

Tumpangpitu Porphyry-High Sulfidation Epithermal Deposit, Tujuh Bukit Project, Indonesia— Geology, Alteration, and Mineralization

Rachel Harrison^{1*} and Adi Maryono²

¹ Independent Consultant Geologist, Joglo Pete, Dusun Pete, Majaksingi, Borobudur, Magelang, Central Java, 56553, Indonesia

² VP Exploration, J Resources, Equity Tower, 48th floor, SCBD, Lot 9, Jl. Jend Sudirman, Kav 52-53, Jakarta, 12190 Indonesia

*E-mail: racharrison@gmail.com

The Tumpangpitu porphyry Cu-Au-Mo and high-sulfidation epithermal Cu-Au-Ag deposit is part of the Tujuh Bukit project, located on SE Java, Indonesia. A number of Au ± Ag epithermal and Cu-Au porphyry deposits have been discovered along the Sunda Banda magmatic arc, including Batu Hijau and Elang in Sumbawa. Tumpangpitu is the most recent discovery. It contains 1.9 billion tons (bt) @ 0.45% Cu and 0.45 g/t Au containing 28 Moz Au and 19 b lbs of Cu, making it one of the largest undeveloped porphyry deposits in the world.

Tumpangpitu is located along a NW-SE–striking structural corridor covering an area of 12 × 5 km. This structural corridor hosts several Cu-Au-Mo mineralized tonalitic porphyries, each with varying degrees of metal enrichment. We have constructed type sections through Tumpangpitu based on intrusive and breccia crosscutting relationships, supported by radiometric dating. This work has provided the first comprehensive geological model for the deposit.

Tumpangpitu is a large, classic example of telescoped Au-Ag (oxide) and hypogene Au-Ag-Cu high sulfidation mineralization and associated advanced argillic alteration (part of a district-scale lithocap) overprinting the top of a Cu-Au-Mo porphyry. Mineralization extends from the present-day surface to depths below 1200 m (current drilling capacity). High-sulfidation mineralization is hosted by three main NW-trending quartz ledges known as Zone A, Zone B, and Zone C, containing oxide ore close to surface that transitions and sulfide ore at depth. Porphyry mineralization extends from an upper level of 200 m to depths of over 1200 m. The 0.2 % Cu shell extends 1.2 to 1.5 km laterally around the tonalite intrusive complex. Spectral data has been used extensively as an essential tool for creating an alteration model of high temperature clay minerals. Zonation vectors are evident, whereby quartz-alunite-dickite assemblages are dominant at higher levels in the epithermal system and pyrophyllite ± diaspore ± topaz at deeper levels. Fluids channelled along structures formed vuggy quartz ledges that zone out to advanced argillic envelopes containing dickite-kaolinite and with decreasing quartz contents. Argillic zones developed distal to the system with illite-smectite neutral clays and propylitized margins (chlorite-calcite ± epidote). The highest grade porphyry mineralization occurred in highly magnetic, potassic-altered rock. This has allowed airborne magnetics to be used in conjunction with mapping and soil molybdenum responses as successful, direct exploration targeting techniques which led to the discovery of the deep porphyry system.

Epithermal mineralization grades from high-sulfidation, fault-controlled enargite ± covellite ± bornite at surface to intermediate sulfidation (tetrahedrite-tennantite dominant) at depth. The epithermal features have overprinted porphyry mineralization (bornite, chalcopyrite, digenite, covellite, and molybdenite) in the deeper levels of the system, with complex sulfide overprinting relationships at the interface. The overlying high-sulfidation epithermal mineralization at Tumpangpitu contains 2.1 Moz Au and 72.9 Moz of silver. The presence of high-sulfidation ore is a significant difference between Tumpangpitu and other porphyry systems along the Sunda-Banda arc (e.g., Batu Hijau, Elang), evidence that Tumpangpitu is less deeply eroded.