Mining Martabe Mine's Purnama Deposit— from Resource to Reconciliation

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G-Resources' Martabe gold mine is located in the Regency of South Tapanuli on the western side of the province of North Sumatra, Indonesia. The 30 km^2 Martabe district contains 6 high sulfidation deposits with a pre-mining resource totaling over 7.4 Moz gold and 70 Moz silver. Current and future mining is by open pit methods producing gold and silver bullion via the standard carbon-in-leach (CIL) process. The Purnama gold mine is the first major deposit in G-Resources' Martabe project to enter production with first ore milled in mid-2012. Annual gold production approximates 0.25 Moz with a designed plant throughput of 4.5 Mt over an initial 10-year life.

Purnama is hosted within an andesitic volcanic breccia/volcaniclastic sequence which is intruded at its northern end by a diatreme pipe. Primary mineralization is refractory with gold occurring within pyrite and arsenic pyrite accompanied by enargite, tennantite, and digenite. Oxidation is variable although broadly decreasing with depth, forming an economic limit to open pit mining and CIL processing. The mineralization is associated with intense silicification and acid leaching, leading to prominent geomorphology with the deposit occurring as a steep-sided ridge. The Purnama mining operation is currently removing the top off the ridge prior to the establishment of a more conventional pit.

Discovered in 1997, Purnama has been drilled with dominantly PQ and HQ diamond core on nominal 50 m × 25 m spacing with a central high grade zone drilled at 25 m × 25 m spacing. Production grade control involves RC drilling on a 12 m × 6 m hole spacing followed by domaining and block modelling. Domain construction uses a combination of lithology and alteration based on RC chip logging and pit mapping. Mine production to date has returned positive reconciliations compared to the resource and reserve models with consistently higher gold and sporadically higher silver production. Diamond drill spacing on the crest of the Purnama ridge was sufficient to produce an accurate global estimate but did not adequately identify narrow, higher grade zones that contribute to increased grades in mining. This was a contributing issue to the early reconciliation variances but there were other factors that contributed as mining activities progressed deeper into the deposit.

This paper details the process and outcomes of a revision to the resource model and domaining process by the reexamination of the distribution and controls on mineralization evident in the close-spaced RC drilling data, using both lithology and grade data, as well as the detailed pit mapping. This process has led to a revision of resource modelling domains applied to the deposit and new insights into the nature of and controls on mineralization at Purnama. The case study details the development of a clearer understanding of mineralization through data analysis leveraged from high quality drilling and mapping data.