MICROBIAL CONTROL REDUCES SULFIDE

R Chandler

Abstract

As microbes are responsible for the breakdown of wastewater to its constituent parts, the ability to control microbes offers the prospect of radically altering the way we manage wastewater systems in the future. One application is to virtually eliminate the bacterial slime that generates H_2S in sewers. This paper is a brief summary of a trial using the proprietary Biosol™ BR X2 product conducted in a component of the Yarra Valley Water system in Melbourne.

Introduction

In 1996 the first breakthrough in microbial control came when scientists recognised that bacteria have to communicate with one another in order to form and maintain biofilms or slime complexes. This communication occurs at the cellular level and elicits a range of responses from the bacteria. These responses range from the resuscitation of dormant planktonic bacteria to the formation or disintegration of biofilms.

Encouraging reports of the trials of a new product.

Today microbial control is an emerging technology and is one of the fastest growing branches in biological science. It has huge potential with applications ranging from medicine, to food preservation, agriculture and food production, water supplies and wastewater systems. In fact its applications will occur where ever bacterial control is required, even to things like tooth paste to control plaque and under-arm deodorants.

Odour and Corrosion Control in Sewage Catchments

It has long been recognised that about 99.9% of malodorous gasses formed in sewage catchments are formed in the biofilm or slime complexes found in the submerged portions of the pipes and in pressure mains.

The removal of these biofilm complexes would in theory remove 99.9% of odour production at its source.

Without the sulfides being generated, sulfuric acid could not be formed in the airspace and sulfuric acid corrosion of infrastructure would not occur. This would substantially increase infrastructure asset life as shown by Pomeroy's Corrosion Model (Bowker *et al,* 1985). It was the investigation of that theory that led to the development of Biosol® products, which have proven effective in the control of odour and corrosion in wastewater systems both in Australia and internationally.

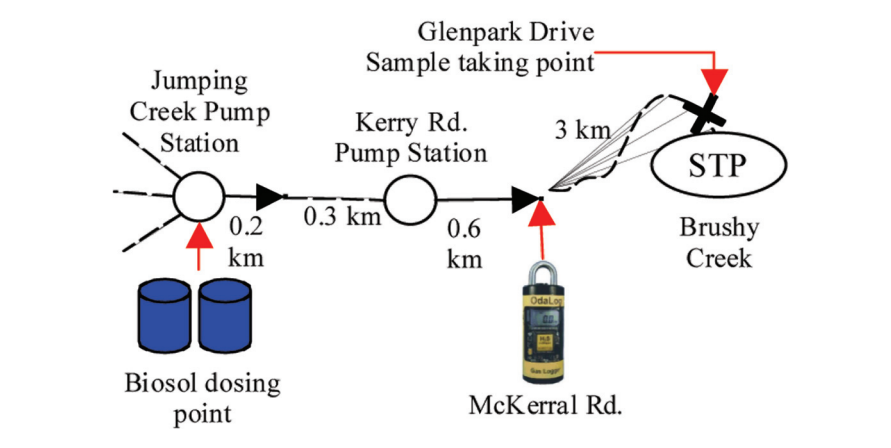

Figure 1. Trial Layout.

Yarra Valley/South East Water Odour Control Trial

During 2004 Biosol® conducted a trial, jointly sponsored by Yarra Valley Water and South East Water on a component of the Yarra Valley Water sewage system. The trial looked at a range of parameters but this article is restricted to H_2S gas odour control and corrosion reduction.

The trial site was located on a part of the Brushy Creek sewage catchment shown in Figure 1.

Biosol® product BRX2 was dosed at the Jumping Creek pump station at rates varying from 7 ppm to 4 ppm across the trial. Odour generation was measured at the end of the Kerry Road Pump Station pressure main at McKerral Road, using App-Tek, OdaLog H_2S data loggers. Yarra Valley Water coordinated the placement and removal of the OdaLog at McKerral Road. They also coordinated the downloading of the data from the OdaLogs for Yarra Valley Water and Biosol, weekly.

An average 94% reduction in H_2S gas levels was achieved across the trial, which indicated that infrastructure corrosion would be significantly reduced. OdaLog

