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Bendezú, R. & Fontboté, L. (2000) Alunite-kaolinite alteration in carbonate-hosted Zn-Pb±Ag mineralization at Colquijirca and San Gregorio (central Peru) as product of a Cu-Au high sulfidation epithermal system. Geological Society of America, November 2000 Annual Meeting, GSA Abstracts with Programs, Vol. 32, No. 7

**Alunite-kaolinite alteration in carbonate-hosted Zn-Pb±Ag mineralization
 at Colquijirca and San Gregorio (central Peru)
 as product of a Cu-Au high sulfidation epithermal system**

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The Colquijirca District is an intrusion-related Au-Cu-Zn-Pb-Ag zoned epithermal mineralization. The central part of the district is constituted by the Miocene Marcapunta dacitic dome complex displaying alunite-dickite and subordinate pyrophyllite-zunyite-illite >> diaspore mixtures which enclose Au (Ag) vuggy quartz irregular bodies of up to 100 m wide with >1 ppm Au. Strongly silicified veins of enargite-pyrite-alunite-pyrophyllite with some Au contents are found at of 500 m.. Similar massive high sulfidation mineralization including also minor luzonite, dickite and illite extends upwards to the south and specially to the north and form sub-horizontal flat elongated tube-like bodies (Smelter Mine) replacing Eocene carbonate rocks.

Alteration and base metal mineralization extends to the north more than 2.5 km within Eocene carbonate rocks essentially as flat elongated tube-like bodies with cores of silica-enargite-pyrite-alunite-pyrophyllite. The cores decrease in diameter to the north and transversally grade outwards to lower temperature and acidity assemblages: pyrite-fallore ± (bornite-chalcopyrite)-alunite-dickite, pyrite-chalcopyrite-alunite-dickite, pyrite-sphalerite-galena-dickite-kaolinite ± alunite and to an outermost zone of pyrite-galena-sphalerite. The sphalerite-galena containing assemblages reach their maximum development at the Colquijirca deposit (>25 Mt at Zn+Pb >8 %), 2 Km north of the central domes. . Thus, the transversal zoning mimics the longitudinal south-north zoning at district scale.

To the south, similar tube-like bodies develop into the Eocene carbonates, although information is scarce. About 2 km south of the Marcapunta volcanic neck the San Gregorio deposit (70 Mt at Zn+Pb >9 %) occurs in Triassic-Jurassic carbonate rocks. Ore in San Gregorio consists mostly in a micro-granular sphalerite-galena-pyrite-alunite-kaolinite-quartz.

In summary, both in the northern (Colquijirca) and southern parts of the district (San Gregorio) the significant carbonate-hosted Zn-Pb resources (>100 Mt Zn+Pb >8%) are associated to advanced argillic alteration (with alunite and kaolinite) external to a Au-Cu high sulfidation epithermal system. Mineralization resulted from progressive cooling and neutralization of highly acidic fluids coming from the internal parts of the system. The extensive alunite-kaolinite assemblages show how the wall-rock buffer effects can be minimized even in strongly reactive carbonate rocks if the fluid flow is channeled and shielded by the alteration minerals.

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