

Subsurface Lithologic and Alteration Mapping and Modelling of the Kay Tanda Epithermal Gold Deposit, Lobo, Batangas, Philippines

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The Kay Tanda epithermal gold deposit is located at the southern flank of Mt. Lobo in the Batangas mineral district, Philippines. It contains approximately 4.9 M metric tonnes of indicated and measured resources at 1.09 g/t Au and 2.15 g/t Ag at 0.5 g/t Au cut-off grade. Situated outside established and well-studied gold districts in the Philippines, its deposit characteristics are among the least studied in the country. This study aims to generate a three-dimensional lithologic and alteration model of the deposit using the data gathered from geologic logging and detailed petrographic and X-ray diffraction analyses.

The deposit is mainly hosted in the Middle Miocene Looc Volcanic Complex (locally named as Talahib Andesite) which is composed of andesitic to dacitic volcanoclastic sequences. Based on the regional mapping conducted by the Bureau of Mines and Geosciences (BMG) in 1980, andesitic sequences dominate the upper sequences of the formation while the lower sequences are dominantly dacitic in composition. Geologic logging showed intertonguing and alternating sequences of the dacitic and andesitic sequences in the deposit. The dacitic sequences are mainly composed of dacitic lapilli tuff. They are composed of strongly hydrothermally altered dacitic fragments with quartz phenocrysts exhibiting embayed to resorbed textures. The andesitic sequences are composed of andesite lava flows. They are hydrothermally altered and exhibit characteristic trachytic and porphyritic textures. The plagioclase phenocrysts are completely altered to clay but their euhedral lath-like habit is still preserved. The Looc Volcanic Complex is intruded by a local multi-facies intrusion called the Balibago Intrusive Complex. It is composed of diorite, quartz diorite and andesite porphyry. The diorite and quartz diorite are phaneroporphyratic while the andesite porphyry exhibits aphanoporphyratic textures. Overlying the Looc Volcanic Complex is the Late Miocene to Early Pliocene Calatagan Formation, a complex sedimentary sequence of sandstones, siltstones, shales, conglomerates, and limestone lenses with minor andesitic tuffs. Weak mineralization was found in some sandstones and limestones of the Calatagan Formation. Overlying the deposit is a post-mineralization Balibago Andesite. It is composed of a slightly to moderately weathered andesitic lapilli tuff.

X-ray diffraction was used to determine the specific alteration mineral assemblages of the samples. The Looc Volcanic Complex is affected by advanced argillic and argillic alteration. The advanced argillic alteration zone is composed of pyrophyllite and kaolinite with minor illite. Argillic alteration zone is composed of illite and smectite with minor amounts of kaolinite. The mineralized portions of the Calatagan Formation are also argillic altered. The intrusive rocks of the Balibago Intrusive Complex are mainly affected by propylitic alteration which is composed of chlorite and illite.

A three-dimensional lithologic and alteration model was generated using the Leapfrog Geo Software. Also, assay values for gold, silver, lead, zinc and copper were inserted in the model to determine the location of the high grade zones of the deposit. The model shows that the gold and silver mineralization are mainly hosted in the dacitic volcanoclastic sequences of the Looc Volcanic Complex which are strongly affected by advanced argillic alteration. Base-metal mineralization is mostly found at the deeper levels of the deposit.

Keywords: Kay Tanda deposit, epithermal, Lobo, Batangas, Philippines, hydrothermal alteration, geologic modelling