



1812-313 PM123 10670

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

OFFICE OF  
PESTICIDES AND TOXIC SUBSTANCES

Ms. Dianne Savage  
Griffin Corporation  
P.O. Box 1847  
Valdosta, GA 31603-1847

MAR 26 1987

Dear Ms. Savage:

Subject: Amendments - Updated Formulas/Revised Labeling/  
New Product Name  
Technical Copper Sulfate Pentahydrate  
EPA Registration No. 1812-293  
Kobasic  
EPA Registration No. 1812-300  
Copper Sulfate Pentahydrate Crystals  
EPA Registration No. 1812-304  
Blue Viking Copper Sulfate Star Shine Crystals  
EPA Registration No. 1812-313 ✓  
Blue Viking Copper Sulfate Star Flow Powder  
EPA Registration No. 1812-314  
Blue Viking Copper Sulfate Star Flow Solution  
EPA Registration No. 1812-319  
Your Submissions Dated February 9 and 16, 1987

The updated basic formulas for EPA Registration Nos. 1812-293, -300, -304, -313, and -314 are acceptable. Alternate formulas using "Griffin" starting materials are also acceptable. It is understood that these basic and alternate formulas dated February 16, 1987 (using "Griffin" starting materials) replace previously accepted formulas for these products. Alternate formulas using Synchem starting material are not acceptable. Since this is an unregistered source of active ingredient, you must submit product chemistry describing this product. You are required to include offers-to-pay for data to support this alternate source of supply for the particular registrations involved since this constitutes a major amendment. We note that you have submitted a partial chemical analysis of the Synchem material. Please submit complete analysis for both Synchem and Griffin copper sulfate pentahydrate materials.

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The formula statement for EPA Registration No. 1812-319 does not support labeling for this product. Since this product contains 6.0% metallic copper, block 13 on the formula statement would be calculated as follows:

$$25.2\% \times (\text{Block 13}) = 6.0\%$$

The label active ingredient statement should read:

Copper expressed as metallic\* . . . 6.0%

\*from copper sulfate pentahydrate

Also, the lb/gallon statement should read:

contains 0.64 lb copper/gal

Revised labeling for EPA Registration Nos. 1812-293, -304, -313, and -314 is acceptable provided you:

1. Make the changes below before releasing the products for shipment bearing amended labeling:

- a. For EPA Registration Nos. 1812-293, -304, -313, and -314, modify the Hazards to Humans statement for eyes to read:

Corrosive. Causes irreversible eye damage.

Under Storage and Disposal for EPA Registration No. 1812-293, delete "spray mixture or rinsate" since this is a manufacturing-use product, and references to concentrate since these are crystals packaged in bags. For the remainder of these products add the complete pesticide disposal text for "acutely hazardous" materials from PR Notice 83-3. Also, add a statement to the front panel referring the user to additional precautionary statements.

- b. For EPA Registration No. 1812-304 under irrigation system control of algae and potamogeton pond weeds, include the suggested number of hours for each treatment. Also, immediately following directions for control of algae in impounded waters add:

(Refer to table below for recommended application  
water)

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- c. For EPA Registration Nos. 1812-313 and -314, delete instructions for calculating (1) weight of water; (2) active ingredient to achieve a given ppm level; and (3) water flow in ditches, etc. This information is unnecessary and/or inappropriate. Only the first paragraph in that section and the note regarding potable water should be included.

Under algacide instructions, add recommended water volume for spray and move the phrase "0.27 ppm to 0.54 ppm (Cu)" so that it follows "3 to 6 lb per acre foot of water." Change the dosage rate for control of tadpole shrimp to 5 to 10 lb per acre.

Since a specific reentry interval for farmworkers is not required after sprays have dried, delete the 24-hour interval proposed or provide a rationale for inclusion.

2. Submit one (1) copy of final printed labeling incorporating the changes above.

A stamped copy of each label is enclosed for your records.

Labeling for EPA Registration No. 1812-319 is not acceptable. Since you are reporting a pH of 1.5, the appropriate signal word for this product is "DANGER." Use the same precautionary language as for the other copper sulfate pentahydrate products, substituting "skin burns" for "skin irritation" and adding "and rubber gloves" after "goggles." Add the Spanish signal word "PELIGRO" adjacent to the English signal word. Add pesticide disposal language for "acutely hazardous" substances from PR Notice 83-3. Modify algacide and tadpole shrimp instructions per 1.c. above, inserting ppm figures immediately following "1.2 to 2.4 gallons" and changing tadpole shrimp rates to 2 to 4 gallons per acre.

