

# RESTRICTED USE PESTICIDE

DUE TO ACUTE INHALATION TOXICITY OF PHOSPHINE GAS

For retail sale to Dealers and Certified Applicators only. For use by Certified Applicators or persons under their direct supervision, and only for those uses covered by the Certified Applicator's certification. Refer to the directions in this Applicator's Manual for requirements of the physical presence of a Certified Applicator.

THE COMPLETE LABEL FOR THIS PRODUCT CONSISTS OF THE CONTAINER LABEL AND THE APPLICATOR'S MANUAL WHICH MUST ACCOMPANY THE PRODUCT. THEREFORE EVERY FOIL POUCH MUST HAVE AN APPLICATOR'S MANUAL DATED 04112017-6782 ACCOMPANY IT. READ AND UNDERSTAND THE ENTIRE LABELING AND APPLICATOR'S MANUAL. A FUMIGATION MANAGEMENT PLAN MUST BE WRITTEN FOR ALL FUMIGATIONS PRIOR TO ACTUAL TREATMENT. CONSULT WITH YOUR STATE LEAD PESTICIDE REGULATORY AGENCY TO DETERMINE REGULATORY STATUS, REQUIREMENTS, AND RESTRICTIONS FOR FUMIGATION USE IN THAT STATE, CALL UPI IF YOU HAVE ANY QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABELING.

## APPLICATOR'S MANUAL 04112017-6782

UPI

### Magnesium Phosphide Fumigant MAGNAPHOS PLATE

FOR USE AGAINST INSECTS WHICH INFEST STORED COMMODITIES

Active Ingredient: Magnesium Phosphide .....	56.0%
Other Ingredients .....	44.0%
Total .....	100.0%



**DANGER - POISON – PELIGRO**



**KEEP OUT OF REACH OF CHILDREN**

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

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

**FOR CHEMICAL EMERGENCY: SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT, CALL CHEMTREC 1-800-424-9300.**

EPA Registration No. 70506-309

EPA Establishment No. 41876-IND-001

**NET WEIGHT: 15.48 LBS (60 Plates X 4.13 OZ) 7.02 KG (60 Plates X 117 GM)**



Manufactured for: **United Phosphorus, Inc.**  
630 Freedom Business Center, Suite 402  
King of Prussia, PA 19406 • 1-800-438-6071

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## SECTION 1

### FIRST AID

**FIRST AID:** Symptoms of exposure to this product are headaches, dizziness, nausea, difficult breathing, vomiting, and diarrhea. In all cases of overexposure get medical attention immediately. Transport victim to a doctor or emergency treatment facility.

<b>IF INHALED</b>	<ul style="list-style-type: none"><li>• Move person to fresh air.</li><li>• If person is not breathing, call 911 or an ambulance, then give artificial respiration immediately, preferably by mouth-to-mouth if possible.</li><li>• Contact a poison control center or doctor for further treatment advice.</li></ul>
<b>IF SWALLOWED</b>	<ul style="list-style-type: none"><li>• Call a poison control center or doctor immediately for treatment advice.</li><li>• Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or physician.</li><li>• Do not give anything by mouth to an unconscious person.</li></ul>
<b>IF ON SKIN OR CLOTHING</b>	<ul style="list-style-type: none"><li>• Take off contaminated clothing.</li><li>• Rinse skin immediately with plenty of water for at least 15-20 minutes.</li><li>• Call a poison control center or doctor for treatment advice.</li></ul>
<b>IF IN EYES</b>	<ul style="list-style-type: none"><li>• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes.</li><li>• Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.</li><li>• Call a poison control center or doctor for further treatment advice.</li></ul>

#### EMERGENCY CONTACT NUMBER CALL CHEMTREC 1-800-424-9300

**Have the product container or label or Applicator's Manual with you when calling a poison control center or doctor, or going for treatment. Contact the Rocky Mountain Poison Center 866-673-6671 for 24-hour emergency treatment for assistance with human or animal medical emergencies.**

## SECTION 2

### NOTE TO PHYSICIAN

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

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

The following measures are suggested for use by physicians in accordance with their own judgment:

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

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

In cases of severe poisoning intensive care unit is recommended.:

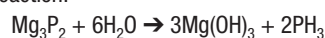
- 1) Where pulmonary edema is observed, steroid therapy should be considered and close medical supervision is recommended. Blood transfusions may be necessary.
- 2) In case of manifest pulmonary edema, venesection should be performed under vein pressure control. Heart glycosides (I.V.) can be used in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

## SECTION 3

### INTRODUCTION

MAGNAPHOS® products are used to protect stored commodities from damage by insects. In limited areas, applications of MAGNAPHOS® may be made to control vertebrate pests. Fumigation of stored products with MAGNAPHOS® in the manner prescribed in the labeling does not contaminate the marketed commodity.

MAGNAPHOS® metal phosphide fumigants are acted upon by atmospheric moisture to produce phosphine (PH<sub>3</sub>) gas. MAGNAPHOS® PLATE contains magnesium phosphide (Mg<sub>3</sub>P<sub>2</sub>) as their active ingredient and will liberate phosphine via the following chemical reaction:



Phosphine gas is highly toxic to insects, humans, and other forms of animal life. In addition to its toxic properties, the gas will corrode certain metals and may ignite spontaneously in air at concentrations above its lower flammable limit of 1.8% v/v (18,000 ppm). These hazards will be described in greater detail in Section 4 of this Applicator's Manual.

MAGNAPHOS® PLATE do not contain ammonium carbamate, therefore they do not liberate ammonia and carbon dioxide.

MAGNAPHOS® PLATE liberate only phosphine gas.

MAGNAPHOS® PLATE is packaged in either single-plate, or 10-plate strips. For the single-plate product, each gas-tight foil pouch contains a single plate, with 60 pouches in each outer drum (for a total of 60 plates). For the 10-plate strip product, each gas-tight foil pouch contains 10 individual plates that are attached end-to-end as a single strip, with 6 of these pouches in each outer drum (for a total of 60 plates). MAGNAPHOS® PLATE are packed in moisture permeable paper that is impregnated with magnesium phosphide and other inert ingredients. Each plate is approximately 1/4 inch thick and measures 9.45 X 5.9 inches.

The drums weigh 7.02 kg and will evolve a total of 1980g of phosphine gas.

The 10 plate-strip product will evolve 330g of phosphine gas, and the strip is 7.88 feet in length.

The single-plate product will evolve 33g of phosphine gas.

Upon exposure to air, MAGNAPHOS® PLATE begin to react with atmospheric moisture to produce small quantities of phosphine gas. This reaction starts slowly, gradually accelerates and then tapers off again as the magnesium phosphide is spent. MAGNAPHOS® PLATE reacts faster than Aluminum phosphide Tablets or Gas Bags. For example, when moisture and temperature of the fumigated commodity are high, decomposition of MAGNAPHOS® may be complete in less than 2 days. However, at lower ambient temperatures and humidity levels, decomposition of MAGNAPHOS® may require 4 days or more. MAGNAPHOS® and other active ingredient Magnesium phosphide products are much more reactive than products which contain aluminum phosphide as the active ingredient. For this reason, MAGNAPHOS is better suited for fumigations conducted under cooler and drier conditions.

The MAGNAPHOS® Plates remain intact after fumigation and will retain spent material. The Plates must be retrieved and disposed of at the end of the fumigation period. If properly exposed, the spent MAGNAPHOS® will normally contain only a very minute amount of unreacted magnesium phosphide and may be disposed of without hazard. While MAGNAPHOS® is not considered a hazardous waste, partially spent residual dusts from incompletely exposed MAGNAPHOS® will require special care. Precautions and instructions for further deactivation and disposal are given in Section 24 of this Applicator's Manual.

MAGNAPHOS® PLATE are supplied in gas-tight packaging and their shelf life is unlimited as long as the packaging remains intact. Once opened for fumigation, the Plates must be used following label instructions or deactivated for disposal. Storage and handling instructions will be given in detail later in Sections 19 and 22 of the Applicator's Manual.

