

Classification of the Hydrothermal Alteration of the Crazy Creek Region, North Range of the Sudbury Impact Crater, Ontario, Canada.

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The Crazy Creek region is located in the North Range of the Sudbury Impact Crater along the Foy offset dike, in the footwall rocks. The impact-generated hydrothermal system of the Sudbury Impact Crater has generated 3 types of Ni-Cu-PGE deposits: contact, offset dikes, and footwall. Previous studies have mainly focused on the hydrothermal alteration of the Sudbury Igneous Complex (SIC), and determining the number of hydrothermal alteration events that occurred. Studies have shown that there were two main hydrothermal alteration events, this study focuses on the one which occurred below the SIC in the footwall rocks. There are three stages that occurred during the hydrothermal alteration event, two high temperature stages, which have been found to be associated with ore forming processes, and a low temperature stage that is not associated. This study focuses on defining the hydrothermal alteration assemblage and establishing the number of hydrothermal alteration events that occurred in the Crazy Creek region. To classify the hydrothermal alteration assemblage, samples were analyzed using petrography, X-ray diffraction, and an electron microprobe. By classifying the hydrothermal alteration assemblage at Crazy Creek, we can use these mineral assemblages as a basis of comparison for the hydrothermal alteration along other parts of the Foy offset dike and the SIC. The number of hydrothermal alteration events were determined by using orientation measurements taken in the field and crosscutting relationships observed during petrographic analysis. The hydrothermal alteration veining was found to be randomly oriented, which is likely caused by fracture infill from the impact event. By determining which stage of hydrothermal alteration occurred in the Crazy Creek region, we can establish the likelihood of an ore body nearby. 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 in the Crazy Creek region.