

Trace Element Content of Pyrite in Orogenic Gold Deposits Across Northwestern Ontario

HANNAH EATON-TESSIER¹, DANIEL D. GREGORY²
AND EVAN HASTIE³

¹University of Toronto

²Department of Earth Sciences, University of Toronto

³Ontario Geological Survey; University of Toronto

Northwestern Ontario hosts some of the largest and richest orogenic gold deposits in Canada, especially within the Red Lake greenstone belt. Enriched in critical metals, these deposits are also host to more than just gold and are potential sources of critical metals like antimony, tellurium, and bismuth. However, there is still a large gap in knowledge surrounding the ore forming processes and sources that formed these deposits.

In this project, the morphology of pyrite in gold bearing samples from orogenic gold deposits across Northwestern Ontario will be analysed to better understand their formation. The morphology of the pyrite crystals will be analysed using reflected light microscopy and scanning electron microscopy to differentiate the generations present in the samples. Careful paragenesis of pyrite generations allow for better understanding of which event correlates to the largest deposition of gold within the deposit, as well as cataloguing the various generations and textures that exist throughout the deposits. Following this, the trace element content of the pyrite will be analysed using laser ablation inductively coupled plasma mass spectrometry. The trace element content of pyrite is crucial, as it reveals information regarding the ore-forming fluid including: temperature, pH, salinity, and oxidation state. The data collected in this project will allow comparison of the depositional mechanisms and fluid sources throughout the deposits, and the ability to predict at a larger scale which gold deposits may have potential as critical metal sources.