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

MAR 13 1987

OFFICE OF  
PESTICIDES AND TOXIC SUBSTANCES

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

SUBJECT: Aluminum and Magnesium Phosphide Registration Standard  
Your letters of February 23 and March 4, 1987  
EPA Reg. Nos. 2548-59

2548-62

2548-63

2548-67

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Gentlemen:

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

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

Sincerely,

A handwritten signature in dark ink, appearing to read "Jeff Kempter", written over a typed name.

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

Enclosures

2/82

ACCEPTED  
with COMMENTS  
in EPA Letter Dated:

MAR 16 1987

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

2548-69

DETIA ROTOX AT LABEL -- FRONT PANEL

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

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

Detia(R) ROTOX(R) AT

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.

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 TABLETS 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 TABLETS 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 TABLETS 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 TABLETS GETS IN EYES: Flush with plenty of water. Get medical attention.

See side panels for additional precautionary statements.

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

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

EPA Establishment No. 33982WG01	Net Contents:
EPA Registration No. 2548-69	Net Contents:

LEFT PANEL

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

KEEP OUT OF REACH OF CHILDREN  
DANGER/POISON

Aluminum phosphide in tablets 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) ROTOX(R) AT will begin to release hydrogen phosphide (phosphine) which is an extremely toxic gas. Contact with water, acids and some other liquids will accelerate this reaction. ~~If a garlic odor is detected, refer to section on respiratory protection of applicator/worker exposure for appropriate monitoring procedures.~~ Pure hydrogen phosphide gas is odorless; the odor is due to a contaminant. Since an odor may not be detected under

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

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

#### NOTE TO PHYSICIAN

Aluminum phosphide in tablets 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). Treatment is symptomatic.

#### RIGHT PANEL

#### DIRECTIONS FOR USE

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

The "Detia(R) ROTOX(R) AT and Detia(R) ROTOX(R) AP Instruction Booklet" is a part of labeling. Refer to it for application procedures and other information necessary to properly use Detia(R) ROTOX(R).

THIS PRODUCT IS ACCOMPANIED BY THE LABELING LISTED ABOVE. READ

07800 AND UNDERSTAND THE ENTIRE LABELING. ALL PARTS OF THE LABELING  
07850 ARE EQUALLY IMPORTANT FOR SAFE AND EFFECTIVE USE OF THIS  
07900 PRODUCT. CALL RESEARCH PRODUCTS COMPANY OR EPA IF YOU HAVE ANY  
07950 QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABELING.

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08050  
08100 STORAGE AND DISPOSAL

08150  
08200 STORAGE

08250  
08300 Flasks should be stored in a dry, well ventilated area, away  
08350 from heat and under lock and key. Post as a pesticide storage  
08400 area. Do not contaminate water, food or feed by storing  
08450 pesticides in the same areas used to store these commodities.

08500  
08550 Do not store in buildings where humans or domestic animals  
08600 reside. Refer to the "Detia(R) ROTOX(R) AT and Detia(R)  
08650 ROTOX(R) AP Instruction Booklet" for additional storage  
08700 instructions.

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08800 DISPOSAL OF UNREACTED OR PARTIALLY REACTED TABLETS (From spills,  
08850 leaking flasks or other sources)

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08950 Unreacted or partially reacted Detia(R) ROTOX(R) tablets are  
09000 acutely hazardous. Improper disposal of this product is a  
09050 violation of federal law.

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09150 If this product cannot be disposed of by ordinary use or  
09200 according to labeling instructions, contact your state pesticide  
09250 or environmental control agency or the hazardous waste  
09300 representative at the nearest EPA regional office for guidance.  
09350 Do not contaminate water by disposal.

09400  
09450 Reacted tablets are not hazardous. For complete disposal, spill  
09500 and leak procedures refer to the booklet "Detia(R) ROTOX(R) AT  
09550 and Detia(R) ROTOX(R) AP Instruction Booklet."

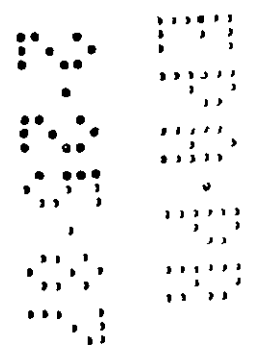
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09700 DISPOSAL OF EMPTY FLASKS

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09800 METHOD ONE: Triple rinse flasks and lids with water. Then  
09850 offer for recycling or reconditioning, or puncture and dispose  
09900 of them in a sanitary landfill or other approved site or by  
09950 other procedures approved by state and local authorities.  
10000 Dispose of rinsate in a sanitary landfill or by other approved  
10050 procedures.

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10150 METHOD TWO: Remove lids and place empty flasks outdoors or in a  
10200 structure being fumigated until residue in flasks is reacted.  
10250 Puncture and dispose of them in a sanitary landfill or other  
10300 approved site or by other procedures approved by state and local  
10400 authorities.  
10450

10500 GENERAL

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10600 Consult federal, state and local disposal authorities for  
10650 approved procedures other than those given above. Approved  
10700 procedures vary for different types of generators.  
10750  
10800 \*If in doubt concerning whether the dust is reacted and/or  
10850 concerning proper disposal techniques contact Research Products  
10900 Company.



