

Improving crusher throughput using a problematic ore index based on simple, first principles geology.

MPepper¹, GGerber², TWalton³ and Dr. CPerring⁴

1. Manager Geology Mining, BHP, Perth WA. Email: mark.pepper2@bhp.com
2. Superintendent Geology Mining - Newman Operations, BHP, Perth WA. Email: glenn.gerber@bhp.com
3. Geologist, Short Term Geological Modelling, BHP, Perth WA. Email: thomas.walton@bhp.com
4. Principal Geologist, BHP, Perth WA. Email: caroline.s.perring@bhp.com

ABSTRACT

Material characterisation, ore sequencing and process capability are commonly regarded as the key parameters to consider in designing and operating an effective pit to plant supply chain. Therefore, an understanding of rock mass properties is the starting point for controlling the presentation of problematic material to the ore handling plant and optimising process utilisation.

There are different methodologies for characterising problematic material and ore handleability which exist across a spectrum of sophistication. At one end of this spectrum are simple indices built using first principles geology and at the other are complex algorithms developed using advanced analytical methods, machine learning and ore traceability. Regardless of the method, without an integrated process for careful management of problematic ore, material handling delays (i.e. blocked, bridged, blinded and buried events) will interrupt the stable flow of production. The ability of the ore control geologist to mitigate these delays is central to the ore handleability challenge.

This paper describes a quick and easy solution that links the presentation of ore to the operating window at the crusher. This operating window is based on material characterisation using the physical, textural and mechanical properties of the rock mass, and crusher performance. It also describes how a basic problematic ore index (POI) can be developed using ore tracking to the production face, petrographic studies of ore texture and mineralogy, and existing variables in the geological model.

Finally, this paper will demonstrate that by coding the POI into the geological model for mine planning, together with performance monitoring through compliance to plan routines, material handling delays at the crusher can be reduced, unlocking significant resource value.