

HARMFUL ALGAL BLOOMS AND DRINKING WATER

SUMMARY

Freshwater harmful algal blooms (HABs) are a growing concern in the United States and worldwide. Negative impacts from HABs on water quality, human and animal health and the economy can be significant. Some HABs can produce toxins that are harmful to humans and animals. These toxins can pose challenges to drinking water supplies. Given this risk, many drinking water systems are taking actions to manage cyanotoxins in drinking water and notify the public if toxin levels become a possible health concern. Reducing nutrient pollution, such as excess nitrogen and phosphorus, in drinking water sources is important for the long-term management of the risks HABs pose to public health and water quality.

BACKGROUND

Cyanobacteria, formerly referred to as blue-green algae, are found naturally in lakes, rivers, ponds and other surface waters. When certain conditions exist, such as in warm water containing an abundance of nutrients, they can rapidly form harmful algal blooms (HABs) (see Figure 1). Some HABs are capable of producing toxins, called cyanotoxins, which can pose health risks to humans and animals. Additionally, HABs can create taste and odor problems in drinking water, such as an earthy and musty smell. The environmental conditions that cause HABs to produce cyanotoxins are not fully understood and can vary from year to year within the same waterbody. Some cyanotoxins occur in blooms that look like thick scum or paint-like substances on the surface of the water, while others occur in blooms that are not as easily visible.

Figure 1. Harmful algal bloom

HEALTH IMPACTS

Conventional water treatment (consisting of coagulation, sedimentation, filtration and chlorination) can generally remove cyanobacterial cells and low levels of toxins. However, water systems may face challenges providing drinking water during a severe bloom event, when there are high levels of cyanobacteria and cyanotoxins in drinking water sources. If cyanotoxins over the U.S. Environmental Protection Agency's national 10-day Health Advisory level (see Table 1) occur in tap water, people are at risk of various adverse health effects including upset stomach, vomiting and diarrhea as well as liver and kidney damage.

10-DAY HEALTH ADVISORIES	LEVEL
Microcystins	
Children pre-school age and younger (under 6 years old)	**0.3 µg/L**
School-age children (6 years and older)	**1.6 µg/L**
Cylindrospermopsin	
Children pre-school age and younger (under 6 years old)	**0.7 µg/L**
School-age children (6 years and older)	**3.0 µg/L**

Table 1. U.S. EPA's National 10-Day Health Advisories

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MANAGING HEALTH RISKS

Given the health concerns that can occur from cyanotoxins in drinking water, many water systems are taking actions to manage and reduce the risks from cyanotoxin contamination in drinking water. These actions can include steps for cyanotoxin monitoring, adjusting treatment to address contamination before levels are of concern and notifying the public through a Drinking Water Advisory when toxin tap water levels are a possible public health concern.