Labeling for EPA Registration No. 1812-300 is not acceptable. Add the Spanish signal word "AVISO" adjacent to the English signal word and, the Spanish text from PR Notice 83-2, "Precaucion al usuario . . ." Modify "Causes severe eye . . . irritation" to read "Causes substantial but temporary eye injury." Use appropriate environmental hazards language for terrestrial end-use products from page 13 in the Standard. There are also numerous problems with the revised directions/diseases proposed. Refer to the enclosed review for required modifications. Submit five (5) copies of revised draft labeling.

The Offer-To-Pay Form for EPA Registration No. 1812-319 was not properly filled out, i.e., the appropriate label was not checked for item 3. Please resubmit this document. Provide a written statement and five (5) copies of draft labeling for this product with your response.

**BEST AVAILABLE COPY**

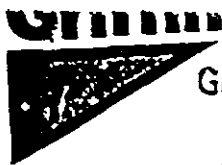
The new product name for EPA Registration No. 1812-293, referred to above, is acceptable. We are also accepting the additional brand name - "Blue Viking Copper Sulfate Star Light Crystals" - under EPA Registration No. 1812-313.

Sincerely yours,



Richard F. Mountfort  
Product Manager (23)  
Fungicide-Herbicide Branch  
Registration Division (TS-767C)

Enclosures



Griffin Corporation, P. O. Box 1847, Valdosta, Georgia 31603-1847  
Read entire label. Use strictly in accordance with precautionary statements and directions, and with applicable state and Federal regulations.

# NET WT. 50 LBS. BLUE VIKING



ACCEPTED  
MAR 26 1987  
313

## KOCIDE COPPER SULFATE STAR SHINE CRYSTALS

ACTIVE INGREDIENT	
COPPER SULFATE PENTAHYDRATE .....	99.0%
INERT INGREDIENTS .....	1.0%
TOTAL	100.0%
COPPER AS METALLIC NOT LESS THAN 25.2%	

**KEEP OUT OF REACH OF CHILDREN**

**DANGER — PELIGRO**

STATEMENT OF PRACTICAL TREATMENT

**IF ON SKIN:** Wash with plenty of soap and water. Get medical attention.  
**IF INHALED:** Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. Get medical attention.  
**IF IN EYES:** Flush with plenty of water. Call a physician.  
**IF SWALLOWED:** Drink promptly a large quantity of milk, egg white, gelatin solution, or if these are not available, large quantities of water. Avoid alcohol. Note to Physician: Probable mucosal damage may contraindicate use of gastric lavage.

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



**KOCIDE CHEMICAL CORPORATION** of Casa Grande  
Casa Grande, Arizona 85222

EPA Reg. No. 1812-313  
EPA Est. No. 45450-AZ-1

A WHOLLY OWNED SUBSIDIARY OF GRIFFIN CORPORATION

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**PRECAUTIONARY STATEMENTS  
HAZARDS TO HUMANS AND DOMESTIC ANIMALS**

**DANGER**

*Carosin.*  
Causes severe eye and skin irritation. Harmful if absorbed through the skin or inhaled. May cause skin sensitization reactions in certain individuals. Avoid contact with the skin, eyes, or clothing. Avoid breathing dust. Protective clothing, including goggles, should be worn. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

**ENVIRONMENTAL HAZARDS**

This pesticide is toxic to fish and aquatic organisms.

**ENDANGERED SPECIES RESTRICTIONS**

It is a violation of Federal law to use any pesticide in a manner that results in the death of an endangered species or adverse modification of their habitat.