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## SECTION 4

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### PRECAUTIONARY STATEMENTS

#### 4.1 HAZARDS TO HUMANS AND DOMESTIC ANIMALS

**DANGER:** Magnesium phosphide from MAGNAPHOS® PLATE or dust may be fatal if swallowed. Do not get in eyes, on skin or on clothing. Do not eat, drink or smoke while handling magnesium phosphide fumigants. If a gas-tight package is opened, or if the material comes into contact with moisture, water or acids, these products will release phosphine which is an extremely toxic gas. If a garlic odor is detected, refer to the Industrial Hygiene Monitoring in Section 15.6 of this Applicator's Manual for appropriate monitoring procedures. Pure phosphine gas is odorless; the garlic odor is due to a contaminant. Since the odor of phosphine may not be detected under some circumstances, the absence of a garlic odor does not mean that dangerous levels of phosphine gas are absent. Observe proper re-entry procedures specified in Section 15.4 to prevent overexposure.

#### 4.2 ENVIRONMENTAL HAZARDS

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

#### 4.3 PHYSICAL AND CHEMICAL HAZARDS

Magnesium phosphide in Plate and partially spent materials will release phosphine if exposed to moisture from the air or if it comes into contact with water, acids and many other liquids. Magnesium phosphide is significantly more reactive than aluminum phosphide and will liberate gas more rapidly especially in the presence of liquid water and at higher temperatures. Since phosphine may ignite spontaneously at levels above its lower flammable limit of 1.8% v/v (18,000 ppm), it is important not to exceed this concentration. Ignition of high concentrations of phosphine can produce a very energetic reaction. Explosions can occur under these conditions and may cause severe personal injury. **Never allow the buildup of phosphine to exceed explosive concentrations.** Do not confine spent or partially spent metal phosphide fumigants as the slow release of phosphine from this material may result in formation of an explosive atmosphere. Magnesium phosphide Plate should not be stacked or piled up or contacted with liquids under any condition, except when deactivating partially spent or unreacted plates using the wet method. This may cause a temperature increase, increase the rate of gas production and confine the gas so that ignition could occur.

It is preferable to open pouch of magnesium phosphide products in open air because under certain conditions, they may flash upon opening. Pouches may also be opened near a fan or other appropriate ventilation that will rapidly exhaust contaminated air. When opening the pouches of MAGNAPHOS Plates, point the pouch away from the face and body and tear or cut open the far end. Although the chances for a flash are very remote, never open these pouches in a flammable atmosphere. These precautions will also reduce the fumigator's exposure to phosphine gas. If pouches are opened inside the structure to be fumigated, air monitoring must be conducted to ensure worker's exposure to phosphine gas does not exceed the allowable limit of 8 hour Time Weighted Average (TWA) of 0.3 ppm or the 15 minute Short Term Exposure Limit (STEL) of 1.0 ppm Phosphine.

Pure phosphine gas is practically insoluble in water, fats and oils, and is stable at normal fumigation temperatures. However, it may react with certain metals and cause corrosion, especially at higher temperatures and relative humidities. Metals such as copper, brass and other copper alloys, and precious metals such as gold and silver are susceptible to corrosion by phosphine. Thus, small electric motors, smoke detectors, brass sprinkler heads, batteries and battery chargers, fork lifts, temperature monitoring systems, switching gears, communication devices, computers, calculators and other electrical equipment should be protected or removed before fumigation. Phosphine gas will also react with certain metallic salts and, therefore, sensitive items such as photographic film, some inorganic pigments, etc., should not be exposed. Immediately after addition of phosphine to the structure, turn off any lights and unessential electric equipment.

MAGNAPHOS® Plates are Restricted Use Pesticides due to the acute inhalation toxicity of phosphine gas. Read and follow the complete label, which contains instructions for the authorized use(s) of the pesticide.

Additional copies of this Manual are available from:

United Phosphorus, Inc. 630 Freedom Business Center, King of Prussia, PA 19406 Telephone: 1 610-491-2800/1-800-438-6071 • Fax: 1-610-491-2810

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## SECTION 5

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### DIRECTIONS FOR USE

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

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## SECTION 6

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### PESTS CONTROLLED

MAGNAPHOS® has been found to be effective against the following insects and their pre-adult stages, (that is, eggs, larvae and pupae)

almond moth	flat grain beetle	Pea Weevil
Angoumois grain moth	fruit flies	pink bollworm
bean weevil	granary weevil	raisin moth
bees	greater wax moth	red flour beetle
Cadelle	hairy fungus beetle	rice weevil
cereal leaf beetle	Hessian fly	rusty grain beetle
cigarette beetle	Indian meal moth	saw-toothed grain beetle
confused flour beetle	Khapra beetle	spider beetle
dermestid beetles	lesser grain borer	tobacco moth
dried fruit beetle	maize weevil	yellow meal worm
dried fruit moth	Mediterranean flour	
European grain moth	moth	

Although it is possible to achieve total control of the listed insect pests, this is frequently not realized in actual practice. Factors contributing to less than 100% control include leaks, poor gas distribution, unfavorable exposure conditions, etc. In addition, some insects are less susceptible to phosphine than others. If maximum control is to be attained, extreme care must be taken in sealing, higher dosages must be used, exposure periods lengthened, proper application procedures followed, and temperature and humidity conditions must be favorable.

## SECTION 7

### COMMODITIES WHICH MAY BE FUMIGATED WITH MAGNAPHOS®

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

#### 7.1 RAW AGRICULTURAL COMMODITIES, ANIMAL FEED AND FEED INGREDIENTS

##### Raw Agricultural Commodities and Animal Feed and Feed Ingredients Which May Be Fumigated with MAGNAPHOS®

Fresh commodities:

alfalfa	eggplant	lime	pimento
avocado	endive	mango	salsify tops
banana (including plantains)	grapefruit	okra	sweet potato
cabbage, Chinese	kumquat	orange	tangelo
citrus Citron	legume vegetables (succulent)	papaya	tangerine
dill	lemon	pepper	tomato
	lettuce	persimmon	

Raw commodities:

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

#### 7.2 PROCESSED FOODS

The listed processed foods may be fumigated with MAGNAPHOS®. Under no condition shall any processed food or bagged commodity come in contact with residual dust from MAGNAPHOS® Plate.

##### Processed Foods Which May Be Fumigated With MAGNAPHOS®

Processed candy and sugar  
Cereal flours and bakery mixes  
Cereal foods (including cookies, crackers, macaroni, noodles, pasta, pretzels, snack foods and spaghetti)  
Processed cereals (including milled fractions and packaged cereals)  
Cheese and cheese byproducts  
Chocolate and chocolate products (such as assorted chocolate, chocolate liquor, cocoa, cocoa powder, dark chocolate coating and milk chocolate products)  
Processed coffee  
Corn grits  
Cured, dried and processed meat products and dried fish  
Dates and figs  
Dried eggs and egg yolk solids  
Dried milk, dried powdered milk, nondairy creamers, and nonfat dried milk  
Dried or dehydrated fruits (such as apples, dates, figs, peaches, pears, prunes, raisins, citrus and sultanas)  
Processed herbs, spices, seasonings and condiments  
Malt  
Processed nuts (such as almonds, apricot kernels, brazil nuts, cashews, filberts, macadamia nuts, peanuts, pecans, pistachio nuts, walnuts and other processed nuts)  
Processed oats (including oatmeal)  
Rice (brewer's rice grits, enriched and polished)  
Soybean flour and milled fractions  
Processed tea  
Dried and dehydrated vegetables (such as beans, carrots, lentils, peas, potato flour, potato products and spinach)  
Yeast (including primary yeast)  
Wild rice  
Other processed foods

#### 7.3 NONFOOD COMMODITIES, INCLUDING TOBACCO

The listed nonfood items that may be fumigated with MAGNAPHOS® Plate. Tobacco, psyllium seed and psyllium seed husks intended for drug use and certain other of the non-food commodities should not be contacted by residual dust from metal phosphide fumigants. Only lots of psyllium seed and psyllium seed husks destined for shipment to pharmaceutical manufacturers may be fumigated. Such dedicated lots may be fumigated in transport vehicles (truck trailers, railcars, containers, in accordance with local regulations) prior to shipment. In addition, psyllium seed and husks may be fumigated at other locations only under direct instructions from the pharmaceutical company.

