

Mr. George Pipkin
Qualis, Inc.
4500 Park Avenue
Des Moines, IA 50321

NOV 6 1986

Dear Mr. Pipkin:

Subject: Amendment - Revised Labeling
Dionne Copper Sulfate Root Killer
EPA Registration No. 34797-39
Your Submissions Dated October 2 and 22, 1986

Labeling referred to above, submitted in connection with registration under the Federal Insecticide, Fungicide, and Rodenticide Act, is acceptable provided you:

1. Add the following statement to the Environmental Hazards section before releasing the product for shipment bearing amended labeling.

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

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

A stamped copy of labeling is enclosed for your records.

Sincerely yours,

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

Enclosure

90578:Mountfort:ME-3:KENCO:10/31/86:11/12/86:sj:vo

CONCURRENCES

SYMBOL ▶								
SURNAME ▶								
DATE ▶								

PROPOSED LABEL COPY

Product Name: Dionne Copper Sulfate Root Killer

Formulation/
Product Number:

Authored by: George E. Pipkin

Reviewed by:

Label Dimensions

Height:

Width:

Paper Type:

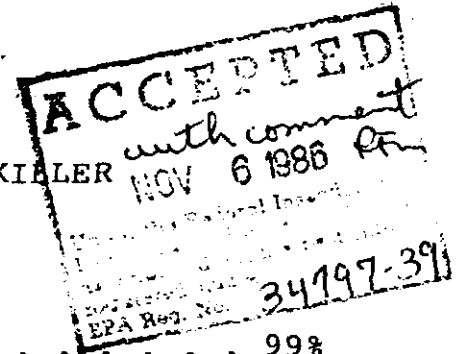
Paper Weight:

(FRONT PANEL)

NET WT:

DIONNE COPPER SULFATE ROOT KILLER

MEDIUM CRYSTALS



ACTIVE INGREDIENT:

COPPER SULFATE (PENTAHYDRATE) * 99%

INERT INGREDIENTS 1%

*METALLIC COPPER EQUIVALENT 25.2% ✓

FOR:

See back for specific use directions

- . Algae control in impounded waters, lakes, ponds, and reservoirs.
- . Algae control in irrigation conveyance systems using the slug application method.
- . Control root growth in sewers.
- . Also for manufacturing, repackaging, formulation of algaecides, fungicides, and other non-pesticidal uses.

KEEP OUT OF REACH OF CHILDREN

DANGER ✓



PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS.

DANGER -- Causes severe eye and skin irritation. Harmful if absorbed through 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.

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STATEMENT OF PRACTICAL TREATMENT:

IF IN EYES, flush with plenty of water. Call a physician.
IF ON SKIN, wash with plenty of soap and water. Get medical attention. 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 the use of gastric lavage. Measure against circulatory shock, respiratory depression and convulsion may be needed.

SEE BACK PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS

EPA Reg. No. 34797-39

EPA Est. No. 34797-IA-02

Manufactured By:

QUALIS, INCORPORATED
DES MOINES, IOWA 50321

ADDITIONAL PRECAUTIONARY STATEMENTS

ENVIRONMENTAL HAZARD STATEMENTS ✓

This pesticide is toxic to fish. Direct application of copper sulfate to water may cause a significant reduction in population of aquatic invertebrates, plants, and fish. Do not treat more than one-half of a 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 of equipment or disposal of wastes.

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

BEST AVAILABLE COPY

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ENDANGERED SPECIES RESTRICTIONS: ✓ It is a violation of Federal laws 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)	Clairborne, 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 USE.

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

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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.

STORAGE AND DISPOSAL ✓

STORAGE:

Store product in a secure, dry place. Keep product dry, as product is water soluble. When opening, closing, or handling open packages or pouring product, wear goggles to prevent dusting into eyes. Spilled product should be swept up, used if clean, or disposed in accord with the disposal procedures below.

Store product only in original container. During storage, store pesticide separately to prevent cross-contamination of other pesticides, fertilizers, food and feed.

DISPOSAL:

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

Paper and plastic bags: 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.

Plastic containers: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

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.

