MOUNT DIMER GOLD DEPOSIT, MARDA GREENSTONE BELT, WESTERN AUSTRALIA

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LOCATION

The Mount Dimer Au deposits are located in the Marda greenstone belt (Figure 1), approximately 100 km NE of Southern Cross at, 119º50'E, 30º23'S; Jackson 1:250 000 map sheet (SH 50-12).

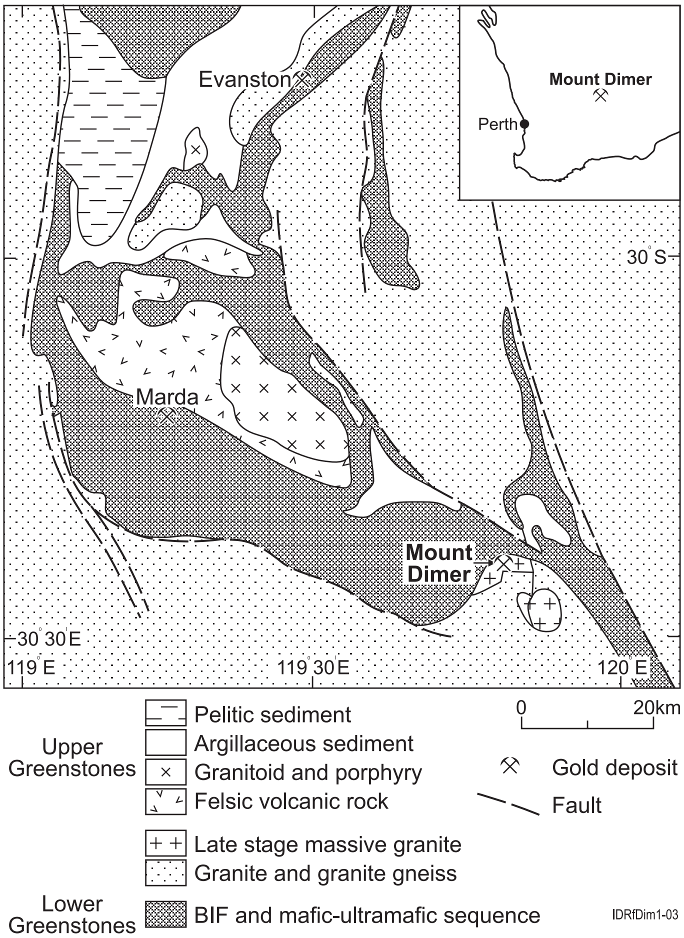

Figure 1. Regional location, geology and nearby mines (after McIntyre and Czerw, 1998).

DISCOVERY HISTORY

Extensive soil sampling and follow-up drilling in the late 1980s by Western Mining Corporation Ltd led to the discovery of lateritic and underlying quartz vein hosted Au mineralization at Mount Dimer (McIntyre and Czerw, 1998). Western Mining Corporation Ltd conducted a small vat leach operation on the laterite ores in 1991-1992 and then sold the property to Glengold Holdings Pty Ltd (Glengold) in early 1993. Work by National Mine Management, on behalf of Glengold, in 1993 outlined an open pit and underground Au resource of 300 000 t at 6.5 g/t in three quartz vein lode systems (L1, L2 and L3; Figure 2) beneath the laterite mineralization. The tenements were subsequently sold to Tectonic Resources NL in May 1994, just after open pit mining had commenced. Subsequent work by National Mine Management and Continental Resource Management on behalf of Tectonic Resources NL led to the development of underground operations under the L1 and L2 pits and the discovery and development of several satellite lode deposits (Golden Slipper, Karli West and Frodo; Figure 2). Mining was completed in July 1997 after the production of 128 000 oz of Au and 188 000 oz of Ag.

Soil and RAB geochemistry have proven to be the most successful exploration techniques in the Mount Dimer region. The deposits do not appear to have any recognizable geophysical expression.

