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Memorandum

Date:	19 August 2009
Company:	Brockman Resources Limited
Attention:	Brendan Hynes
Copy:	Colin Paterson
From:	Mal Kneeshaw
Subject:	**Discussion of Geology Along the Range Front within and in the Vicinity of Brockman Resources Limited Tenement E 47/1408**

The sequence of Cainozoic Tertiary and Quaternary age rocks within the Brockman Resources Limited (BRM) tenement E 47/1408 which occurs along some ~15km of country at the front of the main Hamersley Range escarpment (refer attached oblique aerial photographs – Appendix 1) contains a considerable diversity and history of transported sedimentary and residual rocks. The diversity results from varying climatic, weathering and erosional processes over Cainozoic times.

1 GEOLOGY

Extensive bedded iron deposits (BID) occur in some locations on the main range within the Brockman Iron Formation to the south of the BRM lease, and erosion of laterites and the BID are respectively the primary source of the various Cainozoic Tertiary age channel iron deposits (CID) and detrital iron deposits (DID) within the BRM lease. The youngest surface detrital materials largely comprise BIF (banded iron-formation ie. no iron enrichment and original material), sourced as headward erosion of the creeks cut down through BID / laterite cover into unenriched BIF. The sequence is typical of the detrital sequences in the region. CID is however not always present, its occurrence depending on whether a suitable laterite source was locally available for deposition in a palaeochannel. Similarly, the extent of iron-rich DID depends on the local existence of suitable BID deposits – where not present, BIF is dominant,

A thin cover of younger Cainozoic Quaternary age alluvial / colluvial materials and wind-blown sands cover the main Tertiary detrital sequence.

It is noted that drilling at Koodaideri to the west of BRM's Project area also intersected similar detrital materials off the range front from the main bedrock deposits in a situation similar to the BRM setting (Morris, 1994).

Reference to the Geological Survey of Western Australia's (GSWA) Roy Hill 1:250 000 geological map (Appendix 2) shows the distribution of these Cainozoic sequences in the local and regional area, and the legend provides some descriptions of the various mapping codes used. Those prefixed 'Cz' are of **Cainozoic Tertiary age** (~2Ma - 65Ma), and those with a 'Q' prefix the most recent **Cainozoic Quaternary age** (<2Ma).

In particular, the ones seen in the BRM lease and adjoining areas are as discussed below (from older to younger):-

