Probabilistic fugacity modelling of cyanobacterial toxins in a drinking water reservoir

S.J. Khan[1], S. Chen[1], C. Huang[1], R. Barton[2], A. Davie[2] and B. Vigneswaran[2]

[1] School of Civil & Environmental Engineering, University of New South Wales, NSW, Australia.
[2] WaterNSW, Penrith, NSW, Australia.

Abstract

A fugacity-based fate model was developed to describe and assess the overall fate of selected cyanobacterial exudates in the Gorge area of Lake Burragorang, Sydney. This fate model was based in the previously described Quantitative Water Air Sediment Interaction (QWASI) Model, but some important additional details were added including consideration of thermal stratification in the lake and the use of probabilistic analysis for stochastic variables. The model was used to incorporate various experimentally determined half-lives for biodegradative and photolytic decay of cyanobacterial exudates, along with literature-acquired data describing partitioning to sediment and volatilisation to air. In most cases, biodegradation and photolysis were shown to be the key processes governing the fate of the cyanobacterial exudates.

Keywords: Microcystins, cyanotoxins, environmental fate, fugacity modelling