ACCEPTED  
with COMMENTS  
in EPA Letter Dated:

MAR 16 1987

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

2548-69

DETIA ROTOX AT (small label) -- FRONT PANEL

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

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Detia(R) ROTOX(R) AT (small label)

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Inert Ingredients:.....43%  
TOTAL.....100%

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See side panels for additional precautionary statements.

Manufactured by: Detia Freyberg, GMBH  
P. O. Box 10  
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Distributed by: Research Products Company  
Div. of McShares, Inc.  
P. O. Box 1460  
Salina, KS 67402-1460

EPA Establishment No. 33982WG01 Net Contents:  
EPA Registration No. 2548-69 Net Contents:

#### LEFT PANEL

#### HAZARDS TO HUMANS AND DOMESTIC ANIMALS

KEEP OUT OF REACH OF CHILDREN  
DANGER/POISON

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05150 certain circumstances, the absence of a garlic odor does not  
05200 mean that hydrogen phosphide gas is absent. Observe proper  
05250 application, aeration, reentry and disposal procedures specified  
05300 elsewhere in the labeling to prevent overexposure.

05350  
05400 FREQUENT EXPOSURE TO LOW CONCENTRATIONS ABOVE PERMISSIBLE LEVELS  
05450 OVER A PERIOD OF DAYS OR WEEKS MAY CAUSE POISONING.

05500 NOTE TO PHYSICIAN

05600 Refer to "Detia(R) ROTOX(R) AT and Detia(R) ROTOX(R) AP  
05700 Instruction Booklet" for this section.

05800 RIGHT PANEL

05900 DIRECTIONS FOR USE

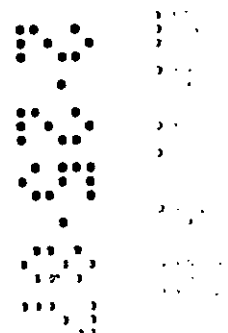
05950  
06000 It is a violation of federal law to use this product in a  
06050 manner inconsistent with its labeling.

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06150 The "Detia(R) ROTOX(R) AT and Detia(R) ROTOX(R) AP Instruction  
06200 Booklet" is a part of labeling. Refer to it for application  
06250 procedures and other information necessary to properly use  
06300 Detia(R) ROTOX(R).

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06450  
06500 THIS PRODUCT IS ACCOMPANIED BY THE LABELING LISTED ABOVE. READ  
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06750  
06800 STORAGE AND DISPOSAL

06850 Refer to "Detia(R) ROTOX(R) AT and Detia(R) ROTOX(R) AP  
06950 Instruction Booklet" for this section.  
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10/22

APPROVED  
with amendments  
in EPA Letter Date 3:

MAR 16 1987

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act  
as amended, for the pesticide  
registered under EPA Reg. No.  
2548-69 and 2548-70

RESTRICTED USE  
PESTICIDE

DUE TO ACUTE INHALATION TOXICITY OF HIGHLY  
TOXIC HYDROGEN PHOSPHIDE (PHOSPHINE, PH<sub>3</sub>) GAS

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

Defia(R) ROTOX(R) AT  
and  
Defia(R) ROTOX(R) AP

INSTRUCTION BOOKLET

EPA Registration No. 2548-69  
EPA Registration No. 2548-70  
EPA Establishment No. 33982WG01

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

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01850 F	TABLE OF CONTENTS
01900	1. INTRODUCTION
01950	A. History.....
02000	B. Product Description.....
02050	C. Product Packaging.....
02100	D. What Is Hydrogen Phosphide.....
02150	E. Safety Recommendations Summary.....
02200	
02250	II. PRECAUTIONARY STATEMENTS.....
02300	A. Hazards To Humans And Domestic Animals..
02350	B. Statement of Practical Treatment.....
02400	C. Note To Physician.....
02450	D. Physical And Chemical Hazards.....
02500	
02550	III. DIRECTIONS FOR USE.....
02600	A. General.....
02650	B. Protective Clothing.....
700	C. Respiratory Protection.....
02750	D. Hydrogen Phosphide Exposure Limits.....
02800	E. Industrial Hygiene Monitoring.....
02850	F. List of Burrowing Pests.....
02900	G. Application Instructions.....
02950	H. Environmental Hazards.....
03000	I. Endangered Species Restrictions.....
03050	J. Special Local Restrictions.....
03100	K. Storage and Disposal.....
03150	L. Spill and Leak Procedures.....

# I. INTRODUCTION

## A. HISTORY

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

## B. PRODUCT DESCRIPTION

Both Detia(R) ROTOX(R) AP and Detia(R) ROTOX(R) AT are a mixture of aluminum phosphide (57% by weight), ammonium carbamate and urea which is pressed into tablet and/or pellet form. The nearly spherical pellets are about 3/8" in diameter and weigh 0.6 grams each. The tablets are either disc shaped (4/5" in diameter and 1/5" thick) or spherical in shape (5/8" in diameter) and weigh 3.0 grams each. A pellet will produce about 0.2 grams hydrogen phosphide, the tablet about 1.0 gram. Both react with atmospheric moisture to produce hydrogen phosphide (PH<sub>3</sub>) in the following way:



Warm, humid air accelerates the reaction while cool, dry air has the opposite effect.

