SAFARI BORE GOLD DEPOSIT, Mt CELIA, WESTERN AUSTRALIA

C.R.M. Butt[1], M.J. Lintern[1] and A.P.J. Bristow[2]

[1]CRC LEME, CSIRO Exploration and Mining,PO Box 1130, Bentley, Western Australia 6102

[2]Simmonds and Bristow Pty Ltd, 40 Reginald St., Rocklea, QLD 4107.

LOCATION

The Safari Bore deposit is located 200 km NNE of Kalgoorlie and 9 km NE of the margin of Lake Raeside at 29º32'16"S, 122º29'32"E (Figure 1); Edjudina 1:250 000 map sheet (SH 51-6).

DISCOVERY HISTORY

Safari Bore was a greenfields discovery, based on a regional BLEG (Bulk Leach Extraction of Gold) survey by Pancontinental Mining Ltd. in 1988, followed up by power auger sampling, targeting pedogenic carbonate on a 50 x 250 m grid (Bristow *et al.*, 1996).

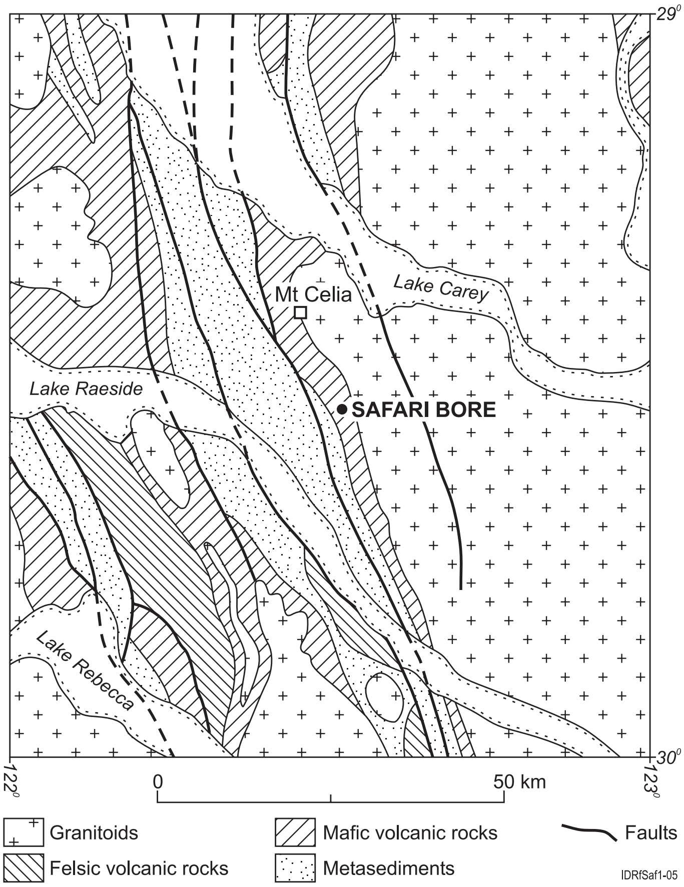

Figure 1. Regional geological setting after Myers and Hocking (1998).

PHYSICAL ENVIRONMENT

The Safari Bore deposit is situated on a broad, sandy, colluvial plain that slopes gently to the SW towards Lake Raeside. The palaeosurface is much steeper and more variable than the present surface. The most prominent features are a W-draining valley in the northern part of the area and a palaeohigh that meets the present land surface, forming higher ground to the E. The climate is semi-arid with a mean annual rainfall of 200-250 mm. Rain falls variably throughout the year, from frontal systems in winter and convectional storms and cyclone-related depressions in summer. The mean minimum and maximum temperatures are 21-36ºC (January) and 5-18ºC (July). The vegetation is medium to dense woodland of *Acacia* spp. with minor *Eucalyptus* spp.

