



DuPont Crop Protection
Stine Haskell Research Center
P.O. Box 30
Newark, DE 19714-0030

Sent Via Federal Express

January 16, 2008

Mr. Robert Pooler, Program Manager
National Organic Standards Board USDA/AMS/TM/NOP
Room 4008-So., Ag Stop 0268
1400 Independence Ave., SW
Washington, DC 20250

Subject: Submission of Petition of Substances for Inclusion on the National List of Substances Allowed in Organic Production

Dear Mr. Pooler:

The enclosed petition for Ethylene Glycol is being submitted by the following company:

E.I. DuPont de Nemours and Company
c/o Kristi Barnett, Registration Coordinator
Stine-Haskell Research Center
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Newark, DE 19714
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(302) 366-5051
(302) 355-2806 (fax)

Item A: Indicate on which section the petitioned substance will be included

- Synthetic substances allowed for use in organic crop production, 205.601

Item B: Provide concise and comprehensive responses in providing all of the following information items on the substance being petitioned.

- 1) Chemical material or common name
 - Ethylene Glycol (50% component of Surfynol® 104E)
- 2) Manufacturer's or producer's name, address and telephone number
 - Surfynol® 104E manufactured by:
Air Products and Chemicals, Inc
7201 Hamilton Blvd

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ORGANIC PROGRAM

Allentown, PA 18195-1501
1-800-523-9374

- 3) Intended or current use of the substance
 - Surfynol® 104E is used as an inert ingredient [surfactant (antifoaming agent)] in DuPont™ Kocide® 2000 Bactericide/Fungicide and DuPont™ Kocide® 3000 Bactericide/Fungicide.
- 4) List of crops, rates and methods of application for which the substance will be used
 - DuPont™ Kocide® 2000 Bactericide/Fungicide and DuPont™ Kocide® 3000 Bactericide/Fungicide are registered for use on various crops such as citrus, conifers, field crops, small fruits, tree crops, vegetables and vines.
 - Please see labels for DuPont™ Kocide® 2000 Bactericide/Fungicide and DuPont™ Kocide® 3000 Bactericide/Fungicide attached in Appendix 1.
- 5) Sources and detailed description of manufacturing procedures
 - Surfynol® 104E is used in Kocide® products as a defoamer and manufacturing process aid. Surfynol® 104E enhances the wetting of copper hydroxide particles in water and prevents excess foam from being formed during milling. The active substance (2,4,7,9-tetramethyl-5-decyne-4,7-diol) is a wax and ethylene glycol is added to liquefy and allow easier handling in the manufacturing plant.
 - Surfynol® 104E is a formulated product and does not have a separate CAS#. It is considered an inert ingredient in the formulated Kocide® products.
 - Ethylene glycol is produced from ethylene, via the intermediate ethylene oxide. Ethylene oxide reacts with water to produce ethylene glycol according to the chemical equation: $C_2H_4O + H_2O \rightarrow HOCH_2CH_2OH$
 - This reaction can be catalyzed by either acids or bases, or can occur at neutral pH under elevated temperatures. The highest yields of ethylene glycol occur at acidic or neutral pH with a large excess of water. Under these conditions, ethylene glycol yields of 90% can be achieved. The major byproducts are the ethylene glycol oligomers diethylene glycol, triethylene glycol, and tetraethylene glycol.
- 6) Summary of any previous reviews by state or private certification programs
 - Please see the EPA Inert Reassessment: Reassessment of 3 Tolerance Exemptions for Ethylene Glycol, Diethylene Glycol, and the Combination of Diethylene Glycol Monomethyl Ether, Diethylene Glycol Monoethyl Ether, and Diethylene Glycol Monobutyl Ether (dated June 29, 2006), attached in Appendix 2.
 - From the EPA Assessment, "List Reclassification Determination: The current List Classification for ethylene glycol and diethylene glycol are 3, and the current List Classifications for diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, and diethylene glycol monobutyl ether are List 2. Because EPA has determined that there is a reasonable certainty that no harm to any population subgroup will result from aggregate exposure to these chemicals when used as an inert ingredient in pesticide formulations, the List Classification for these chemicals will change from List 3 to List 4."

- Please see OMRI Listed certificates for DuPont™ Kocide® 2000 Bactericide/Fungicide and DuPont™ Kocide® 3000 Bactericide/Fungicide attached in Appendix 3. DuPont withdrew the Kocide® products from the OMRI list on November 30, 2007.
- 7) Information regarding EPA, FDA and State regulatory authority registrations
- Please see the letters from Air Products and Chemicals, Inc regarding the FDA Regulatory status of Surfynol® 104 Surfactant and Surfynol® 104E Surfactant, attached in Appendix 4.
- 8) Chemical Abstract Service (CAS) number
- 107-21-1
- 9) Physical properties and chemical mode of action
- Surfynol® 104E is used in Kocide® products as a defoamer and manufacturing process aid. Surfynol® 104E enhances the wetting of copper hydroxide particles in water and prevents excess foam from being formed during milling. The active substance (2,4,7,9-tetramethyl-5-decyne-4,7-diol) is a wax and ethylene glycol is added to liquefy and allow easier handling in the manufacturing plant.
 - Please see the Surfynol® 104 Surfactant fact sheet attached in Appendix 5.
- 10) Safety information about the substance, including a Material Safety Data Sheet (MSDS) and a substance report from the National Institute of Environmental Health Studies
- Please see MSDS for Surfynol® 104E surfactant, attached in Appendix 6.
 - Please see MSDS for ethylene glycol, attached in Appendix 6.
- 11) Research information for the substance
- Not available
- 12) Petition justification statement
- DuPont™ Kocide® 2000 and DuPont™ Kocide® 3000 allow the organic grower to reduce the copper environmental impact while keeping the necessary disease control.
 - i) Metallic copper equivalent in Kocide® 2000 is 35%
 - ii) Metallic copper equivalent in Kocide® 3000 is 30%
 - iii) Other competitor products approved for use in organic agriculture range from 50% - 75% metallic copper
 - Other important benefits of DuPont™ Kocide® 2000 and DuPont™ Kocide® 3000 include:
 - i) Low use rate
 - ii) High quality DF formulation
 - iii) Mixes instantly in water
 - iv) Low foaming characteristics
 - v) Low dust
 - vi) Stays in suspension longer

- vii) Improved worker safety vs. competitor products approved for use in organic agriculture (signal word "Caution" for Kocide® 3000 and "Warning" for Kocide® 2000 vs. "Danger" for Nucop 50WP)
- Due to the small amount of Surfynol® 104E in the finished product ([REDACTED]), the application rate of the ethylene glycol contained in Surfynol® 104E is [REDACTED] (calculation based on 1.0 lb/acre rate for Kocide® 3000).
 - Please see the letters from various crop advisors describing the need for and supporting the continued use of DuPont™ Kocide® 2000 and DuPont™ Kocide® 3000 in organic agriculture attached in Appendix 7.

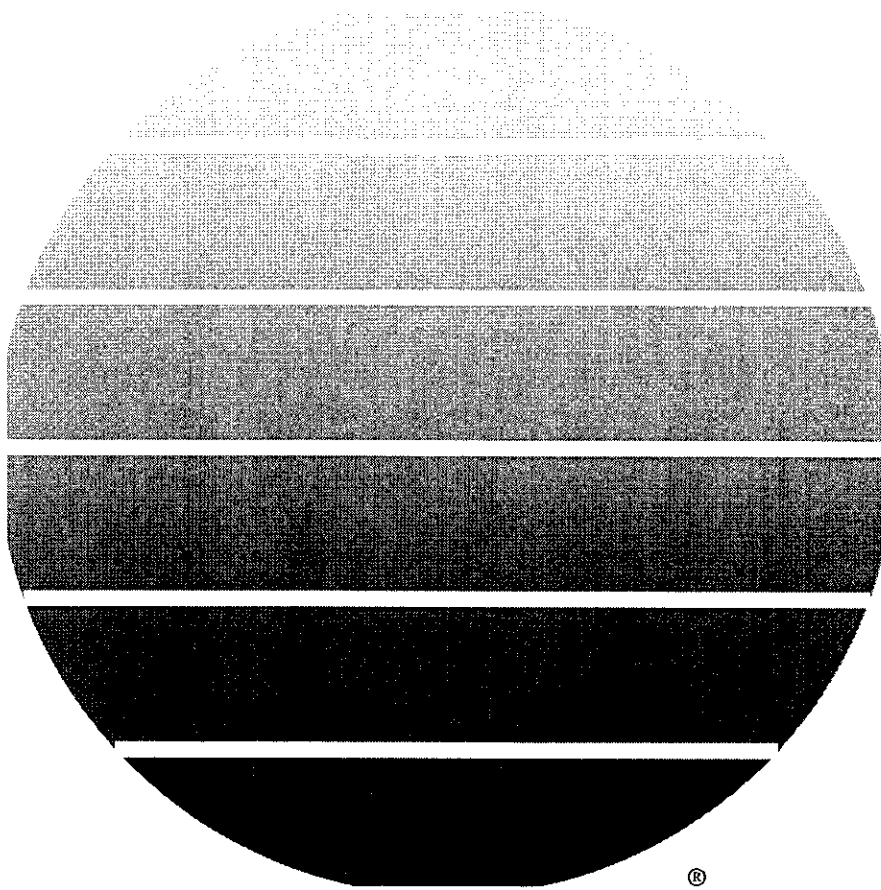
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DuPont™ Kocide® 2000

fungicide/bactericide

App. 1



“..... *A Growing Partnership With Nature*”

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DuPont™ Kocide® 2000

fungicide/bactericide

Dry Flowable

<i>Active Ingredients</i>	<i>By Weight</i>
Copper Hydroxide*	53.8%
<i>Inert Ingredients</i>	46.2%
TOTAL	100.00%

(* Metallic Copper Equivalent 35%)

EPA Reg. No. 352-656

EPA Est. No.

NET CONTENTS: _____

KEEP OUT OF REACH OF CHILDREN WARNING - AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail).

FIRST AID

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

IF INHALED: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-441-3637 for emergency medical treatment information.

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate use of gastric lavage.

See Label for Additional Precautions and Directions for use.

PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS AND DOMESTIC ANIMALS WARNING - AVISO

Causes substantial but temporary eye injury. Harmful if swallowed, absorbed through the skin or inhaled. May cause skin sensitization reactions in certain individuals. Avoid contact with skin, eyes or clothing. Avoid breathing dust.

PERSONAL PROTECTIVE EQUIPMENT

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category A on an EPA chemical resistance category selection sheet.

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Chemical-resistant gloves made of any waterproof material, such as polyvinyl chloride, nitrile rubber or butyl rubber
- Shoes plus socks
- Protective eyewear

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

USER SAFETY RECOMMENDATIONS

USERS SHOULD: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to fish and aquatic organisms. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Drift and runoff from treated areas may be hazardous to fish and aquatic organisms in adjacent aquatic sites. Do not contaminate water by disposal of equipment washwaters.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for protection of agricultural workers on farms, forests, nurseries and greenhouses and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours without required PPE.

The following equipment and precautions must be followed for 7 days following the application of this product:

-An eye-flush container, designed specifically for flushing eyes, must be available at the WPS decontamination site for workers entering the area treated with copper hydroxide.

-Notify workers of the application by warning them orally or in writing that residues in the treated areas may be highly irritating to their eyes and to take precautions such as refraining from rubbing their eyes and if they get residues in their eyes they should immediately flush their eyes using the eye-flush container.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil or water, is:

- Coveralls
- Chemical-resistant gloves made of any waterproof material, such as polyvinyl chloride, nitrile rubber or butyl rubber
- Shoes plus socks
- Protective eyewear

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are not within the scope of the Worker Protection Standard for agricultural pesticides 40 CFR part 170. The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries or greenhouses.

Keep unprotected persons out of treated area until sprays have dried.

GENERAL INSTRUCTIONS

DuPont™ KOCIDE® 2000 may be applied as an aerial, ground dilute or ground concentrate spray unless specifically directed otherwise in the specific crop use directions.

The per acre use rate of KOCIDE® 2000 is applicable for both dilute and concentrate spraying. Depending upon the equipment used and the specific crop, the spray volume applied per acre will differ. Refer to Minimum Recommended Spray Volume Table. Complete spray coverage is essential to assure optimum performance from KOCIDE® 2000. When treating by aerial application or with low volume application equipment, unless you have had specific previous experience, it is advisable to test for compatibility and tolerance to crop injury prior to full scale commercial utilization.

Consult the KOCIDE® 2000 label for specific rates and timing of application by crop. Where application rates and intervals are provided in a range (e.g. 4 to 12 pounds and 7 to 10 days), the higher rates and shorter spray intervals are recommended when rainfall is heavy and/or disease pressure is high. Use the higher rates for large mature tree crops.

SPECIAL PRECAUTIONS

- KOCIDE® 2000 **should not be applied** in a spray solution having a pH of less than 6.5 as phytotoxicity may occur.
- Do not tank mix KOCIDE® 2000 with "Aliette" fungicide for use on any registered crops unless appropriate precautions have been taken to buffer the spray solution because severe phytotoxicity may result. Use in accordance with the most restrictive of label limitations and precautions. No label dosage rates should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.
- This product may be reactive on masonry and metal surfaces such as galvanized roofing. Avoid contact with metal surfaces. Do not spray on cars, houses, lawn furniture, etc.
- Environmental conditions such as extended periods of wet weather, acid rain, etc. which alter the pH of the leaf surface may affect the performance of KOCIDE® 2000 resulting in possible phytotoxicity or loss of effectiveness.
- Agricultural chemicals may perform in an unpredictable manner when tank mixed, especially where several products are involved. Reduced effect on pests or crop injury may occur. Unless recommended on this label or by a state/local expert, it is advisable to test for compatibility and potential crop injury prior to commercial use of a new tank mix; otherwise, tank mixing should not be undertaken.

- It must be determined if proper application equipment is available and if waste associated with its use can be properly handled. Agricultural chemicals are often reactive with the materials used in the construction of application equipment, such as aluminum, rubber and some synthetic materials. This factor should be taken into consideration when selecting proper application equipment. It is necessary that all application equipment be thoroughly flushed with clean water after each day's use.
- Do not apply this product through any irrigation (chemigation) system using aluminum parts or components as damage to the system may occur. Such application is prohibited regardless of whether the irrigation system is flushed with water after use of this product.
- Apply this product only through one or more of the following types of systems: sprinkler, including center pivot, lateral move, traveler, big gun, or plastic pipe solid set system(s) which contain no aluminum parts or components. Do not apply this product through any other type of irrigation system.
- While volume is important in obtaining full spray coverage, often factors such as foliage density, environmental conditions and sprayer calibration have a greater impact. Always be sure that sprayers are calibrated to spray equipment manufacturer's specifications and environmental conditions are within those recommended by State and local regulatory authorities.
- When mixing, fill the spray tank one-half full with water. Add DuPont™ KOCIDE® 2000 slowly to tank while hydraulic or mechanical agitation is operating and continue filling with water. Spreaders, stickers, insecticides, nutrients, etc. should be added last. If compatibility is in question, use the Compatibility Jar Test before mixing a whole tank or contact your chemical supplier. Observe all precautions and limitations on the labels of all products used in mixtures.

CROP CLASSIFICATION

CITRUS: Grapefruit, Kumquat, Lemon, Lime, Orange, Pummelo, Tangelo and Tangerine.

CONIFERS: Douglas Fir, Fir*, Juniper, Leyland Cypress*, Pine* and Spruce*.

FIELD CROPS: Alfalfa, Barley, Corn*, Oats, Peanut, Potato, Sugar Beet and Wheat.

SMALL FRUITS: Blackberry, Blueberry*, Cranberry, Currant, Gooseberry, Raspberry and Strawberry.

TREE CROPS: Almond, Apple, Apricot, Avocado, Banana, Cacao, Cherry, Coffee, Filbert, Mango, Nectarine, Olive, Peach, Pear, Pecan, Pistachio, Plum, Prune, Quince and Walnut.

VEGETABLES: Bean, Beet, Beet Greens, Broccoli, Brussels Sprout, Cabbage, Cantaloupe, Carrot, Cauliflower, Celery, Celery, Cucumber, Eggplant, Greens (Collard, Mustard and Turnip), Honeydew, Muskmelon, Okra*, Onion/Garlic, Pea, Pepper, Pumpkin, Spinach, Squash, Tomato, Watercress and Watermelon.

VINES: Grape, Hops and Kiwi.

MISCELLANEOUS: Atemoya, Carambola, Chives, Dill, Ginseng, Guava, Litchi, Macadamia, Mamey Sapote, Papaya, Parsley, Passion Fruit, Pecan, Sugar Apple and Sycamore.

GREENHOUSE AND SHADEHOUSE CROPS:

KOCIDE® 2000 may be used in greenhouses and shadehouses to control diseases on any crop on this label where physiology allows greenhouse or shadehouse culture. While specific directions are presented for Citrus, Cucumber, Eggplant, Pepper and Tomato; general use may occur for any crop on this label where physiology allows greenhouse or shadehouse culture.

*Except California

Minimum Recommended Spray Volume (Gallons Per Acre) When Applying KOCIDE® 2000

	Aerial	Ground	
		Dilute	Concentrate
Citrus	10	800	100**
Conifers	10	100	30
Field Crops	3	20	---
Small Fruits	5	150	50
Tree Crops	10	400	50
Vegetables	3	20	---
Vines	5	150	50
Miscellaneous	10	150	50

**Pesticide application equipment such as "Curtec" or other similar sprayers which are capable of obtaining thorough coverage at low volumes may be used at as low as 20 gallons per acre of spray volume.

The following specific instructions are based on general application procedures. The recommendations of the State Agricultural Extension Service should be closely followed as to timing, frequency and number of sprays per season.

FROST INJURY PROTECTION

BACTERIAL ICE NUCLEATION INHIBITOR

Application of KOCIDE® 2000 made to all crops listed on this label at rates and stages of growth indicated on this label, at least 24 hours prior to anticipated frost conditions, will afford control of ice nucleating bacteria (*Pseudomonas syringae*, *Erwinia herbicola*, and *Pseudomonas fluorescens*) and may therefore provide some protection against light frost. Not recommended for those geographical areas where weather conditions favor severe frost.

CITRUS

DuPont™ KOCIDE® 2000 may be mixed with dry foliar nutritionals (micronutrients) to create "Shot Bag" mixes to meet the various nutritional requirements of citrus and provide disease protection as described on this label. KOCIDE® 2000 per acre rates in these mixes must not exceed the maximum recommended labeled rates for disease control.

Adding foliar nutritionals or other products to spray mixtures containing KOCIDE® 2000 and applying to citrus during the post bloom period when young fruit are present may result in spray burn.

Disease	Rate/Acre	Use Instructions
Algal Spot, Melanose, Scab	3-9 lbs.	Apply as pre-bloom and post-bloom sprays. Use the higher rates when conditions favor disease.
Greasy Spot, Pink Pitting	1.5-4.5 lbs.	Apply in summer on expanded new flush. Repeat on subsequent flushes where disease pressure is severe. Use the higher rates when conditions favor disease.
Alternaria Brown Spot	3-6 lbs.	On susceptible varieties apply when the first spring flush appears and each flush thereafter. Application to fruit should start after two thirds of the petals have fallen and be repeated on a 21 day schedule or as needed. Use the higher rates when conditions favor disease.
Phytophthora Brown Rot, Septoria Spot	3-6 lbs.	Begin application in fall before or just after the first rain and continue as needed. For Brown Rot only, apply to skirts of trees to a height of at least 4 feet. For control of Septoria Spot or where fruit have already been infected with Brown Rot, apply to entire tree. Apply also to bare ground one foot beyond skirt. Use the higher rates when conditions favor disease. NOTE: In California, in areas subject to copper injury, add 1/3 to 1 pound of high quality lime per pound of KOCIDE® 2000 .
Phytophthora Foot Rot	0.75 lb.	Mix with 1 quart of water, "Tre-Hold" or latex paint. Paint trunks of trees from the soil surface to the lowest scaffold limbs. Apply in May prior to summer rains and/or in the fall prior to wrapping trees for freeze protection. Treatment serves as protection for up to 1 year, but does not cure existing infections. NOTE: Areas where microjet or low volume irrigation hit the tree trunk may require retreatment due to wash off.
Citrus Canker (suppression)	9 lbs.	Spray flushes 7 to 14 days after shoots begin to grow. Young fruit may require an additional application. Number and timing of applications will be dependent upon disease pressure. Under heavy pressure, each flush of new growth should be sprayed.

NOTE: Phytotoxicity may occur on young tender flush when KOCIDE® 2000 is applied to citrus seedlings grown in greenhouses or shadehouses.

CITRUS

Field Nursery Grown

To control Melanose, Scab, Pink Pitting, Greasy Spot, Brown Rot and for suppression of Citrus Canker, apply 3 to 6 pounds of KOCIDE® 2000 per acre. Apply KOCIDE® 2000 at 28 day intervals or as needed depending on disease severity.

FIELD CROPS

Crop	Disease	Rate/Acre	Use Instructions
Alfalfa	Cercospora Leaf Spot, Leptosphaerulina Leaf Spot.	1.5 lbs	Apply 10 to 14 days before each harvest or earlier if disease threatens. NOTE: Spray injury may occur with sensitive varieties such as Lahontan.
Corn* (Field Corn, Popcorn, Sweet Corn)	Bacterial Stalk Rot	1-3 lbs.	Begin treatment when disease first appears and repeat every 7 to 10 days or as needed. Use the higher rates and shorter spray intervals when conditions favor disease.
Peanut	Cercospora Leaf Spot	1-2.25 lbs.	Begin spraying at 35 to 40 days after planting or when disease symptoms first appear and repeat at 10 to 14 day intervals or as needed. Reduce sprays to 7 day intervals during humid weather. Use the higher rates when conditions favor disease. Flowable sulfur may be added.
Potato	Early Blight, Late Blight	0.75-3 lbs.	Apply 0.75 to 1.25 lbs. at 7 to 10 day intervals or as needed starting when plants are 2 to 6 inches high in locations where disease is light. Apply up to 3 pounds per acre when disease is more severe. Under conditions of severe disease, control with DuPont™ KOCIDE® 2000 will be improved by tank mixing with other compatible fungicides registered for use on potatoes. Read and follow all label instructions of tank mix partners.
Sugar Beet	Cercospora Leaf Spot	1.5-3.75 lbs.	Begin applications when conditions first favor disease development and repeat at 10 to 14 day intervals or as needed. Use the higher rates when conditions favor disease. Addition of a spreader/sticker is recommended.
Wheat, Barley, Oats	Helminthosporium Spot Blotch, Septoria Leaf Blotch	1-1.5 lbs.	Make first application at early heading and follow with second spray 10 days later. Use the higher rates when conditions favor disease.