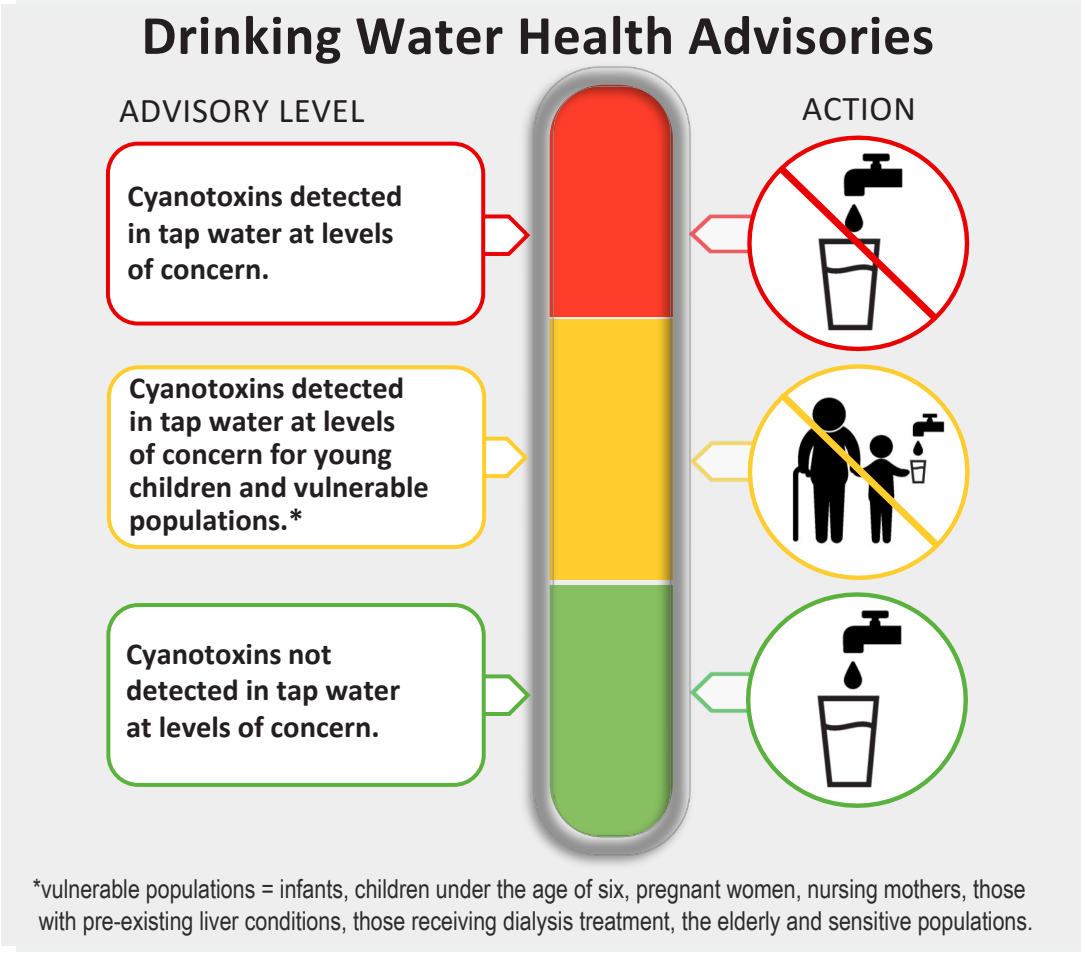

Figure 2. Drinking Water Health Advisories

DRINKING WATER ADVISORIES

If a Drinking Water Advisory is issued for cyanotoxins, instructions for appropriate customer actions will be described in the advisory notification. There is a possibility that there will be different instructions for different population groups, depending on the cyanotoxin levels found in the drinking water.

Using the the U.S. Environmental Protection Agency's national Health Advisory levels for microcystins and cylindrospermopsin as a guide, ranges of cyanotoxin levels in drinking water can be shown with the following advisory levels: **green**, **yellow** and **red** (see Figure 2). **Green** corresponds to drinking water toxin levels where adverse health impacts are unlikely to occur for everyone. **Yellow** indicates drinking water toxin levels where the risk of adverse health impacts is higher for infants, young children under the age of six and other vulnerable populations (including: pregnant women, nursing mothers, those with pre-existing liver conditions, those receiving dialysis treatment, the elderly and other sensitive populations). **Red** indicates drinking water toxin levels above which the risk of adverse health impacts is higher for everyone drinking the water. Drinking water systems can elect to issue Drinking Water Advisories using these categories as guides.

HEALTH ADVISORIES

The U.S. Environmental Protection Agency (U.S. EPA) published national drinking water Health Advisories for the cyanotoxins microcystins and cylindrospermopsin (see Table 1). The Health Advisories provide the cyanotoxin levels in drinking water less than or equal to which adverse human health impacts are unlikely to occur when exposed to these levels over a 10-day time period. The Health

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Advisories are lower for infants and young children under the age of six because they drink more water relative to their body weight as compared to adults and children six years and older.

Health Advisories are developed to help states and water systems assess local situations and during emergency situations and spills. They are not a federally enforceable, regulatory limit. As new information becomes available, the U.S. EPA may develop updated advisories. For more information please see: https://www.epa.gov/nutrient-policy-data/drinking-water-health-advisory-documents.

Data for illnesses associated with exposure are being collected nationally at the Centers for Disease Control and Prevention (CDC). To report a cyanotoxin-associated illness for humans and animals, please contact your state or local health department.

PREVENTING HABS

Keeping the lakes and rivers that supply our drinking water clean is key to ensuring clean drinking water. Reducing the amount of nutrients, such as nitrogen and phosphorus, in sources of drinking water can reduce risks of HABs and associated cyanotoxins impacting drinking water. These excess nutrients typically originate from agricultural, industrial and urban sources as well as from atmospheric deposition. Decreasing this nutrient pollution will help keep drinking water clean and can generally improve local water quality (see Figure 3).

MORE INFORMATION

For more information about how HABs are managed in your tap water contact your public water system. For more general information see: www.epa.gov/cyanohabs.

For more information about HAB-associated illnesses, see www.cdc.gov/habs.

Figure 3. Lake without a harmful algal bloom (Lake Crescent, WA)

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