GEOLOGICAL SETTING

The Safari Bore Deposit lies within the S extension of the Laverton Tectonic Zone, in the Archaean Wiluna-Norseman belt. The bedrock geology consists of an assemblage of komatiite, komatiitic basalt, basalt, andesite, dacite and rhyolite, with minor banded iron formation, chert and argillite. These rocks are variously deformed and generally strike NNW (Figure 1). They have a nearly vertical to WSW-dipping tectonic foliation, and a sub-horizontal to down-dip mineral lineation. Regionally, this greenstone sequence has been metamorphosed to lower greenschist facies, with amphibolite facies adjacent to large plutons of intrusive porphyritic syenite, coarse granodiorite and adamellite (E. Kohler, 1996; written communication).

REGOLITH

The area is completely blanketed by transported overburden, except on the low hills to the E, where weakly weathered Archaean rocks outcrop. The overburden consists of up to 1 m of aeolian sand and sandy sheetwash and 4-10 m of colluvial sediments, reaching 20 m thick in the northern palaeovalley. The sediments consist of a polymictic assemblage containing 2-10% coarse material in a matrix of sand, silt and, in places, clay. The coarse fraction commonly occurs towards the base and, over most of the area, including near the mineralization, is composed of angular fragments of nearly fresh rock. In the northern palaeovalley, there is a mixture of ferruginous pisoliths, nodules and lithorelics. Drilling has intersected narrow lenses of coarse alluvial sand and gravel in places.

Post-depositional modification of the sediments includes intense calcification from about 0.5-5.0 m depth, with some calcrete mottles and nodules within 0.2 m of the surface. The underlying sediments are commonly moderately to strongly indurated by silica and Fe oxides. Most of the residual regolith consists of saprolite with a variable clay content although, in isolated areas to the N, there are deep profiles with highly ferruginous upper horizons. Incipient Fe oxide mottling occurs throughout the saprolite and the upper few metres are commonly indurated by silica and/or carbonate. The weathering front is generally 10-20 m below the unconformity. The bedrock is reasonably fresh in outcrop, but is commonly brecciated by calcification and the upper few metres contain large (to hundreds of mm) calcrete nodules.

MINERALIZATION

The mineralization is hosted by andesitic to dacitic metavolcanic rocks, now largely represented by quartz-chlorite-sericite±carbonate schists. They are bounded to the W and E by serpentinized komatiite and talcose schist. In December 2000, a resource of 3.5 Mt at 3.1 g/t Au had been defined (345 000 oz Au). Later drilling revealed intersections of 18 g/t Au over 11 m (Figure 2), suggesting the resource exceeds 500 000 oz. Gold is primarily associated with quartz veins within an anastomosing shear. High concentrations of Au (maximum 31 ppm) are generally accompanied by Pb enrichments (maximum 1100 ppm), although Pb correlation with Au grade is generally not particularly good. There is also general enrichment in As (to 1000 ppm), S (to 1.1%) and W (to 79 ppm). A high Zn content (maximum 1300 ppm) at one intersection suggests that there may have been more than one mineralizing event.

REGOLITH EXPRESSION

This description is based on a traverse of 25 RAB holes at 25 to 100 m intervals across strike, drilled specifically to investigate the regolith response (Figure 3). They were terminated 4 m below the

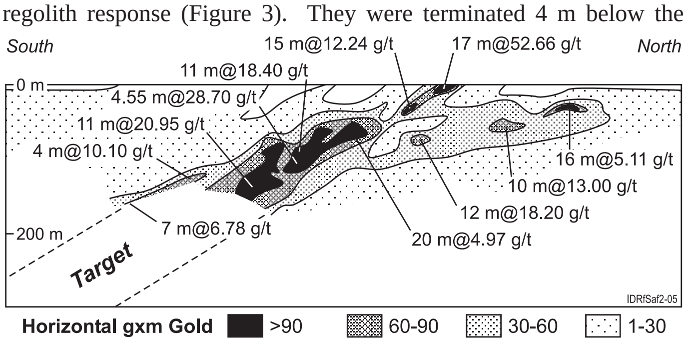

Figure 2. Schematic longitudinal section through the Safari Bore gold deposit (from Sons of Gwalia website, 2005).

