APHRODITE GOLD DEPOSIT, KALGOORLIE, WA

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LOCATION

The Aphrodite gold deposit is located approximately 65 km NNW of Kalgoorlie at 30°10’47”S, 121°13’31”E, on the 1:100,000 Bardoc (3137) and 1:250,000 Kalgoorlie (SH51-9) map sheets.

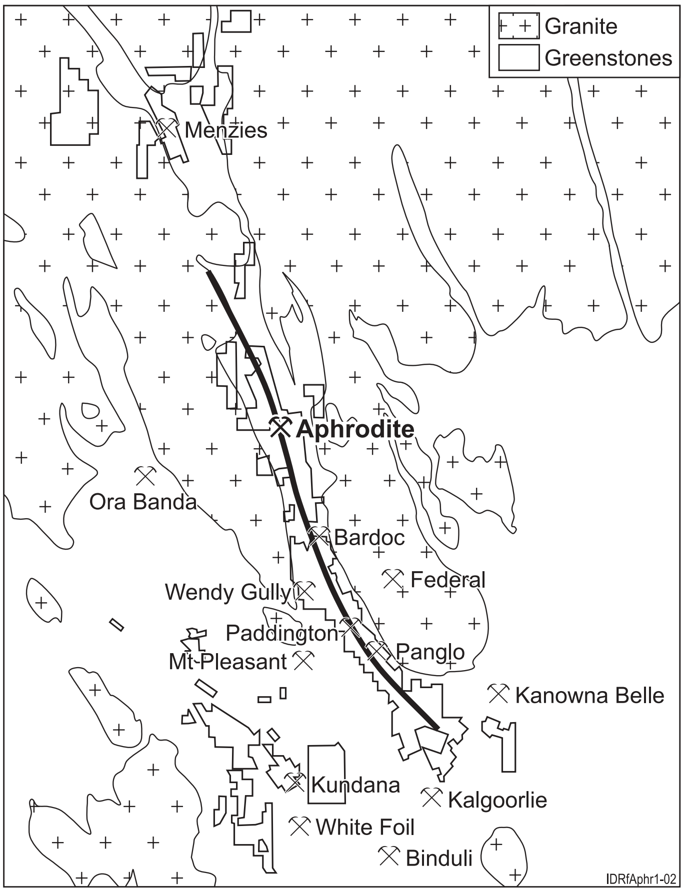

Figure 1. Locality map showing Aphrodite in relation to the geology and surrounding mines.

DISCOVERY HISTORY

In 1993-1994, an auger-sampled bulk soil anomaly was defined at Aphrodite. Reconnaissance RAB and aircore drilling in 1994-1995 on 400x100 m centres beneath the soil anomaly defined a NNW trending supergene gold enhancement immediately above the weathering front at approximately 50 m depth. Detailed RC drilling in 1996 gave the first significant intersection, from oxidized material, of 10 m at 8.6 g/t Au from 71 m down-hole above the Alpha zone, near the eastern edge of the supergene enhancement. The Alpha and Phi zones at Aphrodite were discovered in 1998 and 1999, respectively, by diamond drilling beneath the supergene anomaly (Beeson et al., 1999). By 2000, Goldfields Limited had defined an inferred resource of 895,000 oz of Au in the Alpha and Phi Zones. Both mineralized zones extend further to the S onto adjacent tenements.

PHYSICAL FEATURES AND ENVIRONMENT

The climate is semi-arid, hot (35-40°C) in summer and cool to mild (10-20°C) in winter with irregular rainfall averaging 260 mm per annum. Vegetation is dominated by sparse eucalypts with an irregular understory predominantly of Acacia spp., typical of an area S of the Menzies Line. The deposit lies beneath a strongly dissected plateau of residual gravelly soils adjacent to a sheet-wash depositional plain in the E and S and a line of low basement hills to the W (Figure 2A). The relief is some 15-20 m across the prospect. Grazing is the principal land use.

GEOLOGICAL SETTING

Aphrodite is located in the late Archaean Norseman-Wiluna Belt of the Yilgarn Craton. The deposit lies within the Bardoc Tectonic Zone, a major structural corridor extending 120 km northwards from Kalgoorlie to Menzies. The Bardoc Tectonic Zone has had over 100 years of Au mining (Witt, 1993), with known Au resources and production of nearly 5 M oz (including Aphrodite). Gold mineralization in the Bardoc Tectonic Zone and adjacent greenstone sequences occurs in all rock types, although most historical production has been from mafic host rocks (Witt, 1993). The Aphrodite prospect comprises a suite of intermediate to felsic porphyries that have intruded a sequence of basalts and dominantly volcanic-derived epiclastics. Most of the known Au mineralization occurs within subvertical high-strain zones sub-parallel to stratigraphy.

