Nutrients in Iowa’s Water Bodies May Lead to Harmful Microcystin Toxin, Yet Iowa DNR resists implementing updated exposure limits

Every summer the hot weather ushers in a series of beach advisories at Iowa’s lakes. One of the reasons for the beach advisory is the presence of microcystin toxins. The toxins are created by bacteria that thrive in waters that are polluted with nutrients (mostly phosphorus) and blue-green algae growth. In 2018, 6 beaches tests showed unsafe levels of microcystin toxins. The number was 37 in 2016. A beach advisory is a warning that unsafe levels of microcystin exist, levels that are harmful to human health.

On June 6, 2019, the federal Environmental Protection Agency (EPA) released its final recommendations for levels of microcystin toxins that are safe for people who are swimming or participating in primary contact recreational activities on the water. EPA recommends the level of exposure to be 8 micrograms per liter in order to protect swimmers and beach advisories at levels higher than that.¹

The Iowa Department of Natural Resources (DNR) currently follows recommendations issued by the World Health Organization (20 micrograms per liter). The DNR plans to continue to use its existing standards and has no plans to migrate to the new EPA-recommended standards. Erin Jordan reported in the June 20, 2019, Cedar Rapids Gazette that “The Iowa Department of Natural Resources doesn’t plan to follow new federal recommendations for beach water quality that could lead to more public warnings.”² Further, the DNR “officials say the lower standard would triple the number of state park beach advisories without proof the water is safer for recreation.”³

Mary Skopec, formerly employed by the DNR as the beach monitoring coordinator, explained, “That level of 8 is really protecting the most vulnerable - children who spend time in that shallow water where those scums com up on shore. Kids put their hands in their mouths a lot.”⁴

How microcystin is created

Blue-green algae looks like a blue-green scum on a lake. The algae can also form thick mats.

Blue-green algae growth is caused by nutrient-rich runoff from farm fields and urban areas entering water bodies during warm weather. The nutrients come from commercial fertilizers and manure. The algae

¹ “Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin”, Environmental Protection Agency, June 6, 2019
² Erin Jordan, “Iowa won’t use stricter gauge of beach water quality”, Cedar Rapids Gazette, June 20, 2019
³ Erin Jordan, “Iowa won’t use stricter gauge of beach water quality”, Cedar Rapids Gazette, June 20, 2019
⁴ Erin Jordan, “Iowa won’t use stricter gauge of beach water quality”, Cedar Rapids Gazette, June 20, 2019
growth attracts a bacteria called Microcystis which produces a toxin called microcystin. The water becomes green and smelly.

Unfortunately one cannot use the appearance and smell of the water to determine if microcystin toxins are present. Sometimes elevated levels of microcystin toxins are present even though there are no signs of a blue-green algae bloom.

Although most people would not recreate in smelly water, a water body can still be infected with microcystin and not have a horrible smell. Furthermore, the toxin can be carried in water droplets, which can expose folks who are not recreating in the water.

**Exposure to microcystin toxins is harmful**

Exposure to the toxin can cause serious health problems. “The primary concern with microcystin pollution is very young children who play in the shallows and may put their hands in their mouths.” However people of all ages can be harmed by exposure to microcystin. People who come into contact with the water laced with the toxin can develop blisters around the mouth and rashes. Drinking water contaminated with blue-green algae and the related toxins can result in diarrhea, nausea, vomiting, stomach pain, headaches, sore throats, and even liver and kidney damage. Breathing contaminated water droplets can cause respiratory problems such as pneumonia.

Microcystin can also have negative effects on farm animals, pets, and wildlife, including seizures and paralysis.

**Blue-green algae and microcystin toxins have affected drinking water**

Microcystin toxins may enter into drinking water systems. Cities that rely on surface water sources for drinking water are particularly vulnerable, including Des Moines, Iowa City, and Davenport. Also vulnerable are those cities that rely on water taken from shallow wells, including Cedar Rapids. So far, Iowa’s municipal drinking water utilities have been able to provide water free of unsafe levels of microcystin toxins.