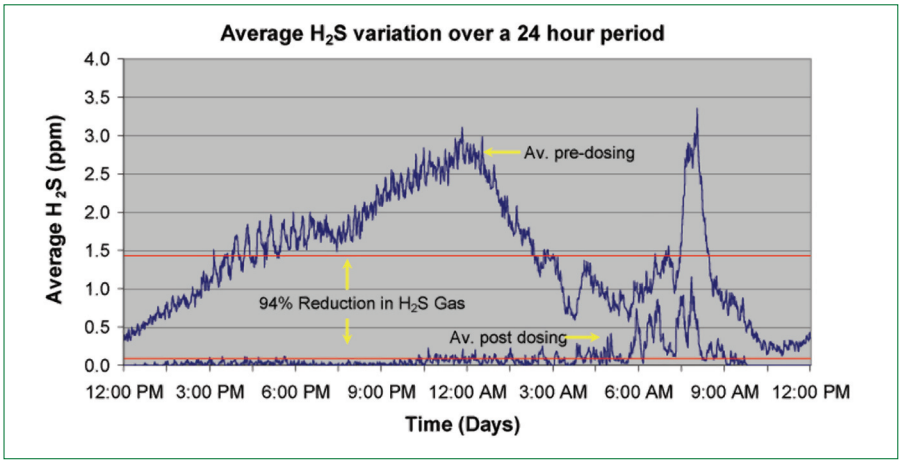

Figure 2. Redlines are the average readings before and after showing a 94% reduction in H_2S gas.

instruments were set to measure H_2S gas levels at minute intervals throughout the trial. This data was used to quantify the average reduction in H_2S gas shown in the graph (Figure 2). Analysis of temperature impacts (using Pommeroy's equations) on the reduction in sulfides has shown that this could only account for a maximum 40% reduction in the sulfide readings, against the 94% shown in these results.

Removal or disintegration of the biofilm complexes in the catchment pipes should reduce the oxygen demand by bacteria in the catchment and the dissolved oxygen levels should rise. The graph (Figure 3) shows increasing levels of dissolved oxygen as the trial progressed which supports reduced microbial oxygen demand. The increasing levels of DO also indicate a substantially reduced ability to generate sulfides in the system and therefore reduced infrastructure corrosion from sulfuric acid.

Dissolved oxygen levels were measured from water samples collected weekly at Glenpark Drive. WSL Laboratories were commissioned to undertake that work.

Yarra Valley Water reported no beneficial or adverse impacts on sewage treatment at the Brushy Creek treatment plant during or after the trial. No measurable impacts at the treatment plant were anticipated as the dilution factors were too great.

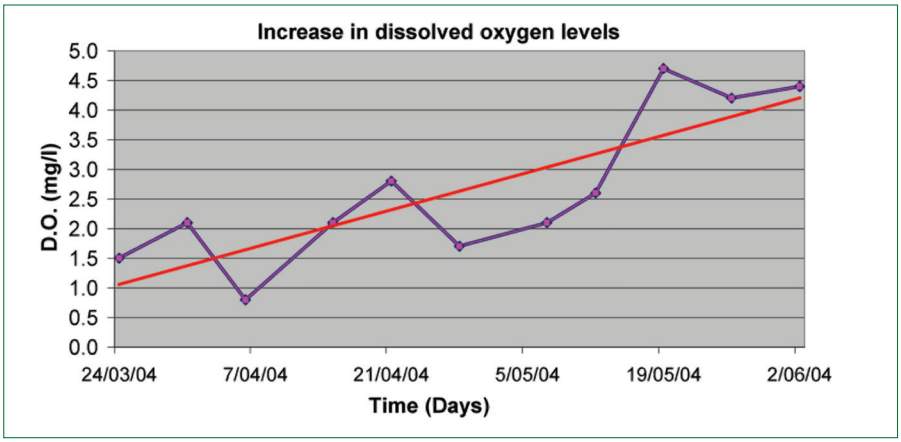

Figure 3. Redline increasing levels of DO.

Research is continuing at both the laboratory and field level with ongoing trials under way or planned with South East Water, Yarra Valley Water and other water authorities.

The Product

Biosol® products are the result of continuing Research in Microbial Control in wastewater systems. They are liquids containing naturally derived, specifically targeted microbial control agents or the synthetic derivatives of such agents. These agents can be used to accelerate or retard microbial activity. The liquids are generally injected into sewage catchments at pump stations in the upper catchment. The products are neither toxic nor hazardous and require no capital-intensive infrastructure.

Conclusion

Infrastructure corrosion is an underestimated expense that costs millions of dollars annually. Odour is a political cost that requires immediate attention. Current Biosol® research is indicating that by minimising odour, infrastructure corrosion is likely to be reduced to a point where there is a net return on the investment to the authority from using the technology.

Acknowledgements

Biosol would like to acknowledge the assistance given by both South East and Yarra Valley Water with this trial.

The Author

Ross Chandler, M.Env.Sc, is co-author of Victoria Felix, Improving Rural Land with Trees. Past Research Awards. "BHP Landcare Research Award (Vic) for Revegetation Research, Waste Management and Environment "Award of Excellence in Waste Management Technology" (1991), for Medical Waste Technology. Biosol® trademark was established in 2001 after 11 years research in microbial control initially in land systems and then wastewater. Email: ross@biosol.net

Reference

Bowker R, Smith J, Webster N, 1985 "Design Manual Odor and Corrosion Control in Sanitary Sewage Systems and Treatment Plants" United States EPA

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