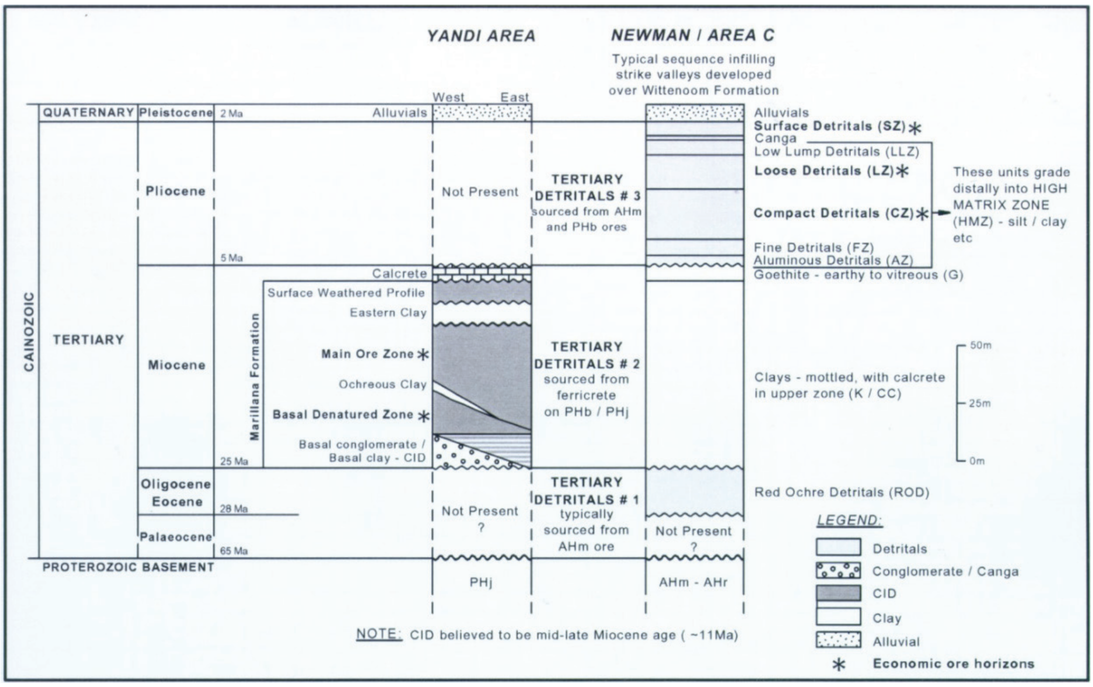
- Czp – represents 'pisolitic limonite deposits' (ie. CID). These do not crop out in the lease area, but are shown by drilling to occur at depth in some areas beneath younger detrital deposits (Czr, Czc, Cza below).
- Czr – represents 'hematite-goethite….(in) adjacent scree deposits' derived from the erosion of BID. The Roy Hill sheet shows this material in outcrop in the area to the south west of the BRM lease, but drilling shows their existence under cover into the BRM lease area in the form of the extensive resource of iron rich detritals.
- Czc and Cza respectively represent younger, non iron-rich (mainly BIF) 'partly consolidated alluvial / colluvial detrital materials'. These form a cover to the above Czr materials.
- Qa / Qs / Qw are shown as the dominant outcropping materials in both the local and regional range front areas. These respectively represent the youngest river alluvial, wind-blown sands and alluvial-colluvial red-brown sandy and clayey soils, which as drilling has shown collectively cover the thicker sequences of older Cz detritals. The wind-blown sands are shown as the dominant cover on the GSWA Roy Hill sheet in the BRM lease area, but they are very thin.

Since the above mapping was completed by the GSWA (originally in 1985-86, revised in 1990-93), work done by industry and CSIRO (Morris and Ramanaidou, 2007) has detailed further the Cainozoic Tertiary sequences which relate to erosional products from various Hamersley weathered surfaces or BID over time.

Regionally, three ages of broad detrital sequences are now recognized (termed CzD1-3 – previously Tertiary Detritals TD 1-3; see Figure 1 below), in places containing iron-rich CID / DID facies (Kneeshaw *et al* 2002).

These sequences / terminologies resulted from drilling in the 1980-90's by various companies across large areas of the eastern and central Hamersley Ranges – in both internal and range front areas – which demonstrated a common stratigraphic sequence of Cainozoic sequences across the Pilbara.

Figure 1
Cainozoic Stratigraphic Column (schematic)
Eastern Pilbara Area from Kneeshaw *et al*, 2002



Although BRM do not (as yet) use the regional terminologies, Table 1 below shows the published regional stratigraphic column (Kneeshaw et al, 2002) for the various Cainozoic sequences (yellow-shaded), compared with the local BRM terms (grey) and the GSWA codes (green). More detail of the parallels is shown in Figure 1 above.

The similarities are obvious and indicate that the nature of the various along-strike transported cover sequences elsewhere within the Hamersleys are essentially similar to those within the BRM tenement. This is further supported by the personal observations of the writer who is familiar with results from drilling in areas both to the south-east and north-west of the BRM tenement.

