

Department of Geology

Thesis Defence



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Honours in Geology

Fluid inclusion systematics of polymetallic (Sb-Pb-Zn-As-Ag-Au) mineralization at the Lansdowne Occurrence, Digby County, Nova Scotia

Supervisor: Dr. Erin Adlakh, Department of Geology

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Science 411

Everyone is welcome!

Fluid inclusion systematics of polymetallic (Sb-Pb-Zn-As-Ag-Au) mineralization at the Lansdowne Occurrence, Digby County, Nova Scotia

Abstract

This is a fluid inclusion study on the occurrence of Sb-Pb mineralization at Lansdowne, Nova Scotia. Polymetallic (Sb-Pb-Zn-As-Ag-Au) quartz veins occur in association with mafic dykes and sills, hosted in the Ordovician Bear River metasediments of the Meguma Terrane. Cathodoluminescence imaging and decrepitate mound analysis of entrapped fluids, shows late-stage Sb-Pb sulfosalt mineralization in the polymetallic veins is coeval with a late generation of quartz. The late quartz hosts abundant fluid inclusions, and analysis of the inclusions recognized the presence of two endmember fluids in the late-stage mineralizing system.

Fluid inclusion assemblages in Lansdowne polymetallic vein samples are commonly heterogeneous, with constituent fluid inclusions of various phase ratios between a high-salinity aqueous phase (0-99 vol%), and a methane vapour phase (1-100 vol%). Microthermometric heating experiments showed a wide array of homogenization temperatures for aqueous-rich (1-20 vol%) inclusions, and led to the decrepitation of methane-rich inclusions before homogenization, suggesting an immiscible relationship between two endmember fluids at the time of entrapment. Microthermometric analysis of rare endmember assemblages allowed for the projection of both aqueous and methane fluid isochores, which intersect at approximately 165°C and 15 bar pressure. The timing of late-stage polymetallic mineralization at Lansdowne is suggested to be late Triassic (≤ 214 Ma), placing the occurrence in proximity to the extension of the Fundy Rift Basin. The results of fluid inclusion analysis and the proposed timing indicate the mineralization of Sb-Pb sulfosalts by the interaction of a metal-enriched brine and methane, in an epithermal system related to rift magmatism.