##### Nonfood Commodities Which May Be Fumigated With MAGNAPHOS®

Processed or unprocessed cotton, wool and other natural fibers or cloth, clothing  
Straw and hay  
Feathers  
Human hair, rubberized hair, vulcanized hair, mohair  
Leather products, animal hides and furs  
Tires (for mosquito control)  
Tobacco  
Wood, cut trees, wood chips, wood and bamboo products  
Paper and paper products  
Dried plants and flowers  
Psyllium seed and psyllium seed husks  
Seeds (such as grass seed, ornamental herbaceous plant seed and vegetable seed)  
Other nonfood commodities

## SECTION 8

### EXPOSURE CONDITIONS FOR ALL FUMIGATIONS

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

Temperature	Minimum Exposure Periods for MAGNAPHOS Plates*
40°F (5°C) or below	Do not fumigate
41°-53°F (5-12°C)	4 days (96 hours)
54°-68°F (12-15°C)	3 days (72 hours)
above 68°F (20°C)	2 days (48 hours)

\* **Note:** The start of the minimum exposure period begins when the target concentration is reached.

Use the above table to determine the minimum length of exposure at the indicated temperatures. The applicator must measure the temperature in the space or stored commodity and use the above table to determine the minimum duration of exposure needed.

The fumigation must be long enough so as to provide for adequate control of the insect pests that infest the commodity being treated. Additionally, the fumigation period should be long enough to allow for more or less complete reaction of MAGNAPHOS® Plate with moisture so that little or no unreacted magnesium phosphide remains. This will minimize worker exposures during further storage and/or processing of the treated bulk commodity as well as reduce hazards during the disposal of partially spent magnesium phosphide products remaining after space fumigations. The proper length of the fumigation period will vary with exposure conditions since, in general, insects are more difficult to control at lower temperatures, and the rate of phosphine gas production by MAGNAPHOS® is lower at lower temperatures and humidities.

It should be noted that there is little to be gained by extending the exposure period if the structure to be fumigated has not been carefully sealed or if the distribution of gas is poor and insects are not subjected to lethal concentrations of phosphine. Careful sealing is required to ensure that adequate gas levels are retained and proper application procedures must be followed to provide satisfactory distribution of phosphine gas. Some structures can only be treated when completely tarped while others cannot be properly sealed by any means and should not be fumigated. Exposure times must be lengthened to allow for penetration of gas throughout the commodity when the fumigant is not uniformly added to the commodity mass, for example, by surface application or shallow probing. This is particularly important in the fumigation of bulk commodities contained in large storage areas.

Remember, exposure periods recommended in the table are minimum periods and may not be adequate to control all stored products pests under all conditions nor will they always provide for total reaction of MAGNAPHOS®.

It is permissible and often desirable to use a low-flow recirculation system for phosphine gas in certain bulk storages. This method may be used in ship's holds, various types of flat storage and vertical storage bins. Recirculation usually involves the application of fumigant to the surface of the commodity. The phosphine gas is then continuously or intermittently drawn out of the over-space and blown into the bottom of the storage using specially designed low volume fans and duct work. This method facilitates the quick and uniform penetration of phosphine gas throughout the commodity. In some instances a reduced dosage may be used.

Please contact United Phosphorus if assistance is required in designing recirculation systems.

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## SECTION 9

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### DOSAGE RATES

#### Dosage Rates

Phosphine is a mobile gas and will penetrate to all parts of the storage structure. Therefore, dosage must be based upon the total volume of the space being treated and not on the amount of commodity it contains. The same number of MAGNAPHOS® Plates are required to treat a 10,000-bushel volume whether it is empty or full of grain unless, of course, the surface of the commodity is sealed by tarpaulin.

#### 9.1 MAXIMUM ALLOWABLE DOSAGE FOR FUMIGATION WITH MAGNAPHOS®

**One MAGNAPHOS Plate (33 g of phosphine gas) per 230 cu. ft. One MAGNAPHOS Plate 10 plate strip configuration (330 g of phosphine gas) per 2300 cu. ft.**

**RESTRICTION: After introduction and equalization, the maximum concentration of phosphine maintained during fumigation must not exceed 1000 ppm for fresh commodities, dates, nuts and dried fruit, or 3625 ppm for all other commodities.**

**The above dosages are not to be exceeded.** It is important to be aware that a shortened exposure period cannot be fully compensated for with an increased dosage of phosphine.

Somewhat higher dosages, not to exceed the maximum dosage, are usually recommended under cooler, drier conditions or where exposure periods are relatively short. However, the major factor in selection of dosage is the ability of the structure to hold phosphine gas during the fumigation. A good illustration of this point is comparison of the low dosages required to treat modern, well-sealed warehouses with the higher range doses used for poorly constructed buildings that cannot be sealed adequately. In certain other fumigations, proper distribution of insecticidal concentrations of gas to reach all parts of the structure becomes a very important factor in dose selection. An example where this may occur is in the treatment of grain stored in tall silos. Poor gas distribution frequently results when the fumigant cannot be uniformly added to the grain and it must be treated by surface application. In such cases, use of a low flow recirculation system is recommended under these circumstances. Please contact United Phosphorus if assistance is required in designing the recirculation system.

#### 9.2 MAGNAPHOS® ADVISORY DOSAGE RATES FOR VARIOUS TYPES OF FUMIGATION

Although it is permissible to use the maximum dosage listed in Section 9.1, the following table lists a range of dosages which can be used as a guideline for various types of fumigation.

Do not exceed the maximum allowable rates specified in Section 9.1

Type of Fumigation	Volume Range Cubic feet One Plate	Volume Range Cubic feet Ten Plate Strip
<b>Bulk Storage Commodities</b>		
Vertical Storages	550-1,100	5,500-11,000
Tanks	470-1,100	4,700-11,000
Flat storages (loose construction)	230-660	2,300-6,600
Farm bins	230-470	2,300-4,700
Bunkers & tarped ground storages	410-1,100	4,100-11,000
Railcars	550-1,100	5,500-11,000
Barges	230-660	2,300-6,600
Shipholds	500-1,100	5,000-11,000
<b>Space</b>		
Processed dried fruits and nuts	825-1,650	8,250-16,500
Mills, warehouses, etc	550-1,650	5,500-16,500
Bagged commodities	550-1,100	5,500-11,000
Stored tobacco	825-1,650	8,250-16,500

Use higher dosages in structures that are of loose construction and in the fumigation of bulk stored commodities in which diffusion will be slowed and result in poor distribution of phosphine gas.

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## SECTION 10

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### PROTECTIVE CLOTHING

#### 10.1 GLOVES

Wear dry gloves of cotton or other material if contact with plate is likely. Gloves should remain dry during use. Wash hands thoroughly after handling magnesium phosphide products. Aerate used gloves and other clothing that may be contaminated in a well-ventilated area prior to laundering.

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## SECTION 11

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### RESPIRATORY PROTECTION

#### 11.1 WHEN RESPIRATORY PROTECTION MUST BE WORN

Respiratory protection is required when concentration levels of phosphine are unknown or when concentrations exceed permissible exposure limits.

#### 11.2 PERMISSIBLE GAS CONCENTRATION RANGES FOR RESPIRATORY PROTECTION DEVICES

A NIOSH approved air-purifying full face gas-mask with a chin style mounted canister approved for phosphine may be used at levels up to 15 ppm or following manufacturer's use conditions instructions for escape. Above 15 ppm or in situations where the phosphine concentration is unknown, a NIOSH approved, self-contained breathing apparatus (SCBA) must be worn. The NIOSH Pocket Guide to Chemical Hazards (Publication Number 2010-168c) or the NIOSH ALERT – Preventing Phosphine Poisoning and Explosions During Fumigation, lists these and other types of approved respirators and the concentration limits at which they may be used.

#### 11.3 REQUIREMENTS FOR AVAILABILITY OF RESPIRATORY PROTECTION

If MAGNAPHOS® is to be applied from within the structure to be fumigated, a NIOSH approved air-purifying full face gas-mask with a chin style mounted canister approved for phosphine or SCBA or its equivalent must be available at the site of application in case it is needed.

