Monitoring and Modelling Chlorine Levels along the Myponga Trunk Main

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Abstract

Chlorine is the most widely used disinfectant in potable water supplies. Its action involves complex reactions that are still not completely understood. Of particular interest in this project was the reactions between chlorine and the four fractions of natural organic matter (NOM): the very hydrophobic acids (VHA), the slightly hydrophobic acids (SHA), the charged compounds and the neutral compounds. Therefore, organic matter from the raw water of the Myponga reservoir (South Adelaide) was fully fractionated (quantitative method) in the laboratory, and chlorine decay tests were undertaken on each fraction. In addition, a five month sampling program of Myponga treated water has enabled the undertaking of a rapid fractionation technique (qualitative method) to obtain the concentration of the four NOM fractions. Chlorine decay tests were then undertaken on these monthly samples to develop kinetic models of chlorine decay that include, among other factors, the effect of the four NOM fractions. The purpose of the full fractionation is to gain some understanding of the interactions between chlorine and each individual NOM fraction. Once this is achieved, the tests on the monthly samples will aim at understanding the interactions between these fractions in the water body and their effect on chlorine demand.

Another aspect of this project is chlorine monitoring and modelling along the Myponga trunk main for a better understanding of chlorine decay kinetics in the bulk water of a distribution system. Although a high chlorine dose is applied at the Myponga treatment plant (~6mg/l), chlorine residual at the extremity of the trunk main (in Aldinga) was found in some occasions below detection limits. After Aldinga, the water had still to travel to the Mc Laren Vale region and be stored in a 10 ML tank (EL 166). This project involved the installation and operation of four on-line chlorine monitoring sites and an on-line flow monitoring site. The monitored data were then incorporated into a water quality model developed using the Aquasim software. The water quality model developed is aiming at forecasting chlorine residuals along the Myponga trunk main and at understanding chlorine decay kinetics in the bulk water of a distribution system and the parameters influencing this decay.

Statement of Originality

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or other tertiary institution and to the best of my knowledge and belief this thesis contains no material previously published or written by another person, except where due reference is made in the thesis text.

I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying.

Signed: **Date:** 13/12/2002

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