Table 1

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Cainozoic Detrital Sequence Comparison
Hamersley Ranges vs BRM vs GSWA at Marillana Range Front

Stratigraphy	**Regional Cainozoic (Cz) Sequence**			**BRM Codes E 47/1408**	**GSWA**
	Names	**BHPB/ Industry Codes**	**Brief Description**		**Codes 1996 Roy Hill sheet**
Qa	Alluvials		Misc Recent alluvials, aeolian sands etc	TOB / THDU	Qa/Qs/Qw
<u>CzD3 DID</u>	Surface detritals	SZ	BIF dominant, hematite content variable		Czc / Cza
	Low lump detritals	LLZ	Hematite dominant, variable to minor BIF content. LZ / CZ have better grades / recovery *All grade laterally into high matrix material (HMZ) – but can occur internally within the sequence*	THD various – includes all BHP codes?	Czr
	Loose detritals	LZ			
	Compact detritals	CZ			
	Fine detritals	FZ	*<= FZ are loose pisoliths.*	TPS THDA	
	Aluminous detritals	AZ	*<= pisoliths coated with pink-white clay*		
Oakover Formation	Calcrete	Czk	Calcrete, minor silcrete	TCC	Czk
<u>CzD2 CID</u> Marillana Formation	Eastern CID	M4	CID usually weathered, siliceous	-	Czp
	Eastern Clay	EK		-	
	Upper CID	M3	High grade, red-brown CID	THP	
	Ochreous Clay	OK	*Internal thin clay*	-	
	Lower CID	M1-2	Yellow-brown CID – *usually ochreous-limonitic to massive goethitic, high LOI*	THP (altered)	
	Basal Clay	BK	Clay ochreous, minor CID	TCL / TLT	
	Basal conglomerate	BC		-	-
Proterozoic	Basement various				

2 HYDROGEOLOGY AND TOPOGRAPHY

Hydrogeological studies conducted by Aquaterra (2009) have demonstrated that the water table throughout the region is in general a subdued reflection of the topography, so that groundwater elevations are generally highest along topographic high points and lowest in valley locations. Water quality also reflects the topography, with the freshest groundwater (~1,000 mg/L TDS) close to the Hamersley Ranges, as this is the zone of recharge for the alluvial aquifer. The salinity of the groundwater in the alluvial aquifer increases to approximately 6,000 mg/L TDS over a distance of 15 km northwards into the valley (Fortescue Marsh areas). Within the basement, groundwater is also relatively fresh near the base of the ranges where recharge is occurring from streamflow events, increasing rapidly northwards into the Marsh.

The main aquifer sequence within the Project area is the orebody itself, which represents a palaeo-channel of the ancestral Weeli Wolli Creek (and local range front tributaries) and variously comprises channel iron deposits overlain by an uncemented pisolite gravel and hematite and BIF detritals. These units have varying hydraulic parameters (although all are relatively permeable). Aquifer properties have been assessed by Aquaterra from previous work at this location, along with their experience of these aquifer units at other locations in the Pilbara.

Underlying the detrital sequences are basement units from the Hamersley Group, which comprises BIF, shale and dolomite predominantly from the Mt Sylvia and Wittenoom Formations, which are generally of low permeability (although the dolomite can locally be permeable) . The detrital sequences along the base of the ranges are bounded to the north by distal clayey-alluvial deposits that form the flood plain of the Fortescue Valley. These alluvial deposits are generally clay-rich and of low permeability.

The attached oblique aerial views of the Marillana Project looking northwest along base of the ranges (Appendix 1) demonstrates that the topographic expression of the detrital sequences is virtually identical for tens of kilometres along strike, further supporting the view of the author that the subsurface geology and hydrogeology of the areas along strike from E47/1408 is similar to that found within the tenement.

3 OCCURRENCE OF TROGLOFAUNA RE GEOLOGY

Work by Ecologia has shown various troglofauna species have been recorded in some ten drill holes spread throughout the lease area (refer GSWA Roy Hill geological map, Appendix 2). Water table varies from ~20 to 40m below surface, and as the BRM cross section(s) of the area show, the troglofauna habitat variously includes (from a geological viewpoint):

- the CzD3 age THD and TOB detrital zones (BRM terminology - Table 1);
- on the GSWA terminology, this covers the Czr, Czc, Cza and the various Qa/Qs/Qw mapping code lithology units.

