Improvement of the grade control procedure at the Oyu Tolgoi copper-gold mine, Southern Mongolia

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ABSTRACT

Oyu Tolgoi copper and gold mine in the southern Mongolia holds mineral resources that make it one of the world's largest known copper and gold deposits. The project is developing an open-pit mining on the near surface of Southern Oyu deposit and two underground block-caving mines at the Hugo Dummet North and South deposits, where lies 80% of valuable ore.

Oyu Tolgoi (OT) commenced open-pit mining in 2011 and implemented an industry standard blast hole sampling, and ordinary kriging grade control block-out method. The OT surface mine geology team is used to apply four different mining and geology software packages (Vulcan, Minesight, Leapfrog and Digger) for grade control. Data processing through several software was not time efficient and vulnerable to errors. Since 2017, grade control improvement projects have been successfully completed that have led to the implementation of our current, improved grade control system. Geology team has developed the Grade Control (GC) Block model for open pit deposits, 3 block models for 9 ore stockpiles and 2 for waste dumps. Geological model is updated by blast hole logging on Leapfrog and used for daily estimations. GC estimation is proceeded solely on Vulcan by running clava script and integrating with SQL server database. Combination of block-out procedure and Grade Control Optimiser (GCO) produces GC model which is updated in Vulcan and SQL database simultaneously. Transition to the integrated SQL server database eliminated manual processes such as importing and exporting data and access to the database any time from different locations and hardware. Thereby, these improvements allowed us to increase an efficiency, create a comprehensive reconciliation system and reduce operational risks. We are looking forward for broad ways of using Grade Control data stored in SQL.

This paper outlines how the grade control system was developed at OT's open pit mine, and how it is integrated into the short range mine planning, mine reconciliation workflow and reporting systems.