A geochemical and petrographic investigation of the distribution of cobalt within the Captain VHMS deposit, Bathurst Mining Camp, New Brunswick, Canada

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The Captain deposit, located approximately 40 km southwest of Bathurst, is one of 46 volcanic-hosted massive sulphide deposits in the Bathurst Mining Camp. The Captain deposit was discovered by Captain Mines in 1956 and was the subject of Geological Survey of Canada Report 66-18. Most recently, Stratabound Exploration conducted an extensive 39-hole drilling program of approximately 11 km of combined length of core on the deposit. The deposit is hosted by a sequence of argillite and quartz-feldsparphyric rhyodacite of the Middle Ordovician Nepisiguit Falls Formation. The Captain deposit has a strike length of 146 m, a down-plunge length of at least 400 m and a maximum width of approximately 50 m. Within this zone stringers, veins, semi-massive, and massive sulphides occur within an envelope of chlorite altered quartzfeldspar-phyric rhyodacite. The similarity in host rocks and alteration types in both structural footwall and hanging wall suggest that the deposit formed as a discordant stock work rather than a stratiform body. Likewise, Cu and Co mineralization with relatively low Zn and Pb content is consistent with high temperature paragenesis typical of the stock work deposits. In thin sections, cobalt sulphides exhibit vein-styled mineralization within pyrite and chalcopyrite crystals. The distribution of cobalt mineralization in the Captain deposit is inferred to be controlled by the remobilization of earlier sulphides by later fluids. This is evident in multiple recrystallization events observed in pyrite within the mineralized body. Cobalt-rich sulphides are able to be investigated in detail, utilizing Micro X-Ray Fluorescence and Instrumental Neutron Activation Analysis in conjunction with various micro-analytical techniques including, Reflected-Light Petrography. Preliminary lithogeochemical data show a relationship between the strongest cobalt enrichment and copper-poor zones. Further investigation of trace element geochemistry is warranted to completely understand the controls on cobalt mineralization within the deposit.

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