711 Workers who handle incompletely aerated commodity must be
 01712 informed and appropriate measures must be taken (i.e.,
 01713 ventilation or respiratory protection) to prevent exposures
 01714 from exceeding the exposure limits for hydrogen phosphide.
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01716 It is recommended that the person responsible for removing
 01717 the placards be familiar with the physical, chemical and
 01718 toxicological properties of hydrogen phosphide. They should
 01719 also be knowledgeable in how to take gas readings, exposure
 01720 limits, symptoms and first aid treatment for hydrogen
 01721 phosphide poisoning.
 01722

01723
 01724
 01726 K. GAS DETECTION EQUIPMENT

01727 There are several reliable devices marketed. One type
 01728 is the hand pump when used in conjunction with the
 01729 appropriate detector tube. They are portable, simple
 01730 devices and do not require intensive training or elaborate
 01731 supporting equipment to operate. Furthermore, they are

01732 inexpensively adaptable to remote monitoring procedures and
 01733 will measure concentrations of hydrogen phosphide in air in
 01734 trace amounts on up. Use instructions are enclosed with
 01735 each purchase. Consult your local supplier of such
 01736 equipment or contact Research Products Company for more
 01737 information.
 01738

L. AERATION OF FUMIGATED COMMODITIES

1. FOODS AND FEEDS

01741 Tolerances for hydrogen phosphide residues have been
 01742 established at 0.1 ppm for animal feeds and 0.01 ppm for
 01743 finished foods. To guarantee compliance with these
 01744 tolerances, it is necessary to aerate these commodities
 01745 for 48 hours prior to offering them to the end
 01746 consumer.
 01747

2. TOBACCO

01748 Tobacco must be aerated for at least three days (72
 01749 hours) when fumigated in hogsheads and for at least two
 01750 days (48 hours) when fumigated in other containers.
 01751 When plastic liners are used, longer aeration periods
 01752 will probably be required to aerate the commodity down
 01753 to 0.3 ppm.
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3. As an alternative to these aeration periods, each
 01756 container of a treated commodity may be analyzed for
 01757 residues using accepted analytical methods. If residues
 01758 are less than tolerance levels, the commodity may be
 01759 shipped to the consumer regardless of the above holding
 01760 periods.
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M. APPLICATOR AND WORKER EXPOSURE

1. HYDROGEN PHOSPHIDE EXPOSURE LIMITS

01763 Exposure to hydrogen phosphide must not exceed the 8
 01764 hour TWA of 0.3 ppm for applicators and workers during
 01765 application. Application is defined as the time period
 01766 covering the opening of the first container, applying
 01767 the appropriate dosage of fumigant and closing up the
 01768 site to be fumigated. All persons in the treated site
 01769 and in adjacent indoor areas are covered by this
 01770 exposure standard.
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01773 After application is completed worker or applicator
 01774 exposure must not exceed 0.3 ppm maximum concentration.
 01775 Such exposures may occur because of leakage into
 01776 enclosed areas from fumigation sites, during reentry or
 01777 during transfer of unaerated commodity.
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2. APPLICATION OF FUMIGANT

01780 Depending upon temperature and humidity, Deltia(R)
 01781 Tablets and Pellets release hydrogen phosphide gas
 01782 slowly upon exposure to moisture from the air. This
 01783 release is often slow enough to permit applicators to
 01784

01785 deposit fumigant in the desired areas and then vacate
 01786 the premises without significant exposure to the gas.
 01787 If the fumigator's exposure exceeds the 8 hour TWA of
 01788 0.3 ppm, approved respiratory protection must be worn.
 01789 Gas concentration measurements for safety purposes must
 01790 be made using low level detector tubes or other suitable
 01791 low level detection equipment. See the "Industrial
 01792 Hygiene Monitoring" section below. Information on
 01793 hydrogen phosphide (phosphine, PH₃) detector tubes may
 01794 be obtained from Research Products Company.
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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.

