

Maximising Resource Utilisation in SA – The BIF Story

A. Singh¹; C. Da Corte²

1. Senior Technical Specialist: Physical Separation (MSc. (Eng.)(Chem.); Pr. Eng; AusIMM), Mintek, South Africa. Email: ashmas@mintek.co.za

2. Senior Engineer MSc. (Eng.)(Chem.), Mintek, South Africa. Email: carlad@mintek.co.za

Banded Iron Formations or more commonly known as BIF are sedimentary rock formations with alternating silica-rich layers and iron-rich layers that are typically composed of iron oxides (hematite and magnetite), iron-rich carbonates, and/or iron-rich silicates. Considering the depletion of high grade iron ore reserves in South Africa, there is a need to maximize resource utilization through the exploitation of sterile resources in particular BIF material which makes up greater than 65% of current reserves. BIF like most resources are non-renewable and the deposition of BIF is thought to have come about by the reaction of Fe^{2+} ions in the ocean water with dissolved oxygen billions of years ago. BIF ore derived from the Limpopo region in South Africa (SA) located in the Penge Iron Formation is according to Cairncross, 2011 equivalent to that contained within the Asbestos Hills Iron Formation of the Transvaal Supergroup in the Northern Cape, SA. Considering that these are one of the largest Fe ore deposits in SA, the case study involved mineralogical characterisation followed by beneficiation of BIF from these two regions to ascertain the comparability.

Coarse and fines gravity separation comprising of Heavy Liquid Separation on the +1.18mm size fraction and shaking table on the -1.18mm size fraction was conducted to ascertain whether an on-grade product or blended feedstock could be produced. Preliminary results for one region indicates a combined coarse and fines product grading at 60% Fe can be achieved at a yield and recovery of 45.41% and 62.5% respectively. Increasing the grade to 63% Fe reduces the recovery by 14.0%. It is envisaged that should the density and mineralogical characterisation be similar for both regions flowsheet development on one region could be extrapolated to the second.

Keywords: Banded Iron Formation (BIF); Heavy Liquid Separation (HLS),

Number of Words: 284