

Igneous Rock Geochronology and Timing Relationships to Gold Mineralisation Within the Tanjianshan Gold Project, Qinghai Province, P.R. China

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The Tanjianshan gold field is located in Qinghai Province, northwest China, and consists of two principal deposits, namely Qinglongtan and Jinlonggou, with total mined and in-ground resources of more than 1.65 Moz of gold averaging 3.46 g/t. These gold deposits are owned and operated by Eldorado Gold Corp and have been in commercial production since 2006, with present annual production of about 80,000 oz.

Gold mineralization within the Tanjianshan gold field is hosted within mid-Proterozoic-aged Wandonggou and Tanjianshan Group metavolcanic-sedimentary packages in the North Qaidam orogenic belt in northwest China. The packages are dominated by pelites, metaandesites, metagabbros, and psammites, with lesser marble. Tanjianshan is located within a tectonic zone along the northern margin of the NW-trending Kunlun geosynclinal fold belt. Locally, the rocks have undergone multiple stages of pre-, syn-, and post-mineral intrusions and deformation.

At the Jinlonggou deposit (1.01 Moz averaging 3.91 g/t Au), gold is hosted within both chialstolite-bearing carbonaceous phyllite and intrusive dikes of intermediate to felsic composition, with diorites and their immediate sheared contacts hosting the majority of gold. The Qinglongtan deposit (320 Koz averaging 6.71 g/t Au), located approximately 16 km north of JLG, is hosted within a complexly folded sequence of carbonaceous phyllite to calcareous phyllite-marble and metagabbro, with minor diorite. Gold mineralization is focused along the margins of a narrow, N-striking, vertical brittle-ductile shear zone. Ore shoots plunge both to the north and south and the highest grades are often associated with sheared intermediate dikes entrained within the shear zone. Wall-rock alteration at both deposits is dominated by intense white mica (dominantly muscovite to phengitic muscovite) alteration of intrusives, ankerite veining, and dolomitization of the phyllites, with disseminated pyrite an important proximal ore control.

Although the main gold deposits, Jinlonggou and Qinglongtan, differ markedly in many respects, they share a spatial if not temporal association with intrusive rocks, particularly when it comes to controls on high-grade gold mineralization. However, despite the extensive exploitation and development of the Tanjianshan gold field, little is known about the geochronology of magmatic rocks and timing relationships to gold mineralization. In order to better constrain the complex paragenesis that exists at Tanjianshan and tie it to the regional tectonic framework, ongoing U-Pb and Ar-Ar geochronology research, in conjunction with Pb isotope studies, is currently being applied to a variety of altered and unaltered intrusive suites. In conjunction with the geochronology, the petrology and whole-rock geochemistry of the intrusives is being documented to establish the role of igneous rocks in controlling the distribution of gold mineralization.