Geochemical and petrological analysis of precious metal mineralization within the Bald Hill antimony deposit, New Brunswick, Canada

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The Bald Hill antimony deposit is located in the Late Cambrian–Early Ordovician Annidale belt in Ganderia in south-central New Brunswick. The Annidale belt comprises deformed, greenschist metamorphosed mafic volcanic rocks, felsic tuffs, rhyolite dome complexes, and sedimentary rocks. The area also contains two major thrust faults — the Albright Brook and the Taylors Brook — as well as shear zones that are commonly associated with gold, antimony, and base-metal sulphide occurrences hosted within quartz-carbonate vein systems and associated alteration zones. The Bald Hill deposit is primarily hosted within the Carpenter Brook Formation and associated with the Bald Hill rhyolite dome complex. The Carpenter Brook Formation is characterized mainly by sedimentary rocks comprising a sandstone-siltstone facies and a siltstone-shale facies, and intercalated felsic volcanic rocks of the peralkaline Bald Hill rhyolite dome complex (Bald Hill member) that are aligned parallel to a northeast-trending regional fabric. The complex contains extrusive felsic ash tuff, pyroclastic breccia, rhyolite flows, and intrusive microgranite. The Bald Hill system is also enriched in sulphides such as pyrite and arsenopyrite, and local stibnite and gold. Previous exploration in the area suggests that there are northeast-trending gold anomalies that are perpendicular to northwest-trending antimony anomalies. Drill core samples were selected from intervals that were enriched in gold based on 2008 drill hole assay data. These samples were then analyzed using an Olympus Vanta model pXRF spectrometer. New assay data for the samples using the Aqua Regia digestion yielded values up to 2 g/t Au and up to 24.9% Sb. Spearman Rank correlation coefficients were calculated for elements determined from the geochemical analyses and the assay data (n = 14). There is a significant association between Au and S (r_s = 0.72), Au and As (r_s = 0.90), Au and Sb (r_s = 0.68), and Au and Sn (r_s = 0.50). Associations of elements were also examined by mapping polished thin sections using Micro X-ray Fluorescence Spectrometry-Energy Dispersive Spectroscopy, which aids in the petrographic analysis of polished thin sections using reflected light microscopy.

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