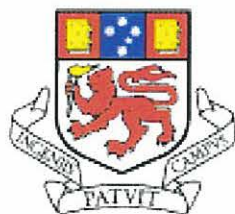


# **Acid Mine Drainage in the Bakers Creek Waste Rock Dump, Hercules, Western Tasmania**

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## ABSTRACT

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Mining has occurred at the Hercules Ag, Au, Cu, Pb, Zn VHMS deposit in western Tasmania, almost continuously for the last 100 years. Mining activity has degraded the local environment, through clearing of vegetation, enhanced erosion and the formation of acid mine drainage (AMD). Of significant concern is the Bakers Creek waste rock dump, situated in a waterfall in the upper reaches of Bakers Creek. This steep, unstable sulfidic rock pile cannot be readily removed or engineered, and is an on-going source of AMD. To allow rehabilitation options for the waste rock dump to be devised, the contribution of AMD from the Bakers Creek waste rock dump needed to be ascertained.

Long term and intensive water sampling programs have been implemented to characterise and quantify AMD emanating from the waste rock dump, and to investigate climatic controls on water quality of Bakers Creek. Water samples were collected from ten sites along Bakers Creek, where field analyses of pH, Eh, conductivity and temperature were conducted. Water samples were collected for laboratory analyses of major and trace element concentrations, sulphate, chloride and alkalinity.

The pH of the drainage waters vary from 5.6 (upstream of mining activity) to 3.0 (foot of the waste rock dump). Maximum metal concentrations were measured at the adit, or the base of the waste rock dump. Major contaminants are Fe (43.8ppm), Pb (19.2ppm), Al (8.47ppm) and Sulfate (1440ppm) and Zn (82.2ppm). During base flow, approximately 47.6 T/yr of Zn is discharging from Bakers Creek into Ring River, (98% of which is contributed by the waste rock dump). Other contaminants contributed by the waste rock dump, represented at least 95% of the total contamination in Bakers Creek including Al (2.87 T/yr), Cu (0.77 T/yr), Fe (1.54 T/yr), Pb 1.9 T/yr, and Sulfate, (199T/yr). The maximum mass loads were recorded during storm events (measured at the base of Bakers Creek). The maximum mass load for each contaminant was 158.9 T/yr Zn, 13.9 T/yr Al, 0.33 T/yr Cd, 3.95 T/yr Cu, 65.4 T/yr Fe, 56.15 T/yr Mn, 23.75 Pb T/yr, and 756 T/yr sulphate. These metal mass loads are high enough to consider metal recovery strategies.

To remediate Bakers Creek, a combination of treatment strategies are probably required. Diversion of Bakers Creek upstream of the waste rock dump, combined with the installation of a biosulphide metal recovery plant to treat Zn, have potential to reduce metal and sulphate concentrations to acceptable levels, and to increase pH. A major

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advantage would be the metals can be extracted from solution and sold to create revenue to offset costs incurred from installing and operating the plant. Diversion of Bakers Creek combined with a wetland filter system at Williamsford, could be an alternative remediation strategy if a biosulphide treatment is not viable.

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