New Insights into Mineralogy of Olympic Dam Acquired Through Spectroscopy

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In 2014, 20,000 m of diamond drill core representing a 14-km cross section through the main body of the Olympic Dam copper-gold-uranium mine in South Australia were subjected to hyperspectral analysis using the CSIRO manufactured visible to thermal infrared core scanner. The acquired data including ancillary information of assays and geophysics provided by BHP Billiton have been made available to the public via the SARIG website and Auscope Portal.

Thirty drill holes with an average depth of 950 m and a maximum depth of over 2,000 m provided a view of the spatial relationships of approximately 10 major minerals in the thermal infrared and 10 minerals in the shortwave infrared. Of particular interest this system now allows the mapping of the proportions of microcline to orthoclase in the K-feldspar series with empirical vectoring toward mineralization. Previously unrecognized albite is now seen to provide evidence for early fluid movement. The variations in the chemistry of sericite and chlorite, which can be extracted from their spectral response, and their relative spatial distribution also provides insight into the paragenesis of the deposit. Preliminary work with the thermal spectra also shows promise of being able to map magnetite vs hematite with higher resolution that current magnetic susceptibility measurements allow.

Future work envisages interpretation of the more complex unusual spectra, signatures that do not currently have presence in the software library. The possibility of scanning further sections through the deposit could improve the 3rd dimension for mapping the mineralogy of the deposit.