

Abstract ID: 200

Title: GEOLOGIC SETTING OF THE EL TOQUI ZINC SKARN DISTRICT, CHILE

Student: No

Topic: Economic Geology

Medium: Invited Oral Presentation

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Keywords: Chile, Patagonia, skarn, zinc, zonation

Abstract: The El Toqui District is located in the Southern Andes of Chile, 1350 km south of Santiago. Exploration in the district since 1970 has identified 8 skarn bodies, 1 carbonate replacement deposit and a system of quartz-base metal veins. Total geological resource for the district is 20 million metric tonnes grading 8.2% Zn and 1.5 g/t Au. The mine is an underground room and pillar operation and has annual production of 520,000 tpy of zinc-dominant ore.

The deposits are part of a zoned skarn system that forms a NW-SE elongate area 40 sq km in size. Ore is hosted in a thin basal limestone horizon of the Cretaceous Coyhaique Gp. Sulfide-oxide minerals include sphalerite, pyrrhotite, pyrite, magnetite, arsenopyrite with minor chalcopyrite, galena and trace amounts of electrum, native bismuth, cobaltite and a variety of sulfosalts. Metals and calc-silicate alteration minerals exhibit well-developed zonation. At district scale, Fe, As, Au, Bi and Co are highest in the SE associated with garnet, pyroxene and amphibole alteration while Pb and Ag are highest in the NW associated with chlorite and sericite. Sphalerite is present across the district but is zoned from high-Fe in the SE to low-Fe in the NW. At deposit scale, mineral zonation illustrates the importance of NW-trending structures as principle conduits for mineralizing fluids.

The Lower Cretaceous Coyhaique Gp, which consists of the Toqui, Katterfeld and Apleg Fms, conformably overlies andesitic volcanic rocks of the Jurassic Ibañez Fm. The Toqui Fm comprises up to 200 m of volcanic sandstone and tuff. A limestone up to 15 m thick, rich in oyster fossils, occurs at the base of the formation and hosts the mineralization. The Toqui Fm is conformably overlain by up to 800 m of Katterfeld Fm black shale. The Katterfeld Fm is overlain by andesite lava/breccia of the lower Divisadero Gp which is overlain unconformably by rhyolite ignimbrite of the upper Divisadero Gp.

Following breakup of Gondwana in the Mesozoic, the axis of volcanism in Patagonia shifted from an eastern passive margin to a western subducting margin represented by the Ibanez Fm. At about this time a series of small interconnected basins developed in the backarc region forming the Rio Mayo embayment of the Austral Basin. Depocenters within the Rio Mayo embayment were localized by transtensional reactivation of a Paleozoic suture between the Somuncura and Deseado massifs. The Toqui Fm represents the transition from a subaerial to marine environment as the basin subsided. Deposition of the lower Divisadero Gp occurred during relatively slow subduction on the west side of the South American plate. Opening of the Atlantic at about 120 Ma increased rate of subduction and coincides with a regional unconformity between lower andesitic and upper rhyolitic Divisadero Gp volcanic rocks. North of the El Toqui District rhyolite ignimbrites of the upper Divisadero Gp have been dated at about 110 Ma, coincident with the age of mineralization at El Toqui.