

## RECOVERY OF COPPER FROM A PROCESS WASTE STREAM

By

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### ABSTRACT

The recovery of base metals from dilute acidic liquors containing copper (Cu), nickel (Ni), and cobalt (Co) by ion exchange (IX) using chelating and strong acid resins has been widely studied. Ion exchange technology has been applied to a range of feeds including heap leach liquors, copper solvent extraction raffinates, waste waters and mine tailings. Application of IX in the context of impurity removal from electrolytes has also been investigated.

This study explored the potential for copper recovery from a waste liquor generated by Newcrest Mining's gold operations at Lihir in Papua New Guinea. The waste water contained high concentrations of iron and non-colloidal silica.

Three different resin functionalities were tested, including bis-picolylamine (BPA), hydroxy-propyl-picolylamine (HPPA) and iminodiacetic acid (IDA). The iminodiacetic acid resin was tested post neutralisation of the feed liquor to reject ferric. This study enabled the comparison of highly selective resin versus a more traditional approach post ferric removal.

Data collected with respect to the impact of pH on the uptake of Cu and other impurities was used to establish the most favourable region of pH for each of the resins. Further test work conducted to determine the key constants required for modelling an IX process included: loading isotherms, kinetic tests, breakthrough curves and elution profiles. Three process options were developed which were tailored to the type of impurities loaded on the resins and the reagent required for elution. The comparative advantages and disadvantages of the various process options are discussed.

*Keywords: Copper, Ion Exchange, Waste Stream*