This study aims to evaluate the effectiveness of membrane filtration in removing natural organic matters (NOMs) from four different source waters and the subsequent effect that it has on total chlorine (TC) demand of these waters. Source water samples were filtered sequentially through membranes with molecular weight cut-off of 3,500, 1,000 and 200 Da as well as RO membrane. The source waters and sequentially filtered samples were dosed with chlorine and the residual chlorine data were used to estimate the TC demand of these waters. A robust chlorine decay model constructed in AQUASIM software was used to do so. More than 80% of the chlorine demand in untreated surface water sources was found to be contributed mainly by NOMs that were larger than 3,500 Da. However, for water treated by granular filtration, the chlorine demand was found to be contributed by NOMs which were down to 200 Da. Sequential filtration through all four membranes reduced chlorine demand by more than 94% in surface waters and 84% in waters treated by granular filtration. Significant reduction in the formation of trihalomethane can be achieved if water is treated by appropriate membranes after granular media filtration.

Keywords: Chlorine; Chlorine demand; Disinfection by-products; Mathematical modelling; Membrane; Natural organic matter (NOM)