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## SECTION 12

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### REQUIREMENTS FOR CERTIFIED APPLICATOR'S PRESENCE AND TRAINING FOR RECEIPT OF IN-TRANSIT VEHICLES UNDER FUMIGATION

#### 12.1 The requirements for the presence of a Certified Applicator and their responsibility for all workers are as follows:

1. A Certified Applicator must be physically present, responsible for, and maintain visual and/or voice contact with all fumigation workers during the opening of the container and during the application of the fumigant. Once the application is complete and the structure has been made secure the certified applicator does not need to be physically present at the site.
2. A Certified Applicator must be physically present, responsible for and maintain visual and/or voice contact with all fumigation workers during the initial opening of the fumigation structure for aeration. Once the aeration process is secured and monitoring has established that aeration can be completed safely the certified applicator does not need to be physically present and trained person(s) can complete the process and remove the placards.
3. Persons with documented training in the handling of Phosphine products must be responsible for receiving, aerating and removal of placards from vehicles, which have been fumigated in transit. Refer to Section 12.2 for training requirements.

#### 12.2 Training requirements for receipt of in-transit vehicles under fumigation are as follows:

The trained person(s) must be trained by a Certified Applicator following the EPA accepted product applicator's manual that must precede or be attached to the outside of a transport vehicle; or by other training which is accepted by local and or state authorities. When training has been completed and the employee demonstrates safety knowledge proficiency, the training date must be logged and maintained in the employee's safety training record for a minimum of three years. Refresher training must be done on an annual basis.

This training must cover the following items, each of which may be found in this manual:

- a. How to aerate the vehicle and verify that it contains no more than 0.3 ppm phosphine.
- OR**
- b. How to transfer the commodity to another storage area without prior aeration and ensure that worker safety limits are not being exceeded during the transfer.
  - c. How to determine when respiratory protection must be worn.
  - d. How to protect workers and nearby persons from exposure to levels above the 8-hour time weighted average (TWA) of 0.3 ppm or the 15 minute TWA short-term exposure limit (STEL) of 1.0 ppm phosphine.
  - e. Proper removal of placards from the vehicle.
  - f. How to follow proper residual disposal instruction.

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## SECTION 13

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### GAS DETECTION EQUIPMENT

There are a number of devices on the market for the measurement of phosphine gas at both industrial hygiene and fumigation levels. Glass detection tubes used in conjunction with the appropriate hand-operated air sampling pumps are widely used. These devices are portable, simple to use, do not require extensive training and are relatively rapid, inexpensive and accurate. Electronic devices are also available for both low level and high phosphine gas readings. Such devices must be used in full compliance with manufacturers' recommendations.

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## SECTION 14

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### NOTIFICATION REQUIREMENTS

#### 14.1 AUTHORITIES AND ON-SITE WORKERS

As required by local regulations, notify the appropriate local officials (fire department, police department, etc.) of the impending fumigation. Provide to the officials a SDS and complete label for the product and any other technical information deemed useful. Offer to review this information with the local official(s).

#### 14.2 INCIDENTS INVOLVING THESE PRODUCTS

Registrants must be informed of any incident involving the use of this product. Please call CHEMTREC: 1-800-424-9300 so the information regarding the incident can be reported to Federal and State Authorities.

#### 14.3 THEFT OF PRODUCTS

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

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## SECTION 15

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### APPLICATOR AND WORKER EXPOSURE

**Approved respiratory protection must be worn if concentrations exceed the allowable limits, or when concentrations are unknown.**

#### 15.1 EXPOSURE LIMITS

Exposure to phosphine must not exceed the 8-hour TWA (Time Weighted Average) of 0.3 ppm or the 15 minute TWA short-term exposure limit (STEL) of 1.0 ppm phosphine. All persons are covered by these exposure standards.

#### 15.2 APPLICATION OF FUMIGANT

At least two persons, a certified applicator and trained person, or two trained persons under the direct supervision of the certified applicator must be present during fumigation of structures when entry into the structure for application of the fumigant is required. Depending upon temperature and humidity, MAGNAPHOS® Plate release phosphine gas slowly upon exposure to moisture from the air. In most cases, this release is slow enough to permit applicators to deposit fumigant in the desired areas and then vacate the premises without significant exposure to the gas. Monitoring must be conducted to determine exposure limits and determine applicator's exposure. If the fumigator's exposure will exceed the allowable limits, approved respiratory protection must be worn. See Section 11 for respiratory protection requirements.

#### 15.3 LEAKAGE FROM FUMIGATED SITES

Phosphine is highly mobile and given enough time may penetrate seemingly gas-tight materials such as concrete and cinder block. Therefore, adjacent, enclosed areas likely to be occupied should be examined to ensure that significant leakage has not occurred. Sealing of the fumigated site and/or airflow in the occupied areas must be sufficient to bring down the phosphine concentration to a safe level of 0.3 ppm or below.

#### 15.4 AERATION AND REENTRY

If the structure is to be entered after fumigation, it must be aerated until the level of phosphine gas is 0.3 ppm or below. The area or site must be monitored to ensure that liberation of gas from the treated commodity does not result in the development of unacceptable levels (i.e., over industrial hygiene levels of phosphine gas). Do not allow reentry into treated structures by any person before the level of phosphine reaches 0.3 ppm or below unless protected by an approved respirator.

#### 15.5 HANDLING UNAERATED COMMODITIES

Transfer of incompletely aerated commodity via bulk handling equipment such as augers, drag conveyors and conveyor belts to a new storage structure is permissible. A Certified Applicator is responsible for training workers who handle the transfer of incompletely aerated listed commodities, and appropriate measures must be taken (i.e., ventilation or respiratory protection) to prevent exposures from exceeding the exposure limits for phosphine. The new storage structure must be placarded if it contains more than 0.3 ppm phosphine. If the fumigation structure must be entered to complete the transfer, at least two trained persons, wearing proper respiratory protection may enter the structure. A certified applicator must be physically present during the entry into the structure.

**REMEMBER** transporting containers or vehicles under fumigation over public roads is prohibited.

#### 15.6 INDUSTRIAL HYGIENE MONITORING

Phosphine gas exposures must be documented in an operations log or manual at each fumigation site and operation where exposures may occur. Monitor airborne phosphine concentrations in all indoor areas to which fumigators and other workers have had access during fumigation and aeration. Perform such monitoring in workers' breathing zones. This monitoring is mandatory and is performed to determine when and where respiratory protection is required. Once exposures have been adequately characterized, spot checks must be made, especially if conditions change significantly or if an unexpected garlic odor is detected or a change in phosphine level is suspected.

## 15.7 ENGINEERING CONTROLS AND WORK PRACTICES

If monitoring shows that workers may be exposed to concentrations in excess of the permitted limits, then engineering controls (such as forced air ventilation) and/or appropriate work practices must be used to reduce exposure to within permitted limits. Appropriate respiratory protection must be worn if phosphine exposure limits are exceeded or concentrations are unknown.

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### SECTION 16

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#### PLACARDING OF FUMIGATED AREAS

All entrances to the fumigated structure must be placarded. Placards must be made of substantial material that can be expected to withstand adverse weather conditions and must bear the wording as follows:

1. The signal word DANGER/PELIGRO and the SKULL AND CROSSBONES symbol in red.
2. The statement "Structure and/or commodity under fumigation, DO NOT ENTER/NO ENTRE".
3. The Statement, "This sign may only be removed by a certified applicator or a person with documented training after the commodity is completely aerated (contains 0.3 ppm or less of phosphine gas). If incompletely aerated commodity is transferred to a new structure, the new structure must also be placarded if it contains more than 0.3 ppm. Worker exposure during this transfer must not exceed allowable limits".
4. The date the fumigation begins.
5. Trade name of the fumigant used and EPA Registration Number.
6. Name, address and telephone number of the fumigation company and/or applicator.
7. A 24-hour emergency response telephone number.

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

Do not remove placards until the treated commodity is aerated down to 0.3 ppm phosphine or less. To determine whether aeration is complete, each fumigated structure or vehicle must be monitored and shown to contain 0.3 ppm or less phosphine gas in the air space around and, if feasible, in the mass of the commodity.

