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E.L. 31/90 REDPA

ANNUAL REPORT

TO THE DEPT. OF MINES

MINERAL HOLDINGS AUSTRALIA PTY. LTD.

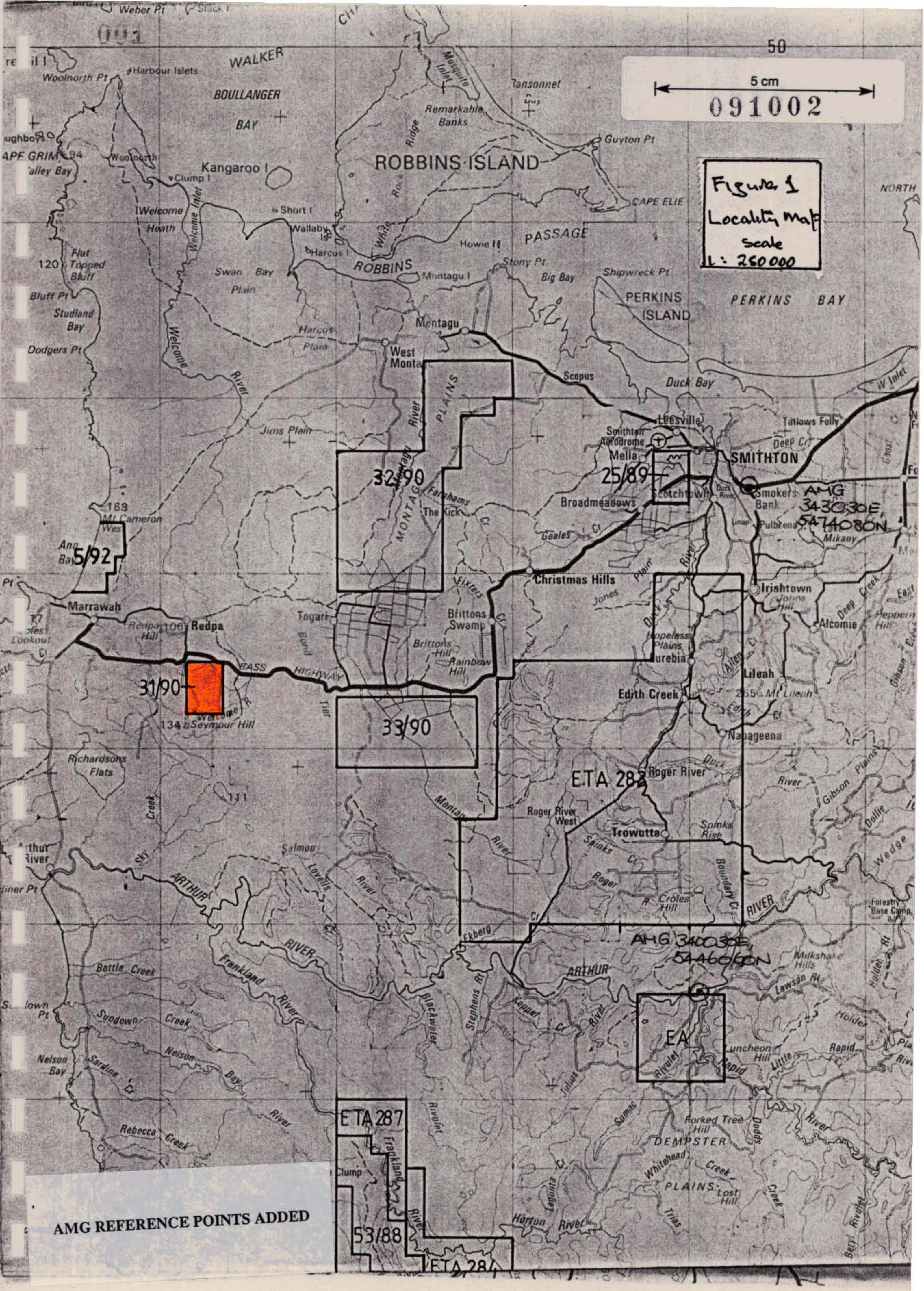
by

Vic Threader

AMG REFERENCE POINTS ADDED

April 1992

Vic Threader and Associates Pty. Ltd.
Kingston Beach



AMG REFERENCE POINTS ADDED

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Introduction

An investigation of Tertiary limestone and underlying Smithton Dolomite has been undertaken by Mineral Holdings Australia Pty. Ltd. (M.H.A.) to assess reserves of metallurgical grade limestone and dolomite and dimension stone.

Indicated reserves of around 1 x 10^6t of limestone and >20 x 10^6t of dolomite have been estimated and a range of potential markets has been investigated and will continue to be investigated in the coming year.

Location and Access

The licence area lies 2 km south of Redpa and 6 km southeast of Marrawah, which are dispersed settlements. The nearest population centre is Smithton (40 km). Access is by all-weather roads Fairview and Kings Roads from Bass Highway and by a 4WD track joining Kings Road to the Highway near the eastern boundary of the licence.