*Except California

SMALL FRUITS

Crop	Disease	Rate/Acre	Use Instructions
Blackberry (Aurora, Boysen, Cascade, Chehalem, Logan, Marion, Santiam, Thornless Evergreen)	Anthracnose, Cane Spot, Leaf Spot, Pseudomonas Blight, Purple Blotch, Yellow Rust	3 lbs.	Make fall application after harvest. Apply delayed dormant spray after pruning/training in the spring. If needed, agricultural-type spray oil may be added.
	Anthracnose, Cane Spot, Leaf Spot, Purple Blotch, Yellow Rust	1.5 lbs.	Apply when leaf buds begin to open and repeat when flower buds show white. If needed, agricultural-type spray oil may be added. NOTE: Crop injury may occur if applied to foliage under certain environmental conditions such as hot or prolonged moist periods. Discontinue applications if signs of crop injury appear.
Blueberry*	Bacterial Canker	3-6 lbs.	Make first application before fall rains and a second application 4 weeks later. Use the higher rates when conditions favor disease.
	Fruit Rot, Phomopsis Twig Blight	2-4 lbs.	Dormant Application: Begin applications when bloom buds begin to swell. Make additional applications at 10 to 14 day intervals or as needed before blooms open.
Cranberry	Fruit Rot	6 lbs.	Make first application in late bloom. Apply one or two additional applications at 10 to 14 day intervals or as needed depending on disease severity.
	Rose Bloom	6 lbs.	Apply three sprays on 10 to 14 day schedule or as needed as soon as symptoms are observed.
	Bacterial Stem Canker	6 lbs.	Apply post harvest and again in spring at bud swell. Apply one or two additional applications at 10 to 14 day intervals or as needed depending on disease severity.
	Leaf Blight, Red Leaf Spot, Stem Blight, Tip Blight (<i>Monilinia</i>)	6 lbs.	Apply delayed dormant spray in the spring. Repeat at 10 to 14 day intervals or as needed through pre-bloom.
Currant, Gooseberry	Anthracnose, Leaf Spot	7.5 lbs.	Make initial application after first leaves have expanded. Continue on a 10 to 14 day schedule or as needed during wet conditions in the spring. Make an additional application after harvest.
Raspberry	Anthracnose, Cane Spot, Leaf Spot, Pseudomonas Blight, Purple Blotch, Yellow Rust	3 lbs.	Make fall application after harvest. Apply delayed dormant spray after training in the spring. If needed, agricultural-type spray oil may be added.
	Anthracnose, Cane Spot, Leaf Spot, Purple Blotch, Yellow Rust	1.5 lbs.	Apply when leaf buds begin to open and repeat when flower buds show white. If needed, agricultural-type spray oil may be added. NOTE: Crop injury may occur if applied to foliage under certain environmental conditions such as hot or prolonged moist periods. Discontinue applications if signs of crop injury appear.
Strawberry	Angular Leaf Spot (<i>Xanthomonas</i>), Leaf Blight, Leaf Scorch, Leaf Spot	1.5-2.25 lbs.	Begin application when plants are established and continue on a weekly schedule throughout the season. Apply in at least 20 gallons of water. Use the higher rates when conditions favor disease. NOTE: Discontinue applications if signs of crop injury appear.

*Except California

TREE CROPS

Crop	Disease	Rate/Acre	Use Instructions
Almond, Apricot, Cherry, Plum, Prune	Bacterial Blast (<i>Pseudomonas</i>), Bacterial Canker, Coryneum Blight (Shot Hole)	6-12 lbs.	Make first application before fall rains and a second at late dormant. Use the higher rates when conditions favor disease. If needed, agricultural-type spray oil may be added. For Cherries: Where disease is severe, an additional application shortly after harvest may be required. Almond Only: For bacterial blast control in sprinkler irrigated orchards or where disease is severe, apply 0.75 pounds per acre post-bloom at 2 week intervals or as needed or just before sprinkling. NOTE: Foliar injury may occur from post-bloom sprays on almonds, especially on NePlus varieties.
	Blossom Brown Rot, Coryneum Blight (Shot Hole)	4.5-6 lbs. (Almond) 6-9 lbs. (All Others)	Apply during early bloom. Do not apply after full bloom or injury may occur. Use the higher rates when rainfall is heavy and disease pressure is high.
	Black Knot* (Plum)	3-6 lbs	Make an application at bud swell up to early bloom for early season disease suppression. Apply before full bloom. Use the higher rates when rainfall is heavy and disease pressure is high. NOTE: To avoid plant injury, do not use after full bloom.
	Cherry Leaf Spot* (Sour Cherries Only)	4-6 lbs.	Apply at petal fall as well as 1 to 2 times after petal fall. Use the lower rates where disease infection is light and use the higher rates for a dormant application or where disease infection is moderate to heavy. Do not apply to sweet cherry or the English Morello variety as severe injury will result. The addition of 1 to 3 pounds of hydrated lime per pound of DuPont™ KOCIDE® 2000 may reduce crop injury. NOTE: Moderate to severe injury such as leaf spotting and defoliation may occur from post-bloom applications.
Apple	Anthracnose, Blossom Blast, European Canker (<i>Nectria</i>), Shoot Blast (<i>Pseudomonas</i>)	9-12 lbs.	Apply before fall rains. Use the higher rates when conditions favor disease. NOTE: Use on yellow varieties may cause discoloration. To avoid discoloration, pick before spraying.
	Apple Scab*, Fire Blight	6-12 lbs.	Make application between silver-tip and green-tip. Apply as a full cover spray for early season disease suppression. NOTE: Moderate to severe crop injury may occur from late application; discontinue use when green-tip reaches 1/2 inch.
	Apple Scab*	1.5-3 lbs.	Extended spray schedule where fruit finish is not a concern: Continued applications may be made at 5 to 7 day intervals or as needed between 1/2 inch green-tip and first cover spray. NOTE: Moderate to severe crop injury may result from this extended spray schedule. It is not intended for fresh market apples or for apples where fruit finish is a concern as it is likely to cause fruit russetting. The addition of 1 to 3 pounds of hydrated lime per pound of KOCIDE® 2000 may reduce crop injury.
	Fire Blight*	0.75-1.5 lbs.	
	Collar Rot, Crown Rot	3 lbs.	Mix in 100 gallons of water. Apply 4 gallons of suspension as a drench on the lower trunk area of each tree. Apply in early spring or in fall after harvest for best results. Do not apply to foliage or fruit. NOTE: Do not use if soil pH is below 5.5 since copper toxicity may result.

TREE CROPS (cont'd)

Crop	Disease	Rate/Acre	Use Instructions
Avocado	Anthracnose, Blotch, Scab	6-9 lbs.	Apply when bloom buds begin to swell and continue application at monthly intervals for five to six applications. Use the higher rates when conditions favor disease.
Banana	Sigatoka (Black and Yellow)	1.5 lbs.	Apply by air in 3 gallons of water. If needed, agricultural-type spray oil may be added. Apply on a 14 day schedule or as needed throughout the wet season. Apply at 21 day intervals or as needed during dry periods.
	Black Pitting	3 lbs.	Mix in 100 gallons of water. Apply to the fruit stem and the basal portion of the leaf crown. Apply during the first and second weeks after fruit emergence.
Cacao	Black Pod	1.5-6.5 lbs.	Begin applications at the start of the rainy season and continue while infection conditions persist. Apply 1.5 to 3.5 lbs. at 14 to 21 day intervals or as needed depending on disease severity. For drier areas, make two to four applications using 4.5 to 6.5 pounds per acre according to disease incidence and planting density.
Coffee	Coffee Berry Disease (<i>Colletotrichum coffeanum</i>)	4.5-6 lbs.	Apply first spray after flowering and before onset of long rains and then at 21 to 28 day intervals or as needed until picking. Use the higher rates when conditions favor disease.
	Bacterial Blight (<i>Pseudomonas syringae</i>)	4.5-6 lbs.	Begin spray program before the onset of long rainy periods and continue throughout the rainy season at 14 to 21 day intervals or as needed. The critical time for spraying to control this disease is just before, during and after flowering(s), especially when coinciding with wet weather. Use the higher rates when rainfall is heavy and disease pressure is high.
	Leaf Rust (<i>Hemileia vastatrix</i>)	1.5-3 lbs.	Apply before the onset of rain and then at 21 day intervals or as needed while the rains continue. Use the higher rates when rainfall is heavy and disease pressure is high.
	Iron Spot (<i>Cercospora coffeicola</i>), Pink Disease (<i>Corticium salmonicolor</i>)	1.5 lbs.	Use concentrate or dilute spray. Begin treatment at the start of wet season and continue at monthly intervals for three applications.
Filbert	Bacterial Blight	12-18 lbs.	Apply as a post harvest spray. In seasons of heavy rainfall, apply a second spray when three-fourths of the leaves have dropped. Use the higher rates when rainfall is heavy and disease pressure is high. If needed, agricultural-type spray oil may be added.
	Eastern Filbert Blight	12-18 lbs.	Apply as a dilute spray in adequate water for thorough coverage. Make applications starting at bud swell to bud break and continue at 2-week intervals or as needed until early May. Thorough coverage is essential. Use the higher rates when rainfall is heavy and disease pressure is high. If needed, agricultural-type spray oil or sticking agent may be added.
Mango	Anthracnose	6-7.5 lbs.	Apply monthly after fruit set until harvest. Use the higher rates when rainfall is heavy and disease pressure is high.
Olive	Olive Knot, Peacock Spot	6-9 lbs.	Make first application before winter rains begin. A second application in early spring should be made if disease is severe. Apply the higher rates for heavy disease pressure or when conditions favor disease development.

TREE CROPS (cont'd)

Crop	Disease	Rate/Acre	Use Instructions
Peach, Nectarine	Bacterial Blast (<i>Pseudomonas</i>), Bacterial Canker, Bacterial Spot (<i>Xanthomonas</i>), Coryneum Blight (Shot Hole), Leaf Curl	6-12 lbs.	Make first application before fall rains and a second at late dormant. For peach leaf curl, late dormant application must be made before leaf buds swell. Use the higher rates when rainfall is heavy and disease pressure is high. If needed, agricultural-type spray oil may be added.
	Blossom Brown Rot, Coryneum Blight (Shot Hole), Leaf Curl	6-9 lbs.	Full cover spray at pink bud. Use the higher rates when conditions favor disease.
	Bacterial Spot	0.75 lb.	Post-bloom application applied at first and second cover sprays. NOTE: Do not spray 3 weeks prior to harvest. Use only recommended rates. Spotting of leaves and defoliation may occur from use in cover sprays.
Pear	Fire Blight	0.75 lb.	Apply at 5 day intervals or as needed throughout the bloom period. NOTE: Russetting may occur in copper sensitive varieties. Excessive dosages may cause fruit russet on any variety.
	Blossom Blast (<i>Pseudomonas</i>)	9-12 lbs.	Apply before fall rains and again during dormancy before spring growth starts. Use the higher rates when disease pressure is high or when conditions favor disease development.
Pecan	Kernel Rot, Shuck Rot (<i>Phytophthora cactorum</i>), Zonate Leaf Spot (<i>Cristulariella pyramidalis</i>)	1.5-3 lbs.	For suppression, apply in sufficient water to ensure complete spray coverage at 2 to 4 week intervals or as needed, starting at kernel growth and continue until shucks open. Use the higher rates and shorter spray intervals if frequent rainfall occurs.
	Ball Moss*, Spanish Moss*	4.5-6 lbs.	Apply in 100 gallons of water in the spring when ball moss is actively growing, using 1 1/2 gallons of spray per foot of tree height. Make sure to wet ball moss tufts thoroughly. The addition of a non-ionic surfactant will improve control. A second application may be required after 12 months.
Pistachio	Botryosphaeria Panicle and Shoot Blight, Botrytis Blight, Late Blight (<i>Alternaria alternata</i>), Septoria Leaf Blight	3-6 lbs.	Make initial application at bud swell and repeat on a 14 to 28 day schedule or as needed. If disease conditions are severe, use the higher rates and shorter spray intervals.
Quince	Fire Blight	0.75 lb.	Apply at 5 day intervals or as needed throughout the bloom period. Apply in adequate water for thorough coverage.
Walnut	Walnut Blight	6-9 lbs.	Apply first spray at early pre-bloom prior to or when catkins are partially expanded. Make additional applications during bloom and early nutlet stage or as needed when frequent rainfall or extended periods of moisture occur. Thorough coverage of catkins, leaves and nutlets is essential for effective control. NOTE: Adequate control may not be obtained when copper tolerant species of <i>Xanthomonas</i> bacteria are present.

*Except California

VEGETABLES

Crop	Disease	Rate/Acre	Use Instructions
Bean (Dry, Green)	Brown Spot, Common Blight, Halo Blight	0.75-2.25 lbs	For protective sprays, make first application when plants are 6 inches high; repeat on a 7 to 14 day schedule or as needed depending on environmental conditions. Use the higher rates for more severe disease.
Beet (Table Beet, Beet Greens)	Cercospora Leaf Spot	1.5-3.75 lbs.	Begin applications when conditions first favor disease development and repeat at 10 to 14 day intervals or as needed. Use the higher rates when conditions favor disease.
Carrot	Alternaria Leaf Spot, Cercospora Leaf Spot	1.5 lbs.	Begin applications when disease first threatens and repeat at 7 to 14 day intervals or as needed depending on disease severity.
Celery, Celeriac	Bacterial Blight, Cercospora Early Blight, Septoria Late Blight	1.5 lbs.	Begin applications as soon as plants are first established in the field, repeating at 5 to 7 day intervals or as needed depending on disease severity and environmental conditions.
Crucifers (Broccoli, Brussels Sprout, Cabbage, Cauliflower, Collard Greens, Mustard Greens, Turnip Greens)	Black Leaf Spot (<i>Alternaria</i>), Black Rot (<i>Xanthomonas</i>), Downy Mildew	0.75-1.5 lbs.	Begin application after transplants are set in the field, or shortly after emergence of field seeded crops or when conditions favor disease development. Apply at 7 to 10 day intervals or as needed. Use the higher rates when conditions favor disease NOTE: Reddening of older leaves may occur on broccoli and a flecking of wrapper leaves may occur on cabbage.
Cucurbits (Cantaloupe, Cucumber, Honeydew, Muskmelon, Pumpkin, Squash, Watermelon)	Alternaria Leaf Spot, Angular Leaf Spot, Anthracnose, Downy Mildew, Gummy Stem Blight, Powdery Mildew, Watermelon Bacterial Fruit Blotch (suppression)	1-2.25 lbs.	Begin applications prior to disease development and continue while conditions are favorable for disease development. Repeat at 5 to 7 day intervals or as needed. Use the higher rates when conditions favor disease. NOTE: Crop injury may occur from application at higher rates and shorter intervals. Discontinue use if injury occurs.
Eggplant	Alternaria Blight, Anthracnose, Phomopsis	1.5 lbs.	Begin applications prior to development of disease symptoms. Repeat sprays at 7 to 10 day intervals or as needed depending on disease severity.
Okra*	Anthracnose, Bacterial Leaf Spot, Leaf Spots, Pod Spot, Powdery Mildew	1.5-3 lbs.	Begin treatment when disease first threatens and repeat every 5 to 10 days or as needed depending on disease severity. Use the higher rates and shorter spray intervals when conditions favor disease.
Onion, Garlic	Bacterial Blight, Downy Mildew, Purple Blotch	1.5 lbs.	Begin when plants are 4 to 6 inches high and repeat at 7 to 10 day intervals or as needed depending on disease severity. Can cause phytotoxicity to leaves.
Pea	Powdery Mildew	1-2.25 lbs.	Begin applications when disease symptoms first appear and repeat at weekly intervals or as needed. Use the higher rates when conditions favor disease.
Pepper	Anthracnose, Bacterial Spot, Cercospora Leaf Spot	1.5-2.25 lbs.	Begin applications when conditions first favor disease development and repeat at 7 to 10 day intervals or as needed depending on disease severity. Use the higher rates when conditions favor disease.
Spinach	Anthracnose, Blue Mold, Cercospora Leaf Spot, White Rust	1.5-2.25 lbs.	Begin application when disease first appears or when conditions favor disease development. Repeat at 7 to 10 day intervals or as needed. Use the higher rates when conditions favor disease. NOTE: Flecking may occur on spinach leaves.
Tomato	Anthracnose, Bacterial Speck, Bacterial Spot, Early Blight, Gray Leaf Mold, Late Blight, Septoria Leaf Spot	1.5-3 lbs.	Begin applications when disease first threatens and repeat at 5 to 10 day intervals or as needed depending on disease severity. Use the higher rates when conditions favor disease.

VEGETABLES (cont'd)

Crop	Disease	Rate/Acre	Use Instructions
Watercress	Cercospora Leaf Spot	1.5 lbs.	Begin applications when plants are first established in the field, repeating at 7 to 14 day intervals or as needed depending on disease severity. Do not exceed four applications per crop. Apply using ground spray equipment at no less than 50 gallons of spray solution per acre.

*Except California

VINES

Crop	Disease	Rate/Acre	Use Instructions
Grape	Black Rot, Downy Mildew, Phomopsis, Powdery Mildew	1.5-3 lbs.	Begin applications at bud break with subsequent applications throughout the season depending on disease severity. Use the higher rates when conditions favor disease. NOTE: Foliage injury may occur on copper sensitive varieties such as Concord, Delaware, Niagara and Rosette. Either test for sensitivity or add 1 to 3 pounds of hydrated lime per pound of DuPont™ KOCIDE® 2000.
Hops	Downy Mildew	1.5 lbs.	Make crown treatment after pruning, but before training. After training, additional treatments are needed at about 10 day intervals NOTE: Discontinue use two weeks before harvest.
Kiwi	<i>Erwinia herbicola</i> , <i>Pseudomonas fluorescens</i> , <i>Pseudomonas syringae</i>	6 lbs.	Apply in 200 gallons of water per acre. Make applications on a monthly basis. A maximum of three applications may be made.

MISCELLANEOUS

Crop	Disease	Rate/Acre	Use Instructions
Atemoya	Anthracoese	2.25-3.5 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates for severe disease.
Carambola	Anthracoese	4.5-6 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates for severe disease.
Chives	Downy Mildew	1.5 lbs	Begin applications when plants are established in the field. Repeat applications every 7 to 10 days or as needed depending on disease conditions.
Dill	Phoma Leaf Spot, Rhizoctonia Foliage Blight	1.5-2.25 lbs.	Begin applications when plants are first established in the field and repeat at 7 to 10 day intervals or as needed depending upon disease severity and environmental conditions. Use the higher rates when conditions favor disease.
Ginseng	Alternaria Leaf Blight, Stem Blight	2-3 lbs.	Use as a tank mix with 2 pounds "Rovral" 50W in 100 gallons of water. Use in accordance with the most restrictive of label limitations and precautions. No label dosage rates should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing. Begin KOCIDE®-"Rovral" applications as soon as plants have emerged in spring. Applications should be repeated every 7 days or as needed until plants become dormant in fall. Apply fungicides at least 8 hours before rain. Use of a spreader-sticker or sticker is advised. NOTE: Alternaria Leaf and Stem Blight is most severe in humid conditions such as those found in the dense canopies of 2 to 4 year old Ginseng. It is very important that the stems be thoroughly covered with fungicide; therefore, use a spray apparatus which distributes the fungicide throughout the canopy.

MISCELLANEOUS (cont'd)

Crop	Disease	Rate/Acre	Use Instructions
Guava	Anthracnose, Red Algae	2.25-3.5 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates for severe disease.
Litchi	Anthracnose	2.25-3.5 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates for severe disease.
Macadamia	Anthracnose	4.5-6.75 lbs.	Initiate sprays at first sign of flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates for severe disease.
	Phytophthora Blight (<i>P. capsici</i>), Raceme Blight (<i>Botrytis cinerea</i>)	3.5-4.5 lbs.	Apply during raceme development and bloom periods. Apply in sufficient water for thorough coverage. Use the higher rates when conditions favor disease.
Mamey Sapote	Algal Leaf Spot, Anthracnose	4.5-6 lbs.	Apply when conditions favor disease development. Repeat on 14 to 30 day schedule or as needed as disease severity and environmental conditions dictate. Use the higher rates when conditions favor disease.
Papaya	Anthracnose	3-7.5 lbs.	Apply before disease appears. Apply at 10 to 14 day intervals under light disease pressure and 5 to 7 day intervals or as needed under heavy disease pressure. The addition of an approved spreader is desirable. Use the higher rates when conditions favor disease.
Parsley	Bacterial Blight (<i>Pseudomonas sp.</i>)	2.25 lbs.	Begin applications when plants are first established in the field and repeat at 5 to 7 days intervals or as needed depending on disease severity and environmental conditions.
Passion Fruit	Anthracnose	4.5-6.75 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates when conditions favor disease.
Sugar Apple (<i>Annona</i>)	Anthracnose	9-13.5 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates when conditions favor disease.
Sycamore	Anthracnose	1.5-2.25 lbs.	Apply as a full cover spray in 100 gallons of water or sufficient volume for thorough coverage. Make first application at bud crack and second application 7 to 10 days later at 10% leaf expansion. Use the higher rates when conditions favor disease.

CONIFERS

For use on conifers, including Douglas Fir, Fir*, Juniper, Leyland Cypress*, Pine* and Spruce*, in forest stands.

For control of foliar diseases, apply DuPont™ KOCIDE® 2000 as a thorough cover spray at rates ranging from 1.5 to 3 pounds per acre. Begin applications in the spring at the initiation of new growth and repeat at 2 to 4 week intervals or as needed. Use the higher rates when disease pressure is severe or when environmental conditions favor disease development.

KOCIDE® 2000 is recommended for use on the listed conifers for control of the following diseases:

Crop	Scientific Name	Disease
Douglas Fir	<i>Pseudotsuga menziesii</i>	Rhabdocline Needlecast
Fir*	<i>Abies spp.</i>	Needlecasts
Juniper	<i>Juniperus spp.</i>	Anthracnose, Phomopsis Twig Dieback*
Leyland Cypress*	<i>X Cupressocyparis leylandii</i>	Cercospora Needle Blight
Pine*	<i>Pinus spp.</i>	Needlecasts
Spruce*	<i>Picea spp.</i>	Needlecasts

Lichens*: To control lichens on any of the conifers above, apply 6 to 10 pounds of Kocide 2000 per acre as a dormant application before new growth emerges in the spring. The addition of a non-ionic surfactant will improve control. A second application may be required after 12 months.

NOTE: Do not buffer or combine with emulsifiable concentrate insecticides.

*Except California

GREENHOUSE AND SHADEHOUSE CROPS

Notice to User: KOCIDE® 2000 may be used in greenhouses and shadehouses to control diseases on crops which appear on this label, and specific instructions have been developed for the crops listed. The grower should bear in mind that the sensitivity of crops grown in greenhouses and shadehouses differs greatly from crops grown under field conditions. Neither the manufacturer nor seller has determined whether or not KOCIDE® 2000 can be used safely on all greenhouse and shadehouse grown crops. Consequently, injury arising from the use of KOCIDE® 2000 on these types of greenhouse and shadehouse crops is the responsibility of the user. The user should determine if KOCIDE® 2000 can be used safely prior to commercial use. In a small area, apply the recommended rates to the plants in question, i.e., foliage, fruit, etc., and observe for 7 to 10 days for symptoms of phytotoxicity prior to commercial use.

Apply KOCIDE® 2000 according to specific rates given for those crops in pounds per acre. **One level tablespoon of KOCIDE® 2000 per 1,000 square feet is equivalent to 1.5 pounds per acre.** KOCIDE® 2000 should be applied in adequate water for thorough coverage of plant parts. Begin application at first sign of disease and repeat at 7 to 14 day intervals or as needed; use shorter spray intervals during periods when severe disease conditions persist.

NOTE: Phytotoxicity may occur on young tender flush when KOCIDE® 2000 is applied to citrus seedlings grown in greenhouses or shadehouses.

Crop	Disease	Rate per 1000 Sq Ft	Use Instructions
Citrus (Non-Bearing Nursery)	Brown Rot, Citrus Canker, Greasy Spot, Melanose, Pink Pitting, Scab	3 TBSP	Begin applications when disease first threatens. Repeat at 30 day intervals or as needed depending on disease severity.
Cucumber	Angular Leaf Spot, Downy Mildew	1 - 2 1/2 TBSP	Apply weekly when plants begin to vine. Use the higher rates when conditions favor disease.
Eggplant	Alternaria Blight, Anthracnose, Phomopsis	1 1/2 TBSP	Begin applications prior to development of disease symptoms. Repeat sprays at 7 to 10 day intervals or as needed depending on disease severity.
Pepper	Bacterial Spot	1 1/2 - 2 1/2 TBSP	Begin applications when conditions first favor disease development and repeat at 5 to 10 day intervals or as needed depending on disease severity. Use the higher rates when conditions favor disease.
Tomato	Anthracnose, Bacterial Speck, Bacterial Spot, Early Blight, Gray Leaf Mold, Late Blight, Septoria Leaf Spot	1 1/2 - 3 TBSP	Begin applications when disease first threatens and repeat at 5 to 10 day intervals or as needed depending on disease severity. Use the higher rates when conditions favor disease.

