A Review of Occurrence and Mitigation of Algal Odorants and Toxins in Surface Waters

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Abstract. Climate change combined with the eutrophication of surface waters lead to more frequent occurrence of cyanobacteria blooms throughout the world. During the blooms, several algal metabolites are released into the source waters that may cause aesthetic or health problems. Off-flavor of finished drinking water due to algal odorants results in consumer complaints and loss of trust to the safety of the tap water. Utilities spend millions of dollars each year to provide palatable water to their customers. On the other hand, presence of algal toxins in source and drinking waters may cause serious health problems such as cancerous tumor formation or liver and kidney failure leading to death. World Health Organization has set a guideline for algal toxins in drinking water at 1 µg/L to prevent adverse health effects. Another problem with the higher levels of algal metabolites in source waters is the higher potential of formation of disinfection by-products. There are several advanced techniques applied for removal of odorants and toxins from the drinking water. A common application for odorant removal is the use of granular or powdered activated carbon which is also shown proven effective for toxin removal. Another method is the ozonation of the finished water coupled with chlorine or chlorine dioxide. A less common method used for algal metabolite treatment is the UV oxidation usually coupled with hydrogen peroxide. Occurrence and treatment of algal metabolites should be understood and studied further to prevent future problems with higher occurrences of these metabolites in source waters.