As the above discussion in Section 1 shows, none of the troglofauna-host rocks are considered unique to the area.

For and on behalf of Coffey Mining Pty Ltd

Mal Kneeshaw
Senior Associate Geologist – Iron Ore

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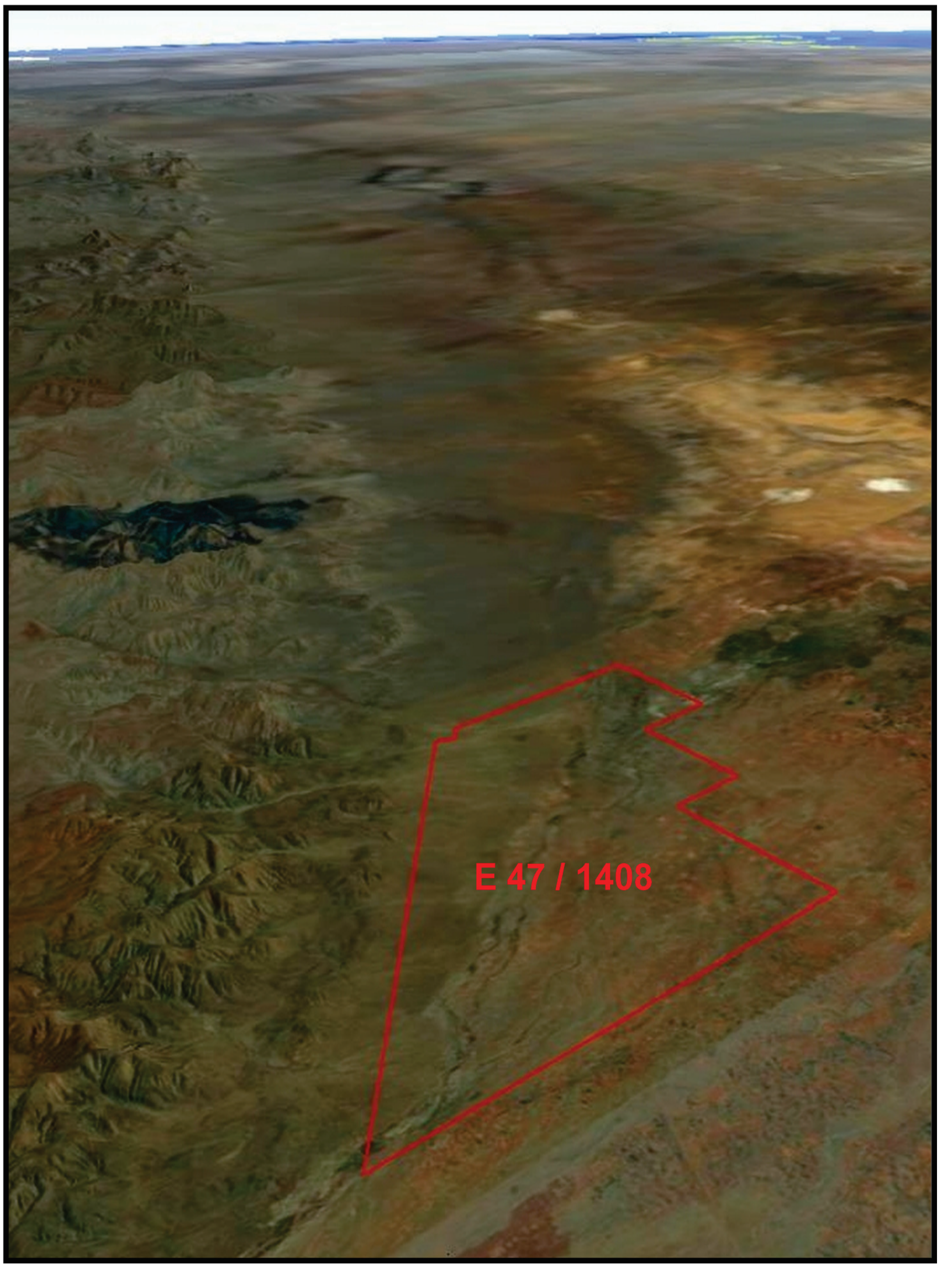
Appendix 1

