

Mineralization and Alteration of the Ulaan Khud Porphyry: A Possible Extension to the Giant Oyu Tolgoi Cu-Au Deposits

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The Ulaan Khud porphyry Cu-Au deposit is located in the South Gobi desert of Mongolia, 90 km north of the Mongolia-China border and ~10 km north of Hugo Dummett deposit, which is part of the giant Oyu Tolgoi Cu-Au (Mo) orebody. Based on detailed investigation including petrography, assays, and age dating from 22 diamond holes, we interpret the Ulaan Khud porphyry as a distal and poorly developed Cu-Au-Mo porphyry system.

Whole-rock analyses show that Ulaan Khud and Oyu Tolgoi deposits are porphyry Cu-Au (Mo) and are associated with calc-alkaline quartz monzodiorite (QMD) intrusives formed within the Devonian Gurvansaikhan island arc. Molybdenite Re-Os in ages from the Ulaan Khud QMD suggest a mineralization age 370 ± 2 Ma. Oyu Tolgoi deposits show very similar age results to each other, ranging between 362 and 371 Ma.

Ulaan Khud Cu-Au (Mo) mineralization hosted in this Devonian QMD appears to be part of a suite of rocks that are also common to Oyu Tolgoi and are intruded by abundant multiphase post-mineral dikes of different lithologies. The deposit is overlain unconformably by a 70-m-thick blanket of Cretaceous claystones. Overall, alteration and mineralization within the QMD are not well developed, and consist mainly of sericite, epidote, and chlorite with minor disseminated pyrite. More advanced potassic alteration is observed as hematite-dusted albite associated with weak chalcopyrite-pyrite and rare molybdenite. The most intense alteration is complete silicification associated with stockwork quartz veins and veinlets, confined to narrow structurally controlled zones within the mineralized QMD. These stockwork zones are the best mineralized, with chalcopyrite plus molybdenite and trace bornite occurring as disseminations and fine veinlets. The average grade of 257 mineralized diamond drill hole intercepts is about 0.3% Cu, 0.01% Mo, and 0.01 g/t Au. The best of these individual Cu-Mo-Au intercepts was 0.7 m @ 10% Cu, 0.6% Mo, and 0.6 g/t Au.

A schematic representation of the different alteration and mineralization styles at Ulaan Khud and the main Oyu Tolgoi orebodies are presented in the poster.

There may be several reasons why the Oyu Tolgoi orebodies are higher grade than Ulaan Khud: (1) the hydrothermal cell(s) were much better developed as evident by the dominant potassic alteration, (2) the host rocks commonly include basalt as well as QMD, thereby creating a stronger reactive situation for these hydrothermal fluids, (3) they have been preserved in downthrown fault blocks and covered beneath a 1,000-m-thick sequence of Carboniferous and Cretaceous sediments, (4) Ulaan Khud uplift block was intensely eroded, perhaps leaving only the base of a bigger porphyry system.