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The Orion Cu-Au-Ag-Co-Zn Discovery in the West Kimberley Region, Western Australia – a New Mineralisation Style in a Greenfields Terrane

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The Orion deposit, discovered in July 2021 by Dreadnought Resources at the Tarraji-Yampi Project in the West Kimberley region of Western Australia, is a massive sulphide body consisting of a structurally hosted hydrothermal, polymetallic assemblage of Cu-Au-Ag-Co-Zn metals. The Orion discovery is hosted in Proterozoic metamorphic rocks within the Wunaamin-Miliwundi Orogen, and is the first documented occurrence of this style of mineralisation in the region.

Polymetallic deposits with similar metal endowment are found in the Mt Isa-Cloncurry districts in northwest Queensland, which are host to an array of iron sulphide-copper-gold (ISCG) and iron oxide-copper-gold (IOCG) deposit styles (Ernest Henry, Eloise, etc.). Mineralisation is typically massive to vein-like with brecciated textures and composed of chalcopyrite-pyrrhotite-quartz-carbonate, strongly analogous to Dreadnought's Orion deposit.

From 1978 to 2013, a significant area of the western Wunaamin-Miliwundi was off-limits to all exploration activity due to the establishment of a military training area. In 2013, exploration restrictions were lifted, but there has been minimal to no drill-testing. Black soil plains, and the nature of the regolith profile, are not amenable to surface geochemical techniques, as there is poor to no dispersion of elements through that type of transported cover, hindering exploration efforts.

Modern exploration techniques, comprising high-powered airborne and ground-based geophysics, and auger drilling, can penetrate through the transported regolith cover in Kimberley and unlock a new exploration space in highly prospective geology. These techniques have been used to great effect in the Mount Isa-Cloncurry districts, which host significant deposits that are heavily endowed in the same metal associations as discovered at Orion—Cu-Au-Ag-Co-Zn-Pb.

Operating in an environmentally sensitive region has required a strong relationship with the Dambimangari Traditional Owners and Department of Defence, critical thinking in relation to drill-pad preparation and rehabilitation, and progressive ideas to generate targets for future base metal discoveries.