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# Appendix 3 Using Copper Products to Control Cyanobacteria

## The Timing of Copper Treatment

Copper can be used to control cyanobacteria, often referred to as blue-green algae. If a treatment seems ineffective, do not repeat, or increase the dose. Copper will not control green or brown algae.

Cyanobacteria grow fast when water temperature starts to rise, usually after a period of warm sunny weather. Always treat at the beginning of the bloom. This will provide much better control. If you treat with copper, always wait a minimum of two weeks before using the water. A waiting period is critical to allow any toxins from cyanobacteria to dissipate. Copper treatments are most successful when pH is between 7 and 8, alkalinity is between 50 to 150 mg/L, water temperature is above 15 degrees C, and the weather is sunny and calm. Never compensate for poor conditions by increasing the chemical dose - this can create serious water quality problems, and make the water unsafe or even dangerous for use.

## Calculating a Copper Dose

Cyanobacteria use sunlight and live near the water surface. Therefore, it is only necessary to treat the top meter of water. A simple calculation can be used to approximate treatment volumes. Measure the surface length and width in meters, and multiply to get the volume of the top meter of water. Multiply by 1,000 to convert the volume from cubic meters into liters. The chemical that causes toxicity is called the active ingredient. Copper is the active ingredient in most products for controlling cyanobacteria. Different products have different amounts of actual copper in the formulation. The table below shows the relative amounts of different products required to deliver the recommended copper dosage of 0.25 mg/L to the top meter of water in a standard as well as large dugout.

**Table 1 Equivalent, Copper Application Rates for Chemicals Regulated by the Pest Management Regulatory Agency (Jan., 2001)**

Item	Active Ingredient % Cu by Weight	Standard Dugouts (2 to 5 million Liters)	Large Dugouts (5 to 30 million Liters)
Dugout Example	-	20m x 50 m x 3.5m	50m x 150m x 6.0 m
Treatment Volume (Target the Top 1.0 m)	-	1.0 million L	7.5 million L
Top 1 m Treatment Dose	-	0.25 mg Cu/L	0.25 mg Cu/L
Copper Sulphate granular	25.4 %	1.0 kg	7.5 kg
Cominco Cupric granular	25.2 %	1.0 kg	7.5 kg
Phelps Dodge Triangle Brand granular	25.2 %	1.0 kg	7.5 kg
Cutrine Plus granular	3.7 %	6.8 kg	50.6 kg
Nalco Cuprose granular	19.1 %	1.3 kg	9.8 kg
Algi-Boss, liquid <sup>+</sup>	5.0 %	4.1 L	31.3 L
Cutrine Plus, liquid <sup>+</sup>	9.0 %	2.3 L	17.2 L
Polydex, liquid <sup>+</sup>	5.0 %	4.1 L	31.3 L

Note: Reduce all application rates by about 60% if fish are present.

## How to Apply Copper Treatments

*Although cyanobacteria may be controlled, over-dosing a dugout with copper may cause a subsequent increase in the growth of green and brown algae.*

Use a safe target dose as recommended by Table 1, being careful not to exceed the label rate. Read the label and product literature for any restrictions on product use.

Dilute the required amount of copper product into a volume of water so that it can be sprayed over the surface of the dugout. Spray the entire surface, with particular focus to areas where cyanobacteria populations are greatest. Spraying can be done from shore or from a boat. Alternatively, dry copper chemical can be put into a nylon sock, with ropes tied to both ends of the sock. Drag the chemical sock back and forth along the top of the water, covering the entire surface area. The dry compound will dissolve in the water. Spot treatment is also possible using one teaspoon (5 ml) of dry copper sulphate added to 1 gallon (5 liters) of water. Spot treat by spraying areas where cyanobacteria are starting to grow. Spot treatment may be useful when wind blows the bacteria against one shoreline.

Inspect the dugout once per week after treatment. Blooms can grow and die off within a one to two week period. A dugout should not be treated with copper more than four times during one open-water season.