The use of this product may pose a hazard to certain Federally designated endangered species known to occur in specific areas within the following counties:

STATE	SPECIES	BULLETIN NO.	COUNTY
California	Solano Grass	EPA/ES-85-13	Solano
Tennessee	Slackwater Darter	EPA/ES-85-04	Lawrence Wayne Hancock
	Freshwater Mussels	EPA/ES-85-07	Claiborne Hawkins Sullivan
Alabama	Slackwater Darter	EPA/ES-85-05	Lauderdale Limestone Madison
Virginia	Freshwater Mussels	EPA/ES-85-06	Grayson Smyth Scott Lee Washington

Before using this product in the above counties you must obtain the EPA Bulletin specific to your area. This Bulletin identifies areas within these counties where the use of this pesticide is prohibited, unless specified otherwise. The EPA Bulletin is available from either your County Agricultural Extension Agent, the Endangered Species Specialist in your State Wildlife Agency Headquarters, or the appropriate Regional Office of the U.S. Fish and Wildlife Service. THIS BULLETIN MUST BE REVIEWED PRIOR TO PESTICIDE USES.

BEST AVAILABLE COPY

This pesticide is toxic to fish. Direct application of copper sulfate to water may cause a significant reduction in populations of aquatic invertebrates, plants and fish.

Do not treat more than one half of lake or pond at one time on order to avoid depletion of oxygen from decaying vegetation. Allow 1 to 2 weeks between treatment for oxygen levels to recover.

Trout and other species of fish may be killed at application rates recommended on this label, especially in soft or acid waters. However, fish toxicity generally decreases when the hardness of water increases.

Do not contaminate water by cleaning or disposal of wastes.

Consult your State Fish and Game Agency before applying this product to public waters. Permits may be required before treating such waters.

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#### STORAGE AND DISPOSAL

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

PESTICIDE DISPOSAL: *Wastes are acutely hazardous*  
Wastes resulting from the use of this product may be disposed of ~~on site or at an~~ approved waste disposal facility.

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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#### DIRECTIONS FOR USE

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

#### RE-ENTRY STATEMENT

Do not apply this product in such a manner as to directly or through drift expose workers or other persons. The area being treated must...be vacated by unprotected persons.

Do not enter treated area without protective clothing until sprays have dried.

Because certain states may require more restrictive re-entry intervals for various crops treated with this product, consult your State Department of Agriculture for further information.

**BEST AVAILABLE COPY**

Written or oral warnings must be given to workers who are expected to be in a treated area or in an area about to be treated with this product. (Indicate specific oral warnings which inform workers of areas or fields that may not be entered without specific protective clothing, period of time field must be vacated and appropriate actions to take in case of accidental exposure.) When oral warnings are given, warnings shall be given in a language customarily understood by workers. Oral warnings must be given if there is reason to believe that written warnings can not be understood by workers. Written warnings must include the following information: DANGER. Area treated with KOCIDE COPPER SULFATE STAR SHINE CRYSTALS on (date of application). Do not enter without appropriate protective clothing for 24 hours. In case of accidental exposure see Statement of Practical Treatment.

### GENERAL DIRECTIONS

Use KOCIDE COPPER SULFATE STAR SHINE CRYSTALS as noted below. When using KOCIDE COPPER SULFATE STAR SHINE CRYSTALS to control algae, there are many factors to consider, water hardness, temperature of the water, kind and amount of vegetation to be controlled and amount of water flow. Algae can be controlled more easily and effectively if treatment with copper sulfate is made soon after plant growth has started. Small amount of copper sulfate can effectively control algae in water. However, if treatment is delayed until a large amount of algae is present, larger quantities of copper sulfate may be required. Control of Algae in water systems is not always permanent. Usually algae is more difficult to control with copper sulfate when water temperatures are low. The dose rates recommended for KOCIDE COPPER SULFATE STAR SHINE CRYSTALS are based on water temperatures of 60°F or above. Larger quantities of copper sulfate will also be required in hard water. Normally, larger quantities of copper sulfate will be required to kill algae in water which is flowing than in a body of stagnant water. If possible, curtail the flow of water before treatment and hold dormant for approximately three days after treatment or until the plants have begun to die. When preparing a copper sulfate solution in water, it is best that the mixing container be made of glass or plastic or if a metal container is used, that it be either painted, enameled, or copper-lined. The use of a galvanized container causes a chemical reaction to take place by which the copper displaces the galvanized coating of the container. It is usually best to treat algae on a sunny day when the heavy mats of filamentary algae are most likely to be floating on the surface where it can be sprayed directly. If there is some doubt about the concentration to apply, it is generally best to start with a lower concentration and to increase this concentration until the algae is killed.

