cylindrospermopsin as detailed in the *Health Effects Support Document for the Cyanobacterial Toxin Microcystins* (U.S. EPA 2015) and *Health Effects Support Document for the Cyanobacterial Toxin Cylindrospermopsin* (U.S. EPA 2015). We also understand, from the EPA's May 2019 Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin document, that the reference dose used in the calculation for microcystin is based on rat exposure to microcystin-LR (considered to be the most frequently occurring and most toxic congener of microcystin evaluated) in drinking water, and the reference dose for cylindrospermopsin is based on a study of mice exposed to the cylindrospermopsin in drinking water. Additionally, we know that these are based on the critical effects of each of these cyanotoxins: slight to moderate liver lesions with necrosis, increased liver weight and enzymes associated with tissue damage (microcystin): adverse effects on kidneys, including decreased urinary protein concentration and increased relative kidney weight (cylindrospermopsin).

The proposed thresholds represent careful scientific studies and calculations based on these studies; however, in an effort to create a quantitative standard, we accept much presumption on the routes of ingestion, the volume of cyanotoxins that can be ingested before health is affected, and the risk to human health that cyanotoxins present.

II. Routes of Ingestion

This calculation only takes ingestion while swimming into account. Exposure to cyanotoxins can also occur dermally and through inhalation of aerosolized particles. These routes are not taken into consideration, as EPA states, because adequate effects data are not available. The relative source contribution that was a part of the 2016 recommendations has been removed, to focus on the ingestion.

III. Volume Ingested

The study used to calculate volume ingested (Dufour 2017) analyzed participants between the ages of 6 and 81; no children younger than 6 were involved in the study. Based on this, the calculation includes a mean body weight for children ages 6-10 (31.8 kg or 70 pounds). This leaves many smaller children at risk, not to mention dogs, many of whom are likely to be less than 70 pounds and to ingest greater volumes of cyanobacteria through many different routes. As stated in the EPA's Recreational Water Quality Criteria in 2012: "Relative to body size, children breathe more air and ingest more food and water than adults (U.S. EPA, 2003). Children also exhibit behaviors that increase their exposure to environmental contaminants, including increased head and body immersion in recreational waters (U.S. EPA, 2010a; Wade et al., 2006, 2008) and hand-to-mouth contact (Xue et al., 2007). The immature immune systems of children can also leave them particularly vulnerable to the effects of environmental agents (Pond, 2005). Children also stay in the water longer than adults (Wade et al., 2006, 2008) and often times ingest more water (Dufour et al., 2006)." Studies that include children under 6 should be conducted, similar to the EPA's NEEAR epidemiology studies for fecal indicator bacteria (FIB).