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Ore and alteration mineralization of Erdenetiin Ovoo Cu-Mo porphyry deposit, Mongolia

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The Erdenetiin Ovoo is one of the largest Cu-Mo porphyry deposits in Mongolia, with estimated metal reserves calculated in 2021 of 10.7 Mt Cu and 0.49 Mt Mo [1]. In this study, we confirmed that ore alteration and mineralogy strongly affect both mining and milling strategies. Using XRF, XRD, SEM-EDX, and ICP-MS techniques, core samples from the Northwest and Central pits of the deposit were investigated.

Ore mineralization changed gradually from depth to upward as Mo porphyry, Cu-Mo porphyry, and Cu porphyry. From the center to the margin of the deposit, four distinct types of alteration zones are recognized (potassic, phyllic, argillic, and propylitic). Potassic alteration is characterized by the presence of quartz, potassium feldspar, and anhydrite. It typically contains minor amounts of chalcopyrite, pyrite, magnetite, and molybdenite with accessory W and Sn. Phyllic alteration includes quartz and sericite with abundant pyrite and lesser chalcopyrite and bornite which contain Fe^{3+}, Mo, Au and Ag. In the argillic alteration zone, pyrite is dominant containing Fe^{2+}(Au), while sphalerite and galena which contain Zn, Pb (Ag, Au) are developed in the propylitic zone [2].

A cross-section through the deposit can be divided into oxidized, mixed, secondary sulfides, and primary sulfide zones (most commonly copper porphyry deposits). The copper-bearing minerals in primary and secondary sulfide zones vary as follows: chalcopyrite, enargite, tennantite are dominants in the primary ore zone, while chalcocite, covellite, and bornite are in the secondary sulfide zone. Copper carbonates, silicates, phosphates, sulfates, oxides, and native copper are developed in the oxidation zone [3].

Based on geological, mineralogical, and geochemical studies, Erdenet Cu-Mo ore can be classified into five types depending on mineral association, chemical composition, oxidation degree, mineral particle size, and grade. Each type is unique and reagent requirements were carefully determined by laboratory testing.

[1] Batgerel et al. (2021), Resources estimation report and exploration result during 2016-2020 for the Erdenetiin Ovoo copper-molybdenum deposit; 176p.

[2] Davaasambuu (1995), Ore composition and technological mineralogy at Erdenetiin Ðžvoo copper porphyry deposit. Ph.D thesis.

[3] Potapov (1991), Detailed exploration and resource estimation report on Erdenetiin Ovoo copper-molybdenum deposit, Mongolia. 360p;