

The investigation of hydrothermal epidote veining proximal to the Foy offset dyke, Sudbury Impact Structure, Canada.

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The Sudbury Impact Crater was generated 1.85 Ga and has formed 3 types of Ni-Cu-PGE deposits: contact, offset dykes, and footwall. Previous studies have mainly focused on the hydrothermal system of the Sudbury Igneous Complex (SIC) and determining the number of hydrothermal alteration events that have occurred in association with the SIC. Studies have shown that there were two main hydrothermal alteration events; one formed above the SIC and one formed below the SIC. The hydrothermal system that developed below the SIC is divided into three stages, two high-temperature stages associated with ore formation and a low-temperature stage. This study focuses on defining the hydrothermal alteration assemblage and establishing the number of hydrothermal alteration stages that occurred proximal to the Foy offset dyke. Petrography, X-ray diffraction, fluid inclusion analysis and an electron microprobe were used to classify the hydrothermal alteration assemblage and the homogenization temperature of the fluid at time of formation. Classifying the hydrothermal alteration assemblage along the Foy offset dyke at the Crazy Creek property allows for comparison with hydrothermal alteration along other parts of the Foy offset and SIC. Using orientation measurements of epidote veins taken in the field and crosscutting relationships of these veins observed during petrographic analysis, the number of hydrothermal alteration events was determined. The hydrothermal alteration veining was found to be preferentially oriented NW-SE, which is parallel to the contact between the SIC and the footwall. Fluid inclusion analysis was completed to determine the temperature of the fluid and will be used to determine which stage of hydrothermal alteration occurred. Petrography and analysis using an electron microprobe will determine the mineral assemblage and from this we can establish the likelihood of an environment with ore body potential. Through the classification of the stage of hydrothermal alteration and its mineral assemblage we can gain a better understanding of the formation and timing of the hydrothermal system that occurred proximal to the Foy offset dyke.