REGOLITH

Aphrodite is located E of some low hills (400 mRL) developed on outcropping basalt, which extend NNW for approximately 8.5 km. Remnant low plateaux (390 m RL) with gravelly to sandy residual soil to a depth of 5-10 m overlie the resource. Flanking these remnant areas 600 m to the E and 1.8 km to the S there is an alluvial plain with an ephemeral stream. Local surface drainage flows S and then to the W. Northward, some 2.5 km along strike of Aphrodite, there is a gradual decrease in the depth of weathering and thickness of transported overburden along the mafic contact with exposure of adjacent sediments.

Carbonate-enriched soil dominates the upper 1-10 m of the regolith on the remnant low plateau over the Aphrodite resource. Lateritic fragments in the soil are typically dark-red to brown and range from sub angular to rounded. Absence of cutans on goethitic pisoliths suggests that these lateritic fragments have been transported, at least locally. The residual soils pass eastwards into silty soils of the alluvial plain and westwards into basaltic outcrops.

Transported plastic smectitic clay underlies the gravelly soils. These clays define a narrow palaeochannel NE and E of Aphrodite. Locally, the palaeochannel clays are more than 50 m deep in the deeply scoured part of this channel, below which only a few metres of lower saprolite is preserved above the fresh basement. The open spacing of drilling information E of Aphrodite precludes accurate mapping of the position of this palaeochannel. Quartz sand and gravel occur at the base of the palaeochannel approximately 2 km S of Aphrodite.

Beneath the clays, a thick (20-50 m) sequence of predominantly kaolinitic upper saprolitic clays wedge eastward over lower saprolite. Kaolinitic clays vary in thickness from 2 to 25 m, generally being thickest E of the Alpha zone over the sediments. The base of the lower saprolite occurs at approximately 60-70 m over the Phi and Alpha zones.

MINERALIZATION

The Alpha and Phi zones of Aphrodite are hosted in a dilational complex of intermediate porphyries and predominantly volcaniclastic rocks on the boundary between the Ora Banda and Boorara domains (Swager et al., 1990). The Aphrodite prospect is a concentration of higher-grade mineralization (>1.0 g/t Au) within a regional sericite-pyrite-arsenopyrite alteration system that extends for some 3 km along strike N and S. Most of the Au occurs within high-strain zones sub-parallel to stratigraphy in a series of NNW to N striking, sub-vertical, brittle-ductile fault zones.

The primary mineralization at Alpha is a vertical to steeply E dipping planar body with a strike of 440 m and an average width of 5 m (Figure 3A). It cuts across the host felsic porphyry and sediments. The Phi zone is predominantly hosted by volcaniclastic rocks between two porphyry bodies, one of which hosts the Alpha mineralization. Primary

