CORNISHMAN GOLD DEPOSIT, SOUTHERN CROSS MINING DISTRICT, WA

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LOCATION

The Cornishman Au Deposit is approximately 5 km SE of Southern Cross at 31°17'00"S, 119°20'48"E; Southern Cross 1:250 000 sheet (SH50-16).

DISCOVERY HISTORY

The first pit to be mined (Double 'O') at the Cornishman deposit was discovered by Troy Resources from auger soil sampling following some anomalous trench samples in 1987 (Watkins et al., 1998). A maximum Au grade of 177 ppb was located directly over the Double 'O' lode. Subsequent RAB drilling in 1988 confirmed significant mineralization and an RC program in 1992 defined a mineable resource of 542 000 t @ 3.60 g/t Au. RAB drilling along strike of the Double 'O' discovered two smaller supergene deposits (Northern and New Find lodes) in 1993-94. In 1997, further RAB drilling to the east of the Double 'O' by the Sons of Gwalia-Troy Resources joint venture delineated the much larger Triple 'O' lode (1.5 Mt at 4.87 g/t Au).

PHYSICAL ENVIRONMENT

The climate is semi-arid with an average annual rainfall of 265 mm. Vegetation is mainly sparse low scrub and a scattering of medium-sized Eucalyptus trees. The topography is generally flat with shallow internal drainage.

GEOLOGICAL SETTING

The Cornishman deposit is in the Bullfinch-Parker Range district of the Southern Cross Province, in a domain of amphibolite facies metamorphism. The primary rock types are tremolite-chlorite schist (after komatiite), plagioclase-hornblende schist (after tholeiitic basalt) and BIF. Soil anomalies and locations of the lodes are shown in Figure 1.

REGOLITH

Markwell (1993) investigated the Double 'O' lode, the only deposit discovered at the time. Despite some lag of mafic amphibolite and tremolite-chlorite rock, there is no outcrop in the area. The residual weathering profile at Double 'O' is truncated to the upper saprolite and mottled zone and overlain by 2-15 m thick, colluvial overburden; ferruginous "buckshot" gravel and quartz fragments cover the red-brown colluvium. Laterite has been eroded from the weathering profile exposed in the pit, but is intersected in a costean to the NE. Weathering is deepest over quartz veins above the mineralized zone, where it reaches 45 m depth, whereas the mafic amphibolite is weathered to a maximum of 35 m.

In saprock, the primary mineral assemblage (tremolite, chlorite, biotite, plagioclase, hornblende), is largely intact; primary textures and structures are preserved throughout. Kaolinite and, to a lesser extent, smectite form weathering rinds around cores of amphibole and feldspar.

The contact between saprock and lower saprolite is gradational, with increased alteration of amphiboles, feldspars and other silicates to clays and Fe oxides.

Two distinct saprolite zones, lower and leached upper saprolite are shown in cross section in Figure 2. The boundary between the two is a sharp colour change from a dark green in the lower saprolite to a pale yellow-green in the leached upper saprolite. Kaolinite and smectite form major components of both, but the absence of Fe oxides and the preservation of tremolite in the lower saprolite distinguish it from the leached upper saprolite. Tremolite is the most abundant mineral in the lower saprolite (40 vol.%), but there are also significant amounts of quartz (15 vol.%), kaolinite (5 vol.%) and smectite (5 vol.%). Secondary minerals comprise about 35-40 vol.% of the lower saprolite; Fe and Mn oxides occur only along fractures. Mafic units such as the