PHYSICAL FEATURES AND ENVIRONMENT

The present landscape (Figure 3) has low relief and forms a sand plain of yellow to white sand with locally abundant ferruginous pebbles, probably on granitoid rocks. To the W are lateritic duricrusts on deeply weathered greenstones and minor siliceous caprocks on ultramafic bedrocks (Chin and Smith, 1983). This prospect is drained to the S and SW towards the playas Walton and Seabrook by intermittent watercourses with alluvial and colluvial deposits. The Mount Dimer area has a non-seasonal arid to semi-arid climate with an annual rainfall of 200-300 mm (Beard, 1990). The area contains two flora communities, broadly described as open Eucalypt woodland over a Chenopod understorey in the valley systems and mixed Acacia species over spinifex on the sand plains (Marianna Partners, 1995).

GEOLOGICAL SETTING

The Mount Dimer deposits are located at the eastern end of the Archaean Marda greenstone belt (Figure 1). This belt comprises a succession of ultramafic and mafic volcanic rocks and chemical sediments unconformably overlain by a sequence of clastic sediments, felsic volcanic rocks and, possibly, by a comagmatic granitoid. The greenstones are bounded to the S by granite, with a structurally complex contact. The deposits are mostly located just S of the contact (Figure 2) in shears trending approximately 340º in a dominantly granitic sequence that has abundant mafic xenoliths with a broad E trend (McIntyre and Czerw, 1998). The main L1, L2 and L3 deposits are truncated to the N by a steeply S-dipping ultramafic unit and to the S by the 50º N-dipping, South Bounding Fault.

REGOLITH

Although the landscape is of low relief and a residual to weakly depositional environment, a complex regolith has developed on the Archaean rocks. A photo interpretation of the regolith units in the Mount Dimer project area was compiled (Baxter, 1996) and the portion over the main mining area is presented as Figure 3. McIntyre and Czerw (1998), recognized several discrete regolith units, listed in order of decreasing age:

1. "Billy" is a colluvial unit of poorly sorted rounded clasts of vein quartz in a quartz sand matrix, which is locally siliceous and ferruginous. This unit is generally 1-2 m thick and lateritized in places.

2. A lateritic profile, comprising pisolitic to nodular ferruginous duricrust over mottled, leached rock and saprolite, is locally well developed, especially over the L1, L2 and L3 lodes. The duricrust over these and other lodes is well mineralized.

3. Colluvial to alluvial fill in palaeochannels, up to 50 m thick over the ultramafic units, mantles much of the surface of the mine leases away from the main lodes. The palaeochannel fill comprises coarse-grained, polymictic conglomerate, interbedded with clay-rich sand and minor clean quartz sand layers, indicating erosion and redeposition of regolith materials. For example, a colluvial blanket of Au-bearing material is developed in the W flank of the Golden Slipper open pit, and has been mined as a 'laterite' resource. Radiometrically anomalous clays are developed on the surface of some of these palaeochannels.

4. Recent lag is developed on residual areas and loamy soils are developed on depositional areas, the latter with strongly developed pedogenic carbonate horizons at or near the surface.

MINERALIZATION

Six lode Au deposits and several minor laterite deposits have been mined within the area of the two principal mining leases at Mount Dimer. Several sub-economic ore shoots have also been discovered (e.g., Lightning, Anomaly 2 and L4). The bulk of the Au (about 87%) was mined from the L1 and L2 open pit and from underground operations. The ore-bearing structures typically have a strike of approximately 340º and dip steeply to the E, although Karli West strikes 010-015º. Regionally, a range of dips from steep westerly to 60º to the E have been reported from the various deposits (Braiden and Czerw,