GENERAL CHEMIGATION INSTRUCTIONS

Do not apply this product through any irrigation (chemigation) system using aluminum parts or components as damage to the system may occur. Such application is prohibited regardless of whether the irrigation system is flushed with water after use of this product.

Apply this product only through one or more of the following types of systems: sprinkler, including center pivot, lateral move, traveler, big gun, or plastic pipe solid set system(s) which contain no aluminum parts or components. Do not apply this product through any other type of irrigation system.

Crop injury, lack of effectiveness or illegal pesticide residues in the crop can result from nonuniform distribution of treated water.

If you have questions about calibration, you should contact State Extension Service specialists, equipment manufacturers or other experts.

Do not connect an irrigation system (including greenhouse systems) used for pesticide application to a public water system unless the pesticide label-prescribed safety devices for public water systems are in place.

A person knowledgeable of the chemigation system and responsible for its operation or under the supervision of the responsible person, shall shut the system down and make necessary adjustments should the need arise.

Shut off injection equipment after treatment and continue to operate irrigation system until DuPont™ KOCIDE® 2000 has been cleared from the last sprinkler head.

CHEMIGATION SYSTEMS CONNECTED TO PUBLIC WATER SYSTEMS

Public water system means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

Chemigation systems connected to public water systems must contain a functional, reduced-pressure zone, backflow preventer (RPZ) or the functional equivalent in the water supply line upstream from the point of pesticide introduction. As an option to the RPZ, the water from the public water system should be discharged into the reservoir tank prior to pesticide introduction. There shall be a complete physical break (air gap) between the outlet end of the fill pipe and the top or overflow rim of the reservoir tank of at least twice the inside diameter of the fill pipe.

The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.

The pesticide injection pipeline must contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.

The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops, or in cases where there is no water pump, when the water pressure decreases to the point where pesticide distribution is adversely affected.

Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.

Do not apply when wind speed favors drift beyond the area intended for treatment.

NOTE: It must be determined if proper application equipment is available and if waste associated with its use can be properly handled. Agricultural chemicals are often reactive with the materials used in the construction of application equipment, such as aluminum, rubber and some synthetic materials. This factor should be taken into consideration when selecting proper application equipment. It is necessary that all application equipment be thoroughly flushed with clean water after each day's use.

When mixing, fill the nurse tank half full with water. Add KOCIDE® 2000 slowly to tank while hydraulic or mechanical agitation is operating and continue filling with water. Stickers, spreaders, insecticides, nutrients, etc. should be added last. If compatibility is in question, use the Compatibility Jar Test before mixing a whole tank. Because of the wide variety of possible combinations which can be encountered, observe all precautions and limitations on the labels of all products used in mixtures. Agitation of the mixture in the nurse tank is recommended.

KOCIDE® 2000 should be added through a traveling irrigation system continuously or at the last 30 minutes of solid set irrigation systems. Shut off injection equipment after treatment and continue to operate irrigation system until KOCIDE® 2000 has been cleared from the last sprinkler head.

SPRINKLER CHEMIGATION

The system must contain a functional check valve, vacuum relief valve, and low pressure drain appropriately located on the irrigation pipeline to prevent water source contamination from backflow.

The pesticide injection pipeline must also contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.

The pesticide injection pipeline must also contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.

The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops.

The irrigation line or water pump must include a functional pressure switch which will stop the water pump motor when

the water pressure decreases to the point where pesticide distribution is adversely affected.

Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.

Do not apply when wind speed favors drift beyond the area intended for treatment.

NOTE: It must be determined if proper application equipment is available and if waste associated with its use can be properly handled. Agricultural chemicals are often reactive with the materials used in the construction of application equipment, such as aluminum, rubber and some synthetic materials. This factor should be taken into consideration when selecting proper application equipment. It is necessary that all application equipment be thoroughly flushed with clean water after each day's use.

When mixing, fill the nurse tank half full with water. Add DuPont™ KOCIDE® 2000 slowly to tank while hydraulic or mechanical agitation is operating and continue filling with water. Stickers, spreaders, insecticides, nutrients, etc. should be added last. If compatibility is in question, use the Compatibility Jar Test before mixing a whole tank. Because of the wide variety of possible combinations which can be encountered, observe all precautions and limitations on the labels of all products used in mixtures. Agitation of the mixture in the nurse tank is recommended.

KOCIDE® 2000 should be added through a traveling irrigation system continuously or at the last 30 minutes of solid set irrigation systems. Shut off injection equipment after treatment and continue to operate irrigation system until KOCIDE® 2000 has been cleared from the last sprinkler head.

STORAGE AND DISPOSAL

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

PESTICIDE STORAGE: Store in a cool, dry place.

PESTICIDE DISPOSAL: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL: Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill, or by incineration, or if allowed by State and local authorities, by burning. If burned, stay out of smoke.

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WARRANTY AND LIABILITY**

NOTICE: Read this 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.

It is impossible to eliminate all risks associated with the use of this product. Such risks arise from weather conditions, soil factors, off target movement, unconventional farming techniques, presence of other materials, the manner of use or application, or other unknown factors, all of which are beyond the control of DuPont. These risks can cause: ineffectiveness of the product, crop injury, or injury to non-target crops or plants. WHEN YOU BUY OR USE THIS PRODUCT, YOU AGREE TO ACCEPT THESE RISKS.

DuPont warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for the purpose stated in the Directions for Use, subject to the inherent risks described above, when used in accordance with the Directions for Use under normal conditions.

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To the extent consistent with applicable law that allows such requirement, DuPont or its Ag Retailer must have prompt notice of any claim so that an immediate inspection of buyer's or user's growing crops can be made. Buyer and all users shall promptly notify DuPont or a DuPont Ag Retailer of any claims, whether based on contract, negligence, strict liability, other tort or otherwise, or be barred from any remedy.

This Limitation of Warranty and Liability may not be amended by any oral or written agreement.

For product information call: 1-888-6-DUPONT

Internet address: <http://cropprotection.dupont.com/>

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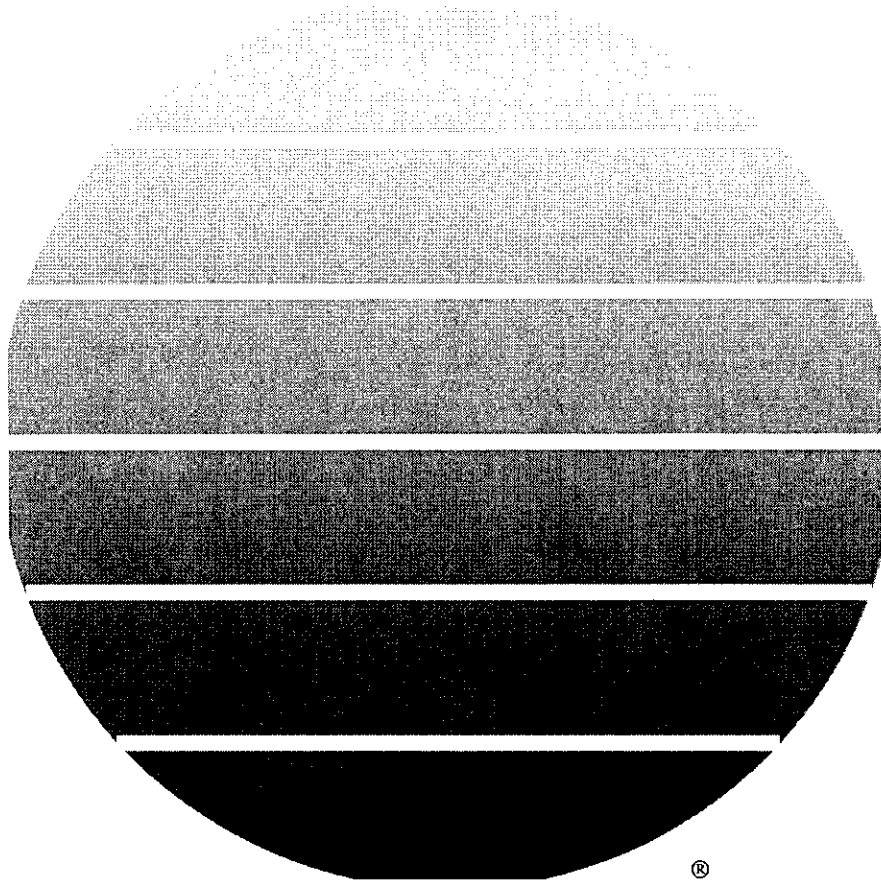


DuPont™ Kocide® 3000

fungicide/bactericide

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“..... A Growing Partnership With Nature”



DuPont™

Kocide® 3000

fungicide/bactericide

Dry Flowable

<i>Active Ingredients</i>	<i>By Weight</i>
Copper Hydroxide*	46.1%
<i>Inert Ingredients</i>	53.9%
TOTAL	100.0%

(* Metallic Copper Equivalent 30%)

EPA Reg. No. 352-662

EPA Est. No.

NET CONTENTS: _____

KEEP OUT OF REACH OF CHILDREN

CAUTION

FIRST AID

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

IF INHALED: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.

IF ON SKIN: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-441-3637 for emergency medical treatment information.

NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate use of gastric lavage.

See Label for Additional Precautions and Directions for use.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Causes moderate eye irritation. Harmful if swallowed, absorbed through the skin or inhaled. Avoid contact with skin, eyes or clothing. Avoid breathing dust. Wash thoroughly with soap and water after handling.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category A on an EPA chemical resistance category selection sheet.

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Shoes plus socks
- Chemical-resistant gloves made of any waterproof material, such as natural rubber, selection Category A

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

USER SAFETY RECOMMENDATIONS

USERS SHOULD: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to fish and aquatic organisms. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Drift and runoff from treated areas may be hazardous to fish and aquatic organisms in adjacent aquatic sites. Do not contaminate water by disposal of equipment washwaters.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for protection of agricultural workers on farms, forests, nurseries and greenhouses and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours without required PPE.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil or water, is:

- Coveralls
- Chemical-resistant gloves made of any waterproof material, such as polyvinyl chloride, nitrile rubber or butyl rubber
- Shoes plus socks

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are not within the scope of the Worker Protection Standard for agricultural pesticides 40 CFR part 170. The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries or greenhouses.

Keep unprotected persons out of treated area until sprays have dried.

GENERAL INSTRUCTIONS

DuPont™ KOCIDE® 3000 may be applied as an aerial, ground dilute or ground concentrate spray unless specifically directed otherwise in the specific crop use directions.

The per acre use rate of KOCIDE® 3000 is applicable for both dilute and concentrate spraying. Depending upon the equipment used and the specific crop, the spray volume applied per acre will differ. Refer to Minimum Recommended Spray Volume Table. Complete spray coverage is essential to assure optimum performance from KOCIDE® 3000. When treating by aerial application or with low volume application equipment, unless you have had specific previous experience, it is advisable to test for compatibility and tolerance to crop injury prior to full scale commercial utilization.

Consult the KOCIDE® 3000 label for specific rates and timing of application by crop. Where application rates and intervals are provided in a range (e.g. 4 to 12 pounds and 7 to 10 days), the higher rates and shorter spray intervals are recommended when rainfall is heavy and/or disease pressure is high. Use the higher rates for large mature tree crops.

SPECIAL PRECAUTIONS

- KOCIDE® 3000 **should not be applied** in a spray solution having a pH of less than 6.5 as phytotoxicity may occur.
- Do not tank mix KOCIDE® 3000 with "Aliette" fungicide for use on any registered crops unless appropriate precautions have been taken to buffer the spray solution because severe phytotoxicity may result. Use in accordance with the most restrictive of label limitations and precautions. No label dosage rates should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.
- This product may be reactive on masonry and metal surfaces such as galvanized roofing. Avoid contact with metal surfaces. Do not spray on cars, houses, lawn furniture, etc.
- Environmental conditions such as extended periods of wet weather, acid rain, etc. which alter the pH of the leaf surface may affect the performance of KOCIDE® 3000 resulting in possible phytotoxicity or loss of effectiveness.
- Agricultural chemicals may perform in an unpredictable manner when tank mixed, especially where several products are involved. Reduced effect on pests or crop injury may occur. Unless recommended on this label or by a state/local expert, it is advisable to test for compatibility and potential crop injury prior to commercial use of a new tank mix; otherwise, tank mixing should not be undertaken.

- It must be determined if proper application equipment is available and if waste associated with its use can be properly handled. Agricultural chemicals are often reactive with the materials used in the construction of application equipment, such as aluminum, rubber and some synthetic materials. This factor should be taken into consideration when selecting proper application equipment. It is necessary that all application equipment be thoroughly flushed with clean water after each day's use.
- Do not apply this product through any irrigation (chemigation) system using aluminum parts or components as damage to the system may occur. Such application is prohibited regardless of whether the irrigation system is flushed with water after use of this product.
- Apply this product only through one or more of the following types of systems: sprinkler, including center pivot, lateral move, traveler, big gun, or plastic pipe solid set system(s) which contain no aluminum parts or components. Do not apply this product through any other type of irrigation system.
- While volume is important in obtaining full spray coverage, often factors such as foliage density, environmental conditions and sprayer calibration have a greater impact. Always be sure that sprayers are calibrated to spray equipment manufacturer's specifications and environmental conditions are within those recommended by State and local regulatory authorities.
- When mixing, fill the spray tank one-half full with water. Add DuPont™ KOCIDE® 3000 slowly to tank while hydraulic or mechanical agitation is operating and continue filling with water. Spreaders, stickers, insecticides, nutrients, etc. should be added last. If compatibility is in question, use the Compatibility Jar Test before mixing a whole tank or contact your chemical supplier. Observe all precautions and limitations on the labels of all products used in mixtures.

CROP CLASSIFICATION

CITRUS: Grapefruit, Kumquat, Lemon, Lime, Orange, Pummelo, Tangelo and Tangerine.

CONIFERS: Douglas Fir, Fir, Juniper, Leyland Cypress, Pine and Spruce.

FIELD CROPS: Alfalfa, Barley, Corn, Oats, Peanut, Potato, Sugar Beet and Wheat.

SMALL FRUITS: Blackberry, Blueberry, Cranberry, Currant, Gooseberry, Raspberry and Strawberry.

TREE CROPS: Almond, Apple, Apricot, Avocado, Banana, Cacao, Cherry, Coffee, Filbert, Mango, Nectarine, Olive, Peach, Pear, Pecan, Pistachio, Plum, Prune, Quince and Walnut.

VEGETABLES: Bean, Beet, Beet Greens, Broccoli, Brussels Sprout, Cabbage, Cantaloupe, Carrot, Cauliflower, Celery, Celery, Cucumber, Eggplant, Greens (Collard, Mustard and Turnip), Honeydew, Lettuce, Muskmelon, Okra, Onion/Garlic, Pea, Pepper, Pumpkin, Spinach, Squash, Tomato, Watercress and Watermelon.

VINES: Grape, Hops and Kiwi.

MISCELLANEOUS: Atemoya, Carambola, Chives, Dill, Ginseng, Guava, Litchi, Macadamia, Mamey Sapote, Papaya, Parsley, Passion Fruit, Pecan, Sugar Apple and Sycamore.

GREENHOUSE AND SHADEHOUSE CROPS:

KOCIDE® 3000 may be used in greenhouses and shadehouses to control diseases on any crop on this label where physiology allows greenhouse or shadehouse culture. While specific directions are presented for Citrus, Cucumber, Eggplant, Pepper and Tomato; general use may occur for any crop on this label where physiology allows greenhouse or shadehouse culture. Consequently; injuries arising from the use of KOCIDE® 3000 on these types of greenhouse and shadehouse crops are the responsibility of the user.

Minimum Recommended Spray Volume (Gallons Per Acre)

When Applying KOCIDE® 3000

	Aerial	Ground	
		Dilute	Concentrate
Citrus	10	800	100*
Conifers	10	100	30
Field Crops	3	20	---
Small Fruits	5	150	50
Tree Crops	10	400	50
Vegetables	3	20	---
Vines	5	150	50
Miscellaneous	10	150	50

* Pesticide application equipment such as "Curtec" or other similar sprayers which are capable of obtaining thorough coverage at low volumes may be used at as low as 20 gallons per acre of spray volume.

The following specific instructions are based on general application procedures. The recommendations of the State Agricultural Extension Service should be closely followed as to timing, frequency and number of sprays per season.

FROST INJURY PROTECTION

BACTERIAL ICE NUCLEATION INHIBITOR

Application of KOCIDE® 3000 made to all crops listed on this label at rates and stages of growth indicated on this label, at least 24 hours prior to anticipated frost conditions, will afford control of ice nucleating bacteria (*Pseudomonas syringae*, *Erwinia herbicola*, and *Pseudomonas fluorescens*) and may therefore provide some protection against light frost. Not recommended for those geographical areas where weather conditions favor severe frost.

CITRUS

DuPont™ KOCIDE® 3000 may be mixed with dry foliar nutritionals (micronutrients) to create "Shot Bag" mixes to meet the various nutritional requirements of citrus and provide disease protection as described on this label. KOCIDE® 3000 per acre rates in these mixes must not exceed the maximum recommended labeled rates for disease control.

Adding foliar nutritionals or other products to spray mixtures containing KOCIDE® 3000 and applying to citrus during the post bloom period when young fruit are present may result in spray burn.

Disease	Rate/Acre	Use Instructions
Algal Spot, Melanose, Scab	1.75-5 lbs.	Apply as pre-bloom and post-bloom sprays. Use the higher rates when conditions favor disease.
Greasy Spot, Pink Pitting	0.75-2.5 lbs.	Apply in summer on expanded new flush. Repeat on subsequent flushes where disease pressure is severe. Use the higher rates when conditions favor disease.
Alternaria Brown Spot	1.75-3.5 lbs.	On susceptible varieties apply when the first spring flush appears and each flush thereafter. Application to fruit should start after two thirds of the petals have fallen and be repeated on a 21 day schedule or as needed. Use the higher rates when conditions favor disease.
Phytophthora Brown Rot, Septoria Spot	1.75-3.5 lbs.	Begin application in fall before or just after the first rain and continue as needed. For Brown Rot only, apply to skirts of trees to a height of at least 4 feet. For control of Septoria Spot or where fruit have already been infected with Brown Rot, apply to entire tree. Apply also to bare ground one foot beyond skirt. Use the higher rates when conditions favor disease. NOTE: In California, in areas subject to copper injury, add 1/3 to 1 pound of high quality lime per pound of KOCIDE® 3000 .
Phytophthora Foot Rot	0.5 lb.	Mix with 1 quart of water, "Tre-Hold" or latex paint. Paint trunks of trees from the soil surface to the lowest scaffold limbs. Apply in May prior to summer rains and/or in the fall prior to wrapping trees for freeze protection. Treatment serves as protection for up to 1 year, but does not cure existing infections. NOTE: Areas where microjet or low volume irrigation hit the tree trunk may require retreatment due to wash off.
Citrus Canker (suppression)	2-5 lbs.	Spray flushes 7 to 14 days after shoots begin to grow. Young fruit may require an additional application. Number and timing of applications will be dependent upon disease pressure. Under heavy pressure, each flush of new growth should be sprayed.

NOTE: Phytotoxicity may occur on young tender flush when KOCIDE® 3000 is applied to citrus seedlings grown in greenhouses or shadehouses.

CITRUS
Field Nursery Grown

To control Melanose, Scab, Pink Pitting, Greasy Spot, Brown Rot and for suppression of Citrus Canker, apply 1.75 to 3.5 pounds of KOCIDE® 3000 per acre. Apply KOCIDE® 3000 at 28 day intervals or as needed depending on disease severity.

FIELD CROPS

Crop	Disease	Rate/Acre	Use Instructions
Alfalfa	Cercospora Leaf Spot, Leptosphaerulina Leaf Spot.	0.75 lbs	Apply 10 to 14 days before each harvest or earlier if disease threatens. NOTE: Spray injury may occur with sensitive varieties such as Lahontan.
Corn (Field Corn, Popcorn, Sweet Corn)	Bacterial Stalk Rot	0.5-1.75 lbs.	Begin treatment when disease first appears and repeat every 7 to 10 days or as needed. Use the higher rates and shorter spray intervals when conditions favor disease.
Peanut	Cercospora Leaf Spot	0.75-1.25 lbs.	Begin spraying at 35 to 40 days after planting or when disease symptoms first appear and repeat at 10 to 14 day intervals or as needed. Reduce sprays to 7 day intervals during humid weather. Use the higher rates when conditions favor disease. Flowable sulfur may be added.
Potato	Early Blight, Late Blight	0.5-1.75 lbs.	Apply 0.5 to 1.75 lbs. at 7 to 10 day intervals or as needed starting when plants are 2 to 6 inches high in locations where disease is light. Apply up to 1.75 pounds per acre when disease is more severe. Under conditions of severe disease, control with DuPont™ KOCIDE® 3000 will be improved by tank mixing with other compatible fungicides registered for use on potatoes. Read and follow all label instructions of tank mix partners.
Sugar Beet	Cercospora Leaf Spot	0.75-2.0 lbs.	Begin applications when conditions first favor disease development and repeat at 10 to 14 day intervals or as needed. Use the higher rates when conditions favor disease. Addition of a spreader/sticker is recommended.
Wheat, Barley, Oats	Helminthosporium Spot Blotch, Septoria Leaf Blotch	0.5-0.75 lbs.	Make first application at early heading and follow with second spray 10 days later. Use the higher rates when conditions favor disease.

SMALL FRUITS

Crop	Disease	Rate/Acre	Use Instructions
Blackberry (Aurora, Boysen, Cascade, Chehalem, Logan, Marion, Santiam, Thornless Evergreen)	Anthracnose, Cane Spot, Leaf Spot, Pseudomonas Blight, Purple Blotch, Yellow Rust	1.75 lbs.	Make fall application after harvest. Apply delayed dormant spray after pruning/training in the spring. If needed, agricultural-type spray oil may be added.
	Anthracnose, Cane Spot, Leaf Spot, Purple Blotch, Yellow Rust	0.75 lbs.	Apply when leaf buds begin to open and repeat when flower buds show white. If needed, agricultural-type spray oil may be added. NOTE: Crop injury may occur if applied to foliage under certain environmental conditions such as hot or prolonged moist periods. Discontinue applications if signs of crop injury appear.
Blueberry	Bacterial Canker	1.75-3.5 lbs.	Make first application before fall rains and a second application 4 weeks later. Use the higher rates when conditions favor disease.
	Fruit Rot, Phomopsis Twig Blight	1.0-2.25 lbs.	Dormant Application: Begin applications when bloom buds begin to swell. Make additional applications at 10 to 14 day intervals or as needed before blooms open.
Cranberry	Fruit Rot	3.5 lbs.	Make first application in late bloom. Apply one or two additional applications at 10 to 14 day intervals or as needed depending on disease severity.
	Rose Bloom	3.5 lbs.	Apply three sprays on 10 to 14 day schedule or as needed as soon as symptoms are observed.
	Bacterial Stem Canker	3.5 lbs.	Apply post harvest and again in spring at bud swell. Apply one or two additional applications at 10 to 14 day intervals or as needed depending on disease severity.
	Leaf Blight, Red Leaf Spot, Stem Blight, Tip Blight (<i>Monilinia</i>)	3.5 lbs.	Apply delayed dormant spray in the spring. Repeat at 10 to 14 day intervals or as needed through pre-bloom.
Currant, Gooseberry	Anthracnose, Leaf Spot	4.25 lbs.	Make initial application after first leaves have expanded. Continue on a 10 to 14 day schedule or as needed during wet conditions in the spring. Make an additional application after harvest.
Raspberry	Anthracnose, Cane Spot, Leaf Spot, Pseudomonas Blight, Purple Blotch, Yellow Rust	1.75 lbs.	Make fall application after harvest. Apply delayed dormant spray after training in the spring. If needed, agricultural-type spray oil may be added.
	Anthracnose, Cane Spot, Leaf Spot, Purple Blotch, Yellow Rust	0.75 lbs.	Apply when leaf buds begin to open and repeat when flower buds show white. If needed, agricultural-type spray oil may be added. NOTE: Crop injury may occur if applied to foliage under certain environmental conditions such as hot or prolonged moist periods. Discontinue applications if signs of crop injury appear.
Strawberry	Angular Leaf Spot (<i>Xanthomonas</i>), Leaf Blight, Leaf Scorch, Leaf Spot	0.75-1.25 lbs.	Begin application when plants are established and continue on a weekly schedule throughout the season. Apply in at least 20 gallons of water. Use the higher rates when conditions favor disease. NOTE: Discontinue applications if signs of crop injury appear.

