

Olympic Dam IOCG-U deposit: significant new additions to the mineral endowment

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The Olympic Dam breccia hosted Fe-oxide Cu-U-Au-Ag (IOCG) deposit is without doubt one of the world's largest metalliferous deposits. Most of the publically declared Resource lies at depths of ~300-1200 m below the surface, with the deepest known areas in the SE part of the deposit. Recent mine-based diamond drilling has outlined mineralization extending for more than 2 km along strike and 1 km in depth below previously delineated mineralization (referred to as the Deeps). To date, drilling has yet to close off mineralization at depth and its lateral extents.

Mono- and polymictic-breccia textures are complicated to interpret, yet the ore and alteration mineralogy are systematically zoned across the deposit. Large syn-post mineralization faulting is followed by partial erosion during post-mineralization events with regional expression. Even though bornite-chalcocite-chalcopyrite-pyrite are present across the shallower parts of the deposit, chalcopyrite and pyrite are the dominant sulfides in the Deeps which also contains uraninite-coffinite-brannerite and Au-Ag minerals. The ratios of hematite to magnetite and siderite to Ca-Mg-Fe-carbonates decreases, while chlorite and carbonates increase with increasing depth. Likewise, the REE mineralogy changes from bastnäsite-synchysite-florencite to monazite-apatite-xenotime-allanite. Muscovite/illite, quartz, barite, fluorite and intensely altered K-feldspar are also present. Hydrothermal biotite has not been observed. The best indicator of transitioning out of mineralisation, even though the rock is significantly altered, is a rapid decrease in the concentrations of sulfides, in particular pyrite.

The distinct mineralogy and associated geochemical signatures across the deposit are used for vectoring to mineralization and recognizing when the limits of Fe-oxide alteration are nearby. The geochemical signature (Mo-As-Sb-Sn-W) of the Deeps is similar to the mineralized areas which overlie the Deeps. Hematite is the dominant mineralogical host of Mo-As-Sb-Sn-W. In fact, granitophile element (U-W-Mo-Sn) enriched hematite is ubiquitous to other IOCG deposits in the region surrounding Olympic Dam.