✓ GENERAL INSTRUCTIONS FOR USE

Copper sulfate effectively controls many species of both filamentous (mat forming green) and planktonic (single-cell blue-green) algae. The dose of copper sulfate and control are affected by algae species, water hardness, water temperature, and concentration as well as whether water is clear, turbid, flowing, or static. Preferably water should be clear and above 60°F with treatment made in late morning on a sunny day. Static water usually requires less copper sulfate than flowing water. The harder the water or the greater the algae concentration, the higher the required dose of copper sulfate. If floating mats of green algae are present, it is advisable to especially treat the surface of these mats for best control. Algae will absorb the copper sulfate within hours after treatment, and death should be evident within 3 to 5 days. If there is some doubt about the concentration to apply, it is generally preferable to begin with a lower dose and increase the dose until algae are killed. (A few algae species are resistant to copper sulfate and may not be killed.) Repeat treatments within a season may be needed to keep algae under control to the desired level.

BEST AVAILABLE COPY

NOTE: Note the above fish toxicity precautionary statement under Environmental Hazards. Treatment of algae can also result in oxygen loss from the water caused by the decay of dead algae. This loss can cause fish suffocation. To minimize this hazard, treat 1/3 to 1/2 of the water area in a single operation and wait 10 to 14 days between treatments. Begin treatments along the shore and proceed outwards in bands to allow fish to move into untreated water.

When a water solution of copper sulfate is prepared, preferably mix in a plastic or glass container. When using a metal container, use one that is painted, enameled, or copper lined. Copper sulfate solutions will slowly react or corrode galvanized containers and brass parts.

SPECIFIC DIRECTIONS FOR USE

- 1. To control algae in impounded waters, lakes, ponds, and reservoirs: When to Apply: Early treatment is essential for most satisfactory algae control at the lowest dosage levels. Early growth is usually confined to shallower shore areas. Begin treatment when not over 5 to 10% of the water surface area is covered with algae growths which is usually nearest the shoreline. Delaying treatment until heavy algae growths are present usually requires a higher dose and may result in fish distress or death since rapid decomposition of heavy growths greatly reduces the oxygen content of the water. Several repeat treatments are usually necessary to control algae each season.

Dosage Rates to Control Algae: Accurately determine the surface acres of water to be treated at one time and multiply this by the average depth in feet of this water area to determine the acre foot of water to be treated. One acre foot = one surface acre (43,560 sq. ft.) X one foot of depth. Each acre foot of water contains 326,000 gallons, or 2,720,000 pounds of water. If the problem algae genera is known use the table below and its equivalence to determine the approximate dosage of this product needed to control that genera. (A dose of 1 ppm equals 1 pound of this product for each million pounds of water.) If the genera of either filamentous or planktonic algae is not known, apply 0.8 to 1.75 pounds of this product per acre foot of water, using the lower rate in soft water and the higher rate in hard water. For control of bottom-attached algae Chara and Nitella, use 1.75 to 2.3 pounds per acre foot of water to be treated. If control is not achieved or in very adverse waters, a higher rate may be needed, but consider the fish caution. Dose should not exceed 4 ppm of this product (1 ppm of copper as metallic) when water is used for drinking.

COPPER SULFATE REQUIRED FOR TREATMENT OF DIFFERENT GENERA OF ALGAE

The genera of algae listed below are commonly found in waters of the United States. Use the lower recommended rate in soft waters (less than 50 ppm methyl orange alkalinity) and the higher concentration in hard water (above 50 ppm alkalinity). Always consult State Fish and Game Agency before applying this product to public waters.

<u>ORGANISM</u>	<u>DOSE</u>	<u>ALGAE SPECIES</u>
Cyanophyceae (blue-green)	1/4 to 1/2 ppm*	Anabaena, Anacystis, Aphanizomenon, Gloeotrichia, Gomphosphaeria, Polycystis, Rivularia
	1/2 to 1 ppm*	Cylindrospermum, Oscillatoris, Plectonema
	1 to 1-1/2 ppm*	Nostoc, Phormidium
	1-1/2 to 2 ppm*	Calothrix, Symploca
Chlorophyceae (Green)	1/4 to 1/2 ppm*	Closterium, Hydrodictyon, Spirogyra, Ulothrix
	1/2 to 1 ppm*	Botryococcus, Cladophora, Coelastrum, Droparnaldia, Enteromorpha, Gloeocystis, Microspora, Tribonema, Zygnema
	1 to 1-1/2 ppm*	Chlorella, Crucigenia, Desmidium, Golenkinia, Oocystis, Palmella, Pithophora, Staurostrum, Tetraedron
	1-1/2 to 2 ppm*	Ankistrodesmus, Chara, Nitella, Scenedesmus
Diatomaceae (Diatoms)	1/4 to 1/2 ppm*	Asterionella, Fragilaria, Melosira, Navicula
	1/2 to 1 ppm*	Gomphonema, Nitzachia, Stephanodiscus, Synedra, Tabellaria
	1 to 1-1/2 ppm*	Achnanthes, Cymbella, Neidium
Protozoa (Flagellates)	1/4 to 1/2 ppm*	Dinobryon, Synura, Uroglena, Volvox
	1/2 to 1 ppm*	Ceratium, Cryptomonas, Euglena, Glenodinium, Mallomonas
	1 to 1-1/2 ppm*	Chlamydomonas, Haematococcus, Peridinium
	1-1/2 to 2 ppm*	Eudorina, Pandorina