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### SECTION 17

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#### SEALING OF STRUCTURES

The structure to be fumigated must first be inspected to determine if it can be made sufficiently gas tight. Careful sealing is required so that adequate gas levels are retained. Turn off all ventilation, supply air, air conditioning, and any other air moving systems which could negatively affect the fumigation. Thoroughly inspect the structure to be fumigated and seal cracks, holes and openings. These areas could include, but are not limited to: windows, doors, ducts, vents, chimneys, open pipes and structural flaws. Sealing techniques can vary, but most often include polyethylene sheeting, adhesive tapes and adhesive sprays. Expandable foam or caulking material can work well on structural flaws. Proper sealing will ensure sufficient gas levels within the fumigated structure and will decrease the chance of unwanted exposures outside of the fumigated area.

As with all fumigations, it is required that sealing be inspected for leaks. If phosphine above 0.3 ppm is found in an area where exposure to workers or bystanders may occur, the fumigator, using proper respiratory protection equipment must attempt to seal the leak from the exterior of the structure. Failing this, the fumigators, following proper procedures, may enter the structure and seal the leak from the interior. If the concentration inside the structure has decreased below the target level as a result of the leakage, additional fumigant may be added following the sealing repairs. If the concentration does not drop outside the structure, isolate the area with proper placarding and barriers to ensure people do not enter the area where the gas concentration is >0.3 ppm.

**DO NOT FUMIGATE A STRUCTURE THAT CANNOT BE SEALED SUFFICIENTLY GAS-TIGHT.**

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## SECTION 18

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### AERATION OF FUMIGATED COMMODITIES

As an alternative to the aeration time periods listed below, each container of the treated commodity may be analyzed for residues using accepted analytical methods.

#### 18.1 FOODS AND FEEDS

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

#### 18.2 NON-FOOD COMMODITIES

Aerate all non-food commodities to 0.3 ppm or less of phosphine. Monitor densely packed commodities to ensure that aeration is complete.

#### 18.3 TOBACCO

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

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## SECTION 19

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### STORAGE INSTRUCTIONS

Do not contaminate food, water or feed by storing pesticides in the same areas used to store these commodities.

MAGNAPHOS® Plates must be stored in a dry, well-ventilated area away from heat, under lock and key. Post as a pesticide storage area.

Do not store in areas where temperature may exceed 130°F

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

The shelf-life of MAGNAPHOS® Plates is virtually unlimited as long as containers remain in original sealed containers.

#### 19.1 LABELING OF STORAGE

The labeling of the storage area should take into account the needs of a variety of organizations. These should include, but not be limited to: corporate policy, insurance carrier, Occupational Safety and Health Administration (OSHA), Emergency Planning and Community Right to Know and local emergency response professionals. At a minimum, the storage must be marked with the following signs and should be locked:

1. Danger, Poison (with skull and cross bones)
2. Authorized Personnel Only
3. Pesticide Storage NFPA Hazard Identification Symbols

The National Fire Protection Association (NFPA) has developed Hazard Identification Symbols. This standardized system is designed to provide, at a glance, the information regarding the health, fire and reactivity hazards associated with hazardous materials. The following are the hazard categories and degree of hazard for magnesium phosphide:

Category	Degree of Hazard
Health	4 (Severe Hazard)
Flammability	4 (Severe Hazard)
Reactivity	2 (Moderate)
Special Notice Key	W

NOTE: When using the NFPA Hazard Identification System, the characteristics of all hazardous materials stored in a particular area must be considered. The local fire protection district should be consulted for guidance on the selection and placement of such signs.



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## SECTION 20

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### TRANSPORTATION INSTRUCTIONS

The United States Department of Transportation (DOT) classifies magnesium phosphide as Dangerous When Wet material and it must be transported in accordance with DOT regulations.

#### 20.1 TRANSPORT DESIGNATIONS

The following transport designations apply to Magnesium phosphide

<b>Proper Shipping Name:</b>	Magnesium phosphide
<b>Hazard Class:</b>	4.3(6.1)
<b>Identification No.:</b>	UN 2011
<b>Packing Group:</b>	PG I
<b>Shipping Label:</b>	Dangerous When Wet/Poison
<b>Shipping Placard:</b>	Dangerous When Wet

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## SECTION 21

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### REQUIRED WRITTEN FUMIGATION MANAGEMENT PLAN

The certified applicator is responsible for working with the owners and/or responsible employees of the structure and/or area to be fumigated to develop and follow a Fumigation Management Plan (FMP). State, County, and local authorities may also have specific requirements. The FMP must be written PRIOR TO EVERY treatment including fumigation for burrowing pests. The FMP must address characterization of the site, and include appropriate monitoring and notification requirements, consistent with, but not limited to, the following:

1. For burrowing rodent applications: **THE USE OF THIS PRODUCT IS STRICTLY PROHIBITED WITHIN 100 FEET OF ANY BUILDING WHERE HUMANS AND/OR DOMESTIC ANIMALS DO OR MAY RESIDE ON SINGLE AND MULTI-FAMILY RESIDENTIAL PROPERTIES AND NURSING HOMES, SCHOOLS (EXCEPT ATHLETIC FIELDS), DAYCARE FACILITIES AND HOSPITALS.** For a list of approved sites see Section 22.
2. Inspect the structure and/or area to determine its suitability for fumigation.
3. When sealing is required, consult previous records for any changes to the structure, seal leaks, and monitor any occupied adjacent buildings.
4. Prior to each fumigation, review any existing FMP, SDS, label and Applicator's Manual and other relevant safety procedures with company officials and appropriate employees.
5. Consult company officials in the development of procedures and appropriate safety measures for nearby workers that will be in and around the area during application and aeration.
6. Consult with company officials to develop an appropriate monitoring plan that will confirm that nearby workers and bystanders are not exposed to levels above the allowed limits during application, fumigation and aeration. This plan must also demonstrate that nearby residents will not be exposed to concentrations above the allowable limits.
7. Consult with company officials to develop procedures for local authorities to notify nearby residents in the event of an emergency.
8. Confirm the placement of placards to secure entrance into any structure under fumigation.
9. Confirm the required safety equipment is in place and the necessary manpower is available to complete a safe effective fumigation.
10. Written notification must be provided to the receiver of a vehicle that is fumigated in transit.

These factors must be considered in putting together an FMP. It is important to note that some plans will be more comprehensive than others. All plans should reflect the experience and expertise of the applicator and circumstances at and around the structure and/or area.

In addition to the plan, the applicator must read the entire label and manual and must follow its directions carefully and completely. If the applicator has any questions about the development of a FMP, contact United Phosphorus, Inc. for further assistance.

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

## STEPS FOR PREPARATION OF THE REQUIRED WRITTEN FUMIGATION MANAGEMENT PLAN

### 21.1 PURPOSE

A Fumigation Management Plan (FMP) is an organized, written description of the required steps involved to help ensure a safe, legal, and effective fumigation. It will also assist you and others in complying with pesticide product label requirements. The guidance that follows is designed to help assist you in addressing all the necessary factors involved in preparing for and fumigating a site.

This guidance is intended to help you organize any fumigation that you might perform PRIOR TO ACTUAL TREATMENT. It is meant to be somewhat prescriptive, yet flexible enough to allow the experience and expertise of the fumigator to make changes based on circumstances which may exist in the field. By following a step-by-step procedure, yet allowing for flexibility, safe and effective fumigation can be performed.

Before any fumigation begins, carefully read and review the complete label, which includes the Applicator's Manual. This information must also be given to the appropriate company officials (supervisors, foreman, safety officer, etc.) in charge of the site. Preparation is the key to any successful fumigation. If you do not find specific instructions for the type of fumigation that you are to perform listed in this Guidance Document, you will want to construct a similar set of procedures using this document as your guide or contact United Phosphorus for assistance. Finally, before any fumigation begins you must be familiar with and comply with all applicable federal, state and local laws. The success and future of fumigation are not only dependent on your ability to do your job but also by carefully following all rules, regulations, and procedures required by governmental agencies.

### 21.2 A CHECKLIST GUIDE FOR A FUMIGATION MANAGEMENT PLAN

This checklist is provided to help you take into account factors that must be addressed prior to performing all fumigations. It emphasizes safety steps to protect people and property. The checklist is general in nature and cannot be expected to apply to all types of fumigation situations. It is to be used as a guide to prepare the required plan. Each item must be considered. However, it is understood that each fumigation is different and not all items will be necessary for each fumigation site.