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 01802 3. LEAKAGE FROM FUMIGATED SITES

01803 Hydrogen phosphide is highly mobile and given enough
 01804 time may penetrate seemingly gas tight materials such as
 01805 concrete and cinder block. Therefore, adjacent,
 01806 enclosed areas likely to be occupied should be examined
 01807 to ensure that significant leakage has not occurred.
 01808 Sealing of the fumigated site and/or air flow in the
 01809 occupied areas should be used to reduce exposure.
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01811 4. AERATION AND REENTRY

01812 If the area is to be entered after fumigation, it must
 01813 be aerated until the level of hydrogen phosphide gas is
 01814 0.3 ppm or below. The area or site must be monitored to
 01815 ensure that liberation of gas from the treated commodity
 01816 does not result in the development of unacceptable
 01817 levels of hydrogen phosphide. Do not allow reentry into
 01818 treated areas by any person before this time unless
 01819 protected by an approved respirator.
 01820

01821 5. HANDLING UNAERATED COMMODITIES

01822 Transfer and processing of a treated commodity prior to
 01823 complete aeration is permissible, however, workers must
 01824 not be exposed to hydrogen phosphide in excess of the
 01825 permitted exposure limits.
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01827 6. INDUSTRIAL HYGIENE MONITORING

01828 It is recommended that hydrogen phosphide exposure be
 01829 documented in an operation log or manual for each site
 01830 and operation where exposure may occur. The purpose of
 01831 this monitoring is to prevent excessive exposure and to
 01832 determine when and where respiratory protection is
 01833 required. This monitoring is mandatory although once
 01834 exposures have been adequately characterized, subsequent
 01835 monitoring is not routinely required. However, spot
 01836 checks should be made occasionally, especially if
 01837 conditions significantly change or an unexpected garlic

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01838 odor is detected. Gas concentration measurements should
 01839 be taken in the worker's breathing zone. Monitoring is
 01840 not required outdoors.

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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

01852 Flasks should be stored in a dry, well ventilated area,
 01853 away from heat and under lock and key. Post as a
 01854 pesticide storage area. Do not contaminate water, food
 01855 or feed by storing pesticides in the same areas used to
 01856 store these commodities. Do not store in buildings
 01857 where humans or domestic animals reside. Keep out of
 01858 reach of children.

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 01860 Detia(R) Tablets and Pellets are supplied in gas tight
 01861 resealable, aluminum flasks. Do not expose the product
 01862 inside flasks to atmospheric moisture any longer than is
 01863 necessary. Seal tightly before returning opened flasks
 01864 to storage. The shelf life of Detia(R) is virtually
 01865 unlimited if the containers are tightly sealed.

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 01867 Flasks should not be stored at sub-zero temperatures
 01868 because this will increase the possibility of an
 01869 ignition (flash) when opened.

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2. DISPOSAL OF UNREACTED OR PARTIALLY REACTED TABLETS OR PELLETS

01872 U (From spills, leaking flasks or other sources)
 01873 Unreacted or partially reacted Detia(R) Pellets or
 01874 Detia(R) Tablets are acutely hazardous. Improper
 01875 disposal of these products is a violation of federal
 01876 law. If these products cannot be disposed of by
 01877 ordinary use or according to the instructions that
 01878 follow, contact your state pesticide or environmental
 01879 control agency or the hazardous waste representative at
 01880 the nearest EPA regional office for guidance. Do not
 01881 contaminate water by disposal.

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 01884 Some local and state waste disposal regulations may vary
 01885 from the following recommendations. Disposal procedures
 01886 should be reviewed with appropriate authorities to
 01887 ensure compliance with local regulations.

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 01890 FOR SPECIFIC INSTRUCTIONS SEE "SPILL AND LEAK
 01891 PROCEDURES" ON PAGE OF THIS MANUAL.