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# CALCULATIONS FOR THE AMOUNT OF WATER IMPOUNDED AND FOR THE AMOUNT OF COPPER SULFATE TO BE USED:

Calculate water volume as follows:  
 (1) Obtain surface area by measuring of regular shaped ponds or mapping of irregular ponds or by reference to previously recorded engineering data or maps. (2) Calculate average depth by sounding in a regular pattern and taking the mean of these readings or by reference to previously obtained data. (3) Multiply surface area in feet by average depth in feet to obtain cubic feet of water volume. (4) Multiply surface area in acres by average depth in feet to obtain total acre-feet of water volume.

**CALCULATE WEIGHT OF WATER TO BE TREATED AS FOLLOWS:** (1) Multiply volume in cubic feet by 62.44 to obtain total pounds of water, or (2) Multiply volume in acre feet by 2,720,000 to obtain pounds of water.

**CALCULATIONS OF ACTIVE INGREDIENT TO BE ADDED:** To calculate the amount of copper sulfate needed to achieve the recommended concentration, multiply the weight of water by the recommended concentration of copper sulfate. Since recommended concentrations are normally given in parts per million (ppm), it will first be necessary to convert the value in parts per million to a decimal equivalent. For example, 2 ppm is the same as 0.000002 when used in this calculation. Therefore, to calculate the amount of copper sulfate to treat 1 acre-foot of water with 2 ppm copper sulfate, the calculation would be as follows:

$$0.000002 \times 2,720,000 = 5.44 \text{ lbs Copper Sulfate}$$

**NOTE:** If treated water is to be used as a source of potable water, the metallic copper residual must not exceed 1 ppm (4 ppm copper sulfate pentahydrate).

**CALCULATION OF WATER FLOW IN DITCHES, STREAMS, AND IRRIGATION SYSTEMS:** The amount of water flow in cubic feet per second is found by means of a weir or other measuring device.

## CONTROL OF TADPOLE SHRIMP

*use in rice fields*  
*use spraying*  
*water volume for spraying?*  
 KOCIDE COPPER SULFATE STAR SHINE CRYSTALS are recommended for the control of tadpole shrimp in rice fields. KOCIDE COPPER SULFATE STAR SHINE CRYSTALS should be applied at a rate of ~~10 to 15~~ pounds per acre using boat, plane or other professional devices. Use at the first indication of infestation after the field has been flooded to a depth of 6 to 8 inches. KOCIDE COPPER SULFATE STAR SHINE CRYSTALS are especially graded for maximum solubility in this volume of water.

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water volume?

ALGAECIDE

KOCIDE COPPER SULFATE STAR SHINE CRYSTALS kills Filamentous and Plankton algae in flooded rice fields, lake or pond water at 0.27 ppm to 0.54 ppm ( $\text{Cu}^0$ ) in the treated water. Apply at a rate of 3 to 6 pounds per acre foot of water using boat, plane or other professional spraying device. Apply twice yearly or as needed. Determine the number of acre feet of water to be treated. An acre foot of water is equal to one acre of water one foot deep which equals 328,000 gallons or 2,720,000 pounds.

SEWER TREATMENT - ROOT DESTROYER

For partial stoppage - add 1/2 pounds of KOCIDE COPPER SULFATE STAR SHINE CRYSTALS to sewer or drain and flush toward blockage with 5 gallons of water. Repeat at 6 month intervals to prevent growth of new roots.

For complete stoppage - Physically remove the root blockage and repeat as above.

WOOD TREATMENT (green, peeled posts) - fungus decay, rot.

Prepare a solution of 18.0 pounds of sodium chromate in each 26 gallons of water to be used and a separate second solution of 18 pounds of copper sulfate in each 24 gallons of water to be used; soak the peeled, green posts, butt end down first in the copper sulfate solution for 3 days, then butt end down in the sodium chromate solution for 2 days, and finally turn the post upside down in the sodium chromate solution for 1 additional day, remove and rinse posts with clear water.

BORDEAUX MIXTURE

HOW TO UNDERSTAND BORDEAUX FORMULATIONS:

If the Bordeaux Mixture instructions read 10-10-100, the first figure means the number of pounds of copper sulfate pentahydrate. The second figure means the pounds of hydrated spray lime, and the third figure, the gallons of water to be used. Use as a full coverage spray to runoff.