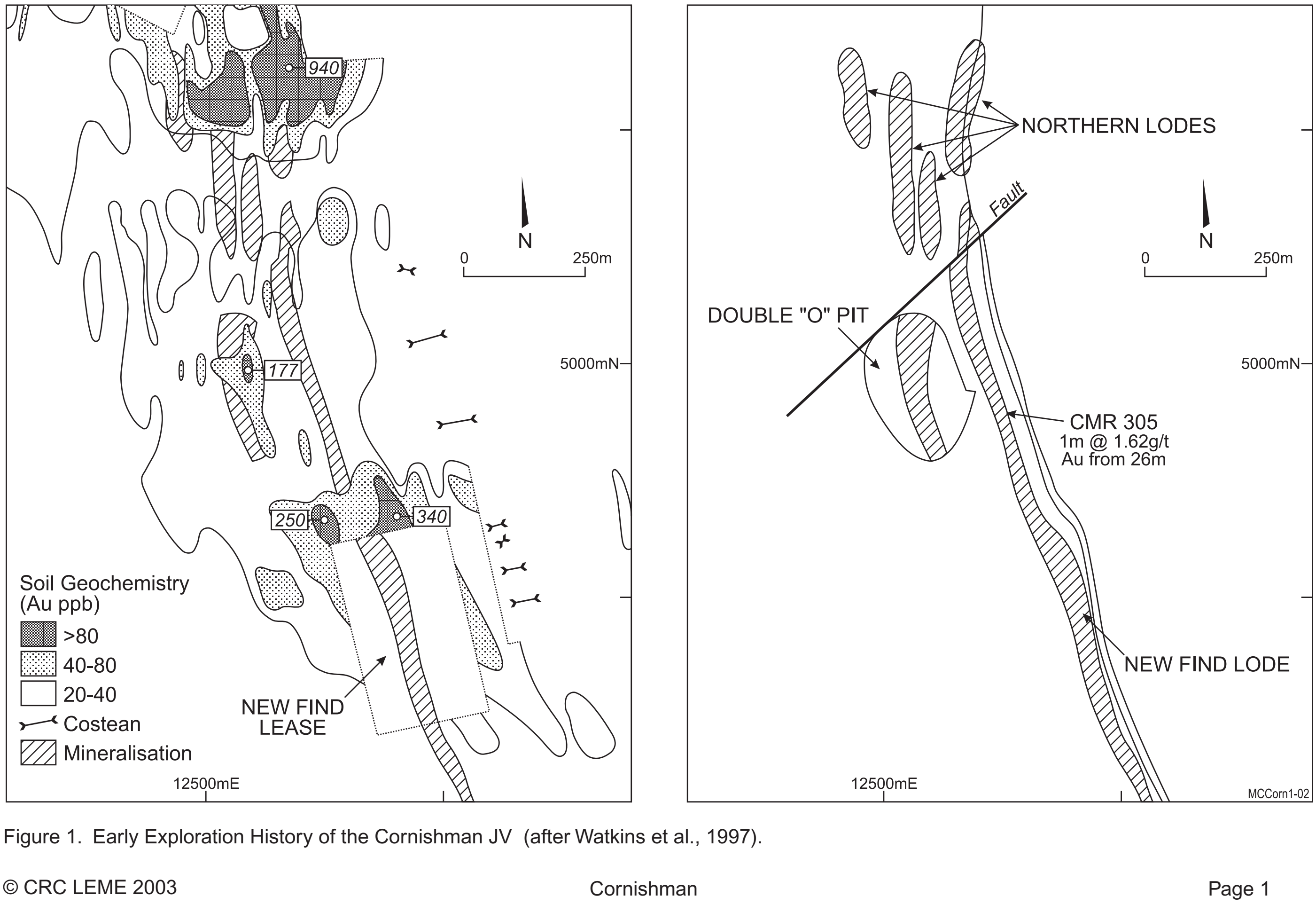

Figure 1. Early Exploration History of the Cornishman JV (after Watkins et al., 1997).