Detia(R) ROTOX(R) so contains ammonium carbamate which liberates ammonia and carbon dioxide as follows:



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

## C. PRODUCT PACKAGING

The tablets are packaged 500 and 100 to a flask. The pellets are packaged 1660 and 500 to a flask.

The aluminum flasks in which they are packaged are resealable and seamless. Their shelf life is almost unlimited as long as the packaging remains well sealed and intact. Once opened, the flasks may be tightly resealed and stored for future use.

## D. WHAT IS HYDROGEN PHOSPHINE?

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

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#### E. SAFETY RECOMMENDATIONS

1. Carefully read the labeling and follow instructions explicitly.
2. Never allow uninstructed persons to handle Detia(R).
3. Wear dry gloves made of cotton or other material when contact with tablets, pellets or their dust is likely.
4. Open fumigant containers in open air. Never open in a flammable atmosphere.
5. Do not allow Detia(R) to contact liquid water or to pile up.
6. Dispose of empty containers in a proper manner consistent with the label instructions.
7. Aerate contaminated clothing in well ventilated area prior to washing.
8. Keep containers tightly closed except when removing product.
9. Do not reuse aluminum phosphide containers for any purpose other than recycling or reconditioning.
10. OSHA recommends that the exposure screening of employees be conducted to detect impaired pulmonary function. OSHA recommends that any employees developing the above condition be referred for medical attention.

### II. PRECAUTIONARY STATEMENTS

#### A. HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Keep Out of Reach of Children

DANGER-POISON

Aluminum phosphide in pellets, tablets 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) ROTOX(R) 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.

Observe proper application and disposal procedures specified elsewhere in the labeling to prevent 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

- 08450 treatment facility.
- 08700
- 08750 U 1. If gas or dust from tablets or 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.
- 09050
- 09100
- 09150 U 2. If the pellets, tablets 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.
- 09250
- 09300
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- 09500 U 3. If pellets, tablets or their dust gets on skin or
- 09600 U 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.
- 09750
- 09800
- 09850
- 09900
- 09950
- 10050 U 4. If dust from the pellets or tablets gets in eyes:
- 10100 Flush with plenty of water. Get medical attention.
- 10150

#### 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:
  - 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

14300 ignition could occur.

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#### A. GENERAL

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Always open flasks of Detia(R) ROTOX in open air. 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 water and oils, and is stable at normal fumigation temperatures. However, it may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities. Metals such as copper, brass and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by hydrogen phosphide.

### 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) ROTOX(R) AT and AP are Restricted Use Pesticides due to the acute inhalation toxicity of hydrogen phosphide (phosphine,  $\text{PH}_3$ ) gas. These products are for retail sale to and use only by certified applicators for those uses covered by the applicator's certification or persons trained in accordance with ~~the attached~~ product manual working under the direct supervision and in the physical presence of the certified applicator. Physical presence means on site or on the premises.

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  
Div. of McShares, Inc.  
P. O. Box 1460  
Salina, Kansas 67402-1460  
913-825-2181

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

#### B. PROTECTIVE CLOTHING

Wear dry gloves made of cotton or other material when

contact with tablets, pellets, or their dust is likely.  
Wash hands after use.

#### C. RESPIRATORY PROTECTION

Respiratory protection need not be available for outdoor applications.

#### D. HYDROGEN PHOSPHIDE EXPOSURE LIMITS

Exposure to hydrogen phosphide must not exceed the 8 hour TWA of 0.3 ppm.

#### E. INDUSTRIAL HYGIENE MONITORING

Monitoring is not required outdoors.

#### F. LIST OF BURROWING PESTS

Detia(R) ROTOX may be used out of doors only for the control of the following burrowing rodents and moles: marmot sp. - woodchucks and yellow-belly marmots (rockchucks), prairie dogs (except Utah prairie dog), Norway and roof rats, mice, ground squirrels, moles (except in Indiana), voles, gophers and chipmunks (except in California).

#### G. APPLICATION INSTRUCTIONS

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

#### H. ENVIRONMENTAL HAZARDS

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

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# I. ENDANGERED SPECIES RESTRICTIONS

The use of Deltia(R) in a manner that may kill or otherwise harm an endangered or threatened species or adversely modify their habitat is a violation of federal law. The use of this product is controlled to prevent death or harm to endangered or threatened species that occur in the following counties or elsewhere in their range. Use of this product in the areas listed below is prohibited without first contacting and obtaining permission from the Endangered Species Specialist at the nearest regional offices of the U. S. Fish and Wildlife Service (FWS).

## Areas Inhabited by Endangered or Threatened Species

- (1) Black-footed ferret - State of Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah and Wyoming.
- (2) Blunt-nosed leopard lizard - Counties of Kern, Kings, Fresno, Madera, Merced, and Tulare in the state of California.
- (3) Desert tortoise - Washington County in the state of Utah.
- (4) Eastern indigo snake - States of Florida and Georgia.
- (5) San Joaquin kit fox - Counties of Kern, Kings, Fresno, Merced, Monterey, San Benito, San Luis Obispo, Santa Barbara, Tulare and Ventura in the state of California.

