

The Prominent Hill Deposit: A Modified, High-Grade IOCG System Hosted in Hematite-Altered Sedimentary Breccias

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Prominent Hill is an iron-oxide copper-gold (IOCG) deposit located on the southern margin of the Mount Woods Domain, approximately halfway between Olympic Dam and Coober Pedy in the Gawler Craton of South Australia. It was discovered by Minotaur Resources in 2001 by drilling of a high frequency gravity anomaly. The deposit occurs in overturned stratigraphy near an unconformity that separates two different basins.

The orebody is primarily hosted by an older sequence of sedimentary rock that is unmetamorphosed and has undergone intense hematite, sericite, chlorite, and carbonate alteration. The copper-gold mineralised hematite breccias with various sedimentary and igneous clasts are believed to have formed from turbiditic and debris flow protoliths. Studies have shown that these rocks experienced a quartz-stable porosity-forming event before hematisation. Carbonate rocks are found near the Hanging Wall Fault, which marks the boundary between unmetamorphosed sedimentary rocks (south) and greenschist facies metasedimentary (north). Detrital zircon studies of the host sequence indicate no input from the Gawler Range Volcanics (GRV), and provenance ages of 1.79-1.69 Ga.

Stratigraphically overlying the mineralised sequence are strongly altered mafic to intermediate correlatives of the ca. 1.59 Ga GRV, suggesting that mineralisation occurred after 1.59 Ga. South of the GRV package, an overturned succession of fluvial or alluvial oxidized clastic rocks may be correlatives of the Pandurra Formation.

Sulfide mineralisation at Prominent Hill is predominantly comprised of chalcocite, bornite, and chalcopyrite. Replacement of early formed pyrite by copper sulfides is common. Some zones feature supergene leaching textures, characterised by abundant earthy hematite and/or hydrated iron oxides. Like the Olympic Dam deposit, there is geochronological evidence for significant hydrothermal activity during the “boring billion”.

As Prominent Hill transitions from a truck haulage operation to a shaft, and greater depth and lateral extents are explored, geological knowledge will continue to develop.