TREE CROPS

Crop	Disease	Rate/Acre	Use Instructions
Almond, Apricot, Cherry, Plum, Prune	Bacterial Blast (<i>Pseudomonas</i>), Bacterial Canker, Coryneum Blight (Shot Hole)	3.5-7.0 lbs.	Make first application before fall rains and a second at late dormant. Use the higher rates when conditions favor disease. If needed, agricultural-type spray oil may be added. For Cherries: Where disease is severe, an additional application shortly after harvest may be required. Almond Only: For bacterial blast control in sprinkler irrigated orchards or where disease is severe, apply 0.5 pounds per acre post-bloom at 2 week intervals or as needed or just before sprinkling. NOTE: Foliar injury may occur from post-bloom sprays on almonds, especially on NePlus varieties.
	Blossom Brown Rot, Coryneum Blight (Shot Hole)	2.5-3.5 lbs. (Almond) 3.5-5.0 lbs. (All Others)	Apply during early bloom. Do not apply after full bloom or injury may occur. Use the higher rates when rainfall is heavy and disease pressure is high.
	Black Knot (Plum)	1.75-3.5 lbs	Make an application at bud swell up to early bloom for early season disease suppression. Apply before full bloom. Use the higher rates when rainfall is heavy and disease pressure is high. NOTE: To avoid plant injury, do not use after full bloom.
	Cherry Leaf Spot (Sour Cherries Only)	2.25-3.5 lbs.	Apply at petal fall as well as 1 to 2 times after petal fall. Use the lower rates where disease infection is light and use the higher rates for a dormant application or where disease infection is moderate to heavy. Do not apply to sweet cherry or the English Morello variety as severe injury will result. The addition of 1 to 3 pounds of hydrated lime per pound of DuPont™ KOCIDE® 3000 may reduce crop injury. NOTE: Moderate to severe injury such as leaf spotting and defoliation may occur from post-bloom applications.
Apple	Anthracnose, Blossom Blast, European Canker (<i>Nectria</i>), Shoot Blast (<i>Pseudomonas</i>)	5.25-7.0 lbs.	Apply before fall rains. Use the higher rates when conditions favor disease. NOTE: Use on yellow varieties may cause discoloration. To avoid discoloration, pick before spraying.
	Apple Scab, Fire Blight	3.5-7.0 lbs.	Make application between silver-tip and green-tip. Apply as a full cover spray for early season disease suppression. NOTE: Moderate to severe crop injury may occur from late application; discontinue use when green-tip reaches 1/2 inch.
	Apple Scab	0.75-1.75 lbs.	Extended spray schedule where fruit finish is not a concern: Continued applications may be made at 5 to 7 day intervals or as needed between 1/2 inch green-tip and first cover spray. NOTE: Moderate to severe crop injury may result from this extended spray schedule. It is not intended for fresh market apples or for apples where fruit finish is a concern as it is likely to cause fruit russetting. The addition of 1 to 3 pounds of hydrated lime per pound of KOCIDE® 3000 may reduce crop injury.
	Fire Blight	0.5-0.75 lbs.	
	Collar Rot, Crown Rot	1.75 lbs.	Mix in 100 gallons of water. Apply 4 gallons of suspension as a drench on the lower trunk area of each tree. Apply in early spring or in fall after harvest for best results. Do not apply to foliage or fruit. NOTE: Do not use if soil pH is below 5.5 since copper toxicity may result.

TREE CROPS (cont'd)

Crop	Disease	Rate/Acre	Use Instructions
Avocado	Anthraxnose, Blotch, Scab	3.5-5.25 lbs.	Apply when bloom buds begin to swell and continue application at monthly intervals for five to six applications. Use the higher rates when conditions favor disease.
Banana	Sigatoka (Black and Yellow)	0.75 lbs.	Apply by air in 3 gallons of water. If needed, agricultural-type spray oil may be added. Apply on a 14 day schedule or as needed throughout the wet season. Apply at 21 day intervals or as needed during dry periods.
	Black Pitting	1.75 lbs.	Mix in 100 gallons of water. Apply to the fruit stem and the basal portion of the leaf crown. Apply during the first and second weeks after fruit emergence.
Cacao	Black Pod	0.75-3.75 lbs.	Begin applications at the start of the rainy season and continue while infection conditions persist. Apply 0.5 to 2.0 lbs. at 14 to 21 day intervals or as needed depending on disease severity. For drier areas, make two to four applications using 2.5 to 3.75 pounds per acre according to disease incidence and planting density.
Coffee	Coffee Berry Disease (<i>Colletotrichum coffeanum</i>)	2.5-3.5 lbs.	Apply first spray after flowering and before onset of long rains and then at 21 to 28 day intervals or as needed until picking. Use the higher rates when conditions favor disease.
	Bacterial Blight (<i>Pseudomonas syringae</i>)	2.5-3.5 lbs.	Begin spray program before the onset of long rainy periods and continue throughout the rainy season at 14 to 21 day intervals or as needed. The critical time for spraying to control this disease is just before, during and after flowering(s), especially when coinciding with wet weather. Use the higher rates when rainfall is heavy and disease pressure is high.
	Leaf Rust (<i>Hemileia vastatrix</i>)	0.75-1.75 lbs.	Apply before the onset of rain and then at 21 day intervals or as needed while the rains continue. Use the higher rates when rainfall is heavy and disease pressure is high.
	Iron Spot (<i>Cercospora coffeicola</i>), Pink Disease (<i>Corticium salmonicolor</i>)	0.75 lbs.	Use concentrate or dilute spray. Begin treatment at the start of wet season and continue at monthly intervals for three applications.
Filbert	Bacterial Blight	7.0-10.5 lbs.	Apply as a post harvest spray. In seasons of heavy rainfall, apply a second spray when three-fourths of the leaves have dropped. Use the higher rates when rainfall is heavy and disease pressure is high. If needed, agricultural-type spray oil may be added.
	Eastern Filbert Blight	7.0-10.5 lbs.	Apply as a dilute spray in adequate water for thorough coverage. Make applications starting at bud swell to bud break and continue at 2-week intervals or as needed until early May. Thorough coverage is essential. Use the higher rates when rainfall is heavy and disease pressure is high. If needed, agricultural-type spray oil or sticking agent may be added.
Mango	Anthraxnose	2-4 lbs.	Apply monthly after fruit set until harvest. Use the higher rates when rainfall is heavy and disease pressure is high.
Olive	Olive Knot, Peacock Spot	3.5-5.25 lbs.	Make first application before winter rains begin. A second application in early spring should be made if disease is severe. Apply the higher rates for heavy disease pressure or when conditions favor disease development.

TREE CROPS (cont'd)

Crop	Disease	Rate/Acre	Use Instructions
Peach, Nectarine	Bacterial Blast (<i>Pseudomonas</i>), Bacterial Canker, Bacterial Spot (<i>Xanthomonas</i>), Coryneum Blight (Shot Hole), Leaf Curl	3.5-7.0 lbs.	Make first application before fall rains and a second at late dormant. For peach leaf curl, late dormant application must be made before leaf buds swell. Use the higher rates when rainfall is heavy and disease pressure is high. If needed, agricultural-type spray oil may be added.
	Blossom Brown Rot, Coryneum Blight (Shot Hole), Leaf Curl	3.5-5.25 lbs.	Full cover spray at pink bud. Use the higher rates when conditions favor disease.
	Bacterial Spot	0.5 lb.	Post-bloom application applied at first and second cover sprays. NOTE: Do not spray 3 weeks prior to harvest. Use only recommended rates. Spotting of leaves and defoliation may occur from use in cover sprays.
Pear	Fire Blight	0.5 lb.	Apply at 5 day intervals or as needed throughout the bloom period. NOTE: Russetting may occur in copper sensitive varieties. Excessive dosages may cause fruit russet on any variety.
	Blossom Blast (<i>Pseudomonas</i>)	5.25-7.0 lbs.	Apply before fall rains and again during dormancy before spring growth starts. Use the higher rates when disease pressure is high or when conditions favor disease development.
Pecan	Kernel Rot, Shuck Rot (<i>Phytophthora cactorum</i>), Zonate Leaf Spot (<i>Cristulariella pyramidalis</i>)	0.75-1.75 lbs.	For suppression, apply in sufficient water to ensure complete spray coverage at 2 to 4 week intervals or as needed, starting at kernel growth and continue until shucks open. Use the higher rates and shorter spray intervals if frequent rainfall occurs.
	Ball Moss, Spanish Moss	2.5-3.5 lbs.	Apply in 100 gallons of water in the spring when ball moss is actively growing, using 1 1/2 gallons of spray per foot of tree height. Make sure to wet ball moss tufts thoroughly. The addition of a non-ionic surfactant will improve control. A second application may be required after 12 months.
Pistachio	Botryosphaeria Panicle and Shoot Blight, Botrytis Blight, Late Blight (<i>Alternaria alternata</i>), Septoria Leaf Blight	1.75-3.5 lbs.	Make initial application at bud swell and repeat on a 14 to 28 day schedule or as needed. If disease conditions are severe, use the higher rates and shorter spray intervals.
Quince	Fire Blight	0.5 lb.	Apply at 5 day intervals or as needed throughout the bloom period. Apply in adequate water for thorough coverage.
Walnut	Walnut Blight	3.5-5.25 lbs.	Apply first spray at early pre-bloom prior to or when catkins are partially expanded. Make additional applications during bloom and early nutlet stage or as needed when frequent rainfall or extended periods of moisture occur. Thorough coverage of catkins, leaves and nutlets is essential for effective control. NOTE: Adequate control may not be obtained when copper tolerant species of <i>Xanthomonas</i> bacteria are present.

VEGETABLES

Crop	Disease	Rate/Acre	Use Instructions
Bean (Dry, Green)	Brown Spot, Common Blight, Halo Blight	0.5-1.25 lbs	For protective sprays, make first application when plants are 6 inches high; repeat on a 7 to 14 day schedule or as needed depending on environmental conditions. Use the higher rates for more severe disease.
Beet (Table Beet, Beet Greens)	Cercospora Leaf Spot	0.75-2.0 lbs.	Begin applications when conditions first favor disease development and repeat at 10 to 14 day intervals or as needed. Use the higher rates when conditions favor disease.
Carrot	Alternaria Leaf Spot, Cercospora Leaf Spot	0.75 lbs.	Begin applications when disease first threatens and repeat at 7 to 14 day intervals or as needed depending on disease severity.
Celery, Celeriac	Bacterial Blight, Cercospora Early Blight, Septoria Late Blight	0.75 lbs.	Begin applications as soon as plants are first established in the field, repeating at 5 to 7 day intervals or as needed depending on disease severity and environmental conditions.
Crucifers (Broccoli, Brussels Sprout, Cabbage, Cauliflower, Collard Greens, Mustard Greens, Turnip Greens)	Black Leaf Spot (<i>Alternaria</i>), Black Rot (<i>Xanthomonas</i>), Downy Mildew	0.5-0.75 lbs.	Begin application after transplants are set in the field, or shortly after emergence of field seeded crops or when conditions favor disease development. Apply at 7 to 10 day intervals or as needed. Use the higher rates when conditions favor disease. NOTE: Reddening of older leaves may occur on broccoli and a flecking of wrapper leaves may occur on cabbage.
Cucurbits (Cantaloupe, Cucumber, Honeydew, Muskmelon, Pumpkin, Squash, Watermelon)	Alternaria Leaf Spot, Angular Leaf Spot, Anthracnose, Downy Mildew, Gummy Stem Blight, Powdery Mildew, Watermelon Bacterial Fruit Blotch (suppression)	0.5-1.25 lbs.	Begin applications prior to disease development and continue while conditions are favorable for disease development. Repeat at 5 to 7 day intervals or as needed. Use the higher rates when conditions favor disease. NOTE: Crop injury may occur from application at higher rates and shorter intervals. Discontinue use if injury occurs.
Eggplant	Alternaria Blight, Anthracnose, Phomopsis	0.75 lbs.	Begin applications prior to development of disease symptoms. Repeat sprays at 7 to 10 day intervals or as needed depending on disease severity.
Okra	Anthracnose, Bacterial Leaf Spot, Leaf Spots, Pod Spot, Powdery Mildew	0.75-1.75 lbs.	Begin treatment when disease first threatens and repeat every 5 to 10 days or as needed depending on disease severity. Use the higher rates and shorter spray intervals when conditions favor disease.
Onion, Garlic	Bacterial Blight, Downy Mildew, Purple Blotch	0.75 lbs.	Begin when plants are 4 to 6 inches high and repeat at 7 to 10 day intervals or as needed depending on disease severity. Can cause phytotoxicity to leaves.
Pea	Powdery Mildew	0.5-1.25 lbs.	Begin applications when disease symptoms first appear and repeat at weekly intervals or as needed. Use the higher rates when conditions favor disease.
Pepper	Anthracnose, Bacterial Spot, Cercospora Leaf Spot	0.75-1.25 lbs.	Begin applications when conditions first favor disease development and repeat at 7 to 10 day intervals or as needed depending on disease severity. Use the higher rates when conditions favor disease.
Spinach	Anthracnose, Blue Mold, Cercospora Leaf Spot, White Rust	0.75-1.25 lbs.	Begin application when disease first appears or when conditions favor disease development. Repeat at 7 to 10 day intervals or as needed. Use the higher rates when conditions favor disease. NOTE: Flecking may occur on spinach leaves.
Tomato	Anthracnose, Bacterial Speck, Bacterial Spot, Early Blight, Gray Leaf Mold, Late Blight, Septoria Leaf Spot	0.75-1.75 lbs.	Begin applications when disease first threatens and repeat at 5 to 10 day intervals or as needed depending on disease severity. Use the higher rates when conditions favor disease.

VEGETABLES (cont'd)

Crop	Disease	Rate/Acre	Use Instructions
Watercress	Cercospora Leaf Spot	0.75 lbs.	Begin applications when plants are first established in the field, repeating at 7 to 14 day intervals or as needed depending on disease severity. Do not exceed four applications per crop. Apply using ground spray equipment at no less than 50 gallons of spray solution per acre.

VINES

Crop	Disease	Rate/Acre	Use Instructions
Grape	Black Rot, Downy Mildew, Phomopsis, Powdery Mildew	0.75-1.75 lbs.	Begin applications at bud break with subsequent applications throughout the season depending on disease severity. Use the higher rates when conditions favor disease. NOTE: Foliage injury may occur on copper sensitive varieties such as Concord, Delaware, Niagara and Rosette. Either test for sensitivity or add 1 to 3 pounds of hydrated lime per pound of DuPont™ KOCIDE® 3000.
Hops	Downy Mildew	0.75 lbs.	Make crown treatment after pruning, but before training. After training, additional treatments are needed at about 10 day intervals NOTE: Discontinue use two weeks before harvest.
Kiwi	<i>Erwinia herbicola</i> , <i>Pseudomonas fluorescens</i> , <i>Pseudomonas syringae</i>	3.5 lbs.	Apply in 200 gallons of water per acre. Make applications on a monthly basis. A maximum of three applications may be made.

MISCELLANEOUS

Crop	Disease	Rate/Acre	Use Instructions
Atemoya	Anthracoise	1.25-2.0 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates for severe disease.
Carambola	Anthracoise	2.5-3.5 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates for severe disease.
Chives	Downy Mildew	0.75 lbs	Begin applications when plants are established in the field. Repeat applications every 7 to 10 days or as needed depending on disease conditions.
Dill	Phoma Leaf Spot, Rhizoctonia Foliage Blight	0.75-1.25 lbs.	Begin applications when plants are first established in the field and repeat at 7 to 10 day intervals or as needed depending upon disease severity and environmental conditions. Use the higher rates when conditions favor disease.
Ginseng	Alternaria Leaf Blight, Stem Blight	1.0-1.75 lbs.	Use as a tank mix with 2 pounds "Rovral" 50W in 100 gallons of water. Use in accordance with the most restrictive of label limitations and precautions. No label dosage rates should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing. Begin KOCIDE® 3000-"Rovral" applications as soon as plants have emerged in spring. Applications should be repeated every 7 days or as needed until plants become dormant in fall. Apply fungicides at least 8 hours before rain. Use of a spreader-sticker or sticker is advised. NOTE: Alternaria Leaf and Stem Blight is most severe in humid conditions such as those found in the dense canopies of 2 to 4 year old Ginseng. It is very important that the stems be thoroughly covered with fungicide; therefore, use a spray apparatus which distributes the fungicide throughout the canopy.

MISCELLANEOUS (cont'd)

Crop	Disease	Rate/Acre	Use Instructions
Guava	Anthracnose, Red Algae	1.25-2.0 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates for severe disease.
Litchi	Anthracnose	1.25-2.0 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates for severe disease.
Macadamia	Anthracnose	2.5-4.0 lbs.	Initiate sprays at first sign of flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates for severe disease.
	Phytophthora Blight (<i>P. capsici</i>), Raceme Blight (<i>Botrytis cinerea</i>)	1.25-2.4 lbs.	Apply during raceme development and bloom periods. Apply in sufficient water for thorough coverage. Use the higher rates when conditions favor disease.
Mamey Sapote	Algal Leaf Spot, Anthracnose	2.5-3.5 lbs.	Apply when conditions favor disease development. Repeat on 14 to 30 day schedule or as needed as disease severity and environmental conditions dictate. Use the higher rates when conditions favor disease.
Papaya	Anthracnose	1.75-4.25 lbs.	Apply before disease appears. Apply at 10 to 14 day intervals under light disease pressure and 5 to 7 day intervals or as needed under heavy disease pressure. The addition of an approved spreader is desirable. Use the higher rates when conditions favor disease.
Parsley	Bacterial Blight (<i>Pseudomonas sp.</i>)	1.25 lbs.	Begin applications when plants are first established in the field and repeat at 5 to 7 days intervals or as needed depending on disease severity and environmental conditions.
Passion Fruit	Anthracnose	2.5-4.0 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates when conditions favor disease.
Sugar Apple (<i>Annona</i>)	Anthracnose	5.25-7.75 lbs.	Make initial application just before flowering and repeat on a weekly schedule until just before harvest. Apply in sufficient water for thorough coverage. Use the higher rates when conditions favor disease.
Sycamore	Anthracnose	0.75-1.25 lbs.	Apply as a full cover spray in 100 gallons of water or sufficient volume for thorough coverage. Make first application at bud crack and second application 7 to 10 days later at 10% leaf expansion. Use the higher rates when conditions favor disease.

CONIFERS

For use on conifers, including Douglas Fir, Fir, Juniper, Leyland Cypress, Pine and Spruce, in Christmas tree plantings, forest stands and silviculture nurseries.

For control of foliar diseases, apply DuPont™ KOCIDE® 3000 as a thorough cover spray at rates ranging from 0.75 to 1.75 pounds per acre. Begin applications in the spring at the initiation of new growth and repeat at 2 to 4 week intervals or as needed. Use the higher rates when disease pressure is severe or when environmental conditions favor disease development.

KOCIDE® 3000 is recommended for use on the listed conifers for control of the following diseases:

Crop	Scientific Name	Disease
Douglas Fir	<i>Pseudotsuga menziesii</i>	Rhabdocline Needlecast
Fir	<i>Abies spp.</i>	Needlecasts
Juniper	<i>Juniperus spp.</i>	Anthracnose, Phomopsis Twig Dieback
Leyland Cypress	<i>X Cupressocyparis leylandii</i>	Cercospora Needle Blight
Pine	<i>Pinus spp.</i>	Needlecasts
Spruce	<i>Picea spp.</i>	Needlecasts

Lichens: To control lichens on any of the conifers above, apply 3.5 pounds of KOCIDE® 3000 per acre as a dormant application before new growth emerges in the spring. The addition of a non-ionic surfactant will improve control. A second application may be required after 12 months.

NOTE: Do not buffer or combine with emulsifiable concentrate insecticides.

GREENHOUSE AND SHADEHOUSE CROPS

Notice to User: KOCIDE® 3000 may be used in greenhouses and shadehouses to control diseases on crops which appear on this label, and specific instructions have been developed for the crops listed. The grower should bear in mind that the sensitivity of crops grown in greenhouses and shadehouses differs greatly from crops grown under field conditions. Neither the manufacturer nor seller has determined whether or not KOCIDE® 3000 can be used safely on all greenhouse and shadehouse grown crops. The user should determine if KOCIDE® 3000 can be used safely prior to commercial use. In a small area, apply the recommended rates to the plants in question, i.e., foliage, fruit, etc., and observe for 7 to 10 days for symptoms of phytotoxicity prior to commercial use. Consequently, injuries arising from the use of KOCIDE® 3000 on these types of greenhouse and shadehouse crops are the responsibility of the user.

Apply KOCIDE® 3000 according to specific rates given for those crops in pounds per acre. **One level tablespoon of KOCIDE® 3000 per 1,000 square feet is equivalent to 0.5 pound per acre.** KOCIDE® 3000 should be applied in adequate water for thorough coverage of plant parts. Begin application at first sign of disease and repeat at 7 to 14 day intervals or as needed; use shorter spray intervals during periods when severe disease conditions persist.

NOTE: Phytotoxicity may occur on young tender flush when KOCIDE® 3000 is applied to citrus seedlings grown in greenhouses or shadehouses.

Crop	Disease	Rate per 1000 Sq Ft	Use Instructions
Citrus (Non-Bearing Nursery)	Brown Rot, Citrus Canker, Greasy Spot, Melanose, Pink Pitting, Scab	1 1/2 TBSP	Begin applications when disease first threatens. Repeat at 30 day intervals or as needed depending on disease severity.
Cucumber	Angular Leaf Spot, Downy Mildew	1/2 - 1 1/2 TBSP	Apply weekly when plants begin to vine. Use the higher rates when conditions favor disease.
Eggplant	Alternaria Blight, Anthracnose, Phomopsis	1/2 TBSP	Begin applications prior to development of disease symptoms. Repeat sprays at 7 to 10 day intervals or as needed depending on disease severity.
Pepper	Bacterial Spot	1/2 - 1 1/2 TBSP	Begin applications when conditions first favor disease development and repeat at 5 to 10 day intervals or as needed depending on disease severity. Use the higher rates when conditions favor disease.
Tomato	Anthracnose, Bacterial Speck, Bacterial Spot, Early Blight, Gray Leaf Mold, Late Blight, Septoria Leaf Spot	1/2 - 1 1/2 TBSP	Begin applications when disease first threatens and repeat at 5 to 10 day intervals or as needed depending on disease severity. Use the higher rates when conditions favor disease.

