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Treatment of a double refractory ore from Barberton using pressure oxidation

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ABSTRACT

The depletion of free milling gold resources, has shifted focus to the treatment of more difficult gold resources. One such example is double refractory gold ores. Double refractory gold ores are known as ores from which gold extraction is poor due to the presence of sulphide minerals and carbonaceous matter (CM) in the ore which preg-rob dissolved gold. In this study, a double refractory flotation concentrate from a mine in Barberton was used to evaluate the effectiveness of pressure oxidation (POX) pre-treatment in enhancing gold extraction. The plant currently conditions the sample in a blinding agent followed by a resin in leach (RIL) process resulting in about 65% gold extraction. Blinding agents are surfactants, usually of hydrocarbon nature which passivate the surface of CM, preventing the adsorption of dissolved gold onto CM.

The flotation concentrate was characterized and subjected to POX and subsequent cyanidation tests were conducted to quantify the improvement and establish best leaching conditions. Base line tests were conducted on the 'as received sample' for comparative purposes. Raman spectroscopic analysis indicated that the carbon in the sample was graphitic and a preg-robbing test of the CM in the sample indicated that it was highly preg-robbing. Although the preg-robbing capacity of CM increased after POX, the research study indicated that conditioning the sample in a blinding agent prior to RIL, resulted in the highest gold extraction of 82% obtained at 20 kg/t NaCN and 50mL/L Minix resin. Even though this study confirmed that POX can be used to enhance gold extraction from this double refractory material, there is still room for further optimization in order to increase the gold recovery