# J. SPECIAL LOCAL RESTRICTIONS

## (1) NORTH CAROLINA

Deltia(R) ROTOX(R) 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

Wisconsin to control small mammals, except rats or mice. Please contact your local Department of Natural Resources office for information.

## (4) INDIANA

Use of Deltia(R) ROTOX(R) 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) ROTOX for chipmunk control is not legal in the state of California.

K. STORAGE AND DISPOSAL

1. STORAGE

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. Do not store in buildings where humans or domestic animals reside. Keep out of reach of children.

Detia(R) ROTOX(R) is supplied in gas-tight resealable, aluminum flasks. Do not expose the product inside flasks to atmospheric moisture any longer than is necessary. Seal tightly before returning opened flasks to storage. The shelf life of Detia(R) is virtually unlimited if the containers are tightly sealed.

2. DISPOSAL OF UNREACTED OR PARTIALLY-REACTED TABLETS OR PELLETS

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

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

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

### 3. DISPOSAL OF EMPTY FLASKS

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.

b. Method\_Two: Remove lids and place empty flasks outdoors 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.

## L. SPILL AND LEAK PROCEDURES

### 1. GENERAL

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

### 2. DAMAGE TO FIBERBOARD CASE

Check aluminum flasks. If they are damaged handle as described below. If they are undamaged return them to cardboard cartons or other suitable packaging which complies with DOT regulations.

### 3. LEAKING FLASK PROCEDURES

If 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.

### 4. SPILL PROCEDURES

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 ~~must~~ 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 material into the water as it is stirred. Stir occasionally thereafter for at least 36 hours. Appropriate respiratory protection must be worn. 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

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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.

TC

(



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

MAR 13 1987

OFFICE OF  
PESTICIDES AND TOXIC SUBSTANCES

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

SUBJECT: Aluminum and Magnesium Phosphide Registration Standard  
Your letters of February 23 and March 4, 1987

EPA Reg. Nos. 2548-59

2548-62

2548-63

2548-67

2548-68

2548-69

2548-70

2548-73

2548-74

Gentlemen:

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

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

Sincerely,

A handwritten signature in dark ink, appearing to read "Jeff Kempter", is written over the typed name.

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

Enclosures

2/82  
ACCEPTED  
with COMMENTS  
In EPA Letter Dated:

MAR 16 1987

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

2548-69

00050 DETIA ROTOX AT LABEL -- FRONT PANEL

00200 RESTRICTED USE PESTICIDE

00250 DUE TO ACUTE INHALATION TOXICITY OF HIGHLY  
00300 TOXIC HYDROGEN PHOSPHIDE (PHOSPHINE, PH<sub>3</sub>) GAS

00400 For retail sale to and use only by certified applicators for  
00450 those uses covered by the applicator's certification or persons  
00500 trained in accordance with the attached product manual working  
00550 under the direct supervision and in the physical presence of the  
00600 certified applicator. Physical presence means on site or on the  
00650 premises. Read and follow the label and the Research Products  
00700 Company product manual which contains complete instructions for  
00750 the safe use of this pesticide.  
00800

00850 Detia(R) ROTOX(R) AT  
00900

00950 Active Ingredient: Aluminum Phosphide.....57%  
01000 Inert Ingredients:.....43%  
01050 TOTAL.....100%  
01100

01150 KEEP OUT OF REACH OF CHILDREN  
01200

01250 DANGER/PELIGRO-POISON  
01300

01350 PRECAUCION AL USUARIO: Si usted no lee ingles, no use este  
01400 producto hasta que la etiqueta se le haya sido explicado  
01450 ampliamente.  
01500

01550 STATEMENT OF PRACTICAL TREATMENT  
01600

01650 Symptoms of overexposure to hydrogen phosphide are headache,  
01700 dizziness, nausea, difficult breathing, vomiting and diarrhea.  
01750 In all cases of overexposure get medical attention immediately.  
01800 Take victim to the doctor or emergency treatment facility. ....  
01850

01900 IF GAS OR DUST FROM TABLETS IS INHALED: Get exposed person to  
01950 fresh air. Keep warm and make sure person can breathe freely. ....  
02000 If breathing has stopped, give artificial respiration by  
02050 mouth-to-mouth or other means of resuscitation. Do not give  
02100 anything by mouth to an unconscious person. ....  
02150

02200 IF THE TABLETS OR THEIR DUST ARE SWALLOWED: Drink or administer  
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02400 one or two glasses of water and induce vomiting by touching back  
 02500 of throat with finger, or if available, administer syrup of  
 02550 ipecac. Do not give anything by mouth if victim is unconscious  
 02600 or not alert.

02650  
 02700 IF TABLETS OR THEIR DUST GET ON SKIN OR CLOTHING: Brush or  
 02750 shake material off clothes and shoes in well ventilated area.  
 02800 Allow clothes to aerate in a ventilated area prior to  
 02850 laundering. Do not leave contaminated clothing in occupied  
 02900 and/or confined areas such as automobiles, vans, motel rooms,  
 02950 homes, etc. Wash contaminated skin thoroughly with soap and  
 03000 water.

