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Application of X-Ray CT and QEMSCAN in Geometallurgical study of gold: A Case study of the Witwatersrand gold ore

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A quartz-pebble auriferous conglomerate from the Witwatersrand gold Province (Carletonville, South Africa) prepared by high pressure grind rolls (HPGR) have been investigated by using three different Micro-focus X-ray tomography systems located in three geographically different places (i.e. NECSA: Radiation Science MIXRAD laboratory, SUN: Central Analytical Facilities CT Scan laboratory and Technikon University of Munich (TUM): Physics department, Germany) and QEMSCAN. Application of X-Ray Micro-CT technology combined with QEMSCAN to the field of geometallurgy is being explored for ore characterisation and generation of geostatistical data. Using these two analytical tools, as well as appropriate reconstruction algorithms, a palpable amount of information concerning gold morphology, liberation characteristics, degree of mineralisation, association with other minerals and quantitative HPGR induced crack network data were obtained. The reconstructed sequential slices show much minutiae of the gold in both two and three-dimensional representation which brands X-Ray Micro-CT an appropriate useful tool for geometallurgical studies. Assimilated X-Ray CT data was validated by comparing the findings with data obtained using QEMSCAN. Ability of X-Rays to permit rapid evaluation of gold mineral brings an innovative technology to the gold mining industry which minimise ore characterisation time, cost and assist in geostatistical distribution of gold interpretation.

Keywords: HPGR, X-Ray CT and Gold deportment

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