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Treatment of tailings water for re-use in an antimony mine

Mark Mullett

Hatch, Perth, Australia
Tel. +61-8-94285292; email: mmullett@hatch.com.au

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ABSTRACT

The Hillgrove Mine in New South Wales operates a bulk flotation circuit to produce a combined concentrate of stibnite (for antimony) and arsenopyrite (for gold). A build up of inorganic impurities in the tailings storage facility (TSF) water, which is recycled to the flotation circuit, led to poor recoveries of sulphide minerals. This influenced a decision to suspend operations. Hatch develop a membrane process to teat the TSF water so it could again be used in the flotation circuit. Removal of the water from the steady state conditions within the TSF destabilised the chemistry causing the autoprecipitation of metal sulphide species. To produce a sustainable membrane process, a water pre-treatment regime was required to prevent the formation of excessive fouling on the membrane. A regime was developed and the stabilised TSF water was used in bench-scale nanofiltration (NF) tests to produce a permeate stream that achieved good metallurgical recoveries in flotation tests. The process was further proven at pilot scale facilitating the design of a full scale plant for implementation at the Hillgrove Mine.

Keywords: Nanofiltration; Antimony; Tailings; Reverse osmosis; Membrane autopsy; Mopungite

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