BEST AVAILABLE COPY

* 1/4 to 1/2 ppm = 0.67 - 1.3 lbs./acre ft.
 * 1/2 to 1 ppm = 1.3 - 2.6 lbs./acre ft.
 * 1 to 1-1/2 ppm = 2.6 - 3.9 lbs./acre ft.
 * 1-1/2 to 2 ppm = 3.9 - 5.32 lbs./acre ft.

How to Apply: Copper sulfate can be applied to impounded waters by several methods to control algae. Medium crystals are usually applied by dragging them in a burlap or finer mesh bag, attaching it to the boat or float so that bag is suspended in the top foot of water until the crystals are dissolved. Determine the quantity of crystals first near the shoreline and continue outward with the boat traveling in parallel lines about 20 to 100 feet apart until area has been treated or until 1/3 to 1/2 of the surface area has been treated. Continue dragging bag over treated area until the required minimum dose is applied and all crystals are dissolved. Various other application techniques may be used as long as the minimum required dose is applied uniformly to the water surface and these medium crystals are dissolved when applied to the water.

✓ 2. To control algae in irrigation conveyance systems using the slug application method. Make a dump of copper sulfate into the irrigation ditch or lateral at 1/4 to 2 pounds per cubic foot per second of water per treatment. Repeat about every 2 weeks as needed. A dump is usually necessary every 5 to 30 miles, depending on water hardness, alkalinity and algae concentration. Copper sulfate becomes less effective as the bicarbonate alkalinity increases. Its effectiveness is significantly reduced when the bicarbonate alkalinity exceeds about 150 ppm as CaCO₃.

✓ 3. To control root growth in sewers:
Commercial, Institutional, and Municipal Sewers use as follows:

Sewers: Use 2 pounds of these crystals every 6 to 12 months, applied into each junction or terminal manhole as a preventive measure. Add copper sulfate crystals during period of reduced flow; however, a small flow is essential. If reduced flow due to root masses is observed, but not completely stopped, add the copper sulfate in the next manhole above the reduced flow area. If completely blocked, use a rod to penetrate the mass so some flow begins before treatment.

Storm Drains: Use 2 pounds of copper sulfate crystals per drain per year. Apply during a period of light water flow. In dry weather, introduce a flow with a hose. If storm drains become almost plugged, repeat treatment 3 or 4 times at 2-week intervals.

Sewer Pumps and Force Mains: Place 2 pounds of copper sulfate crystals in a cloth bag at the storage well inlet. Repeat as needed.

Residential or Household Sewer Systems: In household sewers, use 2 pounds of Dionne Copper Sulfate Root Killer twice yearly. Add Dionne Copper Sulfate Root Killer to sewer line by pouring about 1/2 pound into the toilet bowl nearest to the sewer line and flush, repeating process until recommended dose has been added or remove cleanout plug and pour entire recommended quantity directly into the sewer line, replacing plug and flush toilet several times. Note: Do not apply Dionne Copper Sulfate Root Killer through sink or tub drains as it will corrode these metal drains.

*Deleted
Sewer tanks
cleanouts*

APPROVED BY: _____

DATE: _____

G1363-Lt. Green (366)

PRECAUTIONARY STATEMENTS
 Hazards to Humans & Domestic Animals
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.

STATEMENT OF PRACTICAL TREATMENT
 IF IN EYES: Flush with plenty of water. Call a physician. IF ON SKIN: Wash with plenty of soap and water. Get medical attention. IF SWALLOWED: Give promptly a large quantity of milk, egg white, or plain solution, or if these are not available, large quantities of water. Avoid alcohol. Note: Do not induce vomiting. Proceed to hospital. Do not use gastric lavage.