HOW TO PREPARE A BORDEAUX MIXTURE

To prepare a Bordeaux mixture, fill a tank with water, one quarter full. Then with agitator running, mix in Kocide Copper Sulfate Star Shine through a copper, bronze, stainless steel or plastic screen. Add water so the tank is three quarters full. Mix in the hydrated spray lime through the screen and finish filling the tank with water.

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## CROP USE RECOMMENDATIONS

**ALMONDS, APRICOTS, PEACHES, NECTARINES:** Shot Hole Fungus  
Prepare a 10-10-100 Bordeaux and apply as a dormant spray in late fall or early spring.

**ALMONDS, APRICOTS, CHERRIES, PEACHES, NECTARINES, PLUMS, PRUNES:** Brown Rot Blossom Blight  
Prepare a 10-10-100 Bordeaux and apply when buds begin to swell.

**SOUR CHERRIES:** Leaf Spot  
Prepare a 10-10-100 Bordeaux. Apply as a full coverage spray after petal fall or as recommended by the State Extension Service.

**LEMONS, ORANGES, GRAPEFRUIT:** Phytophthora Brown Rot  
Prepare a 3-4 1/2-100 Bordeaux where there is no history of copper injury or a 3-2-6-100 (Zinc Sulfate-Copper Sulfate-Hydrated Lime-Gallons of water) Bordeaux. Spray 6 gallons on skirt of tree 3 to 4 feet high and 2 to 4 gallons on trunk and ground under tree. If *P.hibernalis* is present, use 10 to 25 gallons to completely cover each tree. Apply in November or December just before or after first rain. In severe brown rot season, apply second application in January or February.

**LEMONS, ORANGES, GRAPEFRUIT:** Septoria Fruit and Leaf Spot, Central California and Brown Rot and Zinc and Copper Deficiencies  
Prepare a 3-2-6-100 Bordeaux and use 10 to 25 gallons to completely cover each tree. Apply in October, November or December before or just after first rain.

**WALNUTS:** Walnut Blight  
Apply 15 pounds with 10 pounds of lime in 100 gallons of water plus one-half gallon summer oil emulsion. Apply in early pre-bloom 10-20% pistillate (not when catkin blooms are showing) before or after rain. Use only if Bordeaux mixture has been shown to be non-phytotoxic in your area.

## KOCIDE COPPER SULFATE STAR SHINE CRYSTALS SUGGESTED USES

## AGRICULTURE

Use in Bordeaux Mixture sprays as a fungicide to control plant diseases, or in fertilizers to correct copper deficiencies in soils. (See directions for use) Copper Sulfate is also a valuable dietary supplement in mixed feeds for beneficial animals. Please consult your State Agricultural Experiment Station of State Extension Service for guidance in preparing dosages and formulas.

**WATER, SEWAGE & WOOD TREATMENT** (See directions for use)

**WATER TREATMENT** - Kills algae in field, lake and pond water.  
**SEWER TREATMENT** - Destroys molds and fungus growth in sewers and storm drains.  
**WOOD TREATMENT** - Use Copper Sulfate with certain other chemicals as a preservative for wooden fence posts.

[Stamp: 1964 APR 15]

WARRANTY STATEMENT

GRIFFIN Warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on such label only when used in accordance with directions under normal use conditions. It is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond the control of GRIFFIN. In no case shall GRIFFIN be liable for consequential, special or indirect damages resulting from the use or handling of this product. All such risks shall be assumed by the Buyer. GRIFFIN MAKES NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ABOVE.

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**Griffin**

Griffin Corporation, P. O. Box 1847, 1

Read entire label. Use strictly in accordance with statements and directions, and with application

**NET WT. 5  
BLUE VIAL**



*Additional  
Crystal  
Size*

**KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS**

**ACTIVE INGREDIENT**

COPPER SULFATE PENTAHYDRATE

**INERT INGREDIENTS**

**TOTAL**

**COPPER AS METALLIC NOT LESS THAN 25.2%**

99.0%

1.0%

100.0%

**KEEP OUT OF REACH OF CHILDREN**

**DANGER — PELIGRO**

**STATEMENT OF PRACTICAL TREATMENT**

**IF ON SKIN:** Wash with plenty of soap and water. Get medical attention.

**IF INHALED:** Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. Get medical attention.

**IF IN EYES:** Flush with plenty of water. Call a physician.

**IF SWALLOWED:** Drink promptly a large quantity of milk, egg white, gelatin solution, or if these are not available, large quantities of water. Avoid alcohol. Note to Physician: Probable mucosal damage may contraindicate use of gastric lavage.

