Acid mine drainage analysis for the Reddale Coal Mine, Reefton, New Zealand

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ABSTRACT

The Reddale Coal Mine is located within the Brunner Coal Measures, which are often assumed to be potentially acid-forming rocks that will release acidity when disturbed by mining. The pre-mining assessment of the site acid mine drainage (AMD) potential assumed overburden acid-neutralising capacity was negligible, similar to Brunner Coal Measures in other areas, and that AMD would occur almost immediately. Column trials using poorly stored and partially oxidised drill core indicated potentially acid-forming (PAF) overburden readily produced acidity with no lag period. Based on the pre-mining assessment, a Ca(OH)\textsubscript{2} dosing plant was constructed for AMD management. Once mining commenced, tiphead samples collected during construction of the Ferndale engineered landform showed that the net acid-producing potential of the potentially acid-forming overburden was overestimated by about one-third when acid-neutralising capacity and non-sulphide forms of sulphur were accounted for. When coupled with material properties which resulted in good compaction of waste rock, construction of the engineered landform in 4 m lifts to minimise convective oxygen flux and aglime (<2.5 mm CaCO\textsubscript{3}) amendments to each lift, acidity loads from the Ferndale engineered landform were negligible. Compliance monitoring downstream of the mine site at Red4 shows that, to date, site discharge pH has remained circum-neutral. Pre-mining AMD management decisions, primarily construction of a Ca(OH)\textsubscript{2} dosing plant that was never commissioned, therefore proved overly conservative. The timing and expense of AMD management has the potential to influence project feasibility and needs to be well understood.