03050  
 03100 IF DUST FROM THE TABLETS GETS IN EYES: Flush with plenty of  
 03150 water. Get medical attention.

03200  
 03250 See side panels for additional precautionary statements.

03300  
 03350 Manufactured by: Detia Freyberg, GMBH  
 03400 P. O. Box 10  
 03450 6947 Laudenbach  
 03500 F.R. of Germany

03550  
 03600  
 03650 Distributed by: Research Products Company  
 03700 Div. of McShares, Inc.  
 03750 P. O. Box 1460  
 03800 Salina, KS 67402-1460

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 03900  
 03950 EPA Establishment No. 33982WG01 Net Contents:  
 04000 EPA Registration No. 2548-69 Net Contents:

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 04200 LEFT PANEL

04250  
 04300 HAZARDS TO HUMANS AND DOMESTIC ANIMALS

04350  
 04400 KEEP OUT OF REACH OF CHILDREN  
 04450 DANGER/POISON

04500  
 04550 Aluminum phosphide in tablets or their dust can be fatal if  
 04600 swallowed. Do not get in eyes, in nose, on skin or on clothing.  
 04650 Do not eat, drink or smoke while handling aluminum phosphide.  
 04700 fumigants. When the container is opened Detia(R) ROTOX(R) AT  
 04750 will begin to release hydrogen phosphide (phosphine) which is an  
 04800 extremely toxic gas. Contact with water, acids and some other  
 04850 liquids will accelerate this reaction. ~~If a garlic odor is~~  
 04900 ~~detected, refer to section on respiratory protection or~~  
 04950 ~~applicator/worker exposure for appropriate monitoring~~  
 05000 ~~procedures.~~ Pure hydrogen phosphide gas is odorless, the odor is  
 05050 due to a contaminant. Since an odor may not be detected under

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

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

#### NOTE TO PHYSICIAN

Aluminum phosphide in tablets 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). Treatment is symptomatic.

#### RIGHT PANEL

#### DIRECTIONS FOR USE

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

The "Detia(R) ROTOX(R) AT and Detia(R) ROTOX(R) AP Instruction Booklet" is a part of labeling. Refer to it for application procedures and other information necessary to properly use Detia(R) ROTOX(R).

THIS PRODUCT IS ACCOMPANIED BY THE LABELING LISTED ABOVE. READ

07800 AND UNDERSTAND THE ENTIRE LABELING. ALL PARTS OF THE LABELING  
07850 ARE EQUALLY IMPORTANT FOR SAFE AND EFFECTIVE USE OF THIS  
07900 PRODUCT. CALL RESEARCH PRODUCTS COMPANY OR EPA IF YOU HAVE ANY  
07950 QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABELING.  
08000

08050  
08100 STORAGE AND DISPOSAL

08150  
08200 STORAGE

08250  
08300 Flasks should be stored in a dry, well ventilated area, away  
08350 from heat and under lock and key. Post as a pesticide storage  
08400 area. Do not contaminate water, food or feed by storing  
08450 pesticides in the same areas used to store these commodities.  
08500

08550 Do not store in buildings where humans or domestic animals  
08600 reside. Refer to the "Detia(R) ROTOX(R) AT and Detia(R)  
08650 ROTOX(R) AP Instruction Booklet" for additional storage  
08700 instructions.  
08750

08800 DISPOSAL OF UNREACTED OR PARTIALLY REACTED TABLETS (From spills,  
08850 leaking flasks or other sources)  
08900

08950 Unreacted or partially reacted Detia(R) ROTOX(R) tablets are  
09000 acutely hazardous. Improper disposal of this product is a  
09050 violation of federal law.  
09100

09150 If this product cannot be disposed of by ordinary use or  
09200 according to labeling instructions, contact your state pesticide  
09250 or environmental control agency or the hazardous waste  
09300 representative at the nearest EPA regional office for guidance.  
09350 Do not contaminate water by disposal.  
09400

09450 Reacted tablets are not hazardous. For complete disposal, spill  
09500 and leak procedures refer to the booklet "Detia(R) ROTOX(R) AT  
09550 and Detia(R) ROTOX(R) AP Instruction Booklet."  
09600

09650  
09700 DISPOSAL OF EMPTY FLASKS  
09750

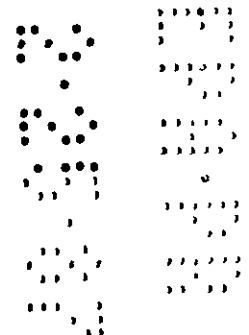
09800 METHOD ONE: Triple rinse flasks and lids with water. Then  
09850 offer for recycling or reconditioning, or puncture and dispose  
09900 of them in a sanitary landfill or other approved site or by  
09950 other procedures approved by state and local authorities.  
10000 Dispose of rinsate in a sanitary landfill or by other approved  
10050 procedures.  
10100

10150 METHOD TWO: Remove lids and place empty flasks outdoors or in a  
10200 structure being fumigated until residue in flasks is reacted.  
10250 Puncture and dispose of them in a sanitary landfill or other  
10300 approved site or by other procedures approved by state and local  
10400 authorities.  
10450

10500 GENERAL

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10600 Consult federal, state and local disposal authorities for  
10650 approved procedures other than those given above. Approved  
10700 procedures vary for different types of generators.

