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Regolith Studies at the Boomerang Gold Prospect, Central Gawler Craton, South Australia

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EXECUTIVE SUMMARY

The Boomerang Gold Prospect is located 650 km NW of Adelaide in undifferentiated Proterozoic rocks incorporated within Archaean Harris Greenstone Belt mafic lithologies of the Gawler Craton. The prospect was originally discovered using calcrete geochemistry and is situated beneath a gypseous and calcareous dune on the edge of a saline drainage system bordering the Great Victoria Desert. Little regional relief exists, but dunes covering basement highs provide local relief up to 5 m. Vegetation is sparse and dominated by low open woodland of Acacia and Casuarina with an understorey of chenopods and other drought-tolerant plants; the area is heavily grazed. The climate is arid with rainfall of about 150 mm per annum falling mostly in the winter.

Drilling of Au in calcrete anomalies has revealed widespread sub-economic Au mineralisation at or near the weathering front. Host lithotypes include quartzo-feldspathic gneissic rocks, foliated granite (partly chlorite and epidote altered), and relatively undeformed coarse-grained mafic rocks. Gold in bedrock is largely associated with quartz veining, commonly in altered and brecciated zones. Lead, Cu, Ni and Zn appear to be associated with some mineralised zones.

Two regolith traverses or sections were investigated at Boomerang. Two zones of mineralisation (Zones 1 and 2) are crossed by the N-S regolith section. At Zone 1, Au concentrations increase with depth to the bottom of hole and form a 600 m wide anomaly. Another dispersion halo (200 m), albeit much weaker and beneath the palaeochannel, is related to quartz veining and is associated with Zone 2 mineralisation. Gold in calcrete is locally anomalous (>10 ppb) over Zone 1 mineralisation reaching a concentration of 26 ppb but the highest Au concentration (35 ppb) occurs in the northern part of the regolith line over thick, barren palaeochannel sediments, and corresponds with a similar anomaly in (calcareous) coarse lag. The soil is calcareous over Zone 1 mineralisation and is also anomalous in Au reaching concentrations of 3 ppb. Samples from 0-1 m are weakly anomalous in Au (maximum of 6 ppb) over mineralisation, as are several 0-1 m and calcrete samples in the northern part of the traverse. Samples from 1-6 m show no Au anomalism over mineralisation which may be due to dilution by gypsum.

Pearl bluebush (Maireana sedifolia) leaves and small branches do not delineate mineralisation well. Samples range in concentration from 0.15-1.2 ppb Au (mean 0.34

ppb), with the two most Au-rich samples (1.2 and 0.9 ppb) located at either ends of the traverse. For Acacia, sampling was restricted to the southern part of the traverse over the gysum dune. As with Maireana, Acacia bark and phyllodes showed little variation in concentration (bark 0.17-0.9, mean 0.31; phyllodes 0.05-0.45, mean 0.27 ppb). Assessing Acacia parts for use as sample media was not possible due to limited distribution over mineralisation only.

Several other elements associated with mineralisation are anomalous in the overlying saprolite, including Cd, Ag, As, Cr, Cu, In, Ni, Pb, Sb and Zn. The most notable of these is Pb, which has a broader footprint (>800 m) than Au and extends (>100 ppm) to near the surface (3-4 m) in the southern part of the line. The other metals are not anomalous in the top 6 m of regolith.

The Boomerang study highlights the difficulty of exploring in terrain covered by recent wind blown gypseous materials. Of the materials studied, calcrete (and possibly soil) provide the only viable geochemical sample media to locate mineralisation in this area. In this type of terrain, exploration should target calcrete initially, then drilling of the best targets with cuttings analysed for Au and pathfinder elements, including Pb and As.