ENVIRONMENTAL HAZARDS
 This product is toxic to fish and aquatic organisms. Do not apply to water except as specified on label. Consult your State Fish and Game Agency before applying this product to public waters. Permits may be required.

ENDANGERED SPECIES RESTRICTIONS
 It is a violation of Federal laws 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	Section No.	COUNTY
CALIFORNIA	Solano Oriole	EPA 65-485-31	Solano
TENNESSEE	Blackwater Darter	EPA 65-485-31	Letcher, Wayne, Hancock
	Freshwater Mussel	EPA 65-485-31	Clatsop, Multnomah, Sullivan
ALABAMA	Blackwater Darter	EPA 65-485-31	Lawrence, Wilcox, Madison
VIRGINIA	Freshwater Mussel	EPA 65-485-31	Frederick, Shenandoah, Scott, Loudoun

Do not use this product in the above counties unless you have obtained the EPA Bureau permit to use it. This Bureau permit is available to you through your State or County Agricultural Extension Agent. The EPA Bureau is available from either your County Agricultural Extension Agent, the Endangered Species Specialist in your State Wildlife Agency, or the appropriate Regional Office of the U.S. Fish and Wildlife Service. This BULLETIN MUST BE REVIEWED PRIOR TO PESTICIDE USE.



In Accordance with FR Notice 82-2.
 Based on Draft Labeling Dated 11/6/86

DIONNE COPPER SULFATE ROOT KILLER

Controls root growths in sewer pipes

Active Ingredients:
 Copper Sulfate (Pentahydrate) 99%
 inert ingredient 1%
 (copper expressed as metallic 25.2%)

**KEEP OUT OF REACH
 OF CHILDREN
 DANGER**

Net Wt. 2 lbs.

EPA Reg. No. 34797-39-50861
 EPA Est. No. 34797-1A-02

(See side panel for use directions and additional precautionary statements)

If your drain is completely blocked, call your local service listed in the white pages of your phone book.

Directions For Use
 It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

To Clean: Place can in groove — pry and lift lid. Invert can — press edges down, snapping lid on. Residential or Household Sewer Systems: Invert can of Root Destroyer twice yearly. After pouring about 1/2 pound into the toilet bowl, repeat process until the recommended dose is reached. Replace plug and flush toilet several times. No through tank or tub drains as it will corrode the tank.

If system is equipped with a septic tank, Root Destroyer septic tank and little will pass into the absorption area. Add 2 pounds of Root Destroyer to distribution pipe and the drain field. If distribution pipe is not available, install a cleanout plug opening into the drain field for effective root control.

Storage & Disposal: Product Disposal: Securely wrap original container and discard in trash. Containers: Dispose. Do not reuse container. Recycle if possible. Storage: Store in original container and place in a cool, dry place.

Warranty: Satisfaction Guaranteed — Root Destroyer Corporation. To obtain the guarantee, simply complete the enclosed purchase receipt to Root Destroyer Corporation and return it to the company.

Distributed by:
 Root Destroyer Corp.
 P.O. Box 1000, St. Louis, MO 63108

G1363A-Black

G1363A-Black

BEST AVAILABLE COPY

NOTE TO PHYSICIAN:

Probable mucosal damage may contraindicate the use of gastric lavage. Measure against circulatory shock, respiratory depression and convulsion may be needed.

SEE BACK PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS

EPA Reg. No. 34797-39

EPA Est. No. 34797-IA-02

Manufactured By:

QUALIS, INCORPORATED
DES MOINES, IOWA 50321

ADDITIONAL PRECAUTIONARY STATEMENTS

ENVIRONMENTAL HAZARD STATEMENTS ✓

This pesticide is toxic to fish. Direct application of copper sulfate to water may cause a significant reduction in population of aquatic invertebrates, plants, and fish. Do not treat more than one-half of a 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 of equipment 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.*

BEST AVAILABLE COPY

ENDANGERED SPECIES RESTRICTIONS: ✓ It is a violation of Federal laws 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:

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	Freshwater Mussels	(EPA/ES-85-07)	Clairborne, 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 USE.

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

DIRECTIONS FOR USE

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

STORAGE AND DISPOSAL

STORAGE:

Store product in a secure, dry place. Keep product dry, as product is water soluble. When opening, closing, or handling open packages or pouring product, wear goggles to prevent dusting into eyes. Spilled product should be swept up, used if clean, or disposed in accord with the disposal procedures below.