Land Tenure and Usage

Boreholes 1 - 23 were drilled on land owned by the KIng family north of Kings Road and 24 - 26 on Edwards' property south of Kings Road. Landowners have been co-operative and are prepared to countenance quarrying.

Land usage in the district is pastoral (dairying and beef cattle), with residential areas concentrated along Bass Highway and Fairview Road.

Environmental Considerations

With the exception of Edwards' house on Kings Road, residential development is confined to Bass Highway north of the E.L. and Fairview Road near its western boundary.

Access is provided by all-weather roads and a direct link to Bass Highway could be provided by up-grading the track from the eastern end of Kings Road.

Following initial contact with land-owners it appears that a mining venture could be negotiated provided it did not disrupt farming activities.

Quarrying, if located on the southern slopes of Michaels Hill, would not be visible from residential areas or from Bass Highway, which runs E-W on the northern side of the hill.

Rainfall

Redpa lies in a 50 inch (1270 mm) annual rainfall belt which extends around the northwest coast of Tasmania. The mean deviation of rainfall, expressed as an average of annual rainfall, is 13% (Scott - 1956) which indicates a relatively even distribution throughout the year.

Natural Drainage

The principal watercourse is Welcome River, which flows easterly along the southern boundary of the licence area then flows north about 25 km and drains into Bass Strait.

All surface drainage in the licence area is into Welcome River but the karst topography and generally dry conditions even after heavy rains indicate the importance of underground drainage.

Regional Geology

The area lies within the recently completed Woolnorth Geological Map Sheet and acknowledgement is made to Dr. D. Seymour who provided much useful information of the regional geology.

A thickness of around 10m of Tertiary marine limestone caps the hills in the subject area. It unconformably overlies Precambrian rocks of either the Smithton Dolomite or the older Caroline Creek Formations. The limestone extends to the coast 10 km to the west and for the most part is covered by Tertiary basalt (Tb - fig 1). The basalt covers about 1 km^2 of the northwest corner of the licence area and basaltic detritus caps Coffeys Hill.

The E.L. lies on the western margin of an extensive plains area including Welcome, Dismal and Brittons Swamps and Montagu Plains. The bedrock structure of the area consists of a folded sequence containing a very large resource of Smithton Dolomite within this licence as well as in E.Ls 32/90 (Brittons Swamp) and 33/9 (Montagu Plains). These licence areas are currently held by M.H.A. Pty. Ltd. (see Locality map).

Previous Investigations

The limestone and dolomite deposits of the Marrawah district have been previously reported by Twelvetrees (1908), Nye (1932) and Hughes (1957). Hughes described the Tertiary limestone as a magnesian limestone but the magnesia content quoted in his report is typical of the Smithton Dolomite in the Redpa district and not of the overlying Tertiary limestone.

Longman and Mathews (1961) described the deposits as pale pink Tertiary Limestone overlying a conglomerate of limestone, dolomite, sandstone and quartzite pebbles in a fine-grained pink calcareous cement. This Tertiary sequence overlies the Precambrian Smithton Dolomite. The MgO content of the Smithton Dolomite varies from pure dolomite (21.7%) at Smithton to as low as 4.8% at Redpa (Magnesian limestone). In this report, "limestone" refers to the Tertiary limestone and "dolomite" refers to the Smithton dolomite.

Current Investigation

1. Surface sampling by M.H.A. and separately by David Mitchell Estate both proved the Tertiary limestone to contain 95% $CaCO_3$. The Smithton Dolomite composition varied from magnesian limestone to 81% dolomite - analyses are given in Appendix 2.

2. Drilling Programme

i) Percussion Drilling

Details:	Dates of drilling:	17-19 June 91
	Machine:	Atlas Copoco ROC 712 HC-00

Contractor:	M. Maxfield (Ulverstone)
No. of holes:	26
Total depth:	257m

General Discussion:

Sixteen of the total twenty-six holes were drilled in outcropping limestone, four in dolomite, two in the Crimson Creek Formation and four were not sited on outcrop. None of these latter four holes drilled deeper than 5.5m. The presence of moist clay clogged the drill bit, preventing sample return. It would be necessary to use larger diameter equipment or another method (auger) to penetrate this ground.

Most of the holes in limestone passed into cavities, where possible they were continued to hard bottom. The deepest cavity (7m) was in B.H.14. The drilling rate and loss of air pressure indicated voids but the presence of unconsolidated cave deposits is likely as the drill rods and bit were found to be coated with wet clay on retrieval.

The limestone crops out between the 50m and 60m contours and the level of the plains is more or less coincident with the surface of the precambrian dolomite. Apparent sink holes and dry gullies (karst topography) are abundant on this surface and the cavities encountered in drilling through the Tertiary limestone are consistent with this evidence, suggesting that these cavities occur in the dolomite or on the limestone/dolomite boundary.

It has not been possible to determine the rock type capping Coffeys Hill, but some water bores in the district contained a sequence of Quaternary sandy gravel, clay