GENERAL CHEMIGATION INSTRUCTIONS

Do not apply this product through any irrigation (chemigation) system using aluminum parts or components as damage to the system may occur. Such application is prohibited regardless of whether the irrigation system is flushed with water after use of this product.

Apply this product only through one or more of the following types of systems: sprinkler, including center pivot, lateral move, traveler, big gun, or plastic pipe solid set system(s) which contain no aluminum parts or components. Do not apply this product through any other type of irrigation system.

Crop injury, lack of effectiveness or illegal pesticide residues in the crop can result from nonuniform distribution of treated water.

If you have questions about calibration, you should contact State Extension Service specialists, equipment manufacturers or other experts.

Do not connect an irrigation system (including greenhouse systems) used for pesticide application to a public water system unless the pesticide label-prescribed safety devices for public water systems are in place.

A person knowledgeable of the chemigation system and responsible for its operation or under the supervision of the responsible person, shall shut the system down and make necessary adjustments should the need arise.

Shut off injection equipment after treatment and continue to operate irrigation system until DuPont™ KOCIDE® 3000 has been cleared from the last sprinkler head.

CHEMIGATION SYSTEMS CONNECTED TO PUBLIC WATER SYSTEMS

Public water system means a system for the provision to the public of piped water for human consumption if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

Chemigation systems connected to public water systems must contain a functional, reduced-pressure zone, backflow preventer (RPZ) or the functional equivalent in the water supply line upstream from the point of pesticide introduction. As an option to the RPZ, the water from the public water system should be discharged into the reservoir tank prior to pesticide introduction. There shall be a complete physical break (air gap) between the outlet end of the fill pipe and the top or overflow rim of the reservoir tank of at least twice the inside diameter of the fill pipe.

The pesticide injection pipeline must contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.

The pesticide injection pipeline must contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.

The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops, or in cases where there is no water pump, when the water pressure decreases to the point where pesticide distribution is adversely affected.

Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.

Do not apply when wind speed favors drift beyond the area intended for treatment.

NOTE: It must be determined if proper application equipment is available and if waste associated with its use can be properly handled. Agricultural chemicals are often reactive with the materials used in the construction of application equipment, such as aluminum, rubber and some synthetic materials. This factor should be taken into consideration when selecting proper application equipment. It is necessary that all application equipment be thoroughly flushed with clean water after each day's use.

When mixing, fill the nurse tank half full with water. Add KOCIDE® 3000 slowly to tank while hydraulic or mechanical agitation is operating and continue filling with water. Stickers, spreaders, insecticides, nutrients, etc. should be added last. If compatibility is in question, use the Compatibility Jar Test before mixing a whole tank. Because of the wide variety of possible combinations which can be encountered, observe all precautions and limitations on the labels of all products used in mixtures. Agitation of the mixture in the nurse tank is recommended.

KOCIDE® 3000 should be added through a traveling irrigation system continuously or at the last 30 minutes of solid set irrigation systems. Shut off injection equipment after treatment and continue to operate irrigation system until KOCIDE® 3000 has been cleared from the last sprinkler head.

SPRINKLER CHEMIGATION

The system must contain a functional check valve, vacuum relief valve, and low pressure drain appropriately located on the irrigation pipeline to prevent water source contamination from backflow.

The pesticide injection pipeline must also contain a functional, automatic, quick-closing check valve to prevent the flow of fluid back toward the injection pump.

The pesticide injection pipeline must also contain a functional, normally closed, solenoid-operated valve located on the intake side of the injection pump and connected to the system interlock to prevent fluid from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down.

The system must contain functional interlocking controls to automatically shut off the pesticide injection pump when the water pump motor stops.

The irrigation line or water pump must include a functional pressure switch which will stop the water pump motor when

the water pressure decreases to the point where pesticide distribution is adversely affected.

Systems must use a metering pump, such as a positive displacement injection pump (e.g., diaphragm pump) effectively designed and constructed of materials that are compatible with pesticides and capable of being fitted with a system interlock.

Do not apply when wind speed favors drift beyond the area intended for treatment.

NOTE: It must be determined if proper application equipment is available and if waste associated with its use can be properly handled. Agricultural chemicals are often reactive with the materials used in the construction of application equipment, such as aluminum, rubber and some synthetic materials. This factor should be taken into consideration when selecting proper application equipment. It is necessary that all application equipment be thoroughly flushed with clean water after each day's use.

When mixing, fill the nurse tank half full with water. Add DuPont™ KOCIDE® 3000 slowly to tank while hydraulic or mechanical agitation is operating and continue filling with water. Stickers, spreaders, insecticides, nutrients, etc. should be added last. If compatibility is in question, use the Compatibility Jar Test before mixing a whole tank. Because of the wide variety of possible combinations which can be encountered, observe all precautions and limitations on the labels of all products used in mixtures. Agitation of the mixture in the nurse tank is recommended.

KOCIDE® 3000 should be added through a traveling irrigation system continuously or at the last 30 minutes of solid set irrigation systems. Shut off injection equipment after treatment and continue to operate irrigation system until KOCIDE® 3000 has been cleared from the last sprinkler head.

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STORAGE AND DISPOSAL

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

PESTICIDE STORAGE: Store in a cool, dry place.

PESTICIDE DISPOSAL: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

CONTAINER DISPOSAL: Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill, or by incineration, or if allowed by State and local authorities, by burning. If burned, stay out of smoke.

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It is impossible to eliminate all risks associated with the use of this product. Such risks arise from weather conditions, soil factors, off target movement, unconventional farming techniques, presence of other materials, the manner of use or application, or other unknown factors, all of which are beyond the control of DuPont. These risks can cause: ineffectiveness of the product, crop injury, or injury to non-target crops or plants.

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



OFFICE OF PREVENTION,
PESTICIDES, AND TOXIC SUBSTANCES

DATE: June 29, 2006

ACTION MEMORANDUM

SUBJECT: Reassessment of 3 Tolerance Exemptions for Ethylene Glycol, Diethylene Glycol, and the Combination of Diethylene Glycol Monomethyl Ether, Diethylene Glycol Monoethyl Ether, and Diethylene Glycol Monobutyl Ether

FROM: Pauline Wagner, Chief *Pauline Wagner 6/30/06*
Inert Ingredient Assessment Branch
Registration Division (7505P)

TO: Lois A. Rossi, Director
Registration Division (7505P)

RECEIVED
 ENVIRONMENTAL
 CHEMICAL PROGRAM
 2006 JUN 18 A 9:35

I. FQPA REASSESSMENT ACTION

Action: Reassessment of three inert exemptions from the requirement of a tolerance. The reassessment decision is to maintain the inert tolerance exemptions "as-is."

Table 1. Tolerance Exemptions Being Reassessed in this Document

Citation as it Appears in the CFR				CAS Registry Number Name
40 CFR 180*	Tolerance Exemption Expression	Limits	Uses	
920	Ethylene glycol	---	Antifreeze, deactivator for all pesticides used before crop emerges from soil and in herbicides before or after crop emerges	107-21-1 1,2-Ethanediol
920	Diethylene glycol	---	Deactivator, adjuvant for formulations used before crop emerges from soil and deactivator for formulations used before crop emerges from soil, stabilizer	111-46-6 Ethanol, 2,2'-oxybis- (9CI)
920	Diethylene glycol monomethyl ether	---	Deactivator for formulations used before crop emerges from soil, stabilizer	111-77-3 Ethanol, 2-(2-methoxyethoxy)-
	Diethylene glycol monoethyl ether			111-90-0 Ethanol, 2-(2-ethoxyethoxy)-
	Diethylene glycol monobutyl ether			112-34-5 Ethanol, 2-(2-butoxyethoxy)-

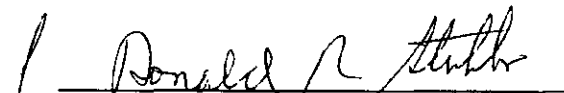
a. Residues listed in 40 CFR 180.920 are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only.

Use Summary: These chemicals have many uses and are also used as antifreeze and deicers, as solvents, humectants, as chemical intermediates in the synthesis of other chemicals, and as components of many products such as brake fluids, lubricants, inks, lacquers, and cosmetics.

List Reclassification Determination: The current List Classifications for ethylene glycol and diethylene glycol are List 3, and the current List Classifications for diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, and diethylene glycol monobutyl ether are List 2. Because EPA has determined that there is a reasonable certainty that no harm to any population subgroup will result from aggregate exposure to these chemicals when used as inert ingredients in pesticide formulations, the List Classification for these chemicals will change from List 2 and 3 to List 4B.

II. MANAGEMENT CONCURRENCE

I concur with the reassessment of one tolerance exemption for ethylene glycol (CAS 107-21-1), one tolerance exemption for diethylene glycol (CAS 111-46-6), and one tolerance exemption for the combination of diethylene glycol monomethyl ether (CAS 111-77-3), diethylene glycol monoethyl ether (CAS 111-90-0), and diethylene glycol monobutyl ether (CAS 112-34-5), and with the List reclassification determinations, as described above. I consider the three exemptions established in 40 CFR part 180.920 to be reassessed for purposes of FFDCA's section 408(q) as of the date of my signature, below. A Federal Register Notice regarding this tolerance exemption reassessment decision will be published in the near future.



Lois A. Rossi, Director
Registration Division

Date:

7/3/06

cc: Debbie Edwards, SRRD
Joe Nevola, SRRD



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

OFFICE OF PREVENTION,
PESTICIDES, AND TOXIC SUBSTANCES

June 30, 2006

MEMORANDUM

SUBJECT: Reassessment of Tolerance Exemptions for Ethylene Glycol, Diethylene Glycol, Diethylene Glycol Monomethyl Ether, Diethylene Glycol Monoethyl Ether, and Diethylene Glycol Monobutyl Ether

FROM: Kit Farwell, D.V.M.
Reregistration Branch 1
Health Effects Division (7509P)

Kit Farwell

TO: Pauline Wagner, Chief
Inert Ingredient Assessment Branch (IIAB)
Registration Division (7505P)

BACKGROUND

This assessment summarizes available information on the use, physical/chemical properties, toxicological effects, and exposure profile for ethylene glycol, diethylene glycol, diethylene glycol monomethyl ether, diethylene glycol monoethyl ether, and diethylene glycol monobutyl ether. The purpose of this document is to reassess the exemptions from the requirement of a tolerance for residues of these chemicals when used as inert ingredients in pesticide formulations as required under the Food Quality Protection Act (FQPA).

EXECUTIVE SUMMARY

This document evaluates ethylene glycol (EG), diethylene glycol (DG), diethylene glycol monomethyl ether (DGME), diethylene glycol monoethyl ether (DGEE), and diethylene glycol monobutyl ether (DGBE), pesticide inert ingredients for which an exemption from the requirement of a tolerance exists. There is one tolerance exemption for DG and one tolerance exemption for the combination of DGME, DGEE, and DGBE under 40 CFR 180.920, and both limit use of the chemicals to before the crop emerges from soil. EG has a tolerance exemption in 40 CFR 180.920 that limits use to before the crop emerges from soil and in herbicides before or after crop emerges.

These chemicals have many uses and are also used as antifreeze and deicers, as solvents, humectants, as chemical intermediates in the synthesis of other chemicals, and as components of many products such as brake fluids, lubricants, inks, lacquers, and cosmetics.

The acute toxicities of EG, DG, DGME, DGEE, and DGBE are low with oral LD₅₀ values > 5,000 mg/kg for all of the chemicals. Systemic toxicity from longer term oral exposure is also low: kidney toxicity generally occurring in the 1,000 – 6,000 mg/kg/day range, although mild kidney toxicity was reported at 300 mg/kg/day in an older rat study with DG. Microscopic liver lesions were seen with EG, thymus toxicity with DGME, and testicular toxicity was reported with DGME and DGEE, also at higher oral doses. Minor hematological effects were reported in several studies.

No systemic toxicity was noted in inhalation studies with DGME and DGEE. No toxicity after dermal exposure was reported in DGBE reproductive and neurotoxicity studies. Mild liver changes were reported after dermal exposure to DGME in guinea pigs at 200 mg/kg/day.

No treatment related neoplasms were found in a mouse carcinogenicity study with EG. Bladder tumors, mostly benign, occurred at 1,500 and 3,000 mg/kg/day in male rats treated with DG; these tumors were associated with irritation from bladder stones which occurred at those doses. Genetic toxicity studies with these chemicals were negative, except for chromosomal damage which occurred in a bone marrow assay with DG.

EG underwent a comprehensive review by NTP of potential human developmental and reproductive toxicity which concluded that “there is negligible concern of adverse developmental toxicity from EG at exposures below 125 mg/kg”. There was no evidence of reproductive toxicity from EG in lab animals. DG caused developmental toxicity in mice at 10,000 mg/kg/day and caused fetal/pup mortality in a reproductive mouse study 6,125 mg/kg/day. DGME caused decreased ossification at 600 mg/kg/day in a rat oral developmental study (NOAEL = 200 mg/kg/day) and at 250 mg/kg/day in a rabbit dermal developmental study (NOAEL = 50 mg/kg/day). Overall, there are no concerns for potential sensitivity of infants and children to these chemicals because developmental toxicity only occurred at doses much greater than that expected from use as inert ingredient.

Exposure to these chemicals as a result of use as an inert ingredient in pesticidal products is possible through the dietary (food and/or drinking water) or residential (dermal and inhalation) routes of exposure. The tolerance exemptions for DG, DGME, DGEE, and DGBE significantly limit the potential for exposure by only allowing applications before the crop emerges from soil. This typically equates to one application. EG’s tolerance exemption also limits applications to use before the crop emerges from soil, except in herbicides. EG, DG, DGME, DGEE, and DGBE all biodegrade quickly in soil and water, and bioconcentration in aquatic organisms is expected to be low. Considering the ready biodegradation and use limitations of these chemicals, dietary and residential exposures of concern are not anticipated.

The low exposure potential for these chemicals limits the potential for risk to human health. Taking into consideration all available information for these chemicals, it has been determined that there is a reasonable certainty that no harm to any population subgroup will result from aggregate exposure when considering exposure through dietary exposure and all other non-occupational sources for which there is reliable information. Therefore, it is recommended that the exemption from the requirement of a tolerance established for residues of EG, DG, DGME,

DGEE, and DGBE when used as inert ingredients in pesticide formulations applied to growing crops under 40 CFR part 180.920 can be considered reassessed as safe under section 408(q) of the FFDCA.

I. Introduction

This report provides a qualitative assessment for ethylene glycol (EG), diethylene glycol (DG), diethylene glycol monomethyl ether (DGME), diethylene glycol monoethyl ether (DGME), and diethylene glycol monobutyl ether (DGBE) when used as a pesticide inert ingredient with tolerance exemptions under 40 CFR 180.920. There is sufficient information to conduct this assessment.

II. Use Information

A. **Pesticides.** The tolerance exemptions for EG, DG, DGME, DGME, and DGBE when used as inert ingredients in pesticide formulations are shown in Table 1.

Table 1. Tolerance Exemptions Being Reassessed in this Document

40 CFR 180	Tolerance Exemption Expression	Limit	Uses	CAS Registry Number Name
920	Ethylene glycol	---	Antifreeze, deactivator for all pesticides used before crop emerges from soil and in herbicides before or after crop emerges	107-21-1 1,2-Ethanediol
920	Diethylene glycol	---	Deactivator, adjuvant for formulations used before crop emerges from soil and deactivator for formulations used before crop emerges from soil, stabilizer	111-46-6 Ethanol, 2,2'-oxybis- (9CI)
920	Diethylene glycol monomethyl ether	---	Deactivator for formulations used before crop emerges from soil, stabilizer	111-77-3 Ethanol, 2-(2-methoxyethoxy)-
	Diethylene glycol monoethyl ether			111-90-0 Ethanol, 2-(2-ethoxyethoxy)-stabilizer
	Diethylene glycol monobutyl ether			112-34-5 Ethanol, 2-(2-butoxyethoxy)-

a. Residues listed in 40 CFR 180.920 are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only.

B. Other Uses

EG is used as a de-icer and anti-icer, is a component in hydraulic brake fluid and inks, and is used as a solvent.

DG is used as a solvent and as a humectant in many products. It is used in brake fluids, lubricants, mold release agents and inks. It is used in the lacquer industry, in cosmetics, as an antifreeze solution for sprinkler systems; and as a lubricating and finishing agent for wool, worsted cotton, rayon, and silk. DG is an intermediate in the production of explosive diethylene glycol dinitrate.

DGME is used as a solvent; in varnish removers, cleaning solution, dye baths; brake fluid component; aviation fuel antiicing additive; solvent in paints, printing inks resins, waxes and dyes. DGME is used as a coupling agent for preparing miscible aqueous systems.

DGBE is used as a solvent and is used as a coupling solvent (in liquid cleaners, cutting fluids, textile auxiliaries). It is also used as a chemical intermediate in the synthesis of diethylene glycol dibutyl ether, diethylene glycol monobutyl ether acetate, and piperonyl butoxide.

DGEE is used as a solvent for dyes, nitrocellulose, and resins; mutual solvent for mineral-oil-soap and mineral-oil-sulfonated-oil mixtures; non-aqueous stains for wood, for setting the twist and conditioning yarns and cloth; textile printing, textile soaps, lacquers, organic synthesis; brake fluid diluent. It is also used as a chemical intermediate for the synthesis of 2-(2-ethoxyethoxy) ethyl acrylate.

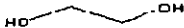
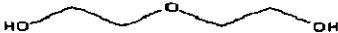
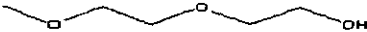


III. Physical and Chemical Properties

EG, DG, and the DG ethers are all colorless liquids. Physical and chemical characteristics and structure and nomenclature are found in Tables 2 and 3.

TABLE 2. The physical and chemical properties (Toxnet SIS, 2005; BIBRA, 1993; ECETOC, 1995; Gingell et al. 1996; Boatman, 2005, ATSDR Medical Management Guideline; Calif. Air Resources Board).

Name/CAS #	EG/107-21-1	DG/111-46-6	DGME/111-77-3	DGEE/111-90-0	DGEE/112-34-5
Synonyms:	Ethylene glycol; 1,2-dihydroxyethane; 1,2-ethanediol; monoethylene glycol	Diethylene glycol, Bis(2-hydroxyethyl) ether, Glycol ethyl ether, Diglycol, Digol, Dissolvent APV	Diethylene glycol (mono) methyl ether, Methyl carbitol, 2-(2-Methoxyethoxy)ethanol, Dowanol DM	Diethylene glycol (mono) ethyl ether, Ethyl carbitol, 2-(2-Ethoxyethoxy)ethanol, Dowanol DE, Poly-solve DE	Diethylene glycol (mono) butyl ether, Butyl carbitol, 2-(2-Butoxyethoxy)ethanol, Dowanol DB
Structure:	HO-CH ₂ -CH ₂ -OH	HO-CH ₂ -CH ₂ -O-CH ₂ -CH ₂ -OH	CH ₃ -(O-CH ₂ -CH ₂) ₂ -OH	C ₂ H ₅ -(O-CH ₂ -CH ₂) ₂ -OH	C ₄ H ₉ -(O-CH ₂ -CH ₂) ₂ -OH
Molecular formula:	C ₂ H ₆ O ₂	C ₄ H ₁₀ O ₃	C ₆ H ₁₂ O ₃	C ₈ H ₁₄ O ₂	C ₈ H ₁₈ O ₃
Molecular weight	62.7	106.12	120.17	134.17	162.23
Color/form	colorless viscous liquid	colorless syrupy liquid	Colorless liquid	Colorless liquid	Colorless liquid
Odor/Taste	odorless, sweet	Odorless/ sweet	ether-like odor/bitter	Mild, pleasant odor/bitter	Faint, butyl odor
Boiling point	198°C	244-245E C	193E C	196E C	230.4E C
Melting point	-13°C	-6.5°C	-85°C	-76°C	-68°C
Specific gravity	1.11	1.18	1.035	0.985	0.935
Vapor pressure	0.06 mm Hg at 20°C 0.092 mm Hg at 25°C	0.006 mm Hg at 25°C	0.256 mm Hg at 25°C	0.13 mm Hg at 25°C	0.002 mm Hg at 25°C
Solubility	6.0x10 ⁻³ atm-m ³ /mole	miscible with water, alcohol, ether, acetone	miscible with water, alcohol, ether, acetone	miscible with water, alcohol, ether, acetone	miscible with water, alcohol, ether, acetone
Log Kow	1	N/A	N/A	-0.54	0.56
	None				
	miscible with water, hygroscopic				
	10				
	50 hours				
	-1.36 / 0.04				

Table 3. Chemical Structures

<p>Ethylene glycol 107-21-1</p> <p>EG</p>	
<p>Diethylene glycol 111-46-6</p> <p>DG</p>	
<p>Diethylene glycol monomethyl ether 111-77-3</p> <p>DGME</p>	
<p>Diethylene glycol monoethyl ether 107-21</p> <p>DGEE</p>	
<p>Diethylene glycol monobutyl ether 112-34-5</p> <p>DGBE</p>	

IV. Hazard Assessment

A. Hazard Profile

There is an extensive toxicological database for EG, DG and the DG ethers. In some of the older studies with DG and its ethers, the test material was contaminated with ethylene glycol. This assessment places the most reliance upon the more recent higher quality studies, although some older studies are cited. Particular emphasis was placed upon studies and a monograph by the National Toxicology Program (NTP). Other references included reviews by the World Health Organization (WHO) and the Agency for Toxic Substances and Disease Registry (ATSDR). Summaries from representative studies are reported here with citations listed in the References section.

B. Toxicological Data

Acute toxicity: The acute toxicity values are provided in the Appendix at the end of this report. EG, DG and the three ethers have low acute toxicity in lab animals. Oral LD₅₀ values are all greater than 5,000 mg/kg. Dermal and inhalation lethal concentrations are also high for the available studies. Clinical signs of acute toxicity are non-specific depression of the central nervous system commonly seen with solvents.

The acute toxicity of EG is well described because of many poisoning incidents from its use in antifreeze. Following an initial CNS depression similar to drunkenness, metabolic acidosis develops and calcium oxalate crystals are formed which can result in kidney damage and eventual death. There are fewer clinical reports for DG and its ethers.

Subchronic and chronic toxicity

Ethylene glycol: In a subchronic mouse study conducted by NTP, the NOAEL = 3,000 mg/kg/day based upon kidney toxicity and microscopic liver changes seen at 6,000 mg/kg/day. No tumors were reported in rats and mice after treatment for two years at 1,000 mg/kg/day (DePass; Woodside; cited by ATSDR). No treatment-related neoplasms were seen in a 2-year mouse carcinogenicity study conducted by NTP at 6,000 mg/kg/day in males and 12,000 mg/kg/day in females. Microscopic liver changes occurred at 3,000 mg/kg/day and higher. Kidney toxicity was not noted though there were small numbers of oxalate-like crystals and calculi seen in the urinary tract.

Diethylene glycol: In a 1976 99-day rat study cited by BIBRA, there were urinary crystals and a mild effect on kidney function at 300 mg/kg/day; more severe effects at 1500 mg/kg/day; and mortality from kidney damage at 3300 mg/kg/day.

In an NTP developmental study in mice, maternal toxicity included increased kidney weights and microscopic changes in the kidneys at 5,000 mg/kg/day; the dose of 10,000 mg/kg/day caused maternal mortality.

In a 2-year rat study, bladder tumors, mostly benign developed at 1,500 and 3,000 mg/kg/day in males (Fitzhugh, cited in BIBRA). Tumors may have been due to chronic irritation from treatment-related bladder stones which developed in those dose groups.