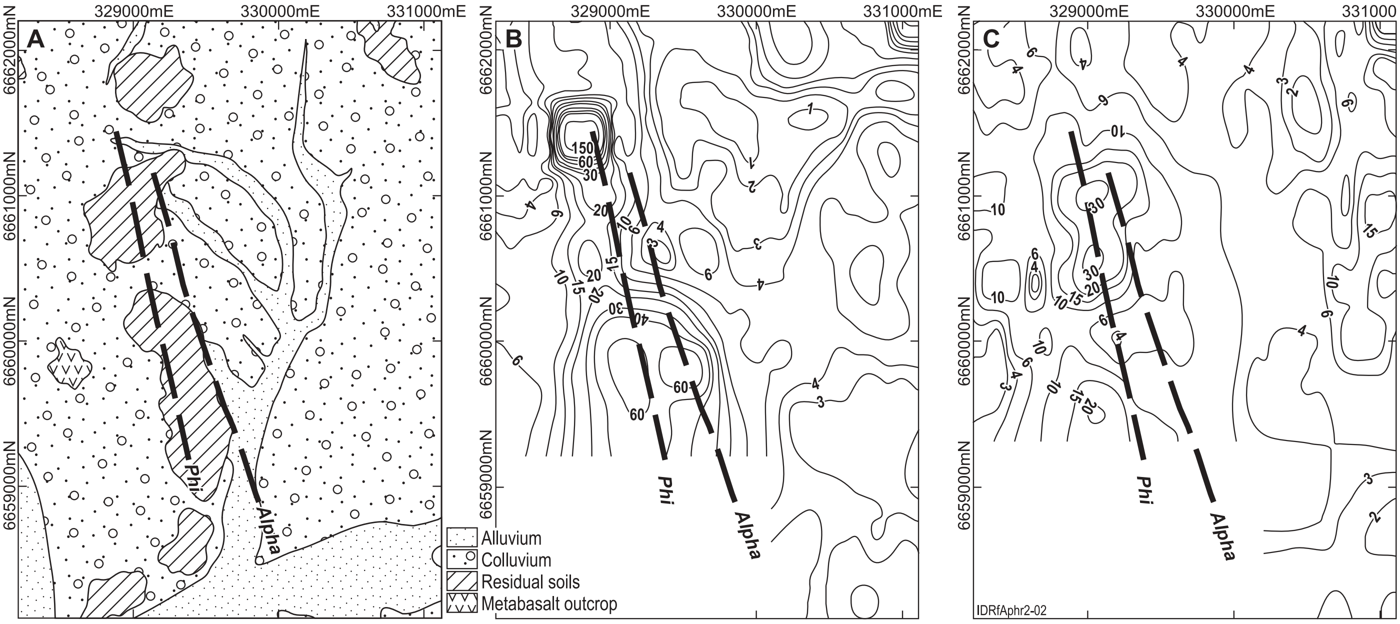

Figure 2. A: Regolith geology of the Aphrodite Deposit. B: Contours of As (ppm) in auger sampled soils. C: Contours of Au (ppb) in auger sampled soils. The surface projections of Alpha and Phi zones are shown as dashed lines.

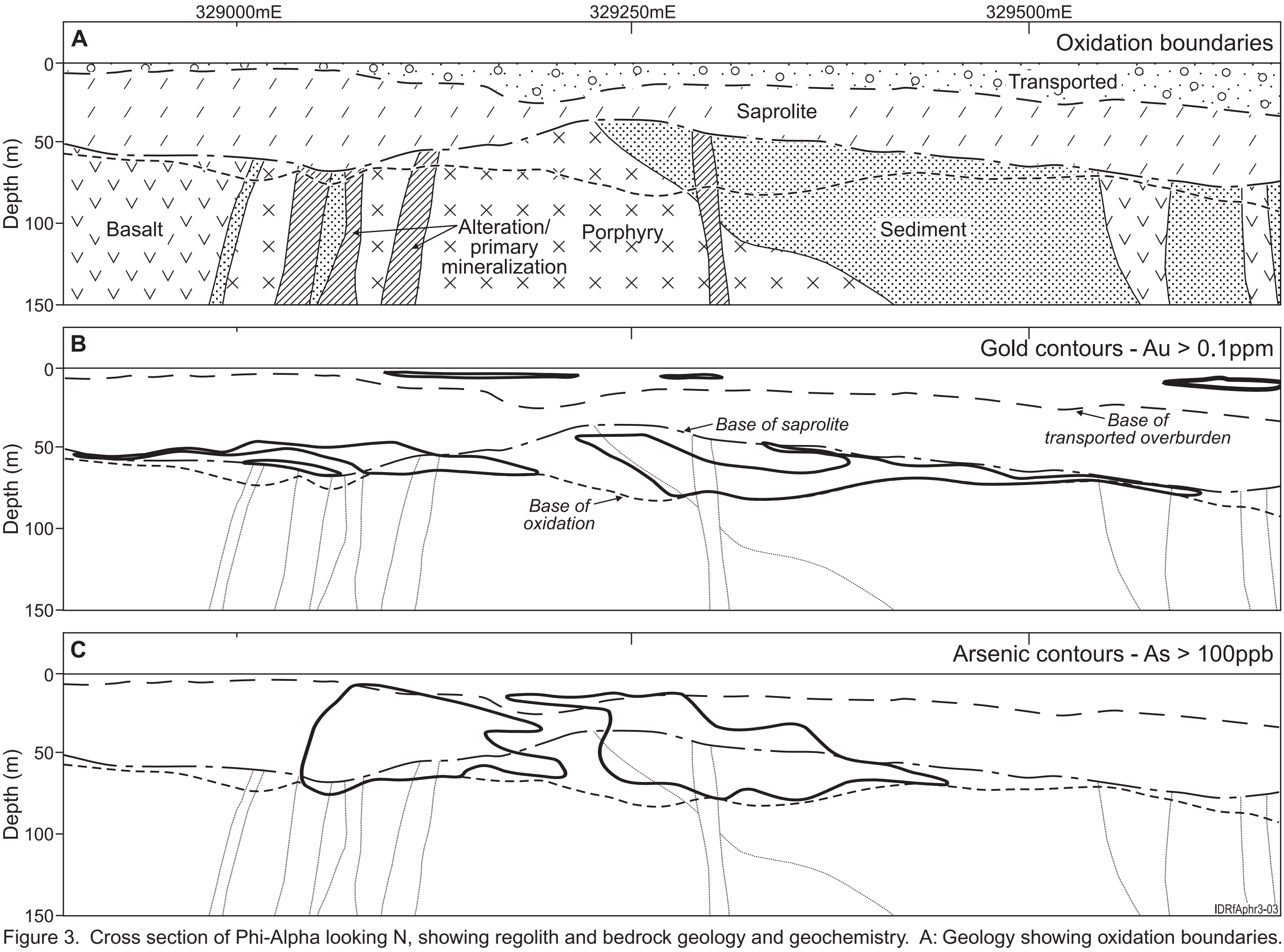

Figure 3. Cross section of Phi-Alpha looking N, showing regolith and bedrock geology and geochemistry. A: Geology showing oxidation boundaries. B: Gold Contours greater than 0.1 ppm. C: Arsenic contours greater than 100ppm.

