Chapter Seven - Conclusions

- Preliminary testing showed that in order to make positive identification of pollution occurrences within large data sets it is of primary importance to monitor, understand and account for the effects that ambient conditions and sampling parameters have upon headspace generation and sensor response profiles. Parametric compensation is of secondary importance

- Simulated spiking within large data sets showed the effects of changing parameters upon sensor response values. Sample temperature is the most significant variable for producing RH whilst a combination of sample concentration and sample temperature effect pollutant identification.

- The dynamic headspace can provide a rapid and relatively simple technique for differentiating between tainted and untainted waters using a flow-cell.

- The results have shown that an array of non-specific sensors are able to detect sudden changes in odour profile arising from a sparged process stream in real time.

- The current limiting factor in applying the integrated monitoring system for detecting the presence/absence of chemical pollutants (particularly compounds which impinge upon taste and odour) in drinking water monitoring is the attainable level of detection (ppm levels).

- The laboratory trials have shown that the limits of detection are within the 5 ppm range. This level of detection is significantly higher than the odour threshold values for both 2-chlorophenol and diesel. This level of detection requires addressing.

- The results show that a chemical sensor array can be used to differentiate between tainted and untainted water by monitoring the headspace generated from a sparged water sample. The differentiation of the sensor array data (using PCA and Statistical significance) over sampling periods of up to five days shows the reproducibility of the sensors and demonstrates that the sampling methodology is repeatable.

- The application of a statistical significance test shows that pollution alarms could be established. The pollution alarm limit, set within the bounds of acceptable system variation, would enable conventional analytical techniques to remain on standby until activated by a statistically significant change in water quality.

- This study demonstrates that a non-specific sensor array can be used to continuously monitor for sudden changes in drinking water quality.