

FACTORS IN THE GENESIS OF THE SERRA PELADA AU-PGE DEPOSIT, SERRA DOS CARAJAS, BRAZIL

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Serra Pelada (Serra dos Carajas, Brazil) is Au-PGE-rich deposit with grades locally exceeding 1000 ppm Au+PGE. It is located in the eastern margin of the Amazonian craton, where lateritization started over 70 Ma ago. The orebody is related to a steep shear zone affecting low-grade metasediments of late Archean deposited over a basement of Archean greenstone units and PGE-rich mafic-ultramafic intrusives (e.g., Luanga), which may have potentially contributed to syn-sedimentary enrichment in precious metals. Faulting may be related to regional E-W trending strike-slip Cinzento Fault System developed prior to 1.7 Ma. The ore zone intersected in drillcores is about 100-150 m thick and extends to depths over 300 m. Preferential ore hosts are the hidrotermalito zones, laminated, black carbon- and clay-rich levels enclosed in hydrothermalized siltstones and sandstones. The ore zone at depth shows complex mineral assemblages characteristic of supergene and low-temperature hydrothermal-epithermal conditions. Ore mineralization is sulphide-poor, dominated by Au-Pt-Pd alloys and minerals with textures indicating polyphase crystallization. Whole-rock geochemistry, mass balance between mineralized and barren rocks, chondrite-normalized REE patterns and stable isotopes show that major, minor and trace elements were redistributed selectively by a polyphase mineralizing process developing from hydrothermal to supergene conditions and that greatly enriched precious metals. Surficial acidic, oxidizing solutions, able to mobilize and transport high quantities of Au and PGE at low temperatures, penetrating at depth along the shear zone may have lead to supergene alteration of hydrothermally altered rocks and deposition of precious metals in suitable conditions (clayey and Fe-hydroxide-rich or carbon-rich units).