

### Intermediate Sulphidation Polymetallic Epithermal Mineralization at Dongil, South Korea

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The Dongil Au-Cu-Ag-Pb-Zn deposit is situated near the town of Uiseong, ~220 km southeast of Seoul.

Dongil lies in the Uiseong sub-basin of the Cretaceous Gyeongsang Basin, an area dominated by the Geumseongsan maar-diatreme-ring fracture volcanic complex. Dongil is hosted in black shale and sandstone (Jeomgog Formation), overlain by shale, mudstone, and sandstone (Sagok Formation) of the Early Cretaceous Hayang Group, deposited into a shallow lacustrine-playa environment under prevailing semi-arid climatic conditions. Coeval volcanic activity is evident, with a rhyodacitic tuff breccia (Gusandong Tuff; 103-97 Ma) interbedded within the Jeomgog Formation and related rhyodacite dome emplaced at Dongil North. Rhyodacite dykes occur with mineralization at Dongil South. Mineralization consists of 2–11 vein breccias arranged in a sheeted zone, striking north-northwest, 1,800 m long and 20–100 m wide. A mineralized breccia pipe is localized on the margin of the rhyodacite dome at Dongil North. The breccias show a paragenetic sequence of comb quartz (Stage I), hydrofracturing, white quartz (Stage IIa) with pyrite, arsenopyrite, chalcopyrite, sphalerite (Fe-rich), galena under low pH acid conditions, then brecciation with several Pb, Cu, Bi Ag sulphosalts (Stage IIb), electrum, sphalerite (Fe-poor) and late (Stage III) fluorite and calcite under alkaline conditions.

Fluid inclusions show early high-temperature (250-350 °C), moderate salinity (1-7 wt.% NaCl) hydrothermal fluids initially deposited quartz and Cu-Zn-Pb-Fe-As sulphides, followed by boiling, an overpressuring breccia event, then mixing, dilution, and cooling with meteoric waters, which deposited Au-Ag and Ag-Sb-Bi sulphosalts at lower temperatures (200-300 °C).

Sericite (dated at 71-65 Ma) and pyrite form a phyllic assemblage around mineralization, with occasional high-temperature zones implied by garnet, diopside, and magnetite. An outer propylitic assemblage forms a halo around phyllic alteration and is characterized by chlorite, pyrite, and calcite veinlets.

The mineralization is interpreted as intermediate sulphidation Au-Cu-Ag-Pb-Zn epithermal style associated with the rhyodacite dome and dykes.