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



**KOCIDE CHEMICAL CORPORATION of Casa Grande**  
Casa Grande, Arizona 85222

A WHOLLY OWNED SUBSIDIARY OF GRIFFIN CORPORATION

EPA Reg. No. 1812-313  
EPA Est. No. 45450-AZ-1

PRECAUTIONARY STATEMENTS  
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Corrosive

DANGER

Causes severe eye and skin irritation. Harmful if absorbed through the skin or inhaled. May cause skin sensitization reactions in certain individuals. Avoid contact with the skin, eyes, or clothing. Avoid breathing dust. Protective clothing, including goggles, should be worn. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

ENVIRONMENTAL HAZARDS

This pesticide is toxic to fish and aquatic organisms.

ENDANGERED SPECIES RESTRICTIONS

It is a violation of Federal law to use any pesticide in a manner that results in the death of an endangered species or adverse modification of their habitat.

The use of this product may pose a hazard to certain Federally designated endangered species known to occur in specific areas within the following counties:

STATE	SPECIES	BULLETIN NO.	COUNTY
California	Solano Grass	EPA/ES-85-13	Solano
Tennessee	Slackwater Darter	EPA/ES-85-04	Lawrence Wayne Hancock
	Freshwater Mussels	EPA/ES-85-07	Claiborne Hawkins Sullivan
Alabama	Slackwater Darter	EPA/ES-85-05	Lauderdale Limestone Madison
Virginia	Freshwater Mussels	EPA/ES-85-06	Grayson Smyth Scott Lee Washington

Before using this product in the above counties you must obtain the EPA Bulletin specific to your area. This Bulletin identifies areas within these counties where the use of this pesticide is prohibited, unless specified otherwise. The EPA Bulletin is available from either your County Agricultural Extension Agent, the Endangered Species Specialist in your State Wildlife Agency Headquarters, or the appropriate Regional Office of the U.S. Fish and Wildlife Service. THIS BULLETIN MUST BE REVIEWED PRIOR TO PESTICIDE USES.

BEST AVAILABLE COPY

This pesticide is toxic to fish. Direct application of copper sulfate to water may cause a significant reduction in populations of aquatic invertebrates, plants and fish.

Do not treat more than one half of lake or pond at one time in order to avoid depletion of oxygen from decaying vegetation. Allow 1 to 2 weeks between treatment for oxygen levels to recover.

Trout and other species of fish may be killed at application rates recommended on this label, especially in soft or acid waters. However, fish toxicity generally decreases when the hardness of water increases.

Do not contaminate water by cleaning or disposal of wastes.

Consult your State Fish and Game Agency before applying this product to public waters. Permits may be required before treating such waters.

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#### STORAGE AND DISPOSAL

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

PESTICIDE DISPOSAL: *Wastes are usually hazardous* Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

INNER 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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#### DIRECTIONS FOR USE

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

#### RE-ENTRY STATEMENT

Do not apply this product in such a manner as to directly or through drift expose workers or other persons. The area being treated must be vacated by unprotected persons.

Do not enter treated area without protective clothing until sprays have dried.

Because certain states may require more restrictive re-entry intervals for various crops treated with this product, consult your State Department of Agriculture for further information.

BEST AVAILABLE COPY

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Written or oral warnings must be given to workers who are expected to be in a treated area or in an area about to be treated with this product. (Indicate specific oral warnings which inform workers of areas or fields that may not be entered without specific protective clothing, period of time field must be vacated and appropriate actions to take in case of accidental exposure.) When oral warnings are given, warnings shall be given in a language customarily understood by workers. Oral warnings must be given if there is reason to believe that written warnings can not be understood by workers. Written warnings must include the following information: DANGER. Area treated with KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS on (date of application). Do not enter without appropriate protective clothing for 24 hours. In case of accidental exposure see Statement of Practical Treatment.

