CALCULATING THE AMOUNT OF WATER IMPOUNDED

Concentrates of copper sulfate in water are expressed in parts per million by weight (abbreviated ppm). This means that if a copper sulfate concentration of 1 ppm is needed to destroy a certain type of algae, then 1 pound of copper sulfate must be distributed for every million pounds of water in the pond. If a concentration of 1/2 ppm is desired in a pond containing 3 million pounds of water, then the amount of copper sulfate required is 3 x 1/2 or 1 1/2 pounds.

From these examples, we see that it is necessary to know the amount of water impounded in order to calculate the amount of copper sulfate to use for obtaining a desired concentration. The weight of water impounded can be readily calculated if the volume of water is known (1 gallon of water weighs 8 1/3 pounds), so the problem is simply a matter of calculating the volume of water in the pond.

The amount of copper sulfate needed to give desired treatment in standing water is generally calculated by multiplying the area in square feet by the average depth in feet to get volume in cubic feet, multiplying the volume by the weight of one cubic foot of water to obtain the total weight in pounds, then multiplying the weight by the recommended concentration expressed as a decimal fraction.

Calculating water volume involves the following steps:

1. Obtain surface area by measuring regularly shaped ponds, by mapping irregular ponds or by referring to previously recorded engineering data or maps.

2. Calculate average depth by sounding in a regular pattern and taking the mean of these soundings or by referring to previously obtained data.

3. Multiply surface area in feet by average depth in feet to obtain cubic feet, or

4. Multiply surface area in acres by average depth in feet to obtain acre feet.

Calculate water weight by:

1. Multiplying volume in cubic feet by 62.44 to obtain poundage of water contained, or

2. Multiplying volume in acre feet by 2,720,000 to obtain poundage of water contained.

Calculate the amount of active ingredient needed to give recommended concentrations by multiplying the recommended concentration in parts per million, expressed as a fraction or decimal, by the water weight as follows:

Water weight = 2,720,000 pounds
Recommended concentration = 2 ppm

$$\frac{2}{1{,}000{,}000} \times 2{,}720{,}000 = 2 \times 2.72 = 5.44 \text{ pounds of copper sulfate}$$

or

$$.000002 \times 2{,}720{,}000 = 2 \times 2.72 = 5.44 \text{ pounds}$$

or

Using the constant 2.72 as the weight of chemical necessary to give 1 ppm in 1 acre foot, multiply the constant by the recommended concentration and multiply the product by the number of acre feet in the pond as follows:

acre feet = 1
recommended concentration = 2 ppm
constant 2.72
2.72 x 1 x 2 = 5.44 pounds of copper sulfate.

APPLYING COPPER SULFATE FOR ALGAE CONTROL

From what has already been said, it is clear that care should be used in determining the amount of copper sulfate to apply, particularly in water used to produce fish. Equal care should be used in weighing out the correct amount of copper sulfate needed to obtain the desired results.

Copper sulfate is available in large crystals similar to those of rock salt, and also in very fine crystals about like table salt. Each form has its particular uses in algae and weed control. For controlling algae it is most practical to spray the algal growths with copper sulfate that has been dissolved in water. For this purpose, the finely ground form is most satisfactory, since it dissolves very quickly in water. For treating large areas of water it is sometimes easiest to place the required weight of copper sulfate in a burlap bag, which is then towed behind a boat until the infested area has been thoroughly covered and all the copper sulfate has been dispensed.

It is the total weight of dry copper sulfate added to the pond which determines the concentration obtained. The amount of water used to dissolve the copper sulfate makes no difference, except that the more water used, the easier it is to get even distribution of the chemical solution over all parts of the pond containing algae.

CONTROLLING ALGAE IN IMPOUNDED WATERS:

LAKES PONDS AND RESERVOIRS

When a copper sulfate solution is placed in a galvanized container, a chemical reaction takes place which causes the copper to displace the galvanized coating on the container. Because of this, the inside of any metal container used for copper sulfate solution should be either painted, enameled, or copper lined.

COPPER SULFATE DOSAGE

The microscopic single-celled plankton algae ("water bloom"), for example: Aphanizomenon, Anabaena, and Gloeotrichia, which gives impounded water a soupy green or sometimes brown color, can usually be controlled by applying 1/4 to 1/2 ppm (parts per million) in soft water (water with less than 50 ppm methyl orange alkalinity) and 1/2 to 1 ppm in hard water.

The stringy filamentous algae, commonly known as pond scums, for example: Spirogyra, Oedegonium, and Chara, can usually be controlled by applying 1/2 to 1 ppm in soft water and 1 to 2 ppm in hard water.

The algae known as "water net" because of the net-like sheet it produces, is somewhat more resistant to copper sulfate than most of the pond scums. Biologists in the southeast find that water net can be effectively controlled by treating with 1/4 ppm of copper sulfate per day for five days in a row. There is one kind of algae, having the scientific name Pithophora, which is highly resistant to copper sulfate, and the amount of chemical necessary to control this plant has not been established. Stonewort or muskgrass is an advanced form of algae which grows from the bottom with stems and branches. It has a quite brittle-feel, and gives a strong skunk-like odor when crushed in the hand. This plant can usually be controlled with 1 to 1 1/2 ppm of copper sulfate. If large amounts of stonewort are present, it may be desirable to drag the pond with a wire or weighted rope stretched across the bottom in order to remove a large portion of the growth before chemically treating the pond. The reason for this suggestion is that when heavy stands of stonewort are destroyed with copper sulfate, the water may become foul-smelling for several weeks after treatment.

