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Resource classification criteria for hydrothermally enriched manganese ore bodies

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ABSTRACT

Due to regulatory developments over the years, various international and local reporting codes have been consolidated to ensure clear and unambiguous reporting of Mineral Resources globally. The Committee for Mineral Reserves International Reporting Standards (CRIRSCO) incorporates in the International Reporting Template, the minimum standards for the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves, and also provides recommendations and interpretive guidelines for the countries represented on the CRIRSCO committee. This template is advisory only and in South Africa the South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves (SAMREC); developed along the CRIRSCO guidelines; is relevant. SAMREC provides the definition for Mineral Resources and subdivides Mineral Resources in order of increasing confidence into Inferred, Measured and Indicated categories based on the confidence and quality of geoscientific evidence.

Whilst there are numerous publications on Mineral Resource classification, few publications exist on the application of Mineral Resource classification techniques applied specifically to manganese deposits. This has led to manganese resource geologists adopting classification methodologies applied to other commodities, and in some cases merging and adapting different methodologies, which might be inappropriate and not suited to the specific manganese ore bodies being investigated. This study set out to develop a defendable guideline for the Mineral Resource classification of hydrothermally enriched manganese ore bodies by considering confidence in both the geology and geostatistical estimation. Wessels mine was presented as a case study.

The literature review conducted, formed the foundation of this research report wherein various Mineral Resource classification techniques were investigated. Estimation parameters were identified to assess confidence in the estimate and to confirm the key geological considerations affecting confidence in the estimate. Statistical and geostatistical analyses of the geoscientific data were combined with geological knowledge to develop a guideline for the Mineral Resource classification of hydrothermally enriched manganese ore bodies.

The research report shows that using a purely mathematical approach to Mineral Resource classification is an over-simplification and not suited to the manganese ore body, particularly when applied to the skew and non-stationary data of the case study.

The absence of an assessment of geological risk in the current classification was found to be a gross oversight. A scorecard method for Mineral Resource classification is proposed, as an improvement over the current methodology. This proposed scorecard is designed to balance three crucial elements: confidence in data integrity, confidence in the geology, and confidence in the mathematical estimation technique. The fundamental research questions have been answered, thereby achieving the objectives of this research study. It is envisaged that this research will contribute to a published body of work that will lead to improved classification of hydrothermally enriched manganese ore bodies.