Diethylene glycol monomethyl ether: Testicular and thymus toxicity were reported in an oral study in rats at doses of 500 mg/kg/day and greater (Kawamoto, 1990, cited in ECETOC). The maternal NOAEL in a rat oral developmental study with DGME (Yamano, 1990), was 600 mg/kg/day based on decreased thymus weight and slightly decreased body weight at 1800 mg/kg/day.

The NOAEL in a dermal toxicity study in guinea pigs was 40 mg/kg/day based on microscopic liver changes (mild fatty change) and decreased splenic weight at 200 mg/kg/day; no testicular changes were noted. The maternal NOAEL in a rabbit dermal developmental study was 250 mg/kg/day based on decreased weight gain and a slight decrease in red blood cell count at 750 mg/kg/day (Scortochini).

No toxicity was reported in a rat inhalation study at the high dose of 1.06 mg/L, which was reportedly the “maximum attainable vapor concentration” (Miller, 1985).

Diethylene glycol monoethyl ether: In a 28-day inhalation study, the NOAEL for systemic toxicity was 1.1 mg/L, reportedly in “excess of the saturated vapor pressure concentrations”.

In a 90 day feeding study in rats with DGEE (Hall, 1966, cited by FAO/WHO), the NOAEL was 800 mg/kg/day and the LOAEL was 4,000 mg/kg/day based on increased testes weight and microscopic changes in the kidneys. Test material contained 0.64% ethylene glycol. In another 90-day feeding study in rats with DGEE (Gaunt, 1966, cited by FAO/WHO), the NOAEL was 250 mg/kg/day and the LOAEL was 2500 mg/kg/day based on slight anemia, increased relative kidney weight, and microscopic changes in the kidneys. Test material contained <0.4% ethylene glycol.

Diethylene glycol monobutyl ether: A 13-week drinking water study in rats reported increased kidney weights and slight decreases in hematological parameters at 1,000 mg/kg/day; the NOAEL was 250 mg/kg/day (Johnson, 2005). In two separate dermal studies in rats, no FOB changes, clinical signs, reproductive toxicity, or systemic toxicity were seen at the high dose of 2,000 mg/kg/day (Beyrouty, 1993; Auletta, 1993).

Metabolism and pharmacokinetics

The diethylene glycol ethers are rapidly absorbed by the oral route and are eliminated in the urine. Dermal absorption of the ethers decreases with increasing molecular weight of the compounds, which correlates with decreased toxicity seen with increasing molecular weight. Dermal absorption of DG and for DGEE was < 10% (Matthews, BIBRA; WHO). Dermal absorption for DGBE was 34 - 65% although this study used prolonged exposure.

DGME is an inducer of the mixed function oxidase enzyme system. Ethylene glycol is metabolized to glycolic acid, which is responsible for developmental toxicity, and ultimately to

oxalic acid which will form crystals in kidney tubules at high doses. Glycolic and oxalic acid are not significant metabolites of the diethylene glycol ethers.

Genetic toxicology

EG, DG, DGME, DGEE, and DGBE were all negative in Ames assays and in a number of *in vivo* and *in vitro* tests although DG did cause chromosomal damage in bone marrow cells.

Cancer

Ethylene glycol was tested in a rat carcinogenic study (Woodside, cited by ATSDR) at 1,000 mg/kg/day and in mouse carcinogenic studies (NTP; DePass, cited by ATSDR) at doses as high as 12,000 mg/kg/day; there was no evidence of carcinogenicity in any of the studies.

DG treatment at high doses (1,500 mg/kg/day) caused bladder stones in male rats but not in females. The bladder stones were associated with bladder tumors in males (Fitzhugh, 1946; Weil, 1965; cited in BIBRA). The bladder tumors may be due to irritation from bladder stones and thus would not occur at doses below that causing bladder stones. Carcinogenicity studies were not available for the other chemicals.

Developmental and Reproductive Toxicity

Ethylene glycol (EG): The potential human reproductive and developmental effects of ethylene glycol underwent a comprehensive review by the National Toxicology Program, Center for the Evaluation of Risks to Human Reproduction and an expert panel. The NTP monograph reported that EG caused increased fetal deaths, skeletal and external malformations, and reduced body weight in offspring in lab animals; fetal effects occurred at doses below those causing maternal toxicity. A metabolite of EG, glycolic acid, is believed to be responsible for the developmental toxicity. As long as EG exposure does not reach a level that saturates the EG-metabolizing enzymes, then developmental toxicity is not expected. The NTP expert panel concluded that “there is negligible concern of adverse developmental toxicity from EG at exposures below 125 mg/kg”.

Reproductive toxicity studies with EG found no evidence of reproductive toxicity at high doses (2826 mg/kg/day in mice and 1000 mg/kg/day in rats. The NTP monograph concluded that there was “negligible concern of adverse reproductive toxicity from EG”.

Diethylene glycol (DG): In an NTP developmental study in mice, the dose of 5,000 mg/kg/day caused maternal toxicity (increased kidney weight), but no developmental toxicity. The dose of 10,000 mg/kg/day caused maternal mortality and decreased fetal body weight.

In an NTP mouse reproduction study, the dose of 6,125 mg/kg/day caused fetal/pup mortality in the absence of parental toxicity in the first generation. The next lower dose, 3,062 mg/kg/day was the NOAEL. No reproductive toxicity was noted in the second generation although parental body weights were decreased.

Diethylene glycol monomethyl ether (DGME): In a rat oral developmental study with DGME (Yamano, 1993), the developmental/offspring NOAEL was 200 mg/kg/day based on decreased body weight, decreased ossification, and effects on the thymus at 600 mg/kg/day. The maternal NOAEL was 600 mg/kg/day based on decreased thymus weight and slightly decreased body weight at 1800 mg/kg/day.

A reproduction study with DGME was not available.

Diethylene glycol monoethyl ether (DGEE): No developmental toxicity was reported at 6,000 mg/kg/day in a dermal developmental study in rats (Hardin, 1984). Maternal weight gain was decreased at the same dose.

Decreased pup body weight and decreased sperm motility were noted at 4400 mg/kg/day; the NOAEL was 2200 mg/kg/day. There was no effect upon reproductive parameters.

Diethylene glycol monobutyl ether (DGBE): No maternal or developmental toxicity was noted in an oral developmental study with rats at 1000 mg/kg/day or in a dermal developmental study in rabbits at 1000 mg/kg/day (Nolen, 1985).

No parental or offspring toxicity was noted in a 1-generation dermal reproduction study with DGBE (Auletta) at the high dose of 2,000 mg/kg/day.

C. Special Considerations for Infants and Children

As reported by the NTP, there is negligible concern of developmental toxicity from EG at exposures below 125 mg/kg. This dose is much greater than exposures expected from use as an inert ingredient.

DG caused fetal/pup mortality in a reproduction study at a dose causing minimal maternal toxicity, however, this occurred above the limit dose at 6,125 mg/kg/day, well above exposures expected from use as an inert ingredient in pesticides used pre-emergent. No developmental toxicity was noted in the NTP mouse study.

Developmental toxicity was noted for DGME at levels below maternal toxicity (offspring NOAEL was 200 mg/kg/day with decreased body weight, decreased ossification, and effects on the thymus observed at 600 mg/kg/day; maternal NOAEL was 600 mg/kg/day with decreased thymus weight and slightly decreased body weight observed at 1800 mg/kg/day). This dose is much greater than exposures expected from use of DGME as an inert ingredient limited to applications before crop emerges from soil.

Developmental toxicity with DGEE occurred at high doses (6000 mg/kg/day) and was accompanied by maternal toxicity. No developmental or reproductive toxicity was noted in an oral study in rats or in dermal studies in rats and rabbits.

There are no concerns from developmental or reproductive toxicity from DGBE.

Overall, there are no concerns for potential sensitivity of infants and children to these chemicals because developmental toxicity only occurred at doses much greater than that expected from use of these chemicals as inert ingredients. For this reason, a safety factor analysis has not been used to assess risk and the 10-fold safety factor for protection of infants and children is not needed.

V. Environmental Fate Characterization/Drinking Water Considerations

Most of the following information was obtained from HSDB Toxnet Database, as of 6/17/2006. Table 2 contains the relevant environmental fate and physicochemical characteristics of EG, DG, DGME, DGEE, and DGBE. There are common environmental fate characteristics to the ethylene glycols. For example, the characteristics of these chemicals suggest that they tend to remain dissolved in water and may be transported in the water column due to their high solubility in water and low organic carbon partition coefficient. They have a relatively low Henry's Law constant, indicating that they tend to remain in moist surfaces such as moist soils, or bodies of water (Henry's Law Constant $<5.3 \times 10^{-6}$ atm-m³/mole). They may volatilize from dry surfaces (Vapor Pressure >0.002 mmHg). Calculated soil and sediment organic carbon partition coefficients indicate that the glycol ethers would be highly mobile in soil and would easily move through a soil via erosion dissolved in the water column or to the subsurfaces to ground water ($K_{oc} < 50$). Soil binding is expected to be minimal. If the chemical reaches bodies of water, it will remain in the water column, as opposed to bound to sediment particles or to organic matter or to living organisms (bioconcentrated). However, these compounds appear to biodegrade relatively quickly in soil and water. Considering the ready biodegradation and use limitations of these chemicals, contributions to drinking water are anticipated to be very low.

These molecules are not susceptible to hydrolysis or direct photolysis at the environmentally relevant spectrum (>290 nm). If these compounds reach the ambient, they will exist as vapor phase only. They may undergo indirect photodegradation via formation of hydroxyl radicals in the atmosphere with varying half-lives (10-50 hrs). The bioconcentration in aquatic organisms is expected to be very low ($BCF < 10$; $K_{ow} < 30$).

VI. Exposure Assessment

EG, DG and the DG ethers are as used inert ingredients in pesticide formulations, as antifreeze, as solvents, and as ingredients in a number of industrial products. Human exposure to these chemicals may occur via dietary (food and drinking water) and/or residential pathways of exposure. Dietary exposure to residues of these chemicals would be via the oral route, by consumption of raw agricultural commodities to which pesticide products containing these chemicals have been applied, and/or by consumption of drinking water.

The tolerance exemptions for EG, DG, DGME, DGEE, and DGBE significantly limit the potential for exposure by only allowing applications before the crop emerges from soil. This typically equates to one application. EG's tolerance exemption also limits applications to use before the crop emerges from soil, except in herbicides. EG, DG, DGME, DGEE, and DGBE all biodegrade quickly in soil and water, and bioconcentration in aquatic organisms is expected to be low. Considering the ready biodegradation and use limitations of these chemicals, dietary and residential exposures of concern are not anticipated.

VII. Aggregate Exposures

For aggregate exposure, the Federal Food, Drug, and Cosmetic Act (FFDCA) section 408 directs EPA to consider available information concerning exposures from the pesticide residue in food and all other non-occupational exposures, including drinking water from ground water or surface water and exposure through pesticide use in gardens, lawns, or buildings (residential and other indoor uses).

For EG, DG, DEME, DGEE, and DGBE, a qualitative assessment for all pathways of human exposure (food, drinking water, and residential) is appropriate given the lack of human health concerns associated with exposure to these chemicals as inert ingredients in pesticide formulations.

VIII. Cumulative Exposure

Section 408(b)(2)(D)(v) of FFDCA requires that, when considering whether to establish, modify, or revoke a tolerance, the Agency consider "available information" concerning the cumulative effects of a particular pesticide's residues and "other substances that have a common mechanism of toxicity."

Unlike other pesticides for which EPA has followed a cumulative risk approach based on a common mechanism of toxicity, EPA has not made a common mechanism of toxicity finding as to EG, DG, DGME, DGEE, DGBE and any other substances, and this material does not appear to produce toxic metabolites produced by other substances. For the purposes of this tolerance action, therefore, EPA has not assumed that these chemicals have a common mechanism of toxicity with other substances. For information regarding EPA's efforts to determine which chemicals have a common mechanism of toxicity and to evaluate the cumulative effects of such chemicals, see the policy statements released by EPA's Office of Pesticide Programs concerning common mechanism determinations and procedures for cumulating effects from substances found to have a common mechanism on EPA's website at <http://www.epa.gov/pesticides/cumulative/>.

IV. Human Health Risk Characterization

Few studies had side-by-side comparisons of the chemicals so direct comparisons cannot be made, however, it can be generalized that for the DG ethers, increasing molecular weight resulted in decreased toxicity by the oral or dermal route and decreased dermal absorption.

The acute toxicities of EG, DG, DGME, DGEE, and DGBE are low with oral LD₅₀ values > 5,000 mg/kg for all of the chemicals. Toxicity from longer term oral exposure is generally low. EG caused kidney and liver toxicity at 3,000 mg/kg/day in a chronic mouse study. DG caused kidney toxicity in rats at 300-1500 mg/kg/day after subchronic oral exposure. DGME caused testicular and thymus toxicity in rats at 500 mg/kg/day. DGEE caused slight anemia and kidney toxicity at 1,250 mg/kg/day in rats and mortality and increased testes weight at 4,000 mg/kg/day. DGBE caused slight anemia and increased kidney weight at 1,000 mg/kg/day.

No systemic toxicity resulted from inhalation studies with DGEE and DGBE at doses that were reportedly the maximum attainable vapor pressure or in dermal studies with DGBE at 2,000 mg/kg/day.

All chemicals were negative in the Ames assay and in a number of other genetic toxicity tests, although DG did cause chromosomal damage in bone marrow cells. There was no evidence of carcinogenicity in rats and mice treated with EG. DG treatment resulted in bladder tumors which were believed to be caused by irritation from bladder stones. Because of the negative results from genetic toxicity studies, there are no carcinogenicity concerns for these chemicals.

EG underwent a comprehensive review by NTP of potential human developmental and reproductive toxicity which concluded that “there is negligible concern of adverse developmental toxicity from EG at exposures below 125 mg/kg”. There was no evidence of reproductive toxicity from EG in lab animals. DG caused developmental toxicity in mice at 10,000 mg/kg/day and caused fetal/pup mortality in a reproductive mouse study 6,125 mg/kg/day. DGME caused decreased ossification at 600 mg/kg/day in a rat oral developmental study (NOAEL = 200 mg/kg/day). Overall, there are no concerns for potential sensitivity of infants and children to these chemicals because developmental toxicity only occurred at doses much greater than that expected from use as inert ingredient in pesticide products.

The tolerance exemptions for DGME, DGEE, and DGBE significantly limit the potential for exposure by only allowing applications before the crop emerges from soil. This typically equates to one application. EG’s tolerance exemptions also limit applications to use before the crop emerges from soil, except in herbicides. EG, DG, DGME, DGEE, and DGBE all biodegrade quickly in soil and water, and bioconcentration in aquatic organisms is expected to be low. Considering the ready biodegradation and use limitations of these chemicals, dietary and residential exposures of concern are not anticipated.

Taking into consideration all available information on EG, DG, DGME, DGEE, and DGBE, it has been determined that there is a reasonable certainty that no harm to any population subgroup will result from aggregate exposure to these chemicals when considering exposure through food commodities and all other non-occupational sources for which there is reliable information. Therefore, it is recommended that the three exemptions from the requirement of a tolerance established for residues of EG, DG, DGME, DGEE, and DGBE when used on growing crops under 40 CFR part 180.920 can be considered reassessed as safe under section 408(q) of the FFDCA.

V. Ecotoxicity and Ecological Risk Characterization

Studies in the Agency’s Ecotox Database (<http://www.epa.gov/ecotox>) for DG, DGME, DGEE, and DGBE chemicals contained acute fish and invertebrate studies. No terrestrial or aquatic plant studies were available in Ecotox appropriate for guideline studies. There was only one chronic study on fish for EG.

Ecotox studies indicate that EG, DG, DGME, DGEE, and DGBE are practically non-toxic to fish on an acute basis. Ecotox studies also indicate that EG and DGEE are practically non-toxic to invertebrates on an acute basis. LC50's for fish for all chemicals ranged from >2700 mg/L to 81950 mg/L. LC50's for invertebrates for EG and DGEE ranged from 3340 mg/L to 55000 mg/L. Invertebrate studies were not available in Ecotox for DG, DGME, and DGBE. There was one chronic effect study on fish for EG, 15380 mg/L (growth) for a 7 day renewal fathead minnow.

Mammalian data will be used as a surrogate for other terrestrial phase animals. The acute toxicities of EG, DG, DGME, DGEE, and DGBE are low with oral LD₅₀ values of > 5,000 mg/kg for these chemicals. Therefore, EG, DG, DGME, DGEE, and DGBE are classified as practically non-toxic to mammals on an acute basis.

For chronic effects in mammals, there was no evidence of reproductive toxicity from EG in lab animals. DG caused developmental toxicity in mice at 10,000 mg/kg/day and caused fetal/pup mortality in a reproductive mouse study 6,125 mg/kg/day. DGME caused decreased ossification at 600 mg/kg/day in a rat oral developmental study (NOAEL = 200 mg/kg/day). These effects may or may not be important ecologically.

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APPENDIX A

Acute Toxicity

Acute toxicity values of EG

Species	Test	Reference
Rat	Oral LD ₅₀ : 5.89 g/kg	Hazardous Substances Databank
Rabbit	Dermal LD ₅₀ : 9530 mg/kg	Hazardous Substances Databank

Acute toxicity values of DG

Species	Test	Reference
Rat	Oral LD ₅₀ : 13-32 g/kg	Bibra
Mouse	Oral LD ₅₀ : 13.3 g/kg	Patty's Toxicology
Rabbit	Dermal LD ₅₀ : 13.1 g/kg bw (24-hr exposure)	BIBRA

Acute toxicity values of DGME

Species	Test	Reference
Rat	Oral LD ₅₀ : 6.70 mL/kg	Toxnet SIS
Rabbit	Dermal LD ₅₀ : no deaths at 2 g/kg.	Toxnet SIS
Rat	LC ₅₀ : no mortalities at 20 mg/L for 1 h.	Toxnet SIS

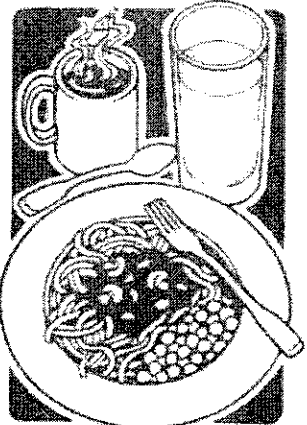
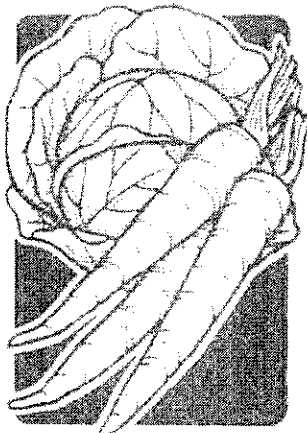
Acute toxicity values of DGEE

Species	Test	Reference
Rat	Oral LD ₅₀ : 8.69 g/kg, 5.54 g/kg	Patty's Toxicology
Mouse	Oral LD ₅₀ : 6.58 g/kg	Patty's Toxicology
Rabbit	Eye irritation: moderate	FAO/WHO

Acute toxicity values of DGBE

Species	Test	Reference
Rat	Oral LD ₅₀ : 6.53 g/kg males; 5.08 g/kg females	Toxnet SIS
Mouse	Oral LD ₅₀ : 2406 mg/kg fasted; 5526 mg/kg non-fasted	Toxnet SIS
Rabbit	Oral LD ₅₀ : 2.2 g/kg	Patty's Toxicology
Guinea pig	Dermal sensitization for formulation: positive	ATOFINA Chemicals

Appen.
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OMRI has reviewed the following material based on the *OMRI Generic Materials List*, the *OMRI Operating Manual for Review of Brand Name Products*, and documentation provided by the manufacturer or distributor to support the product application.

Product Name

DuPont™ Kocide® 2000
Fungicide/Bactericide

OMRI Status*

Restricted

OMRI Product Nr.

cid-578

OMRI Generic Category*

Coppers - fixed

OMRI Class*

Crop Pest, Weed, and Disease Control

Supplier

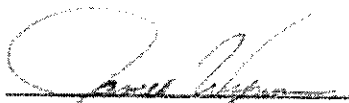
E. I. duPont de Nemours and Company
Mr. Tim McPherson
Stine-Haskell Research Center
Bldg 300/433, 1090 Elkton Rd.
Newark, DE 19714

Issue Date

31-Oct-06

Expires

01-Dec-07

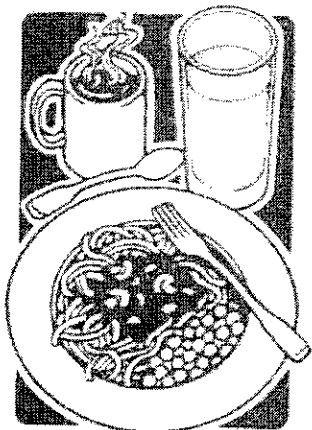
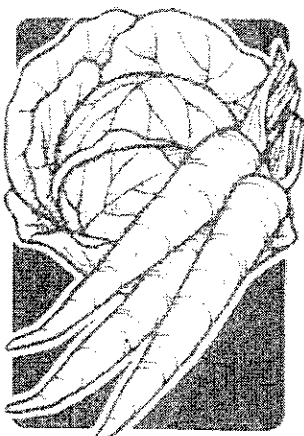

Product Review Coordinator


Executive Director

This listing is not OMRI certification or endorsement and cannot be construed as certification or listing by any of OMRI's subscribing certifiers. Final decisions regarding the acceptability of use of the product and any restrictions on its use under any particular certifier's program are made by the certifier that still has the right to decline OMRI's recommendation. Producers and handlers still need to contact their certifiers for information as to whether or not this material may be used in organic production or handling.

* See the most current *OMRI Generic Materials List* for more information plus annotations and restrictions.

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Meridian

OMRI

Listed

Organic Materials Review Institute
Box 11558 • Eugene, OR, 97440-5758 USA
541-343-7600 • Fax: 541-343-8971
info@omri.org • www.omri.org

OMRI has reviewed the following material based on the *OMRI Generic Materials List*, the *OMRI Operating Manual for Review of Brand Name Products*, and documentation provided by the manufacturer or distributor to support the product application.

Product Name

DuPont™ Kocide® 3000
Fungicide/Bactericide

OMRI Status*

Restricted

OMRI Product Nr.

eid-579

OMRI Generic Category*

Coppers - fixed

OMRI Class*

Crop Pest, Weed, and Disease Control

Supplier

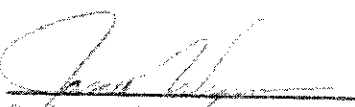
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* See the most current *OMRI Generic Materials List* for more information plus annotations and restrictions.



Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown PA 18195-1501
www.airproducts.com

12 Nov 2007

Kristi Barnett
Dupont
Stine Haskell Research Center 300/4
1090 Elkton Road, P.O. Box 30
Newark, DE US , 19714

Dear Kristi Barnett:

This letter is in response to your request for information about the FDA regulatory status of **SURFYNOL® 104 surfactant**.

SURFYNOL 104 surfactant may be used in compliance with the following FDA regulations:

- 21CFR175.105 - Adhesives
- 21CFR175.300 - Resinous and polymeric coatings (with restrictions)

SURFYNOL 104 surfactant is cleared under 21CFR175.300 in accordance with the following restriction (Section (b) (3) (xxix)): "For use only in can coatings which are subsequently dried and cured at temperatures of at least 193°C (380°F) for 4 minutes."

The above clearances are subject to the end-use and extractive limitations cited in the specific regulations.