10750  
10800 \*If in doubt concerning whether the dust is reacted and/or  
10850 concerning proper disposal techniques contact Research Products  
10900 Company.



ACCEPTED  
with COMMENTS  
in EPA Letter Dated:

MAR 16 1987

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

2548-69

DETIA ROTOX AT (small label) --- FRONT PANEL

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

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

Detia(R) ROTOX(R) AT (small label)

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

KEEP OUT OF REACH OF CHILDREN

DANGER/PELIGRO-POISON

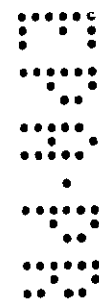
PRECAUCION AL USUARIO: Si usted no lee ingles, no use este  
producto hasta que la etiqueta se le haya sido explicado  
ampliamente.

# 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 TABLETS 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 TABLETS 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 TABLETS 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 TABLETS GETS IN EYES: Flush with plenty of water. Get medical attention.

See side panels for additional precautionary statements.

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

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

EPA Establishment No. 33982WG01  
EPA Registration No. 2548-69

Net Contents:  
Net Contents:

#### LEFT PANEL

#### HAZARDS TO HUMANS AND DOMESTIC ANIMALS

KEEP OUT OF REACH OF CHILDREN  
DANGER/POISON

Aluminum phosphide in tablets 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) ROTOX(R) AT will begin to release hydrogen phosphide (phosphine) which is an extremely toxic gas. Contact with water, acids and some other liquids will accelerate this reaction. If a garlic odor is detected, refer to section on respiratory protection or ~~of the product manual~~ *Industrial Hygiene Monitoring on page* applied for worker exposure for appropriate monitoring procedures. Pure hydrogen phosphide gas is odorless; the odor is due to a contaminant. Since an odor may not be detected under

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

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

#### NOTE TO PHYSICIAN

Refer to "Detia(R) ROTOX(R) AT and Detia(R) ROTOX(R) AP Instruction Booklet" for this section.

#### RIGHT PANEL

#### DIRECTIONS FOR USE

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

The "Detia(R) ROTOX(R) AT and Detia(R) ROTOX(R) AP Instruction Booklet" is a part of labeling. Refer to it for application procedures and other information necessary to properly use Detia(R) ROTOX(R).

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.

#### STORAGE AND DISPOSAL

Refer to "Detia(R) ROTOX(R) AT and Detia(R) ROTOX(R) AP Instruction Booklet" for this section.



ACCOUNT  
APR 10 1987  
in EPA Letter D-13

MAR 16 1987

Under the Federal Insecticide,  
Fungicide, and Rodenticide Act  
as amended, for the pesticide  
registered under EPA Reg. No.  
2548-69 and 2548-70

RESTRICTED USE  
PESTICIDE

DUE TO ACUTE INHALATION TOXICITY OF HIGHLY  
TOXIC HYDROGEN PHOSPHIDE (PHOSPHINE, PH<sub>3</sub>) GAS

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

Detia(R) ROTOX(R) AT  
and  
Detia(R) ROTOX(R) AP

INSTRUCTION BOOKLET

EPA Registration No. 2548-69  
EPA Registration No. 2548-70  
EPA Establishment No. 33982WG01

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

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## TABLE OF CONTENTS

01900	1. INTRODUCTION
01950	A. History.....
02000	B. Product Description.....
02050	C. Product Packaging.....
02100	D. What Is Hydrogen Phosphide.....
02150	E. Safety Recommendations Summary.....
02200	
02250	II. PRECAUTIONARY STATEMENTS.....
02300	A. Hazards To Humans And Domestic Animals..
02350	B. Statement of Practical Treatment.....
02400	C. Note To Physician.....
02450	D. Physical And Chemical Hazards.....
02500	
02550	III. DIRECTIONS FOR USE.....
02600	A. General.....
02650	B. Protective Clothing.....
200	C. Respiratory Protection.....
02750	D. Hydrogen Phosphide Exposure Limits.....
02800	E. Industrial Hygiene Monitoring.....
02850	F. List of Burrowing Pests.....
02900	G. Application Instructions.....
02950	H. Environmental Hazards.....
03000	I. Endangered Species Restrictions.....
03050	J. Special Local Restrictions.....
03100	K. Storage and Disposal.....
03150	L. Spill and Leak Procedures.....

I. INTRODUCTION

A. HISTORY

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

B. PRODUCT DESCRIPTION

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



Warm, humid air accelerates the reaction while cool, dry air has the opposite effect.

Detia(R) ROTOX(R) so contains ammonium carbamate which liberates ammonia and carbon dioxide as follows:



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

C. PRODUCT PACKAGING

The tablets are packaged 500 and 100 to a flask. The pellets are packaged 1660 and 500 to a flask.

