

ORE QUALITY MEASUREMENT AND CONTROL USING GEOSCAN-M PGNAA REAL TIME ELEMENTAL ANALYSIS

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ABSTRACT

Significant value can be added to ore supplied from the mine to the mill by measuring its quality in real time and performing grade control additional to that within the mine. Responsibility for ore quality between the mine and mill stockpiles is not always clear due to operational siloes so geologists and mining engineers need to be involved collaboratively with metallurgists to optimise ore value prior to processing. Sensors, such as the GEOSCAN-M which utilises high specification Prompt Gamma Neutron Activation Analysis (PGNAA), that measure conveyed ore flow representatively (continuous and fully penetrative) and in real time have been used in the minerals sector since 2003 and have been successfully applied in multiple commodities. Quality can be measured within the mine where material is conveyed underground or in-pit. Bulk ore sorting is used to divert increments of waste from the ore stream to upgrade material sent to the crushed ore stockpile (COS) as well as to create run of mine (ROM) stockpiles of different qualities to maximise blending opportunities and accommodate processing priorities, e.g. blending out deleterious content. The real time composition measurement can be combined with moisture and fragmentation analysis data for improved ore type characterisation, to control ore blending, for feedback to the mining schedule and block model reconciliation, and feed forward control for grinding and processing operations. The paper discusses various parameters measured and derived in existing operations that are used to maximise coarse waste rejection and metal recovery, optimise plant feed quality consistency, and reduce consumables; power, grinding media, water, reagents, and minimise fine tailings generation. Innovative geometallurgy applications are also discussed.