

**RAPID DETECTION AND MOLECULAR PROFILING OF WATER-BORNE
BACTERIA**

A THESIS SUBMITTED BY

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B. App. Sc. (Hons)

FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY (*Ph.D.*)

JUNE 2005

IN THE

SCHOOL OF PHARMACY AND MEDICAL SCIENCES

DIVISION OF HEALTH SCIENCES

UNIVERSITY OF SOUTH AUSTRALIA

and

CRC FOR WATER QUALITY AND TREATMENT

ADELAIDE, SOUTH AUSTRALIA

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Summary

In this thesis, detection of active water-borne bacteria was achieved by combining flow cytometry with vital dyes that characterise the metabolic status of cells. Following optimisation, these techniques were applied to investigate the activity of bacteria exposed to disinfection, both in the laboratory and in real systems. Raw and potable waters from various locations around South Australia were then analysed to investigate relationships between numbers of active bacteria and those detected by traditional culture-based techniques. Flow cytometric cell sorting of active bacteria followed by 16S rRNA gene-directed PCR and denaturing gradient gel electrophoresis (DGGE) was then used to track the survival of bacteria through water treatment and into distribution. In doing so the identification of active bacteria not detected by culture was achieved. Finally, real-time PCR was optimised for detection of ammonia oxidising bacteria. This group of bacteria were responsible for loss of disinfection residual within a chloraminated distribution system.