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M e m o r a n d u m

Date: Monday, May 11, 2015

To: Chris Shaw – Utility Director

cc: Water Staff

From: Michael Suha, Technical Services Manager

RE: Cyanobacteria and Cyanotoxins Study Update

Cyanobacteria, also known as blue-green algae, are photosynthetic bacteria that can live in many types of water. They are important primary producers (organisms that make energy directly from the sun) in aquatic ecosystems. Rapid, excessive cyanobacteria growth is commonly referred to as a "bloom", and can cause ecological and public health concerns. Cyanobacteria blooms that produce cyanotoxins are called harmful algal blooms or "HABs". Blooms can be prevalent in the summer time, but not all blooms produce cyanotoxins. The impacts of chronic or acute exposure to cyanotoxins in humans, especially at the lower levels more common in drinking water, remain unknown. Confirmed adverse health effects in humans are rare. Animal studies have shown effects of cyanotoxins (microcystin and cylindrospermopsin), in the liver, nervous, and gastrointestinal system.

The World Health Organization (WHO) developed a provisional finished drinking water guideline of 1.0 microgram per liter, based upon a chronic exposure in 2003. As of early 2015, there are no federal or State of Wisconsin regulatory standards for cyanotoxins in drinking water. In 2015, health advisory standards were published by the federal government. The health advisory values for algal toxins recommend 0.3 micrograms per liter for microcystin and 0.7 micrograms per liter for cylindrospermopsin, as levels not to be exceeded in drinking water for children younger than school age. For all other ages, the health advisory values for drinking water are 1.6 micrograms per liter for microcystin and 3.0 micrograms per liter for cylindrospermopsin. Potential health effects from longer exposure to higher levels of cyanotoxins in drinking water include gastroenteritis and liver and kidney damage. The health advisory values are based on exposure for 10 days.

The Appleton Water Filtration Plant was one of several water plants on Lake Winnebago that began to collect cyanotoxins data with the McNair Scholars Program at the University of Wisconsin – Oshkosh and the Zilber School of Public Health at the University of Wisconsin – Milwaukee. Raw lake and Appleton finished drinking water samples were collected during the summer of 2013, and the summer and winter of 2014. The raw lake samples analyzed to date have not detected cylindrospermopsin during this time period. For all of 2013, Appleton finished drinking water samples analyzed did not detect any toxins at a detection limit of 0.005 micrograms per liter. This study continues, as the remainders of 2014 samples have yet to be analyzed.

Based upon 2013 study results, the cyanotoxins level found in Appleton finished drinking water was undetectable at a level 60 times lower than the 2015 health advisory for children younger than school age and 320 times lower than the value for other ages.