

PALLADIUM AND GOLD REMOBILIZATION DURING SUPERGENE ALTERATION OF THE JACUTINGA ORE IN THE ITABIRA DISTRICT, MINAS GERAIS, BRAZIL

1OLIVO, G.R. AND 2 GAMMONS, C.H. 1 Dept. Geol. Sciences and Geol. Engineering, Queen's University, Kingston, Canada; 2 Dept of Geol. Engineering, Montana Tech, Montana University, Butte, USA

Palladium-bearing gold deposits hosted by jacutinga in the Caue and Conceicao mines, Itabira District, Southern Sao Francisco Craton, Minas Gerais, Brazil. Jacutinga is a weathered, metamorphosed and hydrothermally altered iron-formation of the Paleoproterozoic Minas Supergroup. The primary gold and palladium mineralization occurred during Transamazonian Orogenesis (c.a. 2000 Ma) and is structurally controlled by the elongation lineation generated during D1 deformation. The syn-D1 hydrothermal minerals are quartz, tourmaline, muscovite, phlogopite, talc, specular hematite, magnetite, palladian gold (up to 20 wt% Pd), palladseite ((Pd,Cu,Hg)₁₇Se₁₅), arsenopalladinite (Pd₈(As, Sb)₃) and mertieite II (Pd₈Sb_{2.5}As_{0.5}). However, since the Cretaceous, the Itabira iron-formation has been weathered and under supergene conditions, muscovite, phlogopite, and talc have been partially or completely altered to kaolinite; quartz grains have been corroded along grain contacts; and magnetite and hematite have been partially replaced by Fe and Mn oxide-hydroxides. The ore minerals formed during the supergene alteration are pure gold, pure palladium and palladium-copper oxide-hydroxides and are commonly found in layers rich in Fe-hydroxide and kaolinite. Pure palladium rims palladseite and palladium oxide-hydroxides commonly occur as isolated grains or replacing zoned arsenopalladinite. These secondary palladium minerals are generally coated with pure gold. The supergene minerals are formed either by pseudomorphic replacement of palladian gold and palladium arsenides and selenides under oxidizing conditions or by direct deposition from the groundwater. In the latter case, gold and palladium are transported as hydroxy complexes by air-saturated water and reprecipitate upon entering a more reducing environment.