

Characterizing the Platinum Group Elements (PGEs) and their Distribution within the Low Sulphide Zone at the Nickel Rim South Mine, Sudbury, Ontario, Canada

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The Nickel Rim South Mine is Glencore's largest Ni-Cu-PGE mining operation at Sudbury. The deposit is located on the east rim of the Sudbury Igneous Complex. At Nickel Rim South, low sulphide - high PGE mineralization appears to be discontinuous and a better understanding of the control on the mineralization is required. Specifically the study aims to: 1) determine the composition and distribution of PGEs; 2) identify sulphide minerals with respect to the PGEs; 3) characterize and report the distribution of alteration assemblages; and lastly 4) determine controls on the location of PGE mineralization. The low sulphide zone is hosted within all footwall rock types; primarily Sudbury Breccia and Felsic Gneiss, and is spatially associated with sharp-walled Cu-Ni-PGE vein-style mineralization located mainly within the lower portion of the main footwall zone. For the purposes of this study, a cut-off grade of >2.6% copper equivalent (all metals) and <1% sulphur was used from the ore reserve block model to locate a higher grade portion of the zone. The distribution of the PGEs was determined by mapping and sampling underground drifts that transect the low sulphide - high PGE mineralization and through examination of drill core. A total of 42 samples were collected from higher grade and lower grade areas within the low sulphide zone in order to determine mineralogical, compositional and/or structural differences that may favor PGE mineralization. A further 29 samples were selected from diamond drill core. The samples were analyzed using reflective, transmitted scanning electron microscopy to determine mineral assemblages, textural relationships, structural features and alteration mineral assemblages. The PGE mineralization has higher grades in close proximity to the fringe-style chalcopyrite veins. All samples appear to have abundant chloritized biotite and Fe-rich actinolite assemblages that are found within fractures and in the groundmass and tend to host chalcopyrite and bornite. The PGE mineralization is preferentially concentrated along sulphide and silicate grain boundaries. Michenerite (PtBiTe), sperrylite (PtAs₂), moncheite (PtTe₂), maslovite (PtBiTe) appear to be the dominant PGE assemblages found within the samples. PGE grades appear to increase with a higher density of filled fractures and veins.