The aluminum flasks in which they are packaged are resealable and seamless. Their shelf life is almost unlimited as long as the packaging remains well sealed and intact. Once opened, the flasks may be tightly resealed and stored for future use.

D. WHAT IS HYDROGEN PHOSPHIDE?

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

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## E. SAFETY RECOMMENDATIONS

1. Carefully read the labeling and follow instructions explicitly.
2. Never allow uninstructed persons to handle Detia(R).
3. Wear dry gloves made of cotton or other material when contact with tablets, pellets or their dust is likely.
4. Open fumigant containers in open air. Never open in a flammable atmosphere.
5. Do not allow Detia(R) to contact liquid water or to pile up.
6. Dispose of empty containers in a proper manner consistent with the label instructions.
7. Aerate contaminated clothing in well ventilated area prior to washing.
8. Keep containers tightly closed except when removing product.
9. Do not reuse aluminum phosphide containers for any purpose other than recycling or reconditioning.
10. OSHA recommends that the exposure screening of employees be conducted to detect impaired pulmonary function. OSHA recommends that any employees developing the above condition be referred for medical attention.

## II. PRECAUTIONARY STATEMENTS

### A. HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Keep Out of Reach of Children

DANGER-POISON

Aluminum phosphide in pellets, tablets 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) ROTOX(R) 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.

Observe proper application and disposal procedures specified elsewhere in the labeling to prevent 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

09450 treatment facility.

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09750 U 1. If gas or dust from tablets or 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.

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09100 U 2. If the pellets, tablets 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.

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09500 U 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.

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10000 U 4. If dust from the pellets or tablets gets in eyes: Flush with plenty of water. Get medical attention.

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10200 C. NOTE TO PHYSICIAN

10250 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.

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11000 In sufficient quantity hydrogen phosphide affects the liver, kidneys, lungs, nervous system, and circulatory system.

11050 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).

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Pathology is characteristic of hypoxia (oxygen deficiency in body tissue). Frequent exposure over a period of days or weeks may cause poisoning. Treatment is symptomatic.

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

1. In its milder to moderate forms (symptoms of poisoning may take up to 24 hours to make their appearance), the following is suggested:
  - a. Complete rest 1-2 days during which the patient must be kept quiet and warm.
  - b. If the patient suffers from vomiting or increased blood sugar, appropriate solutions should be administered. Treatment with oxygen is recommended as is the administration of cardiac and circulatory stimulants.
2. In cases of severe poisoning (intensive care unit recommended):
  - a. Where pulmonary edema is observed, steroid therapy should be considered and close medical supervision is recommended. Blood transfusions may be necessary.
  - b. In case of manifest pulmonary edema, venesection should be performed under vein pressure control. Heart glycosides (I.V.) can be used in case of hemoconcentration. Venesection may result in shock. In the case of progressive edema of the lungs, immediately intubate and remove edema fluid and administer oxygen over-pressure respiration, as well as any measures required for shock treatment. In case of kidney failure, extracorporeal hemodialysis is necessary. There is no specific antidote known for this poisoning.
  - c. If pellets or tablets are ingested, induce vomiting. Flush the stomach with a diluted potassium permanganate solution or a solution of magnesium peroxide until flushing liquid ceases to smell of carbide. Thereafter, apply carbomedicinalis.

#### D. PHYSICAL AND CHEMICAL HAZARDS

Aluminum phosphide in 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

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ignition could occur.

Always open flasks of Detia(R) ROTOX in open air. 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 water and oils, and is stable at normal fumigation temperatures. However, it may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities. Metals such as copper, brass and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by hydrogen phosphide.

### 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) ROTOX(R) AT and AP are Restricted Use Pesticides due to the acute inhalation toxicity of hydrogen phosphide (phosphine, PH<sub>3</sub>) gas. These products are for retail sale to and use only by certified applicators for those uses covered by the applicator's certification or persons trained in accordance with ~~the attached~~ <sup>full</sup> 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  
Div. of McWhares, Inc.  
P. O. Box 1460  
Salina, Kansas 67402-1460  
913-825-2181

