

SIMILARITIES AND DIFFERENCES BETWEEN THE MOMOTOMBO GEOTHERMAL FIELD AND THE LA LIBERTAD GOLD DEPOSIT, NICARAGUA

Mauricio Darce ¹, Miriam Down ², Beatriz Levi ³, Ernesto Martínez ², Magdalena Pérez² & Giuseppina Sabatino ²

¹ Empresa Minera de Occidente P.O. Box RP-01 Managua, Nicaragua.

² Instituto Nicaragüense de Energía, P.O. Box 55 Managua, Nicaragua.

³ Department of Geology and Geochemistry, Stockholm, Sweden.

The active geothermal field near the volcano Momotombo in the Nicaraguan Depression, and the epithermal gold deposit at La Libertad which was formed in a Tertiary geothermal field, situated 50 km northwest and 120 km east of Managua, respectively, show the following similarities: (a) location in extensional tectonic settings in northwest-trending calc-alkaline volcanic belts parallel to the present trench, (b) a high density of fractures and faults of predominantly northeastern strike, usually related to vicinity of calderas, and (c) secondary mineral assemblages suggesting neutral to slightly alkaline fluids and thermal gradients of 150-250°C/km during the alteration process; these conditions are confirmed by direct measurements at Momotombo. The main differences are that: (a) quartz veins (with the exception of occasional veinlets) appear to be lacking at Momotombo, (b) the predominant surface minerals at Momotombo are sulfates whereas illite, kaolinite and pyrite dominate in a c. 30 m thick supergene cap at La Libertad, and (c) the silica and clay minerals present in the upper 100-200 m of the volcanic pile are cristobalite and interstratified illite-smectite at Momotombo, and quartz and interstratified smectite-chlorite

(“swelling chlorite”) followed by chlorite at deeper levels at La Libertad (200 m is the maximum depth of drilling here); swelling chlorite and chlorite also occur at Momotombo but at much greater depth. Measurements of fluids inclusions in vein quartz from La Libertad give lower temperatures than those inferred from the alteration assemblages in the host rock, showing that the epithermal veins formed after the alteration, during the cooling of the geothermal system. We suggest that the Momotombo geothermal field is a modern analogue of the partly eroded fossil field at La Libertad, but that cooling, hydraulic fracturing and infilling of fractures with (auriferous) quartz has not started yet at Momotombo.

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