

Hyperspectral Core Scanning at the Iron Creek Cu-Co Deposit, Idaho Cobalt Belt: Development of New Exploration Vectors

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The Idaho Cobalt Belt hosts several important copper-cobalt deposits, but only limited research has been conducted on these deposits over the past decades. While the market for cobalt is currently dominated by the Democratic Republic of Congo and riddled with ethical and geopolitical concerns, development of domestic resources is a high priority to supply the metals needed to support the green energy transition.

This project aims to determine whether the Iron Creek Cu-Co deposit is associated with a hydrothermal alteration halo that can be identified hyperspectrally. Various models for metal enrichment have been proposed for the deposit, ranging from syngenetic metal deposition in the sedimentary rocks to models that suggest deposit formation occurred during or after metamorphism. Shortwave infrared hyperspectral core scanning of exploration diamond drill core enabled identification of spectrally active minerals within the alteration halo and unraveled mineralogical gradients around the ore zones. The data resulted in a better understanding of the deposit geology and assisted in drill target generation.

To understand deposit-scale mineral gradients, ~10 km of exploration drill core was scanned in Salmon, Idaho. A HySpex SWIR-384 core scanning solution with a pixel resolution of ~1.75 mm/pixel was used for data acquisition. The Breeze GEO software was utilized for data acquisition and post-processing, including depth registration of core and mineral classification using USGS MICA. The software outputs included hyperspectral mineral maps of the core, which were stored in the software IMAGO. The hyperspectral mineral maps were used to identify textural relationships that cannot be identified with the unaided eye. In addition, hyperspectral core scanning allowed the generation of mineral abundance data, which were plotted in three dimensions using Leapfrog GEO. Visualization of mineral abundance data unraveled the geometry of the alteration halo and the mineralogical gradients within it.