Regional biogeochemical mapping (and associated regolith studies) of the Cobar Basin for mineral exploration at regional to local scales

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The selection of sampling media in regional geochemical exploration programs involves balancing of various factors. These include the availability of the media, the strength and consistency of geochemical patterns that can be spatially related to the effects of mineralisation and the cost. Recent focus has been on development of methods capable of detecting mineralisation through transported cover.

This study is examining the use of biogeochemistry (cypress pine needles) as a primary sampling media at both regional and local (deposit) scales. The selection of species is based on previous studies at the McKinnons Tank Au deposit and recent orientation work completed in the vicinity of various mineral deposits in the area. It also benefits from recent studies conducted at Sunny Corner and Woodlawn (NSW) and in Cyprus. Needles from over 3,000 trees have been sampled and analysed by a combination of ICP-MS and field-portable XRF (both in the field and laboratory).

An initial assessment of the results indicates strong lithological influences on variation in the background values for various elements, and development of multi-element anomalies within 1–2 km of known mineralisation. At the deposit scale the geochemistry of various mineralisation styles is strongly reflected in the pine needle chemistry, including Au, Pb and W – even in areas with transported cover. The response in some of the micronutrient elements, especially Cu, is more muted in the needles and reflects uptake controls by the trees. For a limited suite of elements, there is close correlation between the ICPMS and fpXRF data. The study is also examining the effects of sub-species variation and seasonal variation on needle chemistry.

Apart from direct biogeochemical indications of buried mineralisation, the results are contributing to a better understanding of the processes by which elements disperse in various landform-regolith settings, and from various deposit styles in the region. The project will integrate with the planned Minex CRC drilling and geophysical studies planned for the Cobar Basin and collation and analysis of existing geochemical datasets from the region.

The work is being supported through the MinEx CRC (https://minexcrc.com.au/), the Geological Survey of NSW and a large group of exploration and mining companies - Aurelia Metals (*Hera, Federation-Dominion*); Peel Mining (*Mallee Bull, Wagga Tank, Southern Nights*), Golden Cross Resources (*Burra Prospects*), 3E Steel (*Bimbella Gold Prospect*), Quintana Resources (*Mineral Hill, Pearse North*), Clean Teq Holdings (*Sunrise Ni-Co-Sc, Pt*) and Sky Metals (*Tallebung*).

