

## EXECUTIVE SUMMARY

The work reported in this study was undertaken to evaluate, at the pre-feasibility level, the proposition, based on observations by researchers at the Rhodes University Environmental Biotechnology Research Unit over several years, that the immobilised sulphide oxidising fixed film system may be considered for the treatment of sulphide containing wastewaters. The passive treatment application was targeted in these studies where sulphide removal presents a severe technological bottleneck in the development of these treatment systems. The current Consultancy Project (K8/763) was undertaken to consolidate and confirm work undertaken at EBRU on sulphide oxidising fixed film systems and to investigate the intellectual property position on which further investment in the process may be considered. The following aims were identified for the study:

- To undertake a preliminary investigation at the pre-feasibility level of the immobilized fixed biofilm system for sulphide oxidation;
- To undertake a preliminary literature review and patent search;
- To investigate optimum process configurations of the tubular reactor;
- To construct and operate a prototype bench-scale plant;
- To make recommendations on the future development of the immobilized fixed biofilm system for sulphide oxidation.

Laboratory-scale studies are reported and the following conclusions may be drawn:

- The feasibility of the sulphide oxidising tubular fixed film system for sulphide removal from wastewaters has been demonstrated;
- This has been demonstrated at the pre-feasibility scale and provides sufficient evidence on which to base larger-scale engineering scale-up studies;
- The results acquired appear to warrant investment in further development of the process;
- Patent and literature searches confirm the originality of the work and that intellectual property residing with the WRC (US Patent, Rose and Rein, 2007) provides a satisfactory base for the protection of the rights of any further investment in development of the process;
- The intellectual property rights would be protected until approximately 16 May 2023 if the registration is kept current;
- Passive treatment of AMD is certain to grow in importance as the gold and coal mining industries in South Africa reach maturity and large scale mine closure ensues. Biological treatment offers one of the few environmentally sustainable technology options and this is crucially dependent on effective technology for the removal of sulphur species from the treated water;
- It is thus strongly recommended that the patent be maintained and that further work be undertaken to establish an engineering scale-up and implementation of the process at industrial scale.