Store product only in original container. During storage, store pesticide separately to prevent cross-contamination of other pesticides, fertilizers, food and feed.

DISPOSAL:

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

Paper and plastic bags: 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.

Plastic containers: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

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.

GENERAL INSTRUCTIONS FOR USE

Copper sulfate effectively controls many species of both filamentous (mat forming green) and planktonic (single-cell blue-green) algae. The dose of copper sulfate and control are affected by algae species, water hardness, water temperature, and concentration as well as whether water is clear, turbid, flowing, or static. Preferably water should be clear and above 60°F with treatment made in late morning on a sunny day. Static water usually requires less copper sulfate than flowing water. The harder the water or the greater the algae concentration, the higher the required dose of copper sulfate. If floating mats of green algae are present, it is advisable to especially treat the surface of these mats for best control. Algae will absorb the copper sulfate within hours after treatment, and death should be evident within 3 to 5 days. If there is some doubt about the concentration to apply, it is generally preferable to begin with a lower dose and increase the dose until algae are killed. (A few algae species are resistant to copper sulfate and may not be killed.) Repeat treatments within a season may be needed to keep algae under control to the desired level.

BEST AVAILABLE COPY

NOTE: Note the above fish toxicity precautionary statement under Environmental Hazards. Treatment of algae can also result in oxygen loss from the water caused by the decay of dead algae. This loss can cause fish suffocation. To minimize this hazard, treat 1/3 to 1/2 of the water area in a single operation and wait 10 to 14 days between treatments. Begin treatments along the shore and proceed outwards in bands to allow fish to move into untreated water.

When a water solution of copper sulfate is prepared, preferably mix in a plastic or glass container. When using a metal container, use one that is painted, enameled, or copper lined. Copper sulfate solutions will slowly react or corrode galvanized containers and brass parts.

SPECIFIC DIRECTIONS FOR USE

- ✓ 1. To control algae in impounded waters, lakes, ponds, and reservoirs: When to Apply: Early treatment is essential for most satisfactory algae control at the lowest dosage levels. Early growth is usually confined to shallower shore areas. Begin treatment when not over 5 to 10% of the water surface area is covered with algae growths which is usually nearest the shoreline. Delaying treatment until heavy algae growths are present usually requires a higher dose and may result in fish distress or death since rapid decomposition of heavy growths greatly reduces the oxygen content of the water. Several repeat treatments are usually necessary to control algae each season.

Dosage Rates to Control Algae: Accurately determine the surface acres of water to be treated at one time and multiply this by the average depth in feet of this water area to determine the acre foot of water to be treated. One acre foot = one surface acre (43,560 sq. ft.) X one foot of depth. Each acre foot of water contains 326,000 gallons, or 2,720,000 pounds of water. If the problem algae genera is known, use the table below and its equivalence to determine the approximate dosage of this product needed to control that genera. (A dose of 1 ppm equals 1 pound of this product for each million pounds of water.) If the genera of either filamentous or planktonic algae is not known, apply 0.8 to 1.75 pounds of this product per acre foot of water, using the lower rate in soft water and the higher rate in hard water. For control of bottom-attached algae Chara and Nitella, use 1.75 to 2.3 pounds per acre foot of water to be treated. If control is not achieved or in very adverse waters, a higher rate may be needed, but consider the fish caution. Dose should not exceed 4 ppm of this product (1 ppm of copper as metallic) when water is used for drinking.

COPPER SULFATE REQUIRED FOR TREATMENT OF DIFFERENT GENERA OF ALGAE
The genera of algae listed below are commonly found in waters of the United States. Use the lower recommended rate in soft waters (less than 50 ppm methyl orange alkalinity) and the higher concentration in hard water (above 50 ppm alkalinity). Always consult State Fish and Game Agency before applying this product to public waters.