#### A. PRELIMINARY PLANNING AND PREPARATION

1. Determine the purpose of the fumigation.
  - a. Elimination of insect infestation
  - b. Elimination of rodent infestation
  - c. Plant pest quarantine.
2. Determine the type of fumigation, for example
  - a. Space: tarp, mill, warehouse, food plant or outdoor area
  - b. Transport Vehicle: railcar, truck, van, or container
  - c. Commodity: raw agricultural or processed foods or non-food
  - d. Type of Storage: vertical silo, farm storage, flat storage, etc.
  - e. Vessels: ship or barge. In addition to the Applicator's Manual, read the US Coast Guard Regulations 46 CFR 147A.
3. Fully acquaint yourself with the structure and commodity to be fumigated, including:
  - a. The general structure layout, construction (materials, design, age, maintenance) of the structure, fire or combustibility hazards, connecting structures and escape routes, above and below ground, and other unique hazards or structure characteristics. Prepare, with the owner/operator/person in charge. Draw or have a drawing or sketch of structure to be fumigated, delineating features, hazards, and other structural issues.
  - b. The number and identification of persons who are authorized to enter the area to be fumigated (i.e., employees, visitors, customers, etc.) where structure is under fumigation.
  - c. The specific commodity to be fumigated, its mode of storage, and its condition.
  - d. The previous treatment history of the commodity, if available.
  - e. Accessibility of utility service connections.
  - f. Nearest telephone or other means of communication, and mark the location of these items on the drawing/sketch.
  - g. Emergency shut-off stations for electricity water and gas. Mark the location of these items on the drawing/sketch.

- h. Current emergency telephone numbers of local Health, Fire, Police, Hospital and Physician responders.
- i. Name and phone number (both day and night) of appropriate company officials.
- j. Check, mark and prepare the points of fumigation application locations if the job involves entry into the structure for fumigation.
- k. Review entire label, which includes the container label and Applicator's Manual.
- l. Exposure time considerations.
  - 1. Fumigant product to be used.
  - 2. Minimum fumigation period, as defined and described by the label use directions.
  - 3. Down time required to be available
  - 4. Aeration requirements
  - 5. Cleanup requirements, including dry or wet deactivation methods, equipment, and personnel needs, if necessary.
  - 6. Measured and recorded commodity temperature and moisture.
- m. Determination of dosage
  - 1. Cubic footage or other appropriate space/location calculations.
  - 2. Structure sealing capability and methods.
  - 3. Maximum allowable label dosage rates
  - 4. Temperature, humidity, and wind
  - 5. Commodity/space volume
  - 6. Past history of fumigation of structure
  - 7. Exposure time.

#### B. PERSONNEL

- 1. Confirm in writing that all personnel in and around the structure to be fumigated have been notified prior to application of the fumigant. Consider using a checklist that each employee initials indicating they have been notified.
- 2. Instruct all fumigation personnel to read the Applicator's Manual. Fumigation personnel must be trained in the proper method of application, the hazards that may be encountered, and the selection of personal protection devices, including detection equipment.
- 3. Confirm that all personnel are aware of and know how to proceed in case of an emergency situation.
- 4. Instruct all personnel on how to report any accident and/or incidents related to fumigant exposure. Provide a telephone number for emergency response reporting.
- 5. Instruct all personnel to report to proper authorities any theft of fumigant and/or equipment related to fumigation.
- 6. Establish a meeting area for all personnel in case of emergency.

#### C. MONITORING

- 1. Safety
  - a. Monitoring of phosphine concentrations must be conducted in areas to prevent excessive exposure and to determine where exposure may occur. Document where monitoring will occur.
  - b. Keep a log or manual of monitoring records for each fumigation site. This log must, at a minimum, contain the timing, number of readings taken and level of concentrations found in each location.
  - c. When monitoring, log records document there is no phosphine present above the safe levels. In such cases, subsequent monitoring is not routinely required. However spot checks must be made occasionally, especially if conditions significantly change.
- 2. Efficacy
  - a. For stationary structures, phosphine readings MUST be taken from within the fumigated structure to insure proper gas concentrations. If the phosphine levels have fallen below the targeted level, the fumigators, following proper entry procedures, may re-enter the structure and add additional product.
  - b. All phosphine readings must be documented.

#### D. NOTIFICATION

- 1. Confirm the appropriate local authorities (fire departments, police departments, etc.) have been notified as per label instructions, local ordinances, or instructions of the client.

- 2. Prepare written procedure ("Emergency Response Plan") which contains explicit instructions, names, and telephone numbers so as to be able to notify local authorities if phosphine levels are exceeded in an area that could be dangerous to bystanders and/or domestic animals.
- 3. Confirm that the receiver of in-transit vehicles under fumigation have been notified and are trained according to Section 12 of this applicator manual.

#### E. SEALING PROCEDURES

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

#### F. APPLICATION PROCEDURES AND FUMIGATION PERIOD

- 1. Plan carefully and apply the product in accordance with the label requirements.
- 2. When entering into the area under fumigation always work with two or more people under the direct supervision of a certified applicator wearing appropriate respirators.
- 3. Apply fumigant from the outside where appropriate.
- 4. Provide watchmen when the possibility of entry into the fumigation site by unauthorized persons cannot otherwise be assured.
- 5. When entering structures always follow OSHA rules for confined spaces.
- 6. Document that the receiver of in-transit vehicles/containers under fumigation has been notified.
- 7. Turn off any electric lights in the fumigated area of the structure as well as all nonessential electrical motors.

#### G. POST-APPLICATION OPERATIONS

- 1. Provide watchmen when the fumigation structure cannot be secured from entry by unauthorized persons during the aeration process.
- 2. Ventilate and aerate in accordance with structural limitations.
- 3. Turn on ventilating or aerating fans where appropriate.
- 4. Use a suitable gas detector before re-entry into a fumigated structure to determine fumigant concentration.
- 5. Keep written records of monitoring to document completion of aeration.
- 6. Consider temperature when aerating.
- 7. Ensure aeration is complete before moving a treated vehicle onto public roads.
- 8. Remove warning placards when aeration is complete.
- 9. Inform business/client that employees/other persons may return to work or otherwise be allowed to re-enter the aerated structure.

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## SECTION 22

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### APPLICATION PROCEDURES

**An FMP MUST BE WRITTEN PRIOR to all applications.**

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

#### 22.1 Fumigation of Railcars, Containers, Trucks, Vans and Other Transport Vehicles

- 1. Develop an appropriate Fumigation Management Plan.
- 2. Do not use MAGNAPHOS® Plates in cars or other personal vehicles.
- 3. Railcars and containers, trucks, vans and other transport vehicles shipped piggyback by rail may be fumigated in transit.
- 4. The aeration of railcars, railroad boxcars, containers and other vehicles is prohibited en-route.
- 5. It is not legal to move trucks, trailers, containers, vans, etc. over public roads or highways until they have been aerated.
- 6. Seal all doors, hatches, vents, cracks and other leaks, particularly if the fumigation is to be carried out in transit.

7. MAGNAPHOS Plates may be applied to bulk or bagged materials in railcars by placing them in porous, drawstring bags, one plate per bag. **CAUTION: Do not put more than one Plate in a single bag. Do not use bags which will confine the gas. Do not put the 10-plate configuration in the bags as they are not intended for this use.** The porous bags containing the Plates may then be suspended from the hatch cover, from a bulkhead, from a nail in the wall of the railcar, etc.
8. Porous bags containing Plates may be placed in contact with the commodity, after they have been suitably anchored, to take advantage of higher commodity temperatures during periods of cooler weather. The temperature of the commodity is frequently higher than ambient air, particularly in in-transit railcar fumigations conducted during winter months. The higher temperature may be of considerable benefit in deactivating of the Plates.
9. Place warning placards on both doors of boxcars.
10. Place fumigation warning placards on both sides of hopper cars near the ladders and atop the hatches to which MAGNAPHOS has been applied.
11. If the transport vehicle is to be shipped under fumigation, attach a packet of information for the consignee.
12. The shipper and/or fumigator must provide written notification to the receiver of railcars, railroad boxcars, shipping container or vehicles fumigated in transit.
13. If the applicators manual is sent with the transport vehicle, it **MUST** be placed securely on the outside of the vehicle.