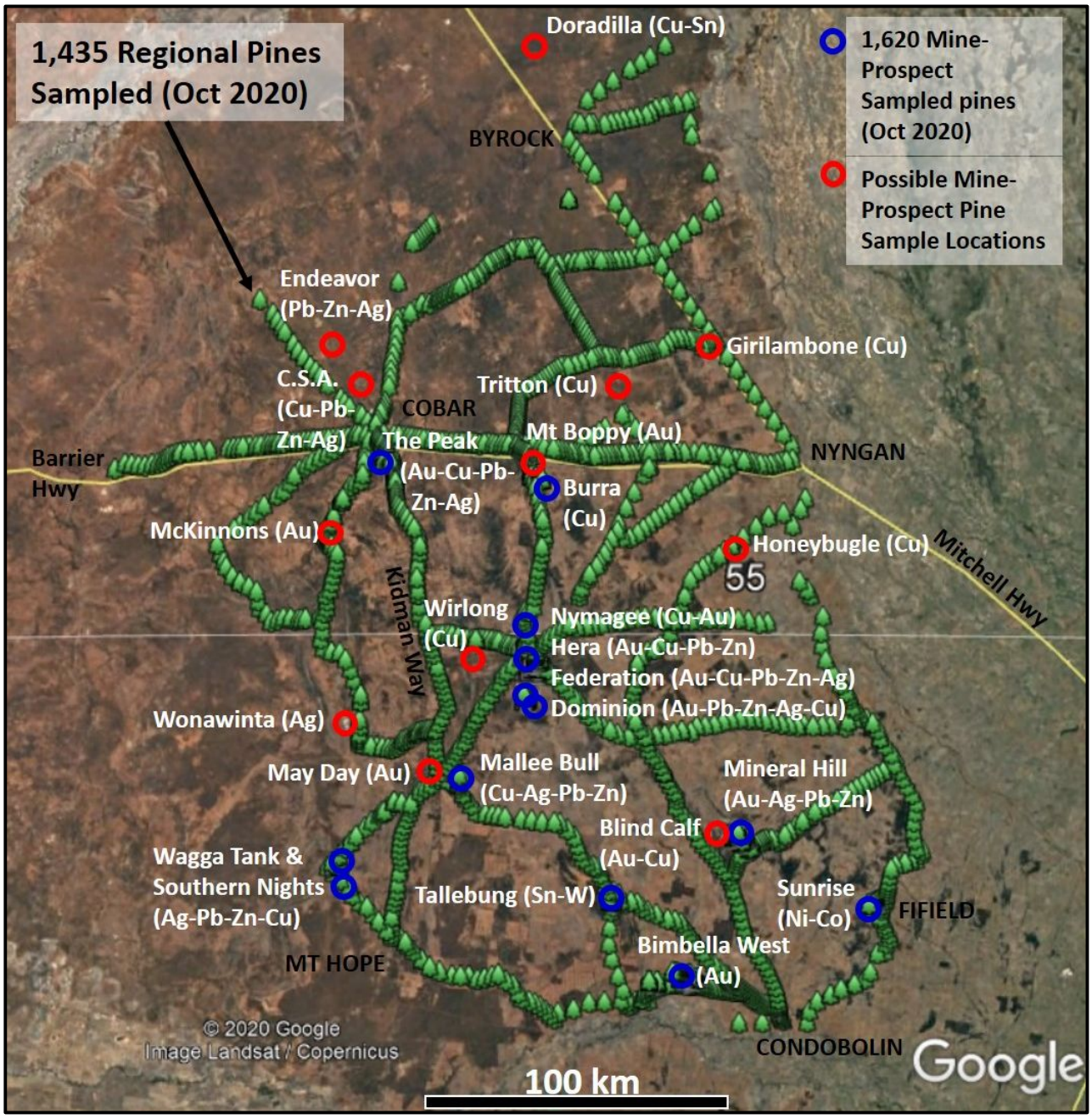

Figure 1. Location of regional roadside sampling traverses and deposit-specific locations in the Cobar Basin, NSW.

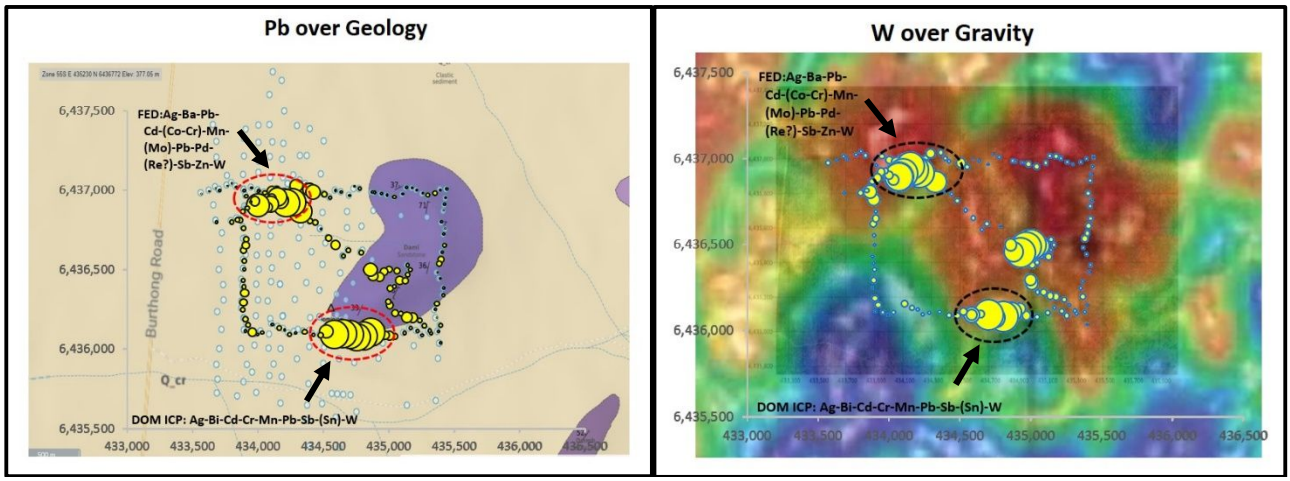

Figure 2. Pb over geology and W over gravity ICP biogeochemical responses at Federation and Dominion (Aurelia).