PD-BISMUTHOTELLURIDES AND OTHER TELLURIDES FROM CU-NI-PGE DEPOSITS, EASTERN DESERT, EGYPT

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Pd-bismuthotellurides and other tellurides are described from three Cu-Ni-PGE deposits in the Eastern Desert, Egypt: Abu Swayl, Genina Gharbia, Gabbro Akarem. The deposits are hosted in Late Precambrian mafic-ultramafic rocks and have different geologic histories. The Abu Swayl deposit occurs in conformable, lens-like mafic-ultramafic rocks in metasediments. Mineralization and host rocks are metamorphosed (amphibolite facies; 550-650°C, 4-5 kbar) and syn-metamorphically sheared. Metamorphism and associated fluid regimes resulted in remobilization and transport of Cu-sulfides and PGE, and development of hydrosilicates. Michenerite, merenskyite, Pd-Bi-melonite, (NiPdBi)Te2, melonite, hessite, altaite and joséite-B occur as inclusions in mobilized sulfides and along cracks in garnet and plagioclase. The Genina Gharbia and Gabbro Akarem deposits are hosted in concentrically zoned, Alaskan-type, complexes; neither is metamorphosed. At Genina Gharbia, ore forms either disseminations in peridotite or massive patches in hornblende-pyroxenite in the vicinity of metasediments. Important petrographic features are a dominance of hornblende, biotite and chlorapatite and alteration of plagioclase to epidote. Disseminated and network sulfide ores are dominated by po, pn, cp and minor py; accessories are cobaltite, molybenite and valleriite. Sulfide textures and host rock petrography suggest a prolonged late-magmatic hydrothermal event. Michenerite, merenskyite, Pd-Bi-melonite, altaite, hessite, tsumoite and native-Te are mainly present at sulfide-silicate contacts. The Gabbro Akarem deposit is hosted in dunite pipes where net-textured and massive sulfides are associated with spinel and Cr-magnetite. Michenerite, merenskyite, Pd-Bi-melonite and hessite occur mainly as inclusions in sulfides. Typical magmatic textures indicate the limited role of late- and post-magmatic hydrothermal processes. Different geological history of the different deposits enables examination of the role
played by late-magmatic and post-magmatic metamorphic fluids in the diversity of tellurides. High Te-activities, indicated by various tellurides at Abu Swayel and Genina Gharbia, relate to participation of solutions generated during metamorphism and late-magmatic hydrothermal activity respectively. The limited role of hydrothermal fluids in the Gabbro Akarem deposit is responsible for low Te activity. It is suggested that hydrothermal fluids introduced by late- and post-magmatic processes largely control Te-activity in Cu-Ni-PGE deposits in mafic-ultramafic rocks. Involvement of a sedimentary component either early, during magma contamination or later, during metamorphism, significantly increases Te-activity.