Thank you for your interest in our product. Please visit our website <http://www.airproducts.com/fdaletters> for additional information or updates. If you have any questions, please e-mail cheminfo@apci.com or contact me directly at 610-481-4620.

Sincerely,

Broniek Z. Drozdowicz, Ph.D.
Manager, Toxicology and Risk Control

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Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown PA 18195-1501
www.airproducts.com

12 Nov 2007

Kristi Barnett
Dupont
Stine Haskell Research Center 300/4
1090 Elkton Road, P.O. Box 30
Newark, DE US , 19714

Dear Kristi Barnett:

This letter is in response to your request for information about the FDA regulatory status of **SURFYNOL® 104E surfactant**.

SURFYNOL 104E surfactant may be used in compliance with the following FDA regulation:

21CFR175.105 - Adhesives

A question of compliance of SURFYNOL 104E surfactant with FDA regulation 21CFR175.300 (resinous and polymeric coatings) is often raised. SURFYNOL 104E surfactant is a solution of SURFYNOL 104 surfactant in ethylene glycol and does not specifically comply with 21CFR175.300 because of the presence of ethylene glycol. Resinous and polymeric coatings that contain SURFYNOL 104 surfactant do comply with 21CFR175.300, if they are cured for four minutes at or above 193°C (359°F).

If a coating prepared with SURFYNOL 104E surfactant undergoes the same curing treatment used for SURFYNOL 104 surfactant, and applicable extractions with food-simulating solvents do not yield detectable amounts of ethylene glycol, then ethylene glycol would not be expected to become a component of contacted food and it therefore could be said that the treated coating complies with 21CFR175.300 as well as with 21CFR175.105 (assuming all other components of the coating, in addition to SURFYNOL 104E surfactant can be used in compliance with 21CFR175.300). The coating manufacturer is responsible for determining whether ethylene glycol is removed from the coating during the curing treatment.

The above clearance is subject to specific end-use and extractive limitations cited in the regulation.

Thank you for your interest in our product. Please reference our website <http://www2.airproducts.com/fdaletters> for additional information or updates. If you have any questions, please e-mail cheminfo@apci.com or contact me directly at 610-481-4620.

Sincerely,

Broniek Z. Drozdowicz, Ph.D.
Manager, Toxicology and Risk Control

Surfynol® 104 Surfactant

Introduction

Surfynol 104 surfactant is one in a series of Air Products' surfactants that provide a unique combination of performance benefits including wetting, defoaming and improving pigment dispersions. Surfynol 104 surfactant is a nonionic molecule containing a hydrophilic portion in the middle of two symmetrical hydrophobic groups. Its unique chemical structure allows this product to provide multifunctional properties such as surface tension reduction, foam control and viscosity stabilization. The hydrophobic nature of Surfynol 104 surfactant results in reduced water sensitivity compared to either conventional ethoxylated or anionic surfactants. Due to its multifunctional properties, Surfynol 104 surfactant provides performance benefits in many waterborne applications such as coatings, paints, adhesives, inks, pigment manufacture and dispersion, cements, metalworking lubricants, agricultural chemicals and dye processing.

Performance Benefits

Surface Tension

Surface tension reduction is an important property of any surfactant because it allows the wetting of substrates whose surface energy is less than the surface tension of water. Table 1 demonstrates the ability of Surfynol 104 surfactant to effectively lower the surface tension of water under static conditions using a duNouy tensiometer.

While steady state reduction in surface tension can give the formulator a quick gauge of a surfactant's effectiveness, many industrial applications never reach equilibrium. Therefore, it is important in processes where surfaces are generated at a rapid rate (printing, spray and roll coating, metalworking, etc.) that the surfactant migrate rapidly to the interface to prevent film retraction and other surface defects. As shown in Table 2, the ability of Surfynol 104 surfactant to

Table 1

Surfynol 104 Surfactant—Equilibrium Surface Tension

Concentration (%)	Surface Tension (dynes/cm)
.01	51.1
.05	37.7
.1	33.1

Table 2

Dynamic Surface Tension Profile¹

Relative Rate of Surface Formation (bubbles/sec)	Surface Tension (dynes/cm)	
	Surfynol 104 (0.1%)	Triton X-100 ² (0.1%)
1 (equilibrium)	33.1	33.4
3	34.1	35.4
6 (dynamic)	36.4	42.2

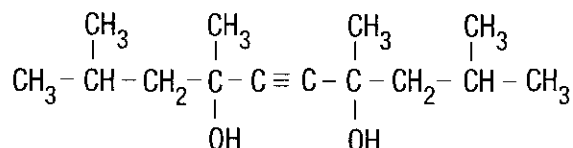
¹Testing performed on a Sensadyne 5000 tensiometer (Chemdyne).

²Union Carbide

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lower surface tension under conditions of rapid surface formation (represented by increasing the bubble rate) is due to its unique ability to migrate quickly to newly formed interfaces. As a result, Surfynol 104 surfactant's performance under dynamic conditions significantly surpasses that of conventional surfactants such as octyl phenol ethoxylate.

Surfynol 104 Surfactant (2,4,7,9-tetramethyl-5-decyne-4,7-diol)



Wetting

Water-based systems such as coatings, adhesives, inks, etc., have a higher surface tension than those which are solvent based. Consequently, surfactants are required to achieve good wetting. However, the addition of most wetting agents causes foam, and the subsequent addition of a defoamer can lead to the recurrence of the original wetting problems. Surfynol 104 surfactant prevents this problem by

providing the necessary wetting under dynamic conditions, while controlling or eliminating foam.

The minimum surface tension that can be achieved using Surfynol 104 surfactant is limited by its solubility. If lower surface tensions are required, Surfynol surfactants with greater water solubility—such as Surfynol SE, TG and the 400 series—should be utilized.

Defoaming

Surfynol 104 surfactant is best described as a defoaming, nonionic surfactant. The defoaming nature of this surfactant is not closely related to temperature. Typical low-foaming nonionics foam less at temperatures above their cloud points because they become insoluble. Surfynol

Table 3

Typical Properties

Surfynol Surfactant	Physical Form	Liquid Composition	Specific Gravity ¹ (@ 25°C)	Lb/Gal (Approx)	Melt Point	Viscosity ² (cps)
Surfynol 104A	Light Yellow Liquid 2-ethylhexanol	50% wt 104 in	0.865	7.2 (32°F)	<0°C	100 @ 20oC
Surfynol 104BC	Light Yellow Liquid 2-butoxy ethanol	50% wt 104 in	0.898	7.6 (-40°F)	<-40°C	100 @ 20oC
Surfynol 104DPM	Light Yellow Liquid dipropylene glycol monomethyl ether	50% wt 104 in	0.928	7.8 (23°F)	-5°C	100 @ 20oC
Surfynol 104E	Light Yellow Liquid ethylene glycol	50% wt 104 in	0.999	8.3 (32°F)	<0°C	100 @ 20oC
Surfynol 104H	Light Yellow Liquid ethylene glycol	75% wt 104 in	0.946	7.9 (50°F)	10°C	150 @ 35oC
Surfynol 104NP	Light Yellow Liquid n-propyl alcohol	50% wt 104 in	0.856	7.1 (-4°F)	-20°C	100 @ 20oC
Surfynol 104PA	Light Yellow Liquid isopropyl alcohol	50% wt 104 in	0.839	7.0 (-40°F)	<-40°C	100 @ 20oC
Surfynol 104PG-50	Light Yellow Liquid propylene glycol	50% wt 104 in	0.971	8.1 (4°F)	-16°C	200 @ 20oC
Surfynol 104S	Free-Flowing Powder amorphous silica	46% wt 104 on	0.457	3.9	—	—

¹Specific Gravity of Surfynol 104 surfactant measured with a pycnometer.

²Viscosity measured with Brookfield viscometer, #1 spindle at 30 rpm's.

104 surfactant does not have a cloud point; therefore, it defoams over a very broad temperature range.

Surfynol 104 surfactant can be used in combination with conventional defoamers. If used in this manner, the conventional defoamer concentration can often be reduced to a level where it causes fewer side effects such as fisheyes and pinholes. In addition, Surfynol 104 is very effective against microfoam.

Water Sensitivity

Many surfactants that effectively reduce surface tension cause water sensitivity problems in dried coatings, inks, adhesives, etc. Highly hydrophilic surfactants such as anionic (sodium dioctyl sulfosuccinate) or heavily ethoxylated (alkyl phenol ethoxylates) surfactants readily resolubilize in water, causing surface defects in the dried product. This resolubilization can promote loss of adhesion, hazing, spotting and other problems. Due to its more hydrophobic nature, Surfynol 104 surfactant does not adversely affect the water sensitivity of formulations.

Physical Properties

As shown in Table 3, Surfynol 104 surfactant is available in liquid forms for ease of handling, or as a free-flowing powder on a solid support.

Freezing Point

Liquid versions of Surfynol 104 surfactant may tend to crystallize at low temperatures. Surfynol 104H surfactant is particularly prone to crystallization in cold weather. If the product has crystallized in the solvent, recovery to the clear solution form is a function of time and temperature.

See "How to Formulate with Surfynol 104 Surfactant" (120-9829) for further information

Cloud Point

Surfynol 104 surfactant does not have a cloud point. Also, although it is a diol, its water solubility is not increased appreciably by higher temperatures.

Stability

Surfynol 104 surfactant alone and in most applications has high thermal stability. It should not be compounded with strong oxidizing or re-

ducing agents or with high levels of caustic ($\text{pH} > 12$) such as sodium hydroxide or potassium hydroxide.

Solubility

Surfynol 104 surfactant is soluble in all common solvents except highly aliphatic products like kerosenes or oils.

Applications and Benefits

Coatings

Surfynol 104 surfactant is employed in coatings to solve a variety of formulating problems including foam and coverage over difficult-to-wet surfaces. Due to its ability to reduce surface tension under dynamic conditions, Surfynol 104 surfactant is incorporated into spray, dip and coil coatings to enhance wetting of oily or improperly cleaned substrates. Surfynol 104 surfactant is also used to aid in the proper coverage of water-based coatings over low surface tension substrates like plastics. And, as a result of its unique structure, Surfynol 104 surfactant will reduce water sensitivity problems associated with most surfactants.

Unlike conventional surfactants that typically cause foam in waterborne coatings, Surfynol 104 surfactant has foam control capabilities. Consequently, traditional defoamers can sometimes be removed or reduced when Surfynol 104 surfactant is employed in the coating formulation. The chemical nature of Surfynol 104 surfactant ensures coating formulators that this surfactant will not lead to the many problems associated with foam. However, if additional foam control agents are necessary, Surfynol 104 surfactant can be used with a wide variety of conventional defoamers.

In coatings, Surfynol 104 surfactant can be included in the grind or letdown, depending on the function required of the surfactant.

For more information see Air Products' technical article entitled "The Importance of Low Dynamic Surface Tension in Waterborne Coatings" (120-9303)

Industrial Maintenance Coatings

The incorporation of Surfynol 104 surfactant into the letdown or grind stage of spray-applied waterborne industrial maintenance coatings aids in the reduction of external and internal microfoam, resulting in improved gloss. Flow and lev-

eling properties are also improved, without additional generation of foam.

For more information see Air Products' brochures entitled "The Benefits of Surfynol® Surfactants in Waterborne Industrial Maintenance Coatings" (120-9755) and "The Benefits of Surfynol Surfactants in Waterborne Thermoplastic Industrial Maintenance Primers" (120-9532)

Printing Inks

Surfynol 104 surfactant is employed for its multifunctional benefits in water-based flexographic and gravure printing inks. The product aids in penetration of the ink into absorbent stocks, such as paper, and also improves coverage over polymeric films, such as polyethylene. In addition, Surfynol 104 surfactant's defoaming capabilities eliminate troublesome foam which causes many problems in printing inks. Surfynol 104 surfactant can be incorporated into the grind or letdown, depending on the surfactant function desired.

For more information see Air Products' brochure entitled "Surfynol Surfactants: Applications in Water-Based Printing Inks" (120-9319)

Factory Applied Wood Coatings

The use of Surfynol 104 surfactant in waterborne wood coatings gives formulators a solution to typical problems encountered when spraying coatings. Problems such as loss of gloss due to microfoam, poor flow and leveling, adhesion and water sensitivity can be reduced or eliminated with incorporation of Surfynol 104 surfactant.

For more information see Air Products' brochures entitled "Surfynol® Surfactants: Multifunctional Problem Solvers in Waterborne Wood Coatings" (120-9756)

DIY Wood Finishes

The performance of waterborne Do-It-Yourself (DIY) wood finishes is enhanced when Surfynol 104 surfactant is used in stain, sealer or topcoat formulations. Primary benefits obtained include color uniformity in stains, early stain lapping resistance and consistent wetting, flow and leveling on various types of wood.

For more information see Air Products' brochures entitled "Surfynol® Surfactants:

Multifunctional Problem Solvers in Waterborne Do-It-Yourself Wood Finishes" (120-9831)

Overprint Varnishes

In overprint varnish systems, Surfynol 104 surfactant provides wetting so that proper coverage of an aqueous overprint varnish can be achieved over wet, solvent-based lithographic ink. In addition, troublesome foam can be reduced when Surfynol 104 is used as the wetting agent. And, because this product's unique structure is hydrophobic in nature, water sensitivity problems are reduced when compared to conventional anionic or ethoxylated nonionic surfactants.

Fountain Solutions

Surfynol 104 surfactant is used in lithographic fountain solutions for the dynamic wetting of aluminum printing plates without causing excess emulsification of the ink. At the same time, Surfynol 104 surfactant controls foam caused by formula components and high shear conditions.

Pressure Sensitive Adhesives

The low surface tensions presented by silicone and plastic film release liners require strong wetting agents in order to achieve proper coverage by the adhesive. Surfynol 104 surfactant's ability to provide good wetting under dynamic conditions ensures consistent substrate coverage while reducing foam problems.

Many commonly used wetting agents provide the required coverage, but also produce foam. In addition, these same wetting agents remain water sensitive in the dried adhesive, causing a loss of bond strength. Surfynol 104 surfactant does not adversely affect the water sensitivity of the adhesive.

For more information see Air Products' brochure entitled "Surfynol® Surfactants for Pressure Sensitive and Laminating Adhesives" (120-9846)

Paper Coatings

When used in paper coating and sizing applications, Surfynol 104 surfactant effectively defoams while improving flow characteristics, thus eliminating pinholes, fisheyes and other surface defects. Water sensitivity of the finished product is also minimized by a reduced rate of water absorption into the coating.

Agricultural Chemicals

As an additive in both wettable powder and flowable pesticide systems, Surfynol 104 surfactant improves wetting, controls foam and enhances leaf and soil penetration. In flowable systems, the wetting benefits of Surfynol 104 surfactant are evident not only in formulating, but also upon dilution, where bloom and dispersion stability are enhanced.

Dye Processing

Surfynol 104E surfactant is widely used to control the foam caused by gas generated during the production of azo dyes. It also effectively defoams mechanically generated foam produced during the spray drying, mixing and filtering of any type of dye. An added benefit is the ability of this product to reduce static charge during spray drying.

When added during dispersion, especially in the presence of lignosulfonate dispersants, Surfynol 104 surfactant controls foam while imparting improved wetting properties leading to more stable dispersions at reduced viscosities. Additionally, higher solids are possible due to these reduced viscosities, promoting savings in the time and energy needed for filtering and spray drying.

For more information see Air Products' brochure entitled "Surfynol® Surfactant Applications in Dye Manufacture" (120-315)

Metalworking Fluids

Lubrication in metalworking is aided by Surfynol 104 surfactant's affinity for metal surfaces and its ability to rapidly migrate to newly formed surfaces. And, unlike many foam generating surfactants, it acts to displace air from

the metal surface as well as the bulk lubricant, resulting in improved workpiece and metal part cooling.

Once the metalworking process is completed, it is important to remove residual surfactant from the part to prevent contamination in downstream processes such as painting or coating. While the majority of Surfynol 104 surfactant will be removed using traditional methods, the product's volatile nature assures that any residual surfactant will evaporate upon heating.

For more information see Air Products' brochure entitled "Surfynol® Surfactants and Acor® Corrosion Inhibitors in Water-Based Metalworking Fluids" (120-641)

Cements, Mortars and Grouts

Surfynol 104 surfactant, as well as several other Surfynol surfactants, is used in water-based cement formulations for construction and oil well applications. These products are effective deairetraining agents for both ready-mix and precast construction cements where they control or eliminate entrained air and improve compression strength. In oil well cements, Surfynol surfactants effectively deairetrain without affecting fluid loss or rheological properties.

Additional Applications

The preceding applications are only a sample of the many different existing and potential end uses for Surfynol surfactants. Other end uses include industrial and household cleaners, carpet backing adhesives, foundry core coatings, textiles, emulsion polymerization and chemical processing, to name just a few. If you have questions about a specific end use, please call 1-800-345-3148 or 610-481-6799 to receive technical information and/or free samples of Surfynol surfactants.

How to Formulate with Surfynol 104 Surfactant

- 1 When blending, maintain adequate agitation and allow sufficient mix times of 15 to 30 minutes. If high viscosity is preventing adequate mixing, heating the mixture will reduce the viscosity.
- 2 Add Surfynol 104 surfactant after other surfactants and polymers have been added.* This will allow the maximum rate of dissolution or dispersibility of Surfynol 104 surfactant into the system.
- 3 If pigments, fillers or other solids are being incorporated, add them after the Surfynol 104 surfactant. This will allow the Surfynol 104 surfactant to wet the solids and control any foam produced during addition.
- 4 Surfynol 104 surfactant is a multifunctional product which may replace one or more formulation additives. Consequently, a ladder study should be conducted to determine optimum use levels.
- 5 When shipped or stored in extremely cold temperatures, several Surfynol 104 surfactant liquid blends can freeze or partially crystallize. Warming above the melt point using mild agitation will provide a liquid product.

*If the formulation viscosity increases, add Surfynol 104 surfactant earlier in the formulation.

Toxicity Data

Surfynol 104 surfactant has a low degree of toxicity and has several FDA and EPA clearances. For specific safety and handling information, please see the MSDS on Surfynol 104 surfactant.

Summary

When used in your formulations, Surfynol 104 surfactant offers the following features and application benefits.

Features

Quick migration, leading to low dynamic surface tension

Low static (equilibrium) surface tension

Defoaming/deaerentraining/nonfoaming nature

Ability to wet contaminated substrates

Ability to reduce pigment particle size and prevent re-agglomeration

Non-micelle forming

Thermal stability over a broad temperature range

Chemical stability from pH ~ 3 to pH ~ 12

Application Benefits

Prevents surface defect problems such as fisheyes, crawling and cratering

on low-energy substrates

Prevents surface defect problems on contaminated or poorly prepared

substrates

Reduces microfoam in spray-applied systems

Improves pigment grind efficiency

Reduces water sensitivity

Defoams and deaerentrains coatings, inks, cements, mortars, grouts and dyes

Defoams and improves flow of coatings, inks, adhesives, paper coatings and sizings

Enhances leaf and soil penetration while improving bloom and stability in agricultural chemical formulations

Lubricates, wets and prevents smut formation while eliminating hot spots in metalworking fluids

For Samples or More Information Europe

If you would like additional information or technical assistance in preparing specific formulations, write or call Air Products and Chemicals, Inc. at the following locations.

North America

Air Products and Chemicals, Inc.
Performance Chemicals Division
7201 Hamilton Boulevard
Allentown, PA 18195-1501 U.S.A.
Telephone: 800-345-3148
(Outside the U.S. and Canada 610-481-6799)
Fax: 610-481-4381
<http://www.airproducts.com/surfynol>

Latin America

Air Products and Chemicals, Inc.
Latin American Region
7201 Hamilton Boulevard
Allentown, PA 18195-1501
Telephone: 610-481-5986
Fax: 610-481-5817

**Air Products and Chemicals de México
S.A. de C.V.**

Pasaje Interlomas No. 16
Col. San Fernando La Herradura
Interlomas
Huixquilucan, Edo. De Mexico
C.P. 52760
México
Telephone: 52-5246-0400
Fax: 52-5246-0448 and 5246-0449

Air Products Gases Industriais Ltda. (APGIL)

Praça Radialista Manoel de Nobrega, 65
Casa Verde
02517-160 São Paulo-SP
Brazil
Telephone: 55-11-3856-1700
Fax: 55-11-3856-1781

Air Products Chemicals Division Europe

Air Products Nederland B.V.
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3502 GD Utrecht
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Telephone: 31-30-2857100
Fax: 31-30-2857111

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Air Products Japan, Inc.
3-18-19, Toranomom, Minato-Ku
Tokyo 105
Japan
Telephone: 81-3-3432-7031
Fax: 81-3-3432-7052

Air Products Asia, Inc.
Room 6505-7, Central Plaza
18 Harbour Road
Wanchai, Hong Kong
Telephone: 852-2527-0515
Fax: 852-2527-1957

The information contained herein is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto.

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www.airproducts.com

Append 5



Material Safety Data Sheet

Version 1.20
Revision Date 04/30/2006

MSDS Number 300000004750
Print Date 10/21/2007

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : SURFYNOL® 104E SURFACTANT

Product Use Description : Surfactant

Company : Air Products and Chemicals, Inc
7201 Hamilton Blvd.
Allentown, PA 18195-1501

Telephone : 1-800-345-3148 Chemicals
1-800-752-1597 Gases and Electronic Chemicals

Emergency telephone number : 800-523-9374 USA
01-610-481-7711 International

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Weight)
Ethylene glycol	107-21-1	50%
Tetramethyl-5-decyne-4,7-diol, 2,4,7,9-	126-86-3	50%

Surfactant.

3. HAZARDS IDENTIFICATION

Emergency Overview

Mild skin irritant.
Severe eye irritant.

Potential Health Effects

Inhalation : Causes headache, drowsiness or other effects to the central nervous system. May cause anesthetic effects.

Eye contact : Severe eye irritation.

Skin contact : Mild skin irritation.

Ingestion : Ingestion may cause vomiting unless treated promptly. May be fatal if swallowed. Contains Ethylene Glycol which may cause birth defects.

Chronic Health Hazard : This product contains no listed carcinogens according to IARC, ACGIH, NTP and/or OSHA in concentrations of 0.1 percent or greater.

Exposure Guidelines

Target Organs : Eyes.
Reproductive system.

Material Safety Data Sheet

Version 1.20
Revision Date 04/30/2006

MSDS Number 300000004750
Print Date 10/21/2007

Liver or the hepatic system.

Aggravated Medical Condition

Liver disorders Eye disease

4. FIRST AID MEASURES

- General advice : Seek medical advice. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately.
- Eye contact : Rinse immediately with plenty of water also under the eyelids for at least 20 minutes.
- Skin contact : Wash off with soap and water. Immediately remove contaminated clothing, and any extraneous chemical, if possible to do so without delay.
- Ingestion : Never give anything by mouth to an unconscious person. Prevent aspiration of vomit. Turn victim's head to the side.
- Inhalation : Move to fresh air.

5. FIRE FIGHTING MEASURES

- Suitable extinguishing media : Alcohol-resistant foam.
Carbon dioxide (CO₂).
Dry chemical.
Dry sand.
Limestone powder.
- Specific hazards : Incomplete combustion may form carbon monoxide. Downwind personnel must be evacuated. Burning produces obnoxious and toxic fumes.
- Special protective equipment for fire-fighters : Use personal protective equipment. Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

- Personal precautions : Use self-contained breathing apparatus and chemically protective clothing. Wear suitable protective clothing, gloves and eye/face protection. Evacuate personnel to safe areas.
- Environmental precautions : Construct a dike to prevent spreading.
- Methods for cleaning up : Approach suspected leak areas with caution. Contact Air Products' Emergency Response Center for advice. Place in appropriate chemical waste container.
- Additional advice : If possible, stop flow of product.

