

## PUBLIC ABSTRACT

First Name: Jason

Middle Name: Gregory

Last Name: Yuvan

Degree: Master's

Department: Geological Sciences

Advisor's First Name: Kevin

Advisor's Last Name: Shelton

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Title: Fluid Inclusion and Oxygen Isotope Studies of High-Grade Quartz-Scheelite Veins at the Cantung Mine, Northwest Territories, Canada: Products of a Late-Stage Magmatic-Hydrothermal Event

High-grade quartz-scheelite veins in the Open Pit orebody, Cantung mine, NWT occur 300 m above a Cambrian limestone-Cretaceous monzogranite contact where the E-Zone orebody, a world-class tungsten skarn, is developed. The trend of the quartz-scheelite vein swarm nearly parallels the trend of a near-vertical aplite dike along the Open Pit's edge. Adjacent to quartz-scheelite veins, alteration selvages overprint earlier skarn alteration, indicating that the veins are not part of the skarn-forming event, but represent a distinct event.

Oxygen isotope data from quartz-scheelite pairs yield temperatures of 430° to 595°C, indicating that the quartz-scheelite veins are related to a magmatic-hydrothermal system and are likely distal expressions of a protracted skarn-forming event.

Fluid inclusion data indicate that the primary ore fluid is a  $\text{H}_2\text{O}-\text{CO}_2-\text{NaCl}\pm\text{CH}_4$  fluid. The ore fluids in high-grade quartz-scheelite veins, skarn-related quartz veins from the E-Zone orebody, and aplite dikes are grossly similar  $\text{H}_2\text{O}-\text{CO}_2-\text{NaCl}\pm\text{CH}_4$  fluids. However, end-member fluids were documented: aplite-related and skarn-related fluids. Fluids in high-grade quartz-scheelite veins contain components of both end-member fluids. Thus, quartz-scheelite veins and aplites may have a genetic relationship.

A conceptual model for this hydrothermal system involves ore-grade tungsten deposits forming where fluids emerging from the granite encounter rocks favorable for skarn development. Due to the folded geometry of the sedimentary sequence, in other areas along the contact, magmatic fluids encounter strata less favorable for skarn development. Where these units are breached by fracture systems, potential ore fluids (and aplites) gained access to rocks more conducive to ore development vertically from the contact. Documentation of magmatic ore fluids distal to intrusions has significant implications for mineral resource assessment.