

Platinum-Group Elements-Co-Ni-Fe Sulfarsenides and Mineral Paragenesis in Cu-Ni-Platinum-Group Element Deposits, Copper Cliff North Area, Sudbury, Canada

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Abstract

Three deposits (the offset sublayer 100 and 120 orebodies, and contact sublayer Lady Violet deposit) in the Copper Cliff North mine area, Sudbury, were sampled with the aim of defining the mineral assemblages. The ores are composed of pyrrhotite-pentlandite-chalcopyrite with minor titanomagnetite, ilmenite, accessory sulfarsenides, Bi-Te minerals, and sperrylite. Sulfarsenides, which are prominent accessory minerals, contain the platinum-group elements (PGE) Rh, Ru, Ir, Os, and Pt in decreasing order of abundance in solid solution. Some zoned sulfarsenide crystals have PGE concentrated in the centers, decreasing toward the edges. Nickeliferous cobaltite, the common sulfarsenide, contains as much as 16 at. percent Σ PGE. Hollingworthite ((Rh,Ru)AsS), which occurs as cores or distinct crystals enclosed in cobaltite, is a newly recognized occurrence in the 100, 120, and Lady Violet deposits in the Sudbury South Range. Formation of primary PGE-bearing sulfarsenides is related to exsolution from monosulfide solid solution at about 550° to 600°C. During late crystallization, aqueous fluids interacted with the rocks, resulting in precipitation of hydrous silicates (epidote, biotite, chlorite) and remobilization of PGE-bearing sulfarsenides.

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