#### GENERAL DIRECTIONS

Use KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS as noted below. When using KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS to control algae, there are many factors to consider, water hardness, temperature of the water, kind and amount of vegetation to be controlled and amount of water flow. Algae can be controlled more easily and effectively if treatment with copper sulfate is made soon after plant growth has started. Small amount of copper sulfate can effectively control algae in water. However, if treatment is delayed until a large amount of algae is present, larger quantities of copper sulfate may be required. Control of Algae in water systems is not always permanent. Usually algae is more difficult to control with copper sulfate when water temperatures are low. The dose rates recommended for KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS are based on water temperatures of 60°F or above. Larger quantities of copper sulfate will also be required in hard water. Normally, larger quantities of copper sulfate will be required to kill algae in water which is flowing than in a body of stagnant water. If possible, curtail the flow of water before treatment and hold dormant for approximately three days after treatment or until the plants have begun to die. When preparing a copper sulfate solution in water, it is best that the mixing container be made of glass or plastic or if a metal container is used, that it be either painted, enameled, or copper-lined. The use of a galvanized container causes a chemical reaction to take place by which the copper displaces the galvanized coating of the container. It is usually best to treat algae on a sunny day when the heavy mats of filamentary algae are most likely to be floating on the surface where it can be sprayed directly. If there is some doubt about the concentration to apply, it is generally best to start with a lower concentration and to increase this concentration until the algae is killed.

BEST AVAILABLE COPY

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**CALCULATIONS FOR THE AMOUNT OF WATER IMPOUNDED AND FOR THE AMOUNT OF COPPER SULFATE TO BE USED:** Calculate water volume as follows: (1) Obtain surface area by measuring of regular shaped ponds or mapping of irregular ponds or by reference to previously recorded engineering data or maps. (2) Calculate average depth by sounding in a regular pattern and taking the mean of these readings or by reference to previously obtained data. (3) Multiply surface area in feet by average depth in feet to obtain cubic feet of water volume. (4) Multiply surface area in acres by average depth in feet to obtain total acre-feet of water volume.

**CALCULATE WEIGHT OF WATER TO BE TREATED AS FOLLOWS:** (1) Multiply volume in cubic feet by 62.44 to obtain total pounds of water, or (2) Multiply volume in acre feet by 2,720,000 to obtain pounds of water.

**CALCULATIONS OF ACTIVE INGREDIENT TO BE ADDED:** To calculate the amount of copper sulfate needed to achieve the recommended concentration, multiply the weight of water by the recommended concentration of copper sulfate. Since recommended concentrations are normally given in parts per million (ppm), it will first be necessary to convert the value in parts per million to a decimal equivalent. For example, 2 ppm is the same as 0.000002 when used in this calculation. Therefore, to calculate the amount of copper sulfate to treat 1 acre-foot of water with 2 ppm copper sulfate, the calculation would be as follows:

$$0.000002 \times 2,720,000 = 5.44 \text{ lbs Copper Sulfate}$$

**NOTE:** If treated water is to be used as a source of potable water, the metallic copper residual must not exceed 1 ppm (4 ppm copper sulfate pentahydrate).

**CALCULATION OF WATER FLOW IN DITCHES, STREAMS, AND IRRIGATION SYSTEMS:** The amount of water flow in cubic feet per second is found by means of a weir or other measuring device.

#### CONTROL OF TADPOLE SHRIMP

*see page 1760  
in book  
re: full*

KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS are recommended for the control of tadpole shrimp in rice fields. KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS should be applied at a rate of ~~10 to 15~~ <sup>5 to 10</sup> pounds per acre using boat, plane or other professional devices. Use at the first indication of infestation after the field has been flooded to a depth of 6 to 8 inches. KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS are especially graded for maximum solubility in this volume of water.

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## ALGAECIDE

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with volume

KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS kills Filamentous and Plankton algae in flooded rice fields, lake or pond water at 0.27 ppm to 0.54 ppm ( $\text{Cu}^0$ ) in the treated water. Apply at a rate of 3 to 6 pounds per acre foot of water using boat, plane or other professional spraying device. Apply twice yearly or as needed. Determine the number of acre feet of water to be treated. An acre foot of water is equal to one acre of water one foot deep which equals 328,000 gallons or 2,720,000 pounds.

## SEWER TREATMENT - ROOT DESTROYER

For partial stoppage - add 1/2 pounds of KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS to sewer or drain and flush toward blockage with 5 gallons of water. Repeat at 6 month intervals to prevent growth of new roots.

For complete stoppage - Physically remove the root blockage and repeat as above.