#### Consignee Responsibilities

Proper handling of treated railcars at their destination is the responsibility of the consignee. Upon receipt of the railcar, railroad boxcars, shipping containers and other transport vehicles, a Certified Applicator and/or persons with documented, authorized training must supervise the aeration process and removal of placards.

Unless prior arrangements have been made to return the railcar containing the spent fumigant back to the shipper, consignees must also be familiar with proper procedures for deactivation and disposal of spent fumigant. Un-aerated railcars being returned in this manner must bear fumigation warning placards and must be carefully sealed. If the railcar containing spent fumigant is not being returned to the shipper, the consignee must:

1. Aerate the railcar and verify that it contains no more than 0.3 ppm phosphine gas.
2. Remove the fumigation warning placards.
3. Remove and properly dispose of the spent fumigant.
4. Ensure that worker exposure limits have not been exceeded.
5. Transfer the fumigated commodity from the railcar, with or without prior aeration.
6. Placard the new storage if it contains more than 0.3 ppm phosphine gas.

#### 22.2 TARPULIN AND SMALL SEALABLE STRUCTURE AND ENCLOSURES FUMIGATIONS

Develop an appropriate Fumigation Management Plan.

Use of plastic sheeting or tarpaulins to cover commodities is one of the easiest and least expensive means for providing relatively gas tight enclosures which are very well suited for fumigation. Polyethylene (poly) tarps are penetrated only very slowly by phosphine gas, and tight coverings are readily formed from the sheets. The volume of these enclosures may vary widely from a few cubic feet; for example, a fumigation tarpaulin placed over a small stack of bagged commodity to form a plastic bunker storage capable of holding 600,000 bushels of grain or more.

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

2. MAGNAPHOS® Plates may be applied to the tarped stack or bunker storage of bulk commodity. Do not apply the MAGNAPHOS® Plates directly under the tarp or in other areas where there is little free air space. Avoid application of large numbers of Plates to any one point. Do not apply in areas where water may leak onto the product or where condensation may occur.
3. MAGNAPHOS® Plates are recommended for the treatment of bagged commodities and processed foods where direct contact with spent dust is prohibited or not desired.
4. Distribution of phosphine gas is generally not a problem in the treatment of bagged commodities and processed foods. However, fumigation of larger bunker storages containing bulk commodity will require proper application procedures to obtain adequate results. Recirculation or other techniques may be necessary to attain satisfactory fumigation levels throughout the bulk commodity.
5. Place warning placards at conspicuous points on the enclosure.
6. Excellent results may be attained in the treatment of small enclosures or structures since it is often possible to control the temperature during fumigation and also to make the enclosure virtually gas tight. Take care not to overdose during these fumigations. A single MAGNAPHOS® Plate will treat a space from 230 to 1650 cubic feet.

#### 22.3 MILLS, FOOD PROCESSING PLANTS AND WAREHOUSES

1. Develop an appropriate Fumigation Management Plan. (Refer to Fumigation Management Plan guidelines.)
2. Using the label, calculate the duration of the fumigation and the dosage of MAGNAPHOS® Plate to be applied based upon volume of the building, air and/or commodity temperature and the general tightness of the building.
3. Carefully seal and placard the space to be fumigated.
4. Apply MAGNAPHOS® Plates to the area to be treated. Lean the Plates against walls, columns, pallet or other support which will allow free access of air to both sides of the Plate.
5. Doors leading to the fumigated space should be closed, sealed, locked and placarded with warning signs.
6. The fumigation period usually lasts from 2 to 5 days, depending upon the temperature. Upon completion of the exposure period, windows, doors, vents, etc should be opened and the fumigated structure allowed to aerate for at least 2 hours before entering. When required, gas concentration readings may be taken using low level detector tubes or similar devices to ensure safety of personnel who re-enter the treated area.
7. Collect the spent MAGNAPHOS® for disposal, with or without further deactivation. Refer to Deactivation and Disposal Instructions in this Manual.
8. Remove fumigation warning placards from the aerated structure when the phosphine gas concentration is 0.3 ppm or less.

#### 22.4 FUMIGATION OF SHIPS – A FMP must be written for all fumigations PRIOR TO ACTUAL TREATMENT

##### 22.4.1 General Information

Important – In-transit ship or ship hold fumigation is also governed by U.S. Coast Guard Regulation 46 CFR 147A, Interim Regulations for Shipboard Fumigation. Refer to this regulation prior to fumigation. For further information contact:

Commandant U.S. Coast Guard  
Hazardous Materials Standards Division GMSO-3  
Washington, DC 20593-0001

MAGNAPHOS® Plate is classified by EPA as a Restricted Use Pesticide due to the inhalation toxicity of phosphine gas.

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

1. Prior to fumigating a vessel for in-transit cargo fumigation, the master of the vessel, or his representative, and the certified applicator must determine whether the vessel is suitably designed and configured so as to allow for safe occupancy by the ship's crew throughout the duration of the fumigation. If it is determined that the vessel does meet these requirements, then the vessel will not be fumigated unless all crew members are removed from the vessel. The crew members will not be allowed to reoccupy the vessel until the vessel has been properly aerated and the master of the vessel and the certified applicator has made a determination that the vessel is safe for occupancy.
2. The certified applicator must notify the master of the vessel, or his representative, of the requirements relating to respiratory protection, 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.
3. Seal all openings to the cargo hold or tank and lock or otherwise secure all openings, manways, etc., which might be used to enter the hold. The over-space pressure relief system of each tank aboard tankers must be sealed by closing the appropriate valves and sealing the openings into the over-space with gas-tight materials.
4. Placard all entrances to the treated spaces with fumigation warning signs.
5. If the fumigation is not completed and the vessel aerated before the manned vessel leaves port, the Certified Applicator shall ensure that at least two units of personal protection equipment and one gas or vapor detection device, and a person qualified in their operation be on board the vessel during the voyage.
6. During the fumigation, or until a manned vessel leaves port or the cargo is aerated, the certified applicator shall ensure that a qualified person using gas or vapor detection equipment tests spaces adjacent to areas containing fumigated cargo as well as all regularly occupied spaces for fumigant leakage. If leakage of the fumigant is detected, the person in charge of the fumigation shall take action to correct the leakage, or shall inform the master of the vessel, or his representative, of the leakage so that corrective action can be taken.
7. Review with the master, or his representative, the precautions and procedures for the voyage.

#### 22.4.3. Application Procedures for Bulk Dry Cargo Vessels and Tankers

1. MAGNAPHOS® Plate may be used for the treatment of ship's holds and tanks if they are secured and marked for easy retrieval.
2. Do not apply MAGNAPHOS® Plate in areas where contact with liquid water is likely.
3. Immediately after application of the fumigant, close and secure all hatch covers, tank tops, butterworth valves, manways, etc.

#### 22.4.4. In-transit Fumigation of Transport Units (Containers) Aboard Ships

In-transit fumigation of transport units on ships is also governed by DOT RSPA 49 CFR 176.76(i) Transport Vehicles, Freight Containers, and Portable Tanks Containing Hazardous Materials and International Maritime Dangerous Goods Code P9025-I Amdt. 27-94. This permit, which must be obtained prior to the fumigation, is available from:

Commandant U.S. Coast Guard  
Hazardous Materials Standards Division GMSO-3  
Washington, DC 20593-0001

Application procedures for fumigation of raw commodities or processed foods in containers and other transport vehicles are described in Section 22.3 of this Manual.

#### 22.4.5. Precautions and Procedures During Voyage

1. Using appropriate gas detection equipment, monitor spaces adjacent to areas containing fumigated cargo and all regularly occupied areas for fumigant leakage. If leakage is detected, the area should be evacuated of all personnel, ventilated, and action taken to correct the leakage before allowing the area to be occupied.

2. Do not enter fumigated areas except under emergency conditions. If necessary to enter a fumigated area, appropriate personal protection equipment must be used. Never enter fumigated areas alone. At least one other person, wearing personal protection equipment, should be available to assist in case of an emergency.

#### 22.4.6. Precautions and Procedures During Discharge

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

#### 22.4.7 Barges

Develop an appropriate Fumigation Management Plan.