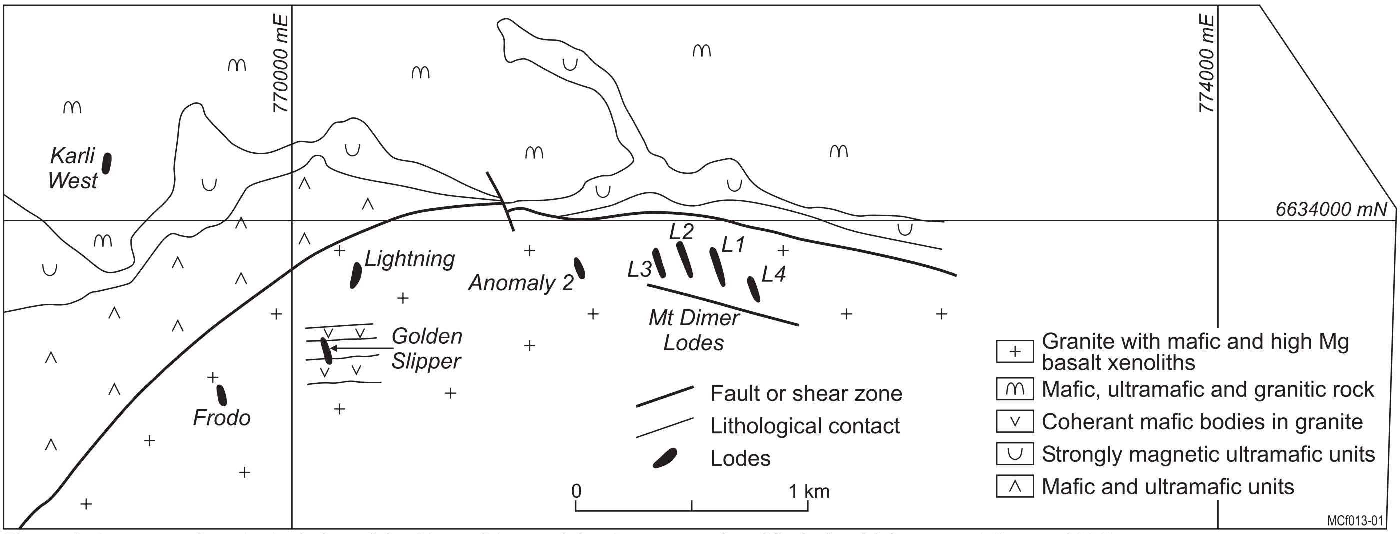

Figure 2. Interpreted geological plan of the Mount Dimer mining lease area (modified after McIntyre and Czerw, 1998).

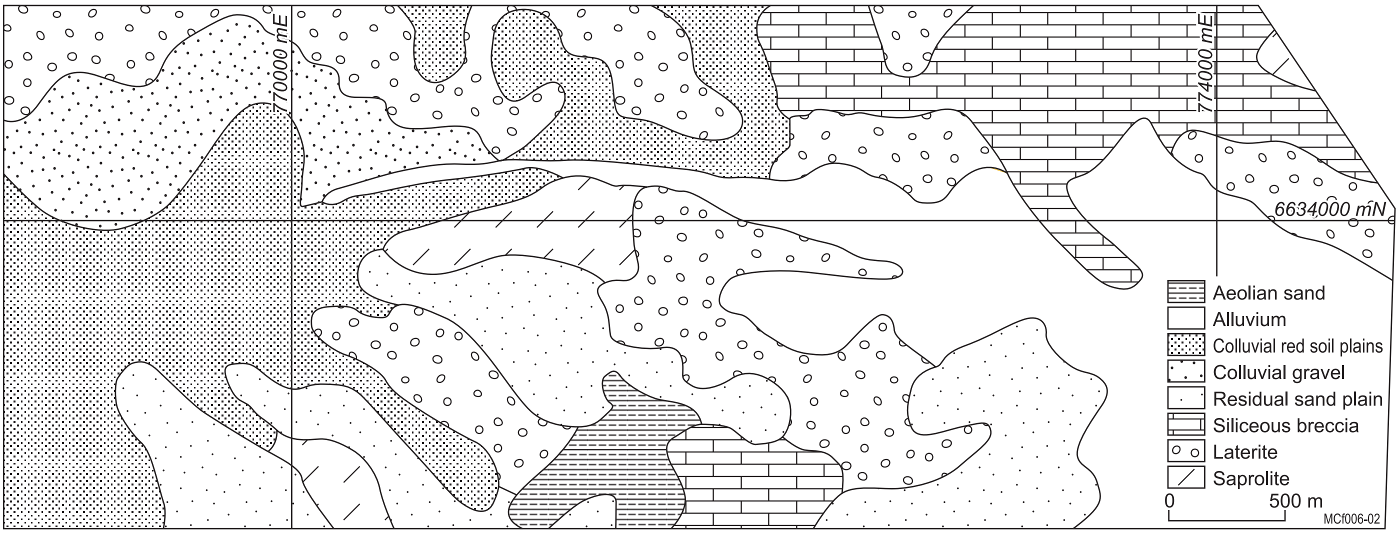

Figure 3. Mount Dimer regolith units (after Baxter, 1996).

