

## Application of Crushing Stage Test to Assess Volatile Content as an Orogenic Gold Exploration Method

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### Summary

The Yellowknife greenstone belt, located in the southern Slave Craton, Northwest Territories, is an Archean tectonic province that hosts numerous gold occurrences including the world-class Giant and Con orogenic gold deposits. Gold mineralization in Yellowknife greenstone belt is dominantly hosted in silicified shear zones and quartz veins cross-cutting Archean metavolcanic and metasedimentary rocks. Studies concerning fluid inclusions in orogenic gold deposits showed that ore related fluids are typically low salinity, near neutral pH, mildly reduced, H<sub>2</sub>O–CO<sub>2</sub> ± CH<sub>4</sub> fluids with elevated CO<sub>2</sub> content.

Understanding the geochemistry of the mineralizing fluid is a crucial step in mineral exploration. Fluid inclusions can be analyzed with different techniques in the laboratory including thin section petrology, microthermometry and Raman spectroscopy. These techniques provide detailed and quantitative results, but in terms of mineral exploration they may not be practical and economic.

In this study, quartz samples collected from shear zones and veins around Yellowknife greenstone belt were analyzed with the crushing stage test to qualitatively assess CO<sub>2</sub> content prior to knowing their gold content. Compared to laboratory techniques, the crushing stage test rapidly assess the abundance of volatile-rich inclusions in a sample. Results show that gold concentrations of the tested samples are in good agreement with high CO<sub>2</sub> levels. This easy, cost effective, field-based technique could be used to target favorable spots for gold mineralization during preliminary exploration.