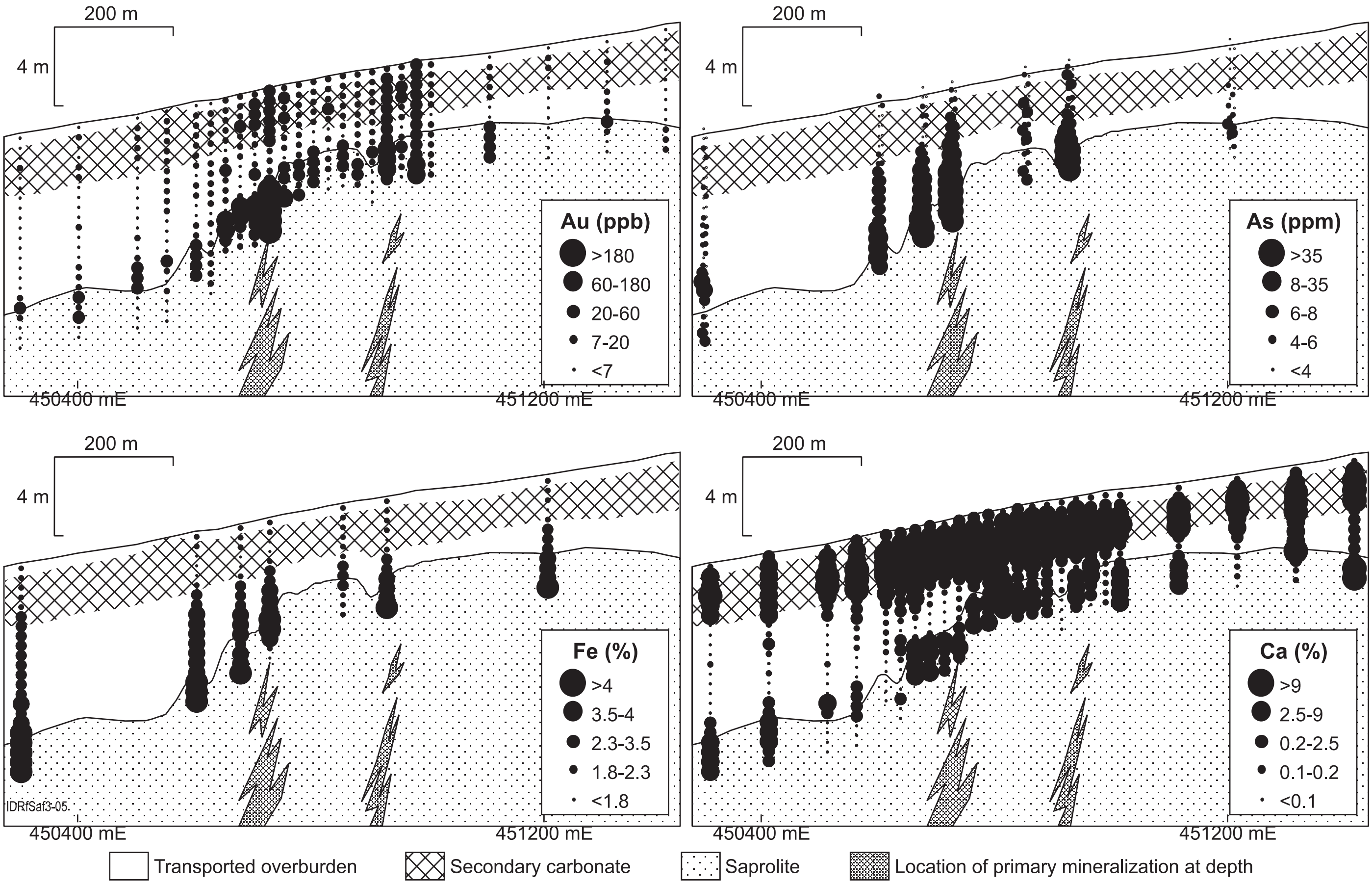

Figure 3. Gold, As, Fe and Ca distributions in transported overburden and top of saprolite on section 6732300N plotted on regolith.

