

THE SERRA PELADA AU-PD-PT DEPOSIT, CARAJÁS MINERAL PROVINCE, NORTHERN BRAZIL:  
RECONNAISSANCE MINERALOGY AND CHEMISTRY OF  
VERY HIGH GRADE PALLADIAN GOLD MINERALIZATION

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**Abstract**

A historic drill core from the Serra Pelada open pit was only recently assayed and has spectacular gold, palladium, and platinum grades over a 43-m-depth interval (4,709 g/t Au, 1,174 g/t Pd, 204 g/t Pt). The Au-Pd-Pt mineralization in a bonanza-grade interval (54.5–55.0 m @ 132,000 g/t Au, 11,400 g/t Pd, 359 g/t Pt) consists of coarse-grained, up to several centimeter-large, dendritic palladian gold aggregates (Au<sub>7</sub>Pd) with abundant inclusions of guanglinitite (Pd<sub>3</sub>As), “stibio-guanglinitite” (Pd<sub>3</sub>[As,Sb]), sudovikovite (PtSe<sub>2</sub>), palladseite (Pd<sub>17</sub>Se<sub>15</sub>), and an unnamed Pd-Pt-Se alloy. The palladian gold aggregates are often coated by goethite and are embedded in a powdery, ferruginous, clay-rich matrix with fragments of vein quartz. Iron and manganese oxides occur as vug fillings in palladian gold and are associated with native palladium and Pd-oxygenated compounds.

The near-surface bonanza palladian gold mineralization is part of a larger, deeply weathered, hydrothermal system which, in deepest drill holes (>300 m), has a relict sulfide assemblage with a variable degree of overprint by iron oxides, sericite, and kaolinite. The deep system still has gold, palladium, and platinum grades in the g/t range and displays erratically high contents in light rare earth elements, bismuth, and selenium. Drill core samples from intermediate depth (157–275 m) are high in gold, palladium, and platinum and show a very pronounced bismuth enrichment, as well as enrichment in iridium, mercury, rare earth elements, uranium, copper, and lead. The shallow drill core is extremely enriched in gold, palladium, platinum, mercury, and manganese.

The occurrence of gold dominantly as an Au-Pd alloy, the abundant selenide and arsenide inclusions in palladian gold, and the characteristic mercury signature point to an origin of the near-surface bonanza ore from a sulfur-deficient hydrothermal system, with apparently only minor supergene precious metal enrichment.