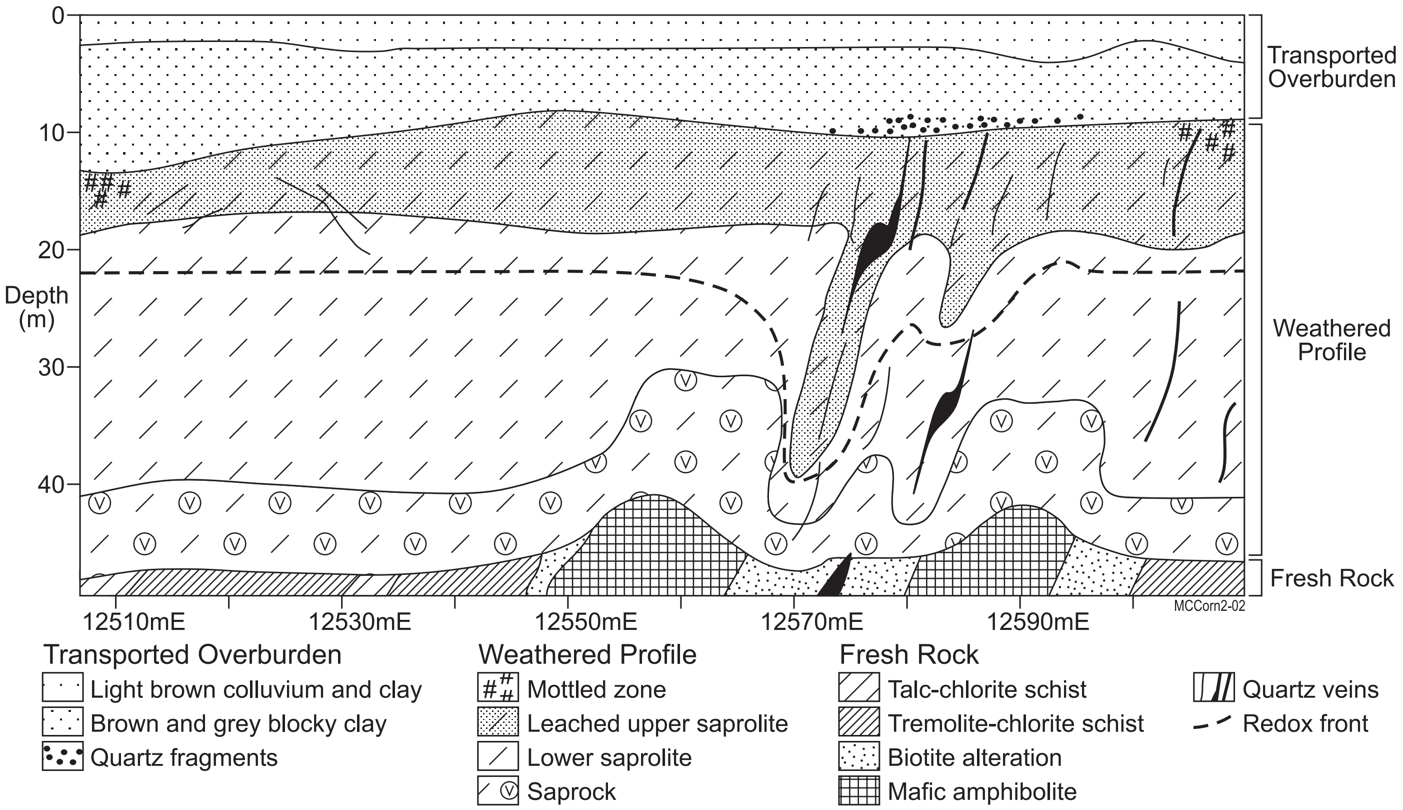

Figure 2. Regolith profile along section 4912mN of the Double 'O' pit. (after Markwell, 1993).

tholeiitic basalt have plagioclase in a kaolinite and smectite matrix, with amphiboles and albite weathered to clays. The primary fabric is highlighted by Fe oxides precipitating along the foliation; alignment of tremolite and biotite is also visible.

The leached upper saprolite is porous and brittle, has a low density, and comprises quartz (50 vol.%), kaolinite (40 vol.%), iron oxides (5 vol.%) and smectite (trace). More than 90 vol.% of the minerals in the leached upper saprolite are products of weathering. Iron oxides are most abundant near the boundary between the residual profile and transported overburden, at around 10 m depth. There is also a concentration of Fe oxides in the lower part of the leached upper saprolite, marking a redox front at 18-22 m depth. Around quartz veins, this redox front dips about 9 m into the profile. Some quartz veins in the more ferruginous areas have a sugary texture, and are very friable, whereas, most quartz veins in the weathering profile are massive and competent. The upper part of the leached upper saprolite, near the contact with the transported overburden, comprises more than 80 vol.% silicified kaolinite. Rock types are difficult to distinguish within the leached upper saprolite, reflecting the degree of weathering and clay recrystallisation. Similarly, the primary foliation is faint, or absent. Indurated Fe oxide mottles in a kaolinite matrix, are present just below the unconformity.