Oblique Aerial Photographs

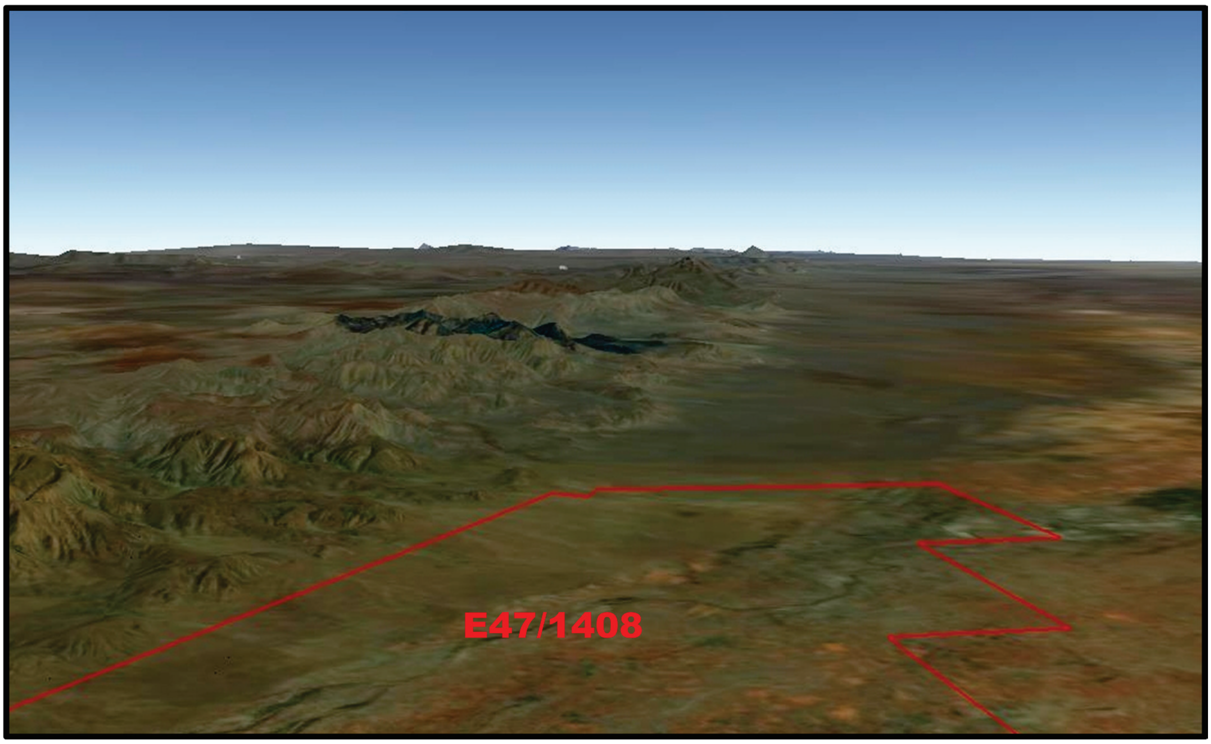
Appendix 1: Oblique Aerial Photographs

Figure 2
Brockman Resources
Marillana Project
Oblique Aerial View 1 of Marillana looking West, showing Detrital Fan Sequences between the Ranges to the South and the Weeli Wolli Creek System to the North



Appendix 1: Oblique Aerial Photographs

Figure 3
Brockman Resources
Marillana Project
Oblique Aerial View 2 of Marillana looking West



Appendix 2

GSWA Roy Hill 1:250 000 Geological Map

Appendix 2: GSWA Roy Hill 1:250 000 Geological Map

Figure 4
Brockman Resources - Marillana Project
GSWA Roy Hill 1:250 000 Geological Map