

SEG 2024 Conference: Sustainable Mineral Exploration and Development

Discovery of the Oak Dam West IOCG Deposit, South Australia

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Oak Dam West is a breccia-hosted iron oxide-copper-gold (IOCG) deposit located approximately 65 km southeast of the iconic Olympic Dam IOCG deposit. The Oak Dam district consists of two distinctive gravity anomalies separated by ~3 km, i.e., Oak Dam East (coincident magnetic anomaly) and Oak Dam West (no magnetic anomaly). The former Western Mining Corporation (WMC) drilled the first hole into Oak Dam East (OKD-E) in 1976, which tested the coincident gravity and magnetic anomalies, intercepting Fe oxide-rich rocks with low copper and high uranium grades under approximately 500 m of post-mineral sedimentary cover. Drilling was completed on 13 holes intermittently until 2010. The first hole into the center of the demagnetized gravity anomaly at Oak Dam West (OKD-W) was drilled in 1981, and intercepted sediment- and hematite-rich, copper-barren breccias at ~730-m depth. Two further holes were completed, with one reaching basement at ~875 m.

Based on the mineral systems approach and multi-disciplinary data integration, a regional prospectivity map and ranking tools were developed to prioritize BHP Metals Exploration 2018 exploration campaign. Oak Dam West was highlighted as the best prospect, based on the strong gravity anomaly (geophysics) associated with hematite-rich breccias (geology), and consistent geochemical footprints with a central zone of a hematite-dominant IOCG hydrothermal mineral system (geochemistry).

A conceptual model of barren hematite-rich core surrounded by mineralized hematite-rich breccias was generated to guide the drilling plan, supported by 3D inversion and forward modeling of gravity. Drill holes were designed to test the margins of the central barren breccia hoping to find the highest copper-grade zones. AD22 successfully intersected chalcopyrite-pyrite mineralized breccias at Oak Dam West. AD23 intersected high-copper-grade, chalcocite-rich hematite breccias, at the northern contact with the central Cu-barren breccia, with 425.7 m at 3.04% Cu and 0.59 g/t Au, becoming the discovery hole of Oak Dam West.