

Toxic Blue-Green Algae

By Don Van Veldhuizen

When considering the validity of this article, I felt that it might spark a little controversy. Many people take blue-green algae as a nutritional supplement. In fact, one of the world's largest distributors of blue-green algae is located right here in Oregon. Let me set the minds of those taking the supplement at ease. There are several hundred types of blue-green algae. This article will address the toxins that occur when certain types of blue-green algae die and decay, posing a risk in several of our lakes each summer and several water systems throughout our state each year.

Blue-green algae, or cyanobacteria, is a naturally occurring bacterium that affects some of Oregon's most beautiful lakes and some that are used as source water for several communities. If the conditions are right, it will bloom to hazardous, even toxic levels in the untreated water. Once the algae die and start to decay, the toxin Microcystin is produced. In its untreated form, it is more lethal than cyanide. At high concentrations this toxin has an immediate effect and can be lethal in minutes. The long-term effects, at lower concentrations, attack the internal organs, specifically the liver.

Blue-green algae is receiving international interest as a water quality issue. The World Health Organization has a limit on the toxin Microcystin at one part per billion (ppb). It was set at a level considered to be safe for human consumption. Although deaths mainly occur in animals that drink the untreated water, an estimated 2000 people were infected in Brazil resulting in 76 deaths. There have also been a few deaths in the U.S. connected with this toxin.

Long-term effects have not been studied much here in the United States. Several other countries including Australia, New Zealand, and Canada are currently looking into this little known bacteria. Some initial studies have shown that it is linked with liver cancer.

It is of particular concern in water treatment here in the states, as the standard treatment does not remove it. To remove it, changes in our treatment

practices will have to be taken and are addressed later in the article.

Our neighbors to the north (Canada) have a protocol for dealing with Microcystin once an algae bloom has been detected in the source water. When the source water reaches one ppb, regular sampling of both raw water and treated water are required. The maximum allowable levels for Microcystin is 1.5ppb. If exceeded, public notification is required and if treatment modifications are unsuccessful, the system may have to change to another raw water source.

Treatment techniques have been studied throughout the world and have shown that chlorination is ineffective. Chlorination for pretreatment is actually harmful as it kills the algae, causing a release of toxin. Powdered Activated Carbon (PAC) is effective as a pretreatment chemical prior to a conventional treatment plant according to a study of five surface water plants in Wisconsin averaging 96% removal. It can, however, be expensive if a major bloom occurs. Without pretreatment, conventional treatment plants were ineffective at removing Microcystin. Granular Activated Carbon (GAC) was also effective, but experienced a shortened life when removing the toxin. Nanofiltration and Reverse Osmosis are both very effective in removing the toxin, but initial expense can be quite high. Ozonation is considered by most (if not all) as the most cost effective method for dealing with Microcystin.

In order to bring this a little closer to home, in recent history, 18 lakes have reported blue-green algae concerns in Oregon. Those lakes include Blue Lake, Cougar Reservoir, Crane Prairie Reservoir, Devil's Lake, Dexter Reservoir, Diamond Lake, Eel Lake, Fish Lake, Hills Creek Reservoir, Lake Oswego, Lake Selmac, Lava Lake, Lookout Reservoir, Mercer Lake, Odell Lake, Paulina Lake, Tenmile Lakes, and Wickiup Reservoir. DHS has a website to inform the public of lakes affected by blue-green algae. Its address is <http://oregon.gov/DHS/ph/envtox/maadvisories.shtml>. Although there are no MCLs for Microcystin, public health may warrant looking into monitoring and/or treatment of this toxin. If you have any questions concerning Blue-green algae please feel free to contact me at dvan@oawu.net.