An Alternative Approach to Defining an Elusive Contact in a Historical CID

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ABSTRACT

For some time geologists at one of Rio Tinto's Channel Iron mines sought help to address consistent mischaracterisation of the contact between two visually distinct stratigraphic units; an upper, competent ore unit and a more variable (generally more friable) lower one. The difficulty in reliably defining this contact is attributed to two main factors: 1) different interpretation paradigms, and 2) historical drilling with limited, non-quantitative logging data.

From the operations perspective, where predicting lump and fines product grade and handling characteristics is critical, the key difference between the upper and lower units is textural. The upper unit is competent, strongly-cemented, and grain-supported, while the lower one is softer and more matrix-supported, with higher ochreous goethite and clay content. In both units grade is a secondary characteristic, with overlapping distributions and identical cut-offs applied. Whilst evaluation geologists generally understand the importance of the physical differences between the upper and lower units, in the absence of quantitative logging data they were left to rely on chemistry, effectively modelling them as higher and lower grade, rather than higher and lower competency.

Investigation into the historical data confirmed the impossibility of identifying the contact based on logging, whilst assays had been demonstrated by operations to be unreliable. In lieu of this, supplementary downhole data was interrogated to determine if a more diagnostic tool could be found. Downhole probe density data - which was available for nearly half of drill holes across the deposit, but generally used only to estimate bulk density for tonnage calculations - was found to be a viable alternative. Once density shells were modelled in Leapfrog Geo, a prominent domain boundary was readily discernible around operation's hard and soft contact, but within the modelled upper unit. This insight should allow resource evaluation and mine geologists to interpret, model and plan more accurately going forward.