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MONITORING BIOSTABILITY AND BIOFILM FORMATION POTENTIAL IN DRINKING WATER DISTRIBUTION SYSTEMS

Kowho Pearl Useh

(Student number: 389928)

School of Civil and Environmental Engineering

University of the Witwatersrand

Johannesburg, South Africa

Supervisor: Dr Biyela

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Abstract

The foremost aim of potable water treatment is to produce water that does not pose a health risk when consumed and/or otherwise used. Nevertheless, research has established that the quality of treated water deteriorates during distribution. The nature and extent of this deterioration varies from system to system and from time to time. The aim of this research study was to monitor the parameters that are known to significantly affect biostability and biofilm formation potential in drinking water distribution systems. Biweekly water samples were collected from thirteen sites, across a section of Johannesburg Water's network, between September 2015 and August 2016. All samples were assayed for a suite of fifteen water quality parameters using standard methods. Heightened temperature, dearth of chlorine residuals, availability of biodegradable dissolved organic carbon (BDOC), and advanced water age all engendered the loss of biostability (instability). Biostability controlling parameters varied seasonally and spatially. Samples collected during spring and summer, in general, were most likely to be characterized by instability than samples collected during winter and autumn. Samples collected from sites RW80, RW81, RW82, RW83, RW104 and RW253 were more prone to instability compared to samples from other sites. From the results, it is clear that chlorine residuals ought to be kept above 0.2 mg/l, and, BDOC below 0.3mg/l to prevent the loss of heterotrophic stability in distributed water. BDOC concentrations can be decreased by, flushing the pipes, cleaning reservoirs regularly and by further treating feed water before distributing. Booster disinfection can be relied upon to ensure that chlorine residuals are maintained throughout the network. Apart from potential health risks, biological instability and biofilm growth can result in non-compliance with regulations.