BEST AVAILABLE COPY

<u>ORGANISM</u>	<u>DOSE</u>	<u>ALGAE SPECIES</u>
Cyanophyceae (blue-green)	1/4 to 1/2 ppm*	Anabaena, Anacystis, Aphanizomenon, Gloeotrichia, Gomphosphaeria, Polycystis, Rivularia
	1/2 to 1 ppm*	Cylindrospermum, Oscillatoris, Plectonema
	1 to 1-1/2 ppm*	Nostoc, Phormidium
	1-1/2 to 2 ppm*	Calothrix, Symploca
Chlorophyceae (Green)	1/4 to 1/2 ppm*	Closterium, Hydrodictyon, Spirogyra, Ulothrix
	1/2 to 1 ppm*	Botryococcus, Cladophora, Coelastrum, Droparnaldia, Enteromorpha, Gloeocystis, Microspora, Tribonema, Zygnema
	1 to 1-1/2 ppm*	Chlorella, Crucigenia, Desmidium, Golenkinia, Oocystis, Palmella, Pithophora, Staurastrum, Tetraedron
	1-1/2 to 2 ppm*	Ankistrodesmus, Chara, Nitella, Scenedesmus
Diatomaceae (Diatoms)	1/4 to 1/2 ppm*	Asterionella, Fragilaria, Melosira, Navicula
	1/2 to 1 ppm*	Gomphonema, Nitzachia, Stephanodiscus, Synedra, Tabellaria
	1 to 1-1/2 ppm*	Achnanthes, Cymbella, Neidium
Protozoa (Flagellates)	1/4 to 1/2 ppm*	Dinobryon, Synura, Uroglena, Volvox
	1/2 to 1 ppm*	Ceratium, Cryptomonas, Euglena, Glenodinium, Mallomonas
	1 to 1-1/2 ppm*	Chlamydomonas, Haematococcus, Peridinium
	1-1/2 to 2 ppm*	Eudorina, Pandorina

* 1/4 to 1/2 ppm = 0.67 - 1.3 lbs./acre ft.

* 1/2 to 1 ppm = 1.3 - 2.6 lbs./acre ft.

* 1 to 1-1/2 ppm = 2.6 - 3.9 lbs./acre ft.

* 1-1/2 to 2 ppm = 3.9 - 5.32 lbs./acre ft.

How to Apply: Copper sulfate can be applied to impounded waters by several methods to control algae. Medium crystals are usually applied by dragging them in a burlap or finer mesh bag, attaching it to the boat or float so that bag is suspended in the top foot of water until the crystals are dissolved. Determine the quantity of crystals first near the shoreline and continue outward with the boat traveling in parallel lines about 20 to 100 feet apart until area has been treated or until 1/3 to 1/2 of the surface area has been treated. Continue dragging bag over treated area until the required minimum dose is applied and all crystals are dissolved. Various other application techniques may be used as long as the minimum required dose is applied uniformly to the water surface and these medium crystals are dissolved when applied to the water.

✓ **2. To control algae in irrigation conveyance systems using the slug application method.** Make a dump of copper sulfate into the irrigation ditch or lateral at 1/4 to 2 pounds per cubic foot per second of water per treatment. Repeat about every 2 weeks as needed. A dump is usually necessary every 5 to 30 miles, depending on water hardness, alkalinity and algae concentration. Copper sulfate becomes less effective as the bicarbonate alkalinity increases. Its effectiveness is significantly reduced when the bicarbonate alkalinity exceeds about 150 ppm as CaCO_3 .

✓ **3. To control root growth in sewers:**
Commercial, Institutional, and Municipal Sewers use as follows:

Sewers: Use 2 pounds of these crystals every 6 to 12 months, applied into each junction or terminal manhole as a preventive measure. Add copper sulfate crystals during period of reduced flow; however, a small flow is essential. If reduced flow due to root masses is observed, but not completely stopped, add the copper sulfate in the next manhole above the reduced flow area. If completely blocked, use a rod to penetrate the mass so some flow begins before treatment.

Storm Drains: Use 2 pounds of copper sulfate crystals per drain per year. Apply during a period of light water flow. In dry weather, introduce a flow with a hose. If storm drains become almost plugged, repeat treatment 3 or 4 times at 2-week intervals.

Sewer Pumps and Force Mains: Place 2 pounds of copper sulfate crystals in a cloth bag at the storage well inlet. Repeat as needed.

Residential or Household Sewer Systems: In household sewers, use 2 pounds of Dionne Copper Sulfate Root Killer twice yearly. Add Dionne Copper Sulfate Root Killer to sewer line by pouring about 1/2 pound into the toilet bowl nearest to the sewer line and flush, repeating process until recommended dose has been added or remove cleanout plug and pour entire recommended quantity directly into the sewer line, replacing plug and flush toilet several times. Note: Do not apply Dionne Copper Sulfate Root Killer through sink or tub drains as it will corrode these metal drains.