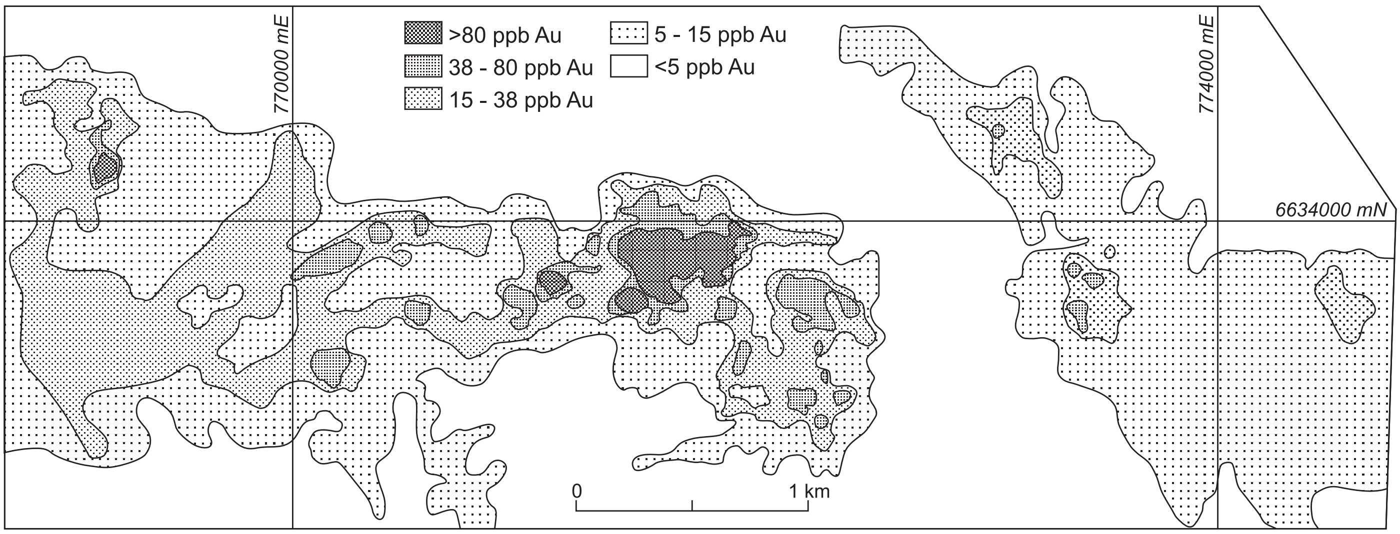

Figure 4. Distribution of Au in soil on the Mt Dimer leases.

1997a and b; McLardy and Czerw, 1997; Tholen and Newman, 1997 and Tholen *et al,* 1997). Gold mineralization at each deposit is in a number of elongate shoots, striking for 5-50 m and from 0.5-6.0 m wide, that generally plunge at 45º to the N (McIntyre and Czerw, 1998). The L1 deposit was the largest producer, with economic ore-bearing structures occurring over a maximum strike of 300 m and to a depth of approximately 200 m.

McIntyre and Czerw (1998) report that, in fresh rock, the L1, L2 and L3 lode mineralization consists of laminated veins containing a quartz-pyrite-sphalerite-galena-chalcopyrite-silver-gold assemblage with Au mineralization almost entirely within the veins. A Ag/Au ratio of 1.5 was reported from mill returns and electrum occurs in the ore. Gold grades show a strong correlation with Zn. Wall rock alteration is intense but narrow and comprises sericite-silica-pyrite in granite country rock and biotite-calcite-pyrite in mafic units.

Mineralization in the regolith at the L1, L2 and L3 deposits occurs as lateritic residuum (McLardy and Czerw, 1997). Flat lying, near surface Au mineralization occurs in pisolitic laterite gravel up to a maximum depth of 3 m, averaging approximately 1.5 g/t Au. Higher grades occur at the base of the gravel on the contact with the silcrete-calcrete horizon and directly over the lodes. Supergene-enriched quartz vein Au mineralization penetrates the silcrete where primary ore shoots are projected to the surface. Discrete primary ore shoots can be seen in the upper levels of the mines, below the silcrete horizon, and these become more clearly defined at depth.