Barge fumigation is also regulated by U. S. Coast Guard Regulation 46 CFR 147A as modified by U. S. Coast Guard Special Permit 2-75. This permit which must be obtained prior to the fumigation is available from:

Commandant U.S. Coast Guard  
Hazardous Materials Standards Division GMSO-3  
Washington, DC 20593-0001

Leaks are a common cause of failures in the treatment of commodities aboard barges. Carefully inspect all hatch covers prior to application of MAGNAPHOS® Plate and seal, if necessary. Placard the barge. Notify consignee if the barge is to be fumigated in-transit and provide safety instructions for receipt and unloading.

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## SECTION 23

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### DISPOSAL INSTRUCTIONS

#### 23.1 GENERAL

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

Never place MAGNAPHOS® Plate, in a closed container such as a dumpster, sealed drum, plastic bag, etc. As flammable concentrations may develop which could result in a flash of phosphine gas.

Unreacted or partially reacted MAGNAPHOS® is acutely hazardous. Improper disposal of excess pesticide is a violation of Federal Law. If these wastes cannot be disposed of by use according to the applicator manual instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance. For specific instructions, see the Spill and Leak Procedures in Section 24 of this Manual.

Some local and state waste disposal regulations may vary therefore disposal procedures must be reviewed with appropriate authorities to ensure compliance with local regulations. Contact your state Pesticide or Environmental Control Agency or Hazardous Waste Specialist at the nearest EPA Regional Office for guidance.

If properly exposed during the fumigation period, MAGNAPHOS® will contain virtually no unreacted magnesium phosphide. This will be a grayish-white powder. This will be a non-hazardous waste. However, incompletely exposed Plates will require special care for disposal. Confinement of partially spent or unreacted MAGNAPHOS® Plate, as in a closed container or plastic bag, may result in a fire hazard. Small amounts of phosphine gas may be given off from unreacted magnesium phosphide and confinement of the gas may result in a flash. Do not transport partially spent or unreacted MAGNAPHOS® Plate over public roads.

#### CONTAINER DISPOSAL

Non-refillable containers. Do not reuse or refill this container. Offer for recycling. Triple rinse container (or equivalent) promptly after emptying. Triple rinse pails, lids and pouches with water. Then offer for recycling, if available or offer for reconditioning, if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities. Rinsate may be disposed of in a sanitary landfill, by pouring it out onto the ground or by other approved procedures. It is permissible to remove lids and expose empty pails to atmospheric conditions until the residue is reacted. Then puncture and dispose of in a sanitary landfill or other approved site, or by other procedures approved by state and local authorities.

#### 23.2 DIRECTIONS FOR DEACTIVATION OF PARTIALLY SPENT OR UNREACTED MAGNAPHOS® PLATES

Any of the following conditions: low humidity, cool temperatures, shortened exposure periods, or in cases where fumigant is added back during fumigation; may result in partially spent material.

**SPILL AND LEAK PROCEDURES****24.1 GENERAL PRECAUTIONS AND DIRECTIONS**

A spill, other than incidental to application or normal handling, may produce high levels of gas and, therefore, attending personnel must wear SCBA or its equivalent when the concentration of phosphine gas is unknown. Other NIOSH approved respiratory protection may be worn if the concentration is known to be less than or equal to 15 ppm. See Section 11 for respiratory protection requirements. Do not use water at any time to clean up a spill of MAGNAPHOS®. Water in contact with un-reacted metal phosphide will greatly accelerate the production of phosphine gas which could result in a toxic and/or fire hazard. Wear dry gloves of cotton or other material when handling and contact with magnesium phosphide is likely.

Return all intact pouches of MAGNAPHOS® Plate to pails or other suitable packaging which has been marked according to DOT regulations. If applicable, notify consignee and shipper of damaged packaging.

If pails or pouches have been punctured or damaged so as to leak, the container may be temporarily repaired with aluminum tape or the pouch may be transferred to a sound metal container which should be sealed and properly labeled as magnesium phosphide according to DOT regulations. Transport the damaged pails/pouches to an area suitable for pesticide storage for inspection. Further instructions and recommendations may be obtained, if required, from UPI or from your distributor.

CAUTION: The punctured pouches may flash upon opening at some later time.

If the age foil pouches of MAGNAPHOS® Plate have been damaged so severely that they cannot be temporarily repaired, or the product used immediately, these materials may be deactivated on site using the procedures described in Section 23. After deactivation, the spent plates may be gathered for disposal at approved sites.

Partially spent MAGNAPHOS® Plate resulting from a spill or leak, must be deactivated further prior to ultimate disposal. When deactivating partially spent or unreacted plates using the dry or wet methods below, the deactivation area must be outdoors, secured and posted so as to keep unauthorized people away.

**23.2.1 WET DEACTIVATION.**

**Partially spent or unreacted plates may be deactivated as follows using the "Wet Method".**

1. Water is used for deactivation of Plates and other magnesium phosphide fumigants by the "Wet Method". Detergent solution is not required for magnesium phosphide fumigants. Fill a drum or other container with water to within an inch or two of the top. Do not allow a large headspace above the surface of the water.
2. Magnesium phosphide will react quite rapidly and very vigorously with liquid water. Therefore, small amounts of partially spent material should be tested initially by immersion in water prior to proceeding with large scale wet deactivation. One or two individual plates should be evaluated first to determine their level of activity.
3. In a well-ventilated area, out-of doors, submerge the entire Plate in water. The Plate may float to the surface, and therefore, it is necessary to hold them under water by use of a suitable weight. CAUTION: Partially spent Plates may ignite if they are allowed to float to the surface. Active Plates should be submerged at least 4 to 6 inches to prevent smoking of the liberated phosphine gas. Plates may be placed in wire baskets for immersion in water. If completely unreacted, only deactivate 1 or 3 plates at a time in each drum of water.
4. Reaction of the magnesium phosphide with water is practically complete within about 15 to 30 minutes. However, Plates should be totally immersed for at least 6 hours to ensure total hydrolysis. CAUTION: Removal of Plates from the water before they are largely deactivated may result in fire. They may be taken to an approved site for disposal. Dispose of the water at a sanitary landfill or other approved site or means. Where permissible, the water may be poured out onto the ground or it may be poured into a storm sewer.  
Caution: Wear a NIOSH approved air-purifying full face gas-mask with a chin style mounted canister approved for phosphine or exposed to levels between 0.3 ppm to 15 ppm or a Self Contained Breathing Apparatus (SCBA) if exposure is unknown or above 15 ppm during wet deactivation of partially spent material. Do not cover the container being used for wet deactivation. Do not dispose of dust in a toilet.

**23.2.2 DRY DEACTIVATION**

1. Extension of the fumigation period is the simplest method for further deactivation of partially spent plates prior to disposal.
2. Partially spent or unreacted plates may also be deactivated using the "Dry Method".
3. Spread plates out onto the ground in a secure, open area away from inhabited buildings, protected from rain and groundwater, to be deactivated by atmospheric moisture. Care should be taken to ensure that the plates are not carried away by the wind. If desired, they may be weighted down by several inches of sand or soil or by other suitable means. Do not use this procedure during periods of rain or if the soil is wet. After deactivation, the spent plates may be gathered for disposal at approved sites.
4. Storage of partially spent Plates in a closed container may result in a fire hazard. Large numbers of partially spent Plates stored in open containers may ignite if contacted by liquid water.

**23.2.3 DIRECTIONS FOR DISPOSAL OF WET OR DRY DEACTIVATED MAGNAPHOS® PLATES**

Deactivated plates may be collected for disposal in well-ventilated containers such as wire baskets or porous cloth bags of burlap, cotton or other suitable material. The plates may be loaded directly into open vehicles for transportation to disposal site. Do not pile the cloth bags together.

**IMPORTANT INFORMATION  
READ BEFORE USING PRODUCT**

**CONDITIONS OF SALE AND LIMITATION OF WARRANTY AND LIABILITY**

**NOTICE:** Read the entire Directions for Use and Conditions of Sale and Limitation of Warranty and Liability before buying or using this product. If the terms are not acceptable, return the product at once, unopened, and the purchase price will be refunded.

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