

## The Composition of Mineralization at the Voisey's Bay Ni-Cu Sulfide Deposit, with Special Reference to Platinum-Group Elements

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### Abstract

The Ni, Cu, platinum-group element (PGE), and Au contents of massive sulfide mineralization, leopard-textured mineralization, sulfides in basal breccia sequence, and sulfides in varied troctolite from four mineralized environments (the Reid Brook zone, the Discovery Hill zone, the Ovoid and Mini-Ovoid, and the Eastern Deeps) at Voisey's Bay have been determined. Modeling of the compositional data indicates that the large zone of massive sulfide comprising the Ovoid has crystallized from the base upward, with a fractionated, residual liquid becoming concentrated toward the top. Massive mineralization from the Mini-Ovoid, Reid Brook zone, and Eastern Deeps has undergone postcrystallization modification, possibly due to the influence of heat from new influxes of magma through the plumbing system; this has resulted in a considerable redistribution of Cu and to a lesser extent of Ni and Au. Leopard-textured mineralization from the Reid Brook and Discovery Hill zones corresponds closely with the postulated sulfide liquid compositions responsible for the Ovoid and Mini-Ovoid, but mineralization composition from the feeder to the Eastern Deeps is exceptional in having many of the characteristics of a monosulfide solid solution cumulate. The composition of disseminated and blotchy sulfides in the varied troctolite of the Eastern Deeps requires a variable but generally higher  $R$  factor than that affecting most of the sulfides, to have operated here. The compositional variability of the Voisey's Bay mineralization is best explained in terms of a model calling for repeated influxes of magma through the plumbing system to the deposit.