

# An atypical copper porphyry occurrence - A case study of the Hopper property, Yukon

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## Introduction

Some of the largest copper occurrences in the Yukon are porphyry type deposits such as the Casino deposit in Dawson Range. The Hopper property in south west Yukon, which has been explored since 1907, was suspected to be a porphyritic type mineralization as well. However, its association with a shear zone and propylitic alteration suggests a different model of mineralization. The focus of this study is to develop a genetic model for the copper mineralization found in the Hopper property, based on field and petrographic observations as well as whole rock and sulphur isotope analyses.

## Results

The main zone of mineralization is 1 km long and 0.5 km wide and is hosted in a granodiorite of calc alkaline affinity interpreted as the Ruby Range batholith. The granodiorite was emplaced in the Aishihik Metamorphic Suite rocks and is cut by younger mafic and felsic dykes. The mineralization consists of chalcopyrite and pyrite along fractures and as disseminations, and molybdenite that is associated with shearing. Sulphur isotopes from chalcopyrite and pyrite range from -1.7 to 0.7 per mil and are similar to sulphur isotopes from skarn samples collected from the same locality, indicating they are likely magmatic in origin. Alteration minerals associated with the mineralization at Hopper are mainly chlorite, epidote-clinozoisite, carbonate and titanite, i.e., the mineralization is dominantly associated with propylitic alteration.

Forty-three samples of least altered and altered granodiorite were selected for whole rock analysis and mass balance calculations. The calculations show that altered granodiorite has lost SiO<sub>2</sub>, Na<sub>2</sub>O, K<sub>2</sub>O, Ba, Rb, and Cr, and gained in addition to Cu and Mo, FeO, Fe<sub>2</sub>O<sub>3</sub>, MgO, and CaO, Ti, and V.

## Conclusions

The associations of copper mineralization with propylitic alteration and the loss of Si and K and gain in Fe, Mg and Ca indicate the system is not a typical copper porphyry system. The mass balance calculations and sulphur isotope data leads us to believe the copper has originated in a copper porphyry system possibly at depth or from a skarn mineralization and was transported to Hopper during a shearing event.

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