A zone of supergene enrichment occurs at 20-30 m depth with remobilization of Au along the structures and into the oxidized wallrock. At greater depths, ore widths are confined to the primary ore shoots. Preferential weathering of the ore structures occurs down to about 50 m, with the quartz lodes containing sulphide pseudomorphs and Fe, Cu and Mn oxides.

REGOLITH EXPRESSION

A regional soil sampling program by Western Mining Corporation Ltd at 400 x 100 m spacing on N-S lines outlined several anomalies, one of which indicated the Mount Dimer L1, L2 and L3 deposits. Details of sample media and the Au analytical technique are unknown (Tanner, 1996). Statistical analysis of this and other regional data by Continental Resource Management (Laubsch, 1996) indicated an anomalous threshold of 5 ppb Au for regional exploration.

Infill soil samples were collected by Continental Resource Management within the two Mount Dimer mining leases (Figures 2-4). Sampling was on E-W lines at spacings from 160 x 40 m to 20 x 20 m; 200 g of the <1.6 mm B-horizon was sampled from 200-300 mm depth and analyzed for Au (Tanner, 1996). Based on 8240 Au results from the mine leases, Chisholm and Maher (1995) concluded:

- The local background for Au in B-horizon soil is 15 ppb.
- The local threshold for Au in B-horizon soil is 38 ppb. Subsurface Au mineralization at Mount Dimer, Karli West, Lightning and Golden Slipper is clearly delineated by the 38 ppb Au contour.
- Gold distribution patterns assist target definition but do not define ultimate grade.
- Geomorphology and bedrock geology has only minor influence on Au concentrations in the regolith.
- The maximum spacing between soil sampling lines is 200 m; the optimum spacing is 160 m.
- Western Mining Corporation Ltd's 400 x 100 m soil sampling would have detected Au anomalies associated with some of the smaller deposits at Mount Dimer, however, anomaly thresholds would have been as low as 15 ppb, possibly even 5 ppb.

As illustrated in Figures 2 and 4, the Mount Dimer ore bodies typically have bedrock Au anomalies of 100-200 m long by 0.5-6.0 m wide. These correspond to soil anomalies measuring 500 x 200 m at a 15 ppb Au anomaly threshold and 400 x 150 m at 38 ppb Au.

To assess the effectiveness of regolith sampling, Chisholm and Maher studied the top sample of all drill holes (N=1566) within the mine leases. The data include both 1 m and 4 m interval samples. The 0.1 g/t Au concentration clearly identifies all known mineralization; the 0.5 g/t contour clearly defines most of the deposits.

Very few samples were analyzed for elements other than Au in the Mount Dimer soil and RAB drilling programs. However, based on the polymetallic nature of the bedrock mineralization, it is likely to have also produced a significant Ag, Cu, Pb and Zn anomaly in soil and drill samples. This is confirmed by examination of the CSIRO-AGE regional laterite database (GSWA, 1998). A total of 15 samples were collected within the Mount Dimer mining leases as part of this survey. Lead produces the strongest anomaly with a maximum of 122 ppm; one third of the results are above the 98th percentile (80 ppm), calculated from 1002 samples, collected over the Marda greenstone belt on the Barlee and Jackson 1:250 000 sheets. Of the other 13 elements in the analytical suite, Ag (maximum 1.0 ppm), Cu (maximum 282 ppm) and Au (maximum 28 ppb) show moderate anomalies around the Mount Dimer mining leases.

HYDROGEOCHEMISTRY

Groundwater was only encountered in the Golden Slipper open pit and the L1 and L2 underground workings. At Golden Slipper, where groundwater occurs in the main mineralized zone, the pH is 8.5 and total dissolved salts are low (1500 ppm) (Braiden and Czerw, 1997b).

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SAMPLE MEDIA – SUMMARY TABLE

Sample Medium	Indicator elements	Analytical methods	Detection limits (ppb)	Background (ppb)	Threshold (ppb)	Max Anomaly (ppb)	Dispersion Distance (m)
1st Drill Sample (Mostly Laterite?)	Au	AAS	10	10	100	44700	200
Soil	Au	AASGF	1	4	15	960	200

AASGF = AAS graphite furnace determination after aqua regia digestion on a 10 g charge