The transported overburden (2-15 m thick) consists of a lower series of mottled clays that contain kaolinite, quartz and hematite with traces of magnetite, and an upper colluvial unit. Scattered along the unconformity or interface, between residual and transported materials, fragments of primary quartz veins occur together with ferruginous gravel. There are channel-like undulations in the base of the colluvium in the southwestern part of the pit. The colluvial upper part of the transported materials contains small amounts of ferruginous gravel, pisoliths, lithic fragments, small quartz boulders and organic matter. The surface has a lag of ferruginous buckshot gravel. Dolomitic, pedogenic carbonate is present in the upper 2 m of the colluvium.

MINERALIZATION

Watkins et al. (1997) identified four styles of mineralization: -

A bifurcating ductile shear zone in tremolite-chlorite schist with biotite-diopside-pyrrhotite-pyrite alteration (Double 'O' lode). Most of the ore is in the supergene zone, although there is still a significant amount of Au associated with the quartz veins (Markwell, 1993).

A BIF-hosted lode with associated calc-silicate veins and alteration (Triple 'O' lode).

A quartz stockwork in weakly developed diopside-chlorite-biotite alteration within a shear zone in amphibolite (New Find Lode).

Supergene mineralization above a shear zone, hosted by ultramafic rock (Northern Lodes).

All mineralization is generally sulphide-poor with minor amounts of pyrrhotite, pyrite and chalcopyrite.

REGOLITH EXPRESSION

The lateral primary Au envelope (>5 ppb) in the Double 'O' lode (Figure 3) in fresh rock is 50 m wide. In saprolite, the halo (> 5 ppb Au) narrows to 30 m but expands again to 45 m at approximately 25 m depth. Between 10-15 m depth, the Au envelope is only 10 m wide, extending to 30 m near the unconformity. High Au concentrations (>10 ppm) persist from the fresh rock through to the unconformity as in situ primary quartz veins.

Secondary Au dispersion in the weathering profile at Double 'O' is confined to two zones; at 10-12 m depth (upper saprolite) and at 20-25 m depth (lower saprolite). Dispersion is associated with interpreted redox fronts in the upper saprolite, and near the top of the lower saprolite. Elsewhere above the weathering front, Au is depleted.

At Double 'O', the distribution of secondary Au is generally narrower than the underlying primary Au mineralization. The observations at Double O are consistent with the findings of Gray et al., 2001, who note that 'lateral dispersion haloes' of Au in saprolite are generally zones of supergene enrichment, with similar dimensions to those of lower level, primary enrichment in bedrock. Significant dispersion, e.g., 150 m at >100 ppb Au, as noted at Hannan South by Lawrance (1991), is rare and is probably related to the highly saline playa environment.

Other elements enriched in the supergene zone, include As, Mo and Sb; the width of their lateral dispersion is 20-40 m. In the saprolite and saprock, As, Sb and W show lateral dispersion of 15-45 m. Elements that are dispersed along the redox front, include As, Co, Cu, Pb and Sb (Figure 4). The Sample Media Table summarizes the dispersion for these elements around the Double 'O' lode.

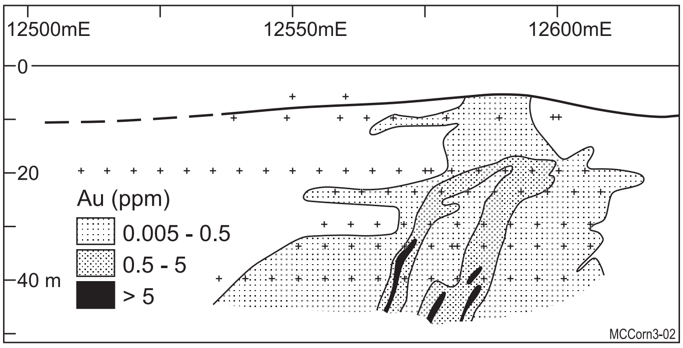

Figure 3. Gold dispersion in the regolith of the Double ‘O’ pit along section 4912mN. (after Markwell, 1993).