In August, 2014, national news carried reports that the drinking water in Toledo, Ohio, was unsafe to drink due to the toxin formed by the presence of blue-green algae. For several days, residents of Toledo, Ohio, were forced to drink bottled water and to curtail other uses of tap water.

Iowa drinking water supplies are not immune to blue-green algae. In fact, about the same time as Toledo experienced a blue-green algae bloom, several water bodies in Iowa experienced blooms of blue-green algae, including Lake Red Rock in central Iowa and Saylorville Lake. An algae contamination of Saylorville

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5 Erin Jordan, “Warning of toxins is first for Lake Macbride, Researcher describes ‘pea soup’ as far as the eye can see’ at Solon site”, *Cedar Rapids Gazette*, June 30, 2019
8 Marcus McIntosh, “Heavy appearance of algae keeps people off water,” *KCCI-TV*, August 4, 2014
9 Rekha Basu, “We can’t let agriculture destroy our environment,” *The Des Moines Register*, August 9, 2014
Lake poses a risk to the drinking water of Des Moines, Iowa’s largest metropolitan area. Saylorville Lake drains into the Des Moines River from which the city of Des Moines withdraws surface water, along with the Raccoon River, and uses that for drinking water in the Des Moines metropolitan area.\footnote{Donnelle Eller, “Algae threat to Des Moines’ water feared,” The Des Moines Register, August 14, 2014}

**Solutions – reducing nutrients and microcystin**

1. The Chapter believes that the DNR should immediately take steps to post beach advisories when the level of microcystin toxins reach 8 micrograms per liter in order to protect swimmers.

2. Every three years the DNR reviews the water quality standards that Iowa has implemented, a process called the triennial review. Given that the DNR is pushing back and refusing to implement the standard of 8 micrograms per liter, a focus of the triennial review is for the Department of Natural Resources to implement the EPA recommendation for the level of exposure to be 8 micrograms per liter in order to protect swimmers.

3. A second focus of the triennial review is for the Department of Natural Resources to implement measurable nutrient reduction that will lead to a significant reduction in the nutrients (phosphorus and nitrogen) entering Iowan’s streams, rivers, and lakes. Currently the Iowa Department of Natural Resource’s (DNR) strategy is for voluntary reduction of non-point sources of nutrients, such as farm fields. This strategy has no measurable criteria for the amount of nutrients allowed in runoff and no time-line by which adequate nutrient reduction must be accomplished. This is inadequate to ensure a timely and satisfactory reduction of nutrients in Iowa’s lakes, rivers, and streams.

**Conclusion**

“Iowa DNR officials said they will further review the EPA’s new recommendations, but [DNR spokesman Alex] Murphy said Iowa already has more oversight of beach water quality than many states that don’t test for microcystins”.\footnote{Erin Jordan, “Iowa won’t use stricter gauge of beach water quality”, Cedar Rapids Gazette, June 20, 2019} The Sierra Club believes that Iowa should strive to be among the best states in the nation in protecting people who recreate in Iowa’s lakes, rivers, and streams.

Although the Iowa Department of Natural Resources tests 39 state park beaches for microcystin toxins every week, the DNR cannot possibly test all waters in Iowa and consequently cannot post warnings at those areas, including those on private land. In spite of voluntary efforts to reduce farm-produced levels of nutrients that are entering Iowa’s water bodies, a significant quantity of phosphorus runs off the landscape and into the water. Microcystin toxin poisonings will continue until nutrient levels are significantly reduced in Iowa’s water bodies.

For current information on beach advisories, contact the Department of Natural Resources at 515-725-3434. You can also consult the DNR’s webpage at www.iowadnr.gov/Environmental-Protection/Water-Quality/Water-Monitoring/Beaches