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3. DISPOSAL OF PELLET OR TABLET DUST FOLLOWING A SPACE FUMIGATION

a. General

If properly exposed, the residual dust remaining after a fumigation with Detia(R) will be a grayish white, spent, nonhazardous waste and will contain only a small amount of unreacted aluminum phosphide. However, residual dust from incompletely exposed pellets or tablets (See "EXPOSURE GUIDE" on page of this manual.) will require special care. Confinement of partially spent residual dust, as in a closed container, or collection and storage of large quantities of this dust may result in a fire hazard. Small 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 THIS DUST IS SPENT IT MUST BE HELD FOR SEVERAL DAYS BEYOND THE REQUIRED EXPOSURE TIME PRIOR TO DISPOSAL OR THE WET METHOD (SEE BELOW) OF DEACTIVATION MUST BE USED. IF THE DUST RETAINS ANY OF ITS GREENISH COLOR THE WET METHOD IS RECOMMENDED.

b. Dry Method

In open areas, small amounts (up to 5 flasks) of residual dust may be disposed of on site by burial or by spreading over the land surface away from inhabited buildings. Up to 3 flasks of this residual dust (4 to 7 lbs.) may be collected in a one gallon bucket for holding or disposal. Larger amounts of residual dust may be collected in a porous cloth bag (burlap, cotton, etc.) for holding and/or transportation to a suitable disposal site. Do not put more than one half case (8 flasks of tablets or 10 flasks of pellets) of residual dust in each bag. Always transport these bags in an open vehicle. Do not pile bags. CAUTION! Do not use this method for dust that still retains some of its original greenish color. Never confine, dispose of or store residual dust in closed containers such as dumpsters, drums or plastic bags.

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

Do not dispose of dust in a toilet.

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c. Wet Method

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 10 gallons of water/detergent solution for each case of spent material. Slowly pour the dust into the container as the water is stirred. Wear appropriate respiratory protection. DO NOT COVER THE CONTAINER AT ANY TIME. This must be done outdoors or in front of an adequate fan that exhausts immediately outside.

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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.

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4. DISPOSAL OF EMPTY FLASKS

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a. Method One: Triple rinse flasks and stoppers with water. Then offer for recycling or reconditioning, or puncture and dispose of them in a sanitary landfill or other approved site or by other procedures approved by state and local authorities. Dispose of rinsate in a sanitary landfill or by other approved procedures. Small quantities can be poured out on the ground.

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b. Method Two: Remove lids and place empty flasks outdoors or in structure being fumigated until residue in flasks is reacted. Puncture and dispose of them in a sanitary landfill or other approved site or by other procedures approved by state and local authorities.

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0. SPILL AND LEAK PROCEDURES

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1. GENERAL

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

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2. DAMAGE TO FIBERBOARD CASE

Check aluminum flasks. If they are damaged handle as described on page . If they are undamaged return them to cardboard cartons or other suitable packaging

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02003 which complies with DOT regulations.

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3. LEAKING FLASK PROCEDURES

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If aluminum flasks have been punctured or damaged causing a leak, the product may be immediately used, the container may be temporarily repaired with aluminum tape or the Detia(R) may be transferred from the damaged flask to a sound metal container which should be sealed and properly labeled as aluminum phosphide. Transport the damaged containers to an area suitable for pesticide storage for inspection. Further instructions and recommendations may be obtained, if required, from Research Products Company.

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

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4. SPILL PROCEDURES

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

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

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

5. DEACTIVATION AND DISPOSAL OF UNREACTED OR PARTIALLY REACTED TABLETS OR PELLETS

a. Wet Method

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

Add 1/4 cup of low sudsing detergent or surfactant in each gallon of water. Each flask of tablets or pellets should be mixed with no less than 1 gallon of water/detergent solution. Slowly pour the

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material into the water as it is stirred. Stir occasionally thereafter for at least 36 hours. Wear appropriate respiratory protection. DO NOT COVER THE CONTAINER. IF THE CONTAINER IS COVERED THE HYDROGEN PHOSPHIDE BEING GENERATED WILL BE CONFINED AND WILL DECOMPOSE EXPLOSIVELY. The wet method of deactivation is the method of choice for quantities in excess of 5 flasks (10 to 15 pounds). It is safe to dispose of this slurry.

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

b. Dry Method

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

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