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

#### B. PROTECTIVE CLOTHING

Wear dry gloves made of cotton or other material when

17050 contact with tablets, pellets, or their dust is likely.  
 17060 Wash hands after use.  
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 17150 C. RESPIRATORY PROTECTION  
 17200 Respiratory protection need not be available for outdoor  
 17250 applications.  
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 17350 D. HYDROGEN PHOSPHIDE EXPOSURE LIMITS  
 17400 Exposure to hydrogen phosphide must not exceed the 8  
 17450 hour TWA of 0.3 ppm.  
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 17550 E. INDUSTRIAL HYGIENE MONITORING  
 17600 Monitoring is not required outdoors.  
 17650  
 17700 F. LIST OF BURROWING PESTS  
 17750 Detia(R) ROTOX may be used out of doors only for the control  
 17800 of the following burrowing rodents and moles: marmot sp. -  
 17850 woodchucks and yellow-belly marmots (rockchucks), prairie  
 17900 dogs (except Utah prairie dog), Norway and roof rats, mice,  
 17950 ground squirrels, moles (except in Indiana), voles, gophers  
 18000 and chipmunks (except in California).  
 18050  
 18100 G. APPLICATION INSTRUCTIONS  
 18150 Add from 1 to 4 Detia(R) ROTOX(R) AT tablets or 5 to 20  
 18200 Detia(R) ROTOX(R) AP pellets to each burrow opening. Seal  
 18250 tightly by shoveling soil over the entrance. Place the  
 18300 pellets or tablets far enough down the burrow that the soil  
 18350 used to plug the burrow doesn't cover the pellets or  
 18400 tablets, slowing down their action. Where possible  
 18450 subsurface tunnels or runways should be treated every 5 to  
 18500 10 feet with a dose of 2 to 4 tablets or 10 to 20 pellets.  
 18550 Use lower rates in smaller burrows, in tight soils, under  
 18600 moist soil conditions and higher rates in larger burrows, in  
 18650 porous soils and/or when soil moisture is low. In extremely  
 18700 dry or porous soil, it is sometimes not possible to obtain  
 18750 satisfactory results. This is particularly true in  
 18800 instances where the burrow systems are extensive such as  
 18850 moles or gophers. It is always better not to fumigate  
 18900 during extended periods of dry weather. Treat reopened  
 18950 burrows and fresh runways a second time 1 to 3 days after  
 19000 the initial treatment.  
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 19100 Detia(R) may be used out of doors only, for control of  
 19150 burrowing pests. Do not use within 15 feet (5 meters) of  
 19200 inhabited structures. Do not apply to burrows which may  
 19250 open under or into occupied buildings.  
 19300  
 19350 H. ENVIRONMENTAL HAZARDS  
 19400 This product is highly toxic to wildlife. Non-target  
 19450 organisms exposed to hydrogen phosphide gas in burrows will  
 19500 be killed. Do not apply directly to water or wetlands  
 19550 (swamps, bogs, marshes, and potholes). Do not contaminate  
 19600 water by cleaning of equipment or disposal of wastes.

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# I. ENDANGERED SPECIES RESTRICTIONS

The use of Deltia(R) in a manner that may kill or otherwise harm an endangered or threatened species or adversely modify their habitat is a violation of federal law. The use of this product is controlled to prevent death or harm to endangered or threatened species that occur in the following counties or elsewhere in their range. Use of this product in the areas listed below is prohibited without first contacting and obtaining permission from the Endangered Species Specialist at the nearest regional offices of the U. S. Fish and Wildlife Service (FWS).

## Areas Inhabited by Endangered or Threatened Species

- (1) Black-footed ferret - State of Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah and Wyoming.
- (2) Blunt-nosed leopard lizard - Counties of Kern, Kings, Fresno, Madera, Merced, and Tulare in the state of California.
- (3) Desert tortoise - Washington County in the state of Utah.
- (4) Eastern indigo snake - States of Florida and Georgia.
- (5) San Joaquin kit fox - Counties of Kern, Kings, Fresno, Merced, Monterey, San Benito, San Luis Obispo, Santa Barbara, Tulare and Ventura in the state of California.

# J. SPECIAL LOCAL RESTRICTIONS

## (1) NORTH CAROLINA

Deltia(R) ROTOX(R) 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

Wisconsin to control small mammals, except rats or mice. Please contact your local Department of Natural Resources office for information.

## (4) INDIANA

Use of Deltia(R) ROTOX(R) for mole control is not legal.

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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 Deltia(R) ROTOX for chipmunk control is not legal in the state of California.

K. STORAGE AND DISPOSAL

1. STORAGE

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. Do not store in buildings where humans or domestic animals reside. Keep out of reach of children.

Deltia(R) ROTOX(R) is supplied in gas-tight resealable, aluminum flasks. Do not expose the product inside flasks to atmospheric moisture any longer than is necessary. Seal tightly before returning opened flasks to storage. The shelf life of Deltia(R) is virtually unlimited if the containers are tightly sealed.

2. DISPOSAL OF UNREACTED OR PARTIALLY-REACTED TABLETS OR PELLETS

(From spills, leaking flasks or other sources) Unreacted or partially reacted Deltia(R) ROTOX(R) AP or Deltia(R) ROTOX(R) AT are acutely hazardous. Improper disposal of these products is a violation of federal law. If these products cannot be disposed of by ordinary use or according to the instructions that follow, contact your state pesticide or environmental control agency or the hazardous waste representative at the nearest EPA regional office for guidance. Do not contaminate water by disposal.

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

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

### 3. DISPOSAL OF EMPTY FLASKS

- 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.
- b. Method\_Two: Remove lids and place empty flasks outdoors 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.

## L. SPILL AND LEAK PROCEDURES

### 1. GENERAL

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

### 2. DAMAGE TO FIBERBOARD CASE

Check aluminum flasks. If they are damaged handle as described below. If they are undamaged return them to cardboard cartons or other suitable packaging which complies with DOT regulations.

### 3. LEAKING FLASK PROCEDURES

If 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.

### 4. SPILL PROCEDURES

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 <sup>plus</sup> 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 material into the water as it is stirred. Stir occasionally thereafter for at least 36 hours. Appropriate respiratory protection must be worn. 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

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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.

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