Material Safety Data Sheet

Version 1.20
Revision Date 04/30/2006

MSDS Number 300000004750
Print Date 10/21/2007

7. HANDLING AND STORAGE

Handling

Emergency showers and eye wash stations should be readily accessible. Adhere to work practice rules established by government regulations. Avoid contact with eyes. Use personal protective equipment. When using, do not eat, drink or smoke.

Storage

Keep containers tightly closed in a dry, cool and well-ventilated place.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Provide readily accessible eye wash stations and safety showers.
Provide natural or explosion-proof ventilation adequate to ensure concentrations are kept below exposure limits.

Personal protective equipment

- Respiratory protection : Not required for properly ventilated areas.
- Hand protection : Neoprene gloves.
Nitrile rubber.
The breakthrough time of the selected glove(s) must be greater than the intended use period.
- Eye protection : Chemical resistant goggles must be worn.
- Skin and body protection : Long sleeve shirts and trousers without cuffs.
- Environmental exposure controls : Construct a dike to prevent spreading.
- Special instructions for protection and hygiene : Provide readily accessible eye wash stations and safety showers. Wash at the end of each workshift and before eating, smoking or using the toilet.

Exposure limit(s)

Ethylene glycol	Ceiling Limit Value: ACGIH	-	100 mg/m ³
Ethylene glycol	Ceiling Limit Value: OSHA Z1A	50 ppm	125 mg/m ³
Ethylene glycol	Ceiling Limit Value: US CA OEL	40 ppm	100 mg/m ³

9. PHYSICAL AND CHEMICAL PROPERTIES

- Color : Light yellow.
- Odor : Menthol.

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Vapor pressure	: < 0.98 mmHg at 21 °C
Density	: 62.428 lb/ft ³ (1 g/cm ³) at 70 °F (21 °C)
Boiling point/range	: > 390 °F (> 199 °C)
Flash point	: > 110 °C

10. STABILITY AND REACTIVITY

Stability	: Stable under normal conditions.
Materials to avoid	: Dehydrating Agents. Reactive metals (e.g. sodium, calcium, zinc etc.). Materials reactive with hydroxyl compounds. Oxidizing agents.
Hazardous decomposition products	: Carbon monoxide. Carbon dioxide (CO ₂). Aldehydes. Flammable hydrocarbon fragments (e.g., acetylene).

11. TOXICOLOGICAL INFORMATION

Acute Health Hazard

Ingestion	: LD50 : > 4,700 mg/kg Species : (Rat) Method : Estimated.
Inhalation	: LC50 (1 h) : > 20 mg/l Species : (Rat) Method : Estimated.
Skin.	: LD50 : > 2,000 mg/kg Species : (Rat) Method : OECD Test Guideline 402
Eye irritation/corrosion	: Severe eye irritation.
Acute dermal irritation/corrosion	: No data available. Mild skin irritation.

Chronic Health Hazard

This product contains ETHYLENE GLYCOL, which has been shown to cause dose-related teratogenic effects in rats and mice when given by gavage or in drinking water at high concentrations or doses. Ethylene glycol has also caused teratogenic effects in mice when administered as an aerosol at a concentration of 2500 mg/m³ for 6 hours a day throughout the period of organogenesis. Repeated ingestion of ethylene glycol has caused bladder and kidney

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stone formation, and kidney damage in laboratory animals. Two chronic feeding studies, using rats and mice, have not produced any evidence that ethylene glycol caused dose-related increases in tumor incidence. S-104 was administered orally to dogs in gelatin capsules at dose levels of 0, 200, 250, and 300 mg/kg/day for 91 days. All dogs survived for the duration of this study with few clinical signs. Some dogs in the 250 and 300 mg/kg/day dose groups exhibited sporadic convulsions or tremors during the study. The only other adverse effect observed was an increase in liver weights at all dose levels. Adult rats were orally administered S-104 in the diet at the following concentrations 0, 500, 1000, and 2000 mg/kg/day. The offspring were treated at the same dose levels as their parents for 91 days. Slight decreases in the mean weanling weights, lactation indices, body weights and food consumption were measured. The reproductive organs, fertility, offspring viability and gestation indices were not affected. After 91 day on test, a significant increase in liver weights with accompanying microscopic changes was observed in both sexes in the mid- and high-dose groups. The oral NOEL was 500 mg/kg/day for both the reproduction and repeated dose phases of this experiment. Rats were orally administered Tetramethyl-5-Decyne-4,7-Diol, 2,4,7,9- (S-104) in the diet for 28 days at concentrations of 0, 625, 1250, 2500, and 5000 ppm. No adverse effects were seen at any of the dose levels. The oral No-Observed-Effect-Level (NOEL) was 5000 ppm.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity : LC50 (96 h) : 81 mg/l
Species : Fathead minnow (*Pimephales promelas*).
LC50 (48 h) : 185 mg/l
Species : *Daphnia*
Method : see user defined free text

Toxicity to algae - Components

Tetramethyl-5-decyne-4,7-diol, 2,4,7,9-, EC50 (72 h) : 82 mg/l

Species : *Selenastrum capricornutum*

Tetramethyl-5-decyne-4,7-diol, 2,4,7,9-, EC50 (72 h) : 112 mg/l

Species :
Skeletonema costatum.

Toxicity to other organisms : No data available.

Persistence and degradability

Mobility : No data available.

Bioaccumulation : No data is available on the product itself.

Bioaccumulation - Components

Ethylene glycol

Negligible bioaccumulation potential.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products : Contact supplier if guidance is required.

Contaminated packaging : Dispose of container and unused contents in accordance with federal, state, and local requirements.

14. TRANSPORT INFORMATION

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CFR

Proper shipping name : Environmentally hazardous substances, liquid, n.o.s. (Ethylene glycol)
Class : 9
UN/ID No. : UN3082
Packing group : III

IATA

Proper shipping name : Environmentally hazardous substance, liquid, n.o.s. (Ethylene glycol)
Class : 9
UN/ID No. : UN3082
Packing group : III

IMDG

Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Ethylene glycol)
Class : 9
UN/ID No. : UN3082
Packing group : III

CTC

Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Ethylene glycol)
Class : 9
UN/ID No. : UN3082
Packing group : III

15. REGULATORY INFORMATION

OSHA Hazard Communication Standard (29 CFR 1910.1200) Hazard Class(es)
Irritant. Reproductive toxin. Kidney toxin.

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
EU	EINECS	Included on EINECS inventory or polymer substance, monomers included on EINECS inventory or no longer polymer.
Canada	DSL	Included on Inventory.
Australia	AICS	Included on Inventory.
Japan	ENCS	Included on Inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Included on Inventory.
Philippines	PICCS	Included on Inventory.

EPA SARA Title III Section 312 (40 CFR 370) Hazard Classification:
Acute Health Hazard

EPA SARA Title III Section 313 (40 CFR 372) Component(s) above 'de minimus' level:
Ethylene glycol

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US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)
This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other harm.

16. OTHER INFORMATION

HMIS Rating

Health	: 2
Flammability	: 1
Physical hazard	: 0

Prepared by : Air Products and Chemicals, Inc. Global EH&S Product Safety Department

For additional information, please visit our Product Stewardship web site at
<http://www.airproducts.com/productstewardship/>

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Texaco Texcool® E 100

Product Use: Antifreeze/Coolant

Product Number(s): CPS227939

Company Identification

ChevronTexaco Global Lubricants
6001 Bollinger Canyon Road
San Ramon, CA 94583
United States of America

Transportation Emergency Response

CHEMTREC: (800) 424-9300 or (703) 527-3887

Health Emergency

ChevronTexaco Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623

Product Information

email : lubemsds@chevrontexaco.com

Product Information: 800-LUBE-TEK

MSDS Requests: 800-414-6737

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Ethylene Glycol	107-21-1	80 - 95 %weight
Diethylene glycol	111-46-6	1 - 5 %weight

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

- HARMFUL OR FATAL IF SWALLOWED
- POSSIBLE BIRTH DEFECT HAZARD - CONTAINS MATERIAL THAT MAY CAUSE BIRTH DEFECTS BASED ON ANIMAL DATA
- MAY CAUSE DAMAGE TO:
- KIDNEY

IMMEDIATE HEALTH EFFECTS

Eye: Not expected to cause prolonged or significant eye irritation.

Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin.

Ingestion: Toxic; may be harmful or fatal if swallowed.

Inhalation: The vapor or fumes from this material may cause respiratory irritation. Symptoms of respiratory irritation may include coughing and difficulty breathing. Breathing this material at concentrations above the recommended exposure limits may cause central nervous system effects. Central nervous system effects may include headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation. At extreme exposures, central nervous system effects may include respiratory

depression, tremors or convulsions, loss of consciousness, coma or death.

DELAYED OR OTHER HEALTH EFFECTS:

Reproduction and Birth Defects: Contains material that may cause birth defects based on animal data.

Target Organs: Contains material that may cause damage to the following organ(s) following repeated ingestion based on animal data: Kidney

See Section 11 for additional information. Risk depends on duration and level of exposure.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.

Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.

Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.

Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.

SECTION 5 FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:

OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

NFPA RATINGS: Health: 2 Flammability: 1 Reactivity: 0

FLAMMABLE PROPERTIES:

Flashpoint: (Cleveland Open Cup) 127 °C (260 °F)

Autoignition: No Data Available

Flammability (Explosive) Limits (% by volume in air): Lower: No data available Upper: No data available

EXTINGUISHING MEDIA: Dry Chemical, CO₂, AFFF Foam or alcohol resistant foam.

PROTECTION OF FIRE FIGHTERS:

Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.

Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion. Combustion may form oxides of: Phosphorus, Potassium .

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.

Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.

Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: Do not breathe vapor or fumes. Wash thoroughly after handling.

General Handling Information: Do not taste or swallow antifreeze or solution. Keep out of the reach of children and animals.

Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling,

gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.

General Storage Information: Do not store in open or unlabeled containers.

Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.

Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Natural rubber, Neoprene, Nitrile Rubber, Polyvinyl Chloride (PVC or Vinyl).

Respiratory Protection: Determine if airborne concentrations are below the recommended occupational exposure limits for jurisdiction of use. If airborne concentrations are above the acceptable limits, wear an approved respirator that provides adequate protection from this material, such as: Air-Purifying Respirator for Organic Vapors, Dusts and Mists.

Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Ethylene Glycol	ACGIH	--	--	100 mg/m3	--

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Pink

Physical State: Liquid

Odor: No Data Available

pH: 10.2

Vapor Pressure: 0.1 mmHg @ 20 °C (68 °F)

Vapor Density (Air = 1): 2.1

Boiling Point: 108.9°C (228°F)

Solubility: Miscible

Freezing Point: -36.7°C (-34°F)

Specific Gravity: 1.12 - 1.14

Density: 1.12 kg/l - 1.14 kg/l @ 15°C (59°F)

Viscosity: 18.7 cSt @ 20°C (68°F)

Evaporation Rate: No Data Available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

Hazardous Decomposition Products: Aldehydes (Elevated temperatures)

Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS

Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.

Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.

Skin Sensitization: No product toxicology data available.

Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:

This product contains ethylene glycol (EG). The toxicity of EG via inhalation or skin contact is expected to be slight at room temperature. The estimated oral lethal dose is about 100 cc (3.3 oz.) for an adult human. Ethylene glycol is oxidized to oxalic acid which results in the deposition of calcium oxalate crystals mainly in the brain and kidneys. Early signs and symptoms of EG poisoning may resemble those of alcohol intoxication. Later, the victim may experience nausea, vomiting, weakness, abdominal and muscle pain, difficulty in breathing and decreased urine output. When EG was heated above the boiling point of water, vapors formed which reportedly caused unconsciousness, increased lymphocyte count, and a rapid, jerky movement of the eyes in persons chronically exposed. When EG was administered orally to pregnant rats and mice, there was an increase in fetal deaths and birth defects. Some of these effects occurred at doses that had no toxic effects on the mothers. We are not aware of any reports that EG causes reproductive toxicity in human beings.

This product contains diethylene glycol (DEG). The estimated oral lethal dose is about 50 cc (1.6 oz) for an adult human. DEG has caused the following effects in laboratory animals: liver abnormalities, kidney damage and blood abnormalities. It has been suggested as a cause of the following effects in humans: liver abnormalities, kidney damage, lung damage and central nervous system damage.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY

The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

ENVIRONMENTAL FATE

This material is expected to be readily biodegradable.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the

criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: Anti-freeze Preparations, Proprietary, NOT REGULATED AS A HAZARDOUS MATERIAL

IMO/IMDG Shipping Description: NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORTATION UNDER THE IMDG CODE

ICAO/IATA Shipping Description: Anti-freeze Preparations, Proprietary, NOT REGULATED AS A DANGEROUS GOOD

SECTION 15 REGULATORY INFORMATION

- EPCRA 311/312 CATEGORIES:** 1. Immediate (Acute) Health Effects: YES
2. Delayed (Chronic) Health Effects: YES
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

The following components of this material are found on the regulatory lists indicated.

Diethylene glycol	07
Ethylene Glycol	03, 05, 06, 07

CHEMICAL INVENTORIES:

All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), KECI (Korea), PICCS (Philippines), TSCA (United States).

NEW JERSEY RTK CLASSIFICATION:

Refer to components listed in Section 2.

WHMIS CLASSIFICATION:

Class D, Division 1, Subdivision B: Toxic Material - Acute Lethality
Class D, Division 2, Subdivision A: Very Toxic Material - Teratogenicity and Embryotoxicity
Class D, Division 2, Subdivision B: Toxic Material - Chronic Toxic Effects

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 2 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 2* Flammability: 1 Reactivity: 0

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:

Label Category : ANTIFREEZE/COOLANT 1

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 1-16

Revision Date: 08/02/2004

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - ChevronTexaco	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the ChevronTexaco Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Appendix 7



January 9, 2008

Kristi A. Barnett
U.S. Registration Coordinator
DuPont Crop Protection
Stine Haskell Research Center 300/429
1090 Elkton Road P.O. Box 30
Newark, DE 19714

(302)366-5051
(302)355-2806 (fax)

RECEIVED
USDA NATIONAL
ORGANIC PROGRAM
2008 JAN 18 A 9:36

Subject: Letter of Support for DuPont™ Kocide® 2000 (EPA Reg. No. 352-656) and DuPont™ Kocide® 3000 (EPA Reg. No. 352-662) for use in organic agriculture

Dear Ms. Barnett:

I am writing this letter in support of DuPont's efforts to reinstate the OMRI listing of Kocide® 2000 and Kocide® 3000 for organic agriculture. As you know, organic growers are severely limited in choices of products to combat common maladies affecting the crops we grow. We have been using the Kocide® products as our primary copper fungicide with good results. This is a tool that we need in order to continue growing high quality organic produce that the consumer demands. We have researched other copper fungicide products and have not found any other organically approved copper products which can be used on such a wide range of crops, are safe and easy to apply, and are readily available.

On behalf of organic vegetable growers and consumers, we hope DuPont will vigorously pursue resolution of issues to have Kocide® 2000 and Kocide® 3000 reinstated on the OMRI list of approved organic materials. If we can be of further help, please feel free to contact us. Thank you for your efforts on our behalf.

Sincerely,

A handwritten signature in black ink, appearing to read "Steve Groves", is written over a horizontal line.

Steve Groves
Organic Crop Protection Manager
Grimmway Enterprises Inc.
PO Box 81498
Bakersfield, CA 93380-1498

(661) 845-2296 (office)
(661) 477-0645 (cell)
(661) 858-0636 (fax)



CORNELL

3059 Sound Avenue
Riverhead, NY 11901

Telephone: 631 727-3595
Fax: 631 727-3611

Long Island Horticultural Research
and Extension Center

January 11, 2008

Kristi A. Barnett
U.S. Registration Coordinator
DuPont Crop Protection
Stine Haskell Research Center 300/429
1090 Elkton Road P.O. Box 30
Newark, DE 19714-0030

Dear Ms Barnett,

The purpose of my letter is to state my opinion about the value of Kocide 3000 for organic vegetable producers and the importance of having it OMRI listed. I interact extensively with organic growers here on Long Island as well as throughout the northeastern US and thus feel I understand their needs. In addition to conducting research on organic disease management and working with local organic growers on managing diseases on their farms, I am a member of the Cornell Organic Production Program Work Team, the Northeast Organic Network, and I was part of the educational team for the Advanced Training in Organic Crop Production program conducted in 2005.

Copper fungicides are an important tool for managing diseases of organic vegetable crops. Growers producing vegetable crops organically typically produce a diversity of crops. Often copper is the only effective option for a disease. And it is helpful with this diversity to have a foundation product that can be used widely. Kocide 3000 has been especially valuable because its improved bioactivity allows growers to greatly reduce the quantity of copper they are putting in the environment when they apply copper. This is an important issue for organic growers. For example, rates for diseases of cucurbit crops are 1.5-3 lb/A for Champion, a copper fungicide that was commonly used, versus 0.5-1.25 lb/A for Kocide 3000.

The OMRI list is the standard for identifying products acceptable for organic production in the US. Sometimes certifiers will permit a grower to use a product that is not OMRI listed. However, growers are reluctant to use a product that does not have the OMRI logo on the container out of concern that they might jeopardize their organic certification.

I hope my perspective on the importance of Kocide 3000 for organic producers, and communicating my support, will be helpful for resolving its status.

Please do not hesitate to contact me if you need additional information.

Sincerely,



Margaret Tuttle McGrath
Associate Professor
Department of Plant Pathology and Plant-Microbe Biology
e-mail: mtm3@cornell.edu



January 7, 2008

Kristi A. Barnett
U.S. Registration Coordinator
DuPont Crop Protection
Stine Haskell Research Center 300/429
1090 Elkton Rd.; Box 30
Newark, DE 19714

RE: Kocide 2000/3000 and its use in Organic Agricultural Production

Dear Ms. Barnett:

This communiqué is being provided in response to the U.S. EPA's announcement on September 11, 2007 regarding their removal of several substances from List 4, the Agency's list of Inerts of Minimal Concern for use in pesticides for organic production. The Florida Fruit and Vegetable Association (FFVA) is a private, non-profit agricultural cooperative whose mission is to enhance the business and competitive environment for producing fruits, vegetables, and other crops by managing issues and providing collective services for our members. FFVA is submitting these comments on behalf of the organic crop production industry in the state. We appreciate and welcome the opportunity to supply input on this important topic. It is our understanding that products containing these removed inert substances will no longer qualify for use in crop protection production formulations to be used in organic agriculture. It is also our understanding that this situation arose because of "administrative issues" between EPA and the USDA Office of the National Organic Standards Board. Simply stated, with all factors considered, mere administrative issues of any type between various governmental agencies are in no way justification for removal of an inert ingredient from the approved list of minimal concern materials.

Copper and other similar products such as sulfur are widely used in organic farming primarily for disease prevention. Copper products include compounds that are exempt from tolerance by the EPA such as Bordeaux mixes, copper hydroxide, copper sulfates, copper-zinc chromate, copper oxychloride and copper oxides. These compounds may be used as algicides, bactericides, fungicides, molluscicides, for arthropod control, for wood treatment or as micronutrients. The Organic Resource Manual lists copper compounds as the #1 most commonly used disease management material in organic farming. The toxic action of copper is attributed to its ability to denature cellular proteins and to deactivate enzyme systems in fungi and algae. The Organic Foods Protection Act at

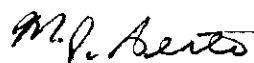
K. Barnett
January 7, 2008
Page 2 of 2

6517(c)(1)(B)(i) provides an exemption for synthetic copper and sulfur compounds that appear on the National List. The USDA organics final rule lists copper sulfate for plant disease control at 205.601(i)(2), with a restriction that substance must be used in a manner that minimizes copper accumulation in the soil. Yet somehow all of a sudden, even with all these exemptions in place for copper as the active ingredient, the inert ingredients contained in the above referenced formulations and inter-agency administrative issues associated with those inert ingredients apparently have unjustifiably driven certain copper products off of the Organic Material Review Institute's (OMRI) approved use list.

Copper obviously has a long standing history of success both efficacy wise and toxicologically, hence it's more than half a century of profitable use by the Florida agricultural production and organic production industries. Consequently, it seems quite disturbing and confusing that any copper product could be de-listed from the ORMI's approved list merely because the National Organic Program based their approved directory of inerts on an EPA list that was produced many years ago. Kocide 2000/3000 products have been determined by EPA to have no toxicological or regulatory concerns, yet the EPA "no longer maintained" list of inert ingredients being referred to somehow remains the cause of this problem. A no longer maintained list of inert ingredients by itself is in no way cause for any crop protection product to be removed from the ORMI's list of approved compounds, unless some type of scientifically based toxicological reasoning or other similar justification can be established that validates these copper products and/or their inert ingredients being removed from organic production.

For all the aforementioned reasons and justifications, the organic production industry in the state definitely deserves access to Kocide 2000/3000 and other such copper products. FFVA strongly endorses the organic registration reinstatement/preservation efforts and placement of Kocide back onto the OMRI's list of approved products. If any additional information is needed or questions arise, please do not hesitate to contact us. Thank you in advance for your support with this situation.

Sincerely



Michael J. Aerts
Assistant Director
Environmental and Pest Management Division





P.O. BOX 5147 • OXNARD, CA 93031 • PHONE: 805.984.7494 • FAX: 805.984 6021

December 13, 2007

Kristi A. Barnett
U.S. Registration Coordinator
DuPont Crop Protection
Stine Haskell Research Center 300/429
1090 Elkton Road P.O. Box 30
Newark, DE 19714

302-366-5051
302-355-2806 Fax

Subject: Letter of support for DuPont/trademark Kocide/registered 2000(EPA Reg. No. 352-656) and DuPont/trademark Kocide/registered 3000 (EPA Reg. No.352-662) for use in organic agriculture.

Dear Ms. Barnett:

I am pleased to support DuPont's petition to the National Organic Standards Board (NOSB) in order to reinstate the OMRI listing of Kocide/registered 2000 and Kocide/registered 3000 in organic agriculture. We need Kocide/registered available for organic production because it has the lowest rate of copper and is the most environmentally friendly of the copper choices on the market. We can apply it and effectively control disease throughout the season without exceeding the European copper application limits, it is the only product that we can use for this.

Sincerely,

A handwritten signature in cursive script that reads "Gerald Benson".

Gerald Benson
Farm Manager, PCA
Duda Farm Fresh Foods, Inc.
Oxnard, Ca
805-377-3440
805-984-6021 Fax

Frank's Crop Watch

DATE: _____

CLIENT: _____

December 13, 2007

Kristi A. Barnett
U.S. Registration Coordinator
DuPont Crop Protection
Stine Haskell Research Center 300/429
1090 Elkton Road P.O. Box 30
Newark, DE 19714

(302)366-5051
(302)355-2806 (fax)

Subject: Letter of Support for DuPont™ Kocide® 2000 (EPA Reg. No. 352-656)
and DuPont™ Kocide® 3000 (EPA Reg. No. 352-662) for use in organic
agriculture

Dear Ms. Barnett:

I am pleased to support DuPont's petition to the National Organic Standards Board (NOSB) in order to reinstate the OMRI listing of Kocide® 2000 and Kocide® 3000 in organic agriculture. The Kocide® products offer organic growers a superior copper fungicide in comparison to the available alternatives. The lower metallic copper content, ease of handling and worker safety features make the Kocide® products desirable to the organic growers. With downy mildew affecting all the organic cucumbers, squash and melons in the area we need Kocide; quite simply Serenade/Sonata and/or other products will NOT provide adequate control.

Sincerely,



Frank Marcello
Frank's Crop Watch
15855 Tittabawassee Rd.
P.O. Box 558
Hemlock, MI 48626
(989) 751-5631 cell phone
email: fjmarc@tir.com