

GEOCHEMICAL STUDIES OF GOLD MINERALIZING EVENTS IN THE DISCOVERY-ORMSBY
AND CLAN LAKE AREAS OF THE YELLOWKNIFE GREENSTONE BELT, NORTHWEST
TERRITORIES, CANADA

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ABSTRACT

Metavolcanic rocks of the mafic Discovery-Ormsby area and the intermediate to felsic Clan Lake area are sites of active gold exploration in the north end of the Yellowknife Greenstone Belt (YGB), Northwest Territories, Canada. The deposits present an opportunity to determine if their ores are related to similar hydrothermal systems whose chemistries differ as a function of host lithology.

Oxygen isotope studies were employed to determine fluid source(s) and infer ore fluid pathways. Data from Ormsby's quartz veins are interpreted to reflect dominance of metasedimentary-derived fluids. Clan Lake's quartz veins are interpreted to indicate both metavolcanic and metasedimentary fluid sources. 3-D models of $\delta^{18}\text{O}$ infer possible fluid conduits by volumes of host rock with higher degrees of metasedimentary-fluid interaction.

Tyhee Gold Corporation's lithogeochemical data sets permit me to link $\delta^{18}\text{O}$ values with host rock chemistry. At Clan Lake, volumes of rock with higher $\delta^{18}\text{O}$ values coincide with elevated gold concentrations, suggesting the potential use of $\delta^{18}\text{O}$ values as an ore guide. Lithogeochemical data were used to investigate preferred host rock chemistries at Clan Lake and indicate a narrow range of intermediate rocks associated with gold. These favorable chemistries and $\delta^{18}\text{O}$ patterns crosscut lithologies, indicating that permeability and porosity are strong controlling factors for gold deposition, rather than simply rock type.

A conceptual model for the entire YGB was constructed for the formation of substantial wall-rock-hosted economic gold mineralization. Resource potential appears to require satisfaction of three key components: auriferous fluid source(s); regional and local structural conduits linking metasedimentary and metavolcanic rock domains; and highly reactive, deformed metavolcanic host rocks.