In contrast, the Northern Lode has a 400 m lateral dispersion of supergene Au (Watkins et al., 1997), below a 20-30 m depletion zone. The Northern lode appears to have less carbonate alteration and less Au associated with quartz veining, allowing more supergene dispersion.

In summary, Au around the Double ‘O’ lode has not been significantly dispersed by supergene processes, and hence, does not present a large exploration target. In addition, truncation of the profile has removed any pre-existing surface dispersion halo. Combined with the deposition of 2-15 m of barren transported overburden, the narrow halo of supergene Au makes discovery of deposits like Cornishman difficult using drill and Au analysis only. Initial discovery was through soil anomalies, but as discussed in Watkins et al., (1997), soil anomalies may not reflect the positions or the grades of underlying mineralization. By concentrating on the soil anomalies, discovery of the true extent of the mineralization may have been delayed by several years (there was no such soil anomaly above the Triple ‘O’ lode). In hindsight, a more extensive RAB or aircore-drilling programme following up the first significant soil anomalies may have resulted in a more successful exploration program (Watkins et al., 1997). Interface sampling could have further improved this approach.

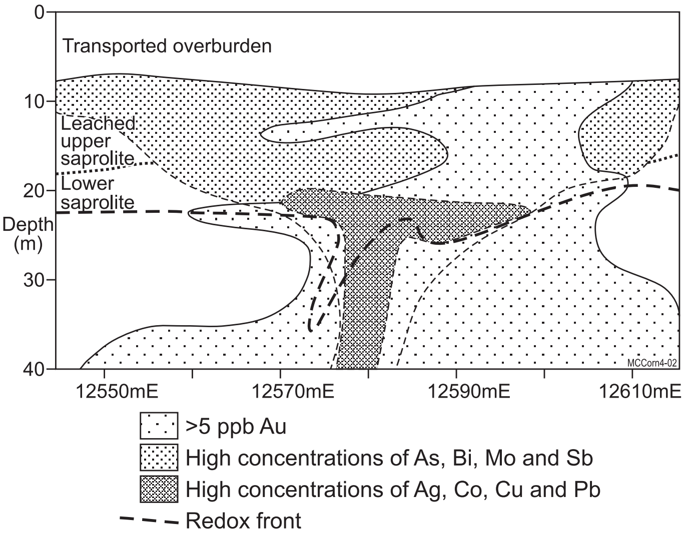

Figure 4. Summary of the ore-associated element distributions in the Double ‘O’ pit along section 4912mN. (after Markwell, 1993).

Ore-associated elements (as discussed with the Double ‘O’) have different geochemical properties to Au and may have provided an enlarged exploration target at Cornishman. However, the relative concentrations of these elements in the regolith is dependent on the mineralogy of the primary rocks. In the case of the Double ‘O’ lode, As, Bi, Mo and Sb have dispersed into the leached upper saprolite and are useful indicators to the buried Au deposit.

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SAMPLE MEDIUM - SUMMARY TABLE

Sample medium	Indicator elements	Analytical methods	Detection limits (ppm)	Background (ppm)	Threshold (ppm)	Max anomaly (ppm)	Dispersion distance (m)
Supergene mineralization	Au	ETA, AAS	0.001	0.004	0.01	0.4	35
	As	ICP-MS	2	10	200	1080	35
	Mo	ICP-MS	0.5	1	2.5	5.5	40
	Sb	ICP-MS	0.5	1	2	4.5	15
Saprolite and saprock	Au	ETA, AAS	0.001	0.05	0.1	480	65
	As	ICP-MS	2	4	20	560	15
	Sb	ICP-MS	0.5	1	2	4.5	15
	W	ICP-MS	1	2	5	39	45
Redox fronts	Au	ETA, AAS	0.001	0.046	0.1	480	55
	As	ICP-MS	2	8	200	275	30
	Co	ICP-MS	1	60	200	380	60
	Cu	AAS	1	62	110	165	50
	Pb	AAS	2	4	10	42	45
	Sb	ICP-MS	1	1	2	2.5	30
Soil	Au	ETA	0.001	0.001	0.03	0.13	50