In destroying any of the algae, treatment is much easier and more effective if it is made when the algae first appear. All of the algae start outgrowing on the bottom in shallow water. If it is necessary to treat filamentous algae after it has become abundant, treatment will be easiest on an afternoon following a sunny morning. Under these conditions a large amount of the algal mat is likely to be floating at the surface where it can be sprayed directly.

If there is some doubt about how heavy a concentration to apply it is generally best to start with the lower concentration. If the algae is not killed by this concentration, use a higher one.

WARNING: Trout and certain other species of fish may be killed at the application rates recommended, especially in soft or acid waters; however, fish toxicity generally decreases when the water hardness increases. Consult your State Fish and Game Agencies before applying this product, especially to public waters.

CONTROLLING ALGAE IN IMPOUNDED WATER

LAKES PONDS AND RESERVOIRS

When algae has been destroyed by treatment with copper sulfate much of the oxygen in the water is used up as the dead plant matter decays. If there is too much dead vegetation in the water the depletion of oxygen can cause fish suffocation. If algae (and weeds) cover more than half the water area, treat 1/3 to 1/2 the surface at one time and wait 10 to 14 days between treatments. Treat the water along the shore first and move outward in bands to allow fish to move into untreated areas. 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).

DIRECTIONS FOR USE:

SWIMMING POOLS

1. In freshly filled pools or pools showing no visible algae growth add one gallon AQUA-KLEEN Algaecide per 25,000 gallons of water to prevent algae growth.

2. If algae growth is observed, add one gallon AQUA-KLEEN Algaecide for each 10,000 gallons of water to kill and control those algae species most commonly found in swimming pools. When existing growth is dead clean the pool, drain and refill if necessary, and add one gallon AQUA-KLEEN Algaecide per 25,000 gallons of water.

3. If the pool water treated as in (1) or (2) above is recycled, add one gallon of AQUA-KLEEN Algaecide per 50,000 gallons of water every five to seven days, to maintain between two and five parts per million of active ingredient. See serviceman for tset kit.

4. If the pool water treated as in (1) or (2) above is not recycled or not filtered it should be tested periodically to determine the active ingredient content. When necessary, one gallon AQUA-KLEEN Algaecide per 50,000 gallons of water should be added to maintain two to five parts per million of active ingredient.

AQUA-KLEEN suppresses algae growth and keeps pool water sparkling clear. AQUA-KLEEN is compatible with chemicals used in pool water treatment and will not damage tile, concrete, etc., found in pool systems.

How to Determine Pool Capacity
(IN U.S. GALLONS)

Rectangular or square pools

Multiply length x width x average depth (in feet) x 7.5

Circular pools

Diameter (feet)	24'	22'	18'	15'	12'	9'
Gals. per ft. of depth	3,400	2,850	1,900	1,320	850	480

EPA Reg. No. 9898-1

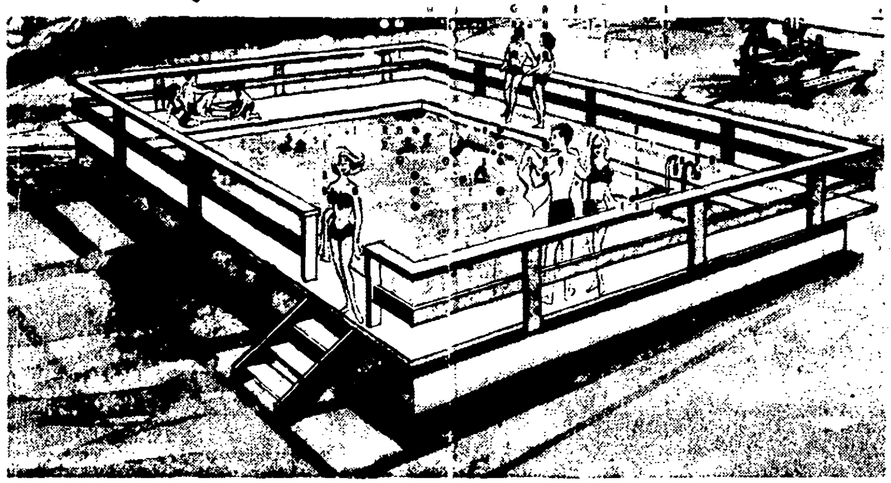
MANUFACTURED BY

E-Z **CHEMICAL COMPANY**
6751-53 HOLABIRD AVE.
BALTIMORE, MD. 21222

NET CONTENTS – 1 GALLON

ACCEPTED
January 22, 1973
UNDER THE FEDERAL INSECTICIDE FUNGICIDE AND RODENTICIDE ACT FOR ECONOMIC POISON REGISTERED UNDER NO. 9898-1

AQUA-KLEEN



ALGAECIDE

ACTIVE INGREDIENTS:

Methyldodecylbenzyl trimethy ammonium chloride	8%
Methyldodecylxylylene bis (trimethyl ammonium chloride)	2%
INERT INGREDIENTS:	90%

A Quaternary Ammonium Chloride

DANGER: KEEP OUT OF REACH OF CHILDREN
SEE SIDE PANEL FOR ADDITIONAL WARNING STATEMENTS