## WOOD TREATMENT (green, peeled posts) - fungus decay, rot.

Prepare a solution of 18.0 pounds of sodium chromate in each 26 gallons of water to be used and a separate second solution of 18 pounds of copper sulfate in each 24 gallons of water to be used; soak the peeled, green posts, butt end down first in the copper sulfate solution for 3 days, then butt end down in the sodium chromate solution for 2 days, and finally turn the post upside down in the sodium chromate solution for 1 additional day, remove and rinse posts with clear water.

## BORDEAUX MIXTURE

### HOW TO UNDERSTAND BORDEAUX FORMULATIONS:

If the Bordeaux Mixture instructions read 10-10-100, the first figure means the number of pounds of copper sulfate pentahydrate. The second figure means the pounds of hydrated spray lime, and the third figure, the gallons of water to be used. Use as a full coverage spray to runoff.

### HOW TO PREPARE A BORDEAUX MIXTURE

To prepare a Bordeaux mixture, fill a tank with water, one quarter full. Then with agitator running, mix in Kocide Copper Sulfate Star Light through a copper, bronze, stainless steel or plastic screen. Add water so the tank is three quarters full. Mix in the hydrated spray lime through the screen and finish filling the tank with water.

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## CROP USE RECOMMENDATIONS

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**ALMONDS, APRICOTS, PEACHES, NECTARINES:** Shot Hole Fungus

Prepare a 10-10-100 Bordeaux and apply as a dormant spray in late fall or early spring.

**ALMONDS, APRICOTS, CHERRIES, PEACHES, NECTARINES, PLUMS, PRUNES:** Brown Rot Blossom Blight

Prepare a 10-10-100 Bordeaux and apply when buds begin to swell.

**SOUR CHERRIES:** Leaf Spot

Prepare a 10-10-100 Bordeaux. Apply as a full coverage spray after petal fall or as recommended by the State Extension Service.

**LEMONS, ORANGES, GRAPEFRUIT:** Phytophthora Brown Rot

Prepare a 3-4 1/2-100 Bordeaux where there is no history of copper injury or a 3-2-6-100 (Zinc Sulfate-Copper Sulfate-Hydrated Lime-Gallons of water) Bordeaux. Spray 6 gallons on skirt of tree 3 to 4 feet high and 2 to 4 gallons on trunk and ground under tree. If *P. hibernalis* is present, use 10 to 25 gallons to completely cover each tree. Apply in November or December just before or after first rain. In severe brown rot season, apply second application in January or February.

**LEMONS, ORANGES, GRAPEFRUIT:** Septoria Fruit and Leaf Spot, Central California and Brown Rot and Zinc and Copper Deficiencies

Prepare a 3-2-6-100 Bordeaux and use 10 to 25 gallons to completely cover each tree. Apply in October, November or December before or just after first rain.

**WALNUTS:** Walnut Blight

Apply 15 pounds with 10 pounds of lime in 100 gallons of water plus one-half gallon summer oil emulsion. Apply in early pre-bloom 10-20% pistillate (not when catkin blooms are showing) before or after rain. Use only if Bordeaux mixture has been shown to be non-phytotoxic in your area.

### KOCIDE COPPER SULFATE STAR LIGHT CRYSTALS SUGGESTED USES

#### AGRICULTURE

Use in Bordeaux Mixture sprays as a fungicide to control plant diseases, or in fertilizers to correct copper deficiencies in soils. (See directions for use) Copper Sulfate is also a valuable dietary supplement in mixed feeds for beneficial animals. Please consult your State Agricultural Experiment Station of State Extension Service for guidance in preparing dosages and formulas.

**WATER, SEWAGE & WOOD TREATMENT** (See directions for use)

**WATER TREATMENT** - Kills algae in field, lake and pond water.

**SEWER TREATMENT** - Destroys rots and fungus growth in sewers and storm drains.

**WOOD TREATMENT** - Use Copper Sulfate with certain other chemicals as a preservative for wooden fence posts.

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The diagram illustrates a 2D hexagonal lattice. A central atom is shown with a larger radius than the surrounding atoms. A dashed line connects this central atom to one of its nearest neighbors. The distance between the central atom and its nearest neighbor is labeled 'a'. The lattice is shown as a portion of a larger, periodic structure.

Wm. H. R. Co.