A geometallurgical approach to product predictions at a Channel Iron Deposit in the Pilbara

TTT Nguyen[1], S Talukdar[2], M Wlasenko[3] and J McKee[4]

1.
Evaluation Metallurgist, Rio Tinto Iron Ore, Perth, WA, 6000. Email: theresa.nguyen@riotinto.com

2.
Specialist Mining Engineer, Rio Tinto Iron Ore, Perth, WA, 6000. Email: suman.talukdar@riotinto.com

3.
Specialist Geologist, Rio Tinto Iron Ore, Perth, WA, 6000. Email: michael.wlasenko@riotinto.com

4.
Specialist Metallurgist, Rio Tinto Iron Ore, Perth, WA, 6000. Email: justin.mckee@riotinto.com

ABSTRACT

Developing ore body knowledge for a deposit spans from collecting data from exploration and resource evaluation, followed by multiple iterations of interpretation, geological modelling and metallurgical testing. The management and effective communication of information between teams is critical for downstream business decisions. Unfortunately, in large organisations the successful transaction of information can at times be challenging and stymied by the "silo effect". Here we present an alternative example where information has been communicated effectively to better utilise the resources hosted by a CID deposit in the Pilbara. In this case, more informed decisions were able to be made in the mine planning space where an opportunity for additional future revenue was realised. This is from identifying a significant opportunity to convert blending material to plant feed which would otherwise be on a long term stockpile.

Geological observations from the resource evaluation stage drilling identified regional differences within the deposit instigating collaborative work between geologists and metallurgists to establish geometallurgical domains. These domains were used as a basis for the design of the metallurgical diamond drill holes which were tested for a process response.

Predicting product grade and yield is an integral part of the value chain as it contributes to the mine planning process for existing and future RTIO operations. A crucial step in developing these regressions is the assessment of discrete geometallurgical domains. This involves exploratory data analysis whereby composites with similar process responses are clustered together and are differentiated from dissimilar groups by geological features and chemistry. Contingent to this is obtaining an extensive understanding of the deposit along with the support of a comprehensive data set. Once established, these domains provide mine planning with higher resolution on material behaviour to maximise crusher feed opportunities.

There is ongoing work at RTIO to continually improve geometallurgy practices. One aspect is by promoting the value of effective information communication to work downstream and by "closing the loop" with feedback for validation. This involves collaborative work between geologists, metallurgists and mine planners, breaking the "silo effect", and making the link between available geological information to predict and explain a metallurgical response.