mineralization at Phi extends for at least 440 m of strike and 400 m vertically. It is vertical to steeply W dipping and is 10-50 m wide. Primary mineralization at Alpha is higher grade (7.15 ppm Au) and narrower than Phi (1.83 ppm Au).

High-grade (5-15 ppm) Au mineralization is associated with zones of quartz-pyrite-arsenopyrite veins or breccias and texturally destructive sericite-pyrite-arsenopyrite±galena±chalcopyrite±stibnite±fuchsite alteration. A pyrrhotite zone of up to 3 m width is developed on the footwall of Alpha zone. Fluorite and tetrahedrite are also present. There is a broad biotite alteration zone distal to the Alpha and Phi zones, with subordinate chlorite pseudomorphs after hornblende and massive biotite-pyrite±chlorite aggregates in mafic xenoliths.

A sub-horizontal zone of supergene gold mineralization is developed immediately above the interface with fresh rock (50–80 m) over both zones of primary mineralization (Figure 3B). Lesser pods of supergene Au mineralization are evident higher in the saprolite. The total resource is 6.3 Mt @ 4.8 g/t Au for 895 000 oz.

REGOLITH EXPRESSION

Abundant pedogenic carbonate nodules in the top 10 m (commonly the top 3 m) of the gravelly residual soils, provided an ideal sample medium for Au. Soils were sampled by mechanised auger to approximately 1.2 m depth on an orthogonal pattern of 400x50 m, with subsequent infilling at 200x50 m. Bulk soil samples were analysed for Au (aqua regia dissolution with an AAS finish to 1 ppb) and As (XRF to 1 ppm). Gold (maximum 240 ppb; Figure 2C) and As (maximum 163 ppm; Figure 2B) were anomalous over a NNW strike length of approximately 3 km. The soil anomaly over Phi zone is best developed in the gravelly, residual soils, attenuating in the silty soils of the alluvial plain to the E.

Several zones of supergene Au enrichment occur within the regolith (Figure 3B) with that at the base of the saprolite by far the most extensive. It contains the bulk of the oxide resource at Alpha (44 000 oz Au), with drill intersections of up to 10 m @ 8.6 ppm Au. An unusual aspect of this supergene zone is a local pod of As enrichment (Figure 3C) to 9150 ppm near the Alpha zone. The shape of the As anomaly suggests supergene enrichment.

Immobile elements (Sc, V, Ti, Th, Hf and Cr) proved particularly useful to aid logging and to help correlate primary lithologies. Sericite alteration around the Aphrodite porphyry complex is characterized by Na depletion and moderate K abundances with high Ba:K ratios. Albite alteration, predominantly within the porphyries, was characterized by Na enrichment and high Sr:Na ratios.

PIMA analyses of diamond drill core, RC chips and bottom-of-hole RAB and aircore samples suggest a broad phengitic (Fe, Mg-rich) alteration halo surrounds mineralization. The unaltered rocks contain paragonite (Na-rich mica), whereas, Alpha and Phi Lodes were characterized by muscovite (K-rich mica), the distribution of which closely matches the spatial extent of elevated Au and As.

ACKNOWLEDGEMENTS

The authors thank Placer Dome Asia Pacific Ltd and Dalrymple Resources NL for allowing publication of this paper. P. Kitto (Goldfields Limited) and M. Harris (Dalrymple Resources NL) are thanked for reviewing the manuscript.

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SAMPLE MEDIA - SUMMARY TABLE

Sample medium	Indicator elements	Analytical methods	Detection limits (ppm)	Background (ppm)	Threshold (ppm)	Max anomaly (ppm)	Dispersion distance (m)
Fresh rock	Au	50 g FA	0.01	0.08	0.1	64	-
	As	XRF	5	30	75	18 000	-
Base of saprolite	Au	50 g FA	0.01	0.15	0.2	57.4	300
	As	XRF	5	20	80	9 150	300
Base of transported overburden	Au	50 g FA	1	0.03	0.06	16.1	-
	As	XRF	5	35	40	1 170	-
Soil	Au	AAS	0.001	0.008	0.015	0.240	450
	As	XRF	1	10	25	163	450

FA Fire Assay AAS after aqua regia digestion