Mineralogy and geochemistry of indium-bearing polymetallic veins in the Sarvlaxviken area, Lovisa, Finland

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Polymetallic veins, in the southwestern part of the Wiborg Batholith, Finland, are hosted by both wiborgite and even-grained granites. The wiborgite-hosted veins consist of at least two generations and can be grouped by the dominant metal association: Li-As-W-Zn-Mn; Cu-As-In and Pb-Zn; locally with high contents of base, alloy and noble metals (e.g., Cu, Sn, Zn, W and Ag), as well as critical metals (e.g., In and Li). The Cu-As-In association is characterized by high In contents (up to 1,490 ppm) and very high In/Zn ratios, enabling formation of a proper indium mineral; roquesite. The Li-As-W-Zn-Mn association is characterized by high Li contents (up to 2,390 ppm) most probably hosted in mica. Structural control of the veins shows that the Li-As-W-Zn-Mn association formed before the Cu-As-In and Pb-Zn associations. The wiborgite-hosted polymetallic veins display spatial zoning with respect to different metals (e.g., In, Li, Ag, Pb, Bi) but the main metals (e.g., Sn, Fe, Zn) display either no zoning or an unclear pattern. Vein deposition was, most probably, a multi-stage event, involving evolution of the ore-forming fluids in time and space. Greisenization in the wiborgite-hosted veins was accompanied by silicification and followed by sericitization and chloritization. The veins in the even-grained granites are only observed in locally derived boulders and include the As-Sn-Cu and Mo-Bi-Be metal associations, accompanied by intense greisenization and berylification respectively.

The high concentrations of critical metals, and a potential for as-yet undiscovered mineralization, makes the area attractive for further exploration. The diverse geochemical character of the veins provides evidence of a considerable, but often overlooked, potential for mineralization within A-type rapakivi granites.