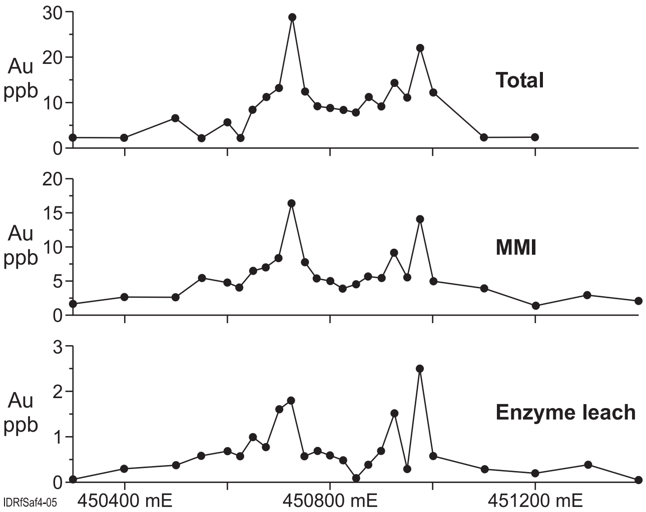

Figure 4. Comparison between total, MMI and enzyme leach extractions of Au in soils (0-0.5 m sample interval), section 6732300N, (after Gray et al., 1996).

unconformity and sampled at 0.5 m intervals. Anomalous Au occurs in the saprolite just below the unconformity, especially where it directly overlies primary mineralization (*e.g.,* 1200 ppb in a quartz vein from the top two metres of the saprolite). The mean Au content of the top 1 m of saprolite gives a very strong anomaly peaking over mineralization (1000 ppb), compared to an elevated and noisy background of 10-50 ppb Au.

Significantly, Au is anomalous (22-50 ppb) in the carbonate horizon, with enrichment strongest at 0.5-2.5 m depth directly over mineralization, where the total overburden thickness is 5-8 m. Concentrations of Au (over 7 ppb) above background occur in the calcareous horizon for 800 m across strike of the mineralization. Using a cyanide leach with a low detection limit (0.04 ppb), an anomaly in the top half metre, with excellent contrast, peaks directly over the primary mineralization with concentrations exceeding 5 ppb for over 600 m across strike. Despite having higher absolute Au contents, preferentially sampled highly calcareous fragments do not increase anomaly contrast, and the Au/Ca ratio in these is consistently lower than a bulk sample from the same interval.

Multi-element analyses of a limited number of samples indicate low to moderate enrichment of Sb, W and As in the upper saprolite (>1.5 ppm Sb, >10 pm W and >35 ppm As) associated with mineralization. Of these elements, only As also has a response in the transported overburden, with concentrations of 8-35 ppm As associated with Fe oxides in the basal 2-3 m, possibly extending 300 m downslope from subcropping mineralization.

Iodide-soluble Au varies from less than 10% in the mineralization to over 80% in weathered wallrocks and calcareous samples in the overburden. This implies secondary chemical dispersion, with precipitation in the carbonates.

A comparison of partial extractants (Gray *et al.,* 1996, 1999) shows that dilute and concentrated HCl, iodide, MMI and enzyme leach all give good anomaly definition for Au, although none is superior to total analysis (Figure 4).

Biogeochemistry

Plant material and soil mull are ineffective in detecting mineralization. Bromine is anomalously high (up to 160 ppm) in *Acacia* growing over mineralization against a background of around 20 ppm, but the relationship with mineralization is unclear. All other elements are present in very low concentrations, and only one sample (mull) over mineralization has elevated concentrations of Au, As, Ce, Co, Fe, La, Na, Sc, Sm, W and Yb. It is suspected that these enrichments, and the inhomogeniety of Au distribution in other samples and sub-samples, may be due to contamination from drill dust.

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SAMPLE MEDIA – SUMMARY TABLE

Sample medium	Element	Analytical method	Detection limit (ppm)	Threshold (ppm)	Range (ppm)	Downslope dispersion (m)
Calcareous horizon	Au	INAA	0.005	0.008	0.008-0.057	300
Basal sediment	Au	INAA	0.005	0.008	0.008-0.042	300
	As	INAA	1	7	7-11	300
	W	INAA	2	2	<2	-
	Sb	INAA	0.2	1.5	<1.5	-
Mineralization	Au	INAA	0.005		0.005-310	
	As	INAA	1		7-1000	
	W	INAA	2		<2-80	
	Sb	INAA	0.2		0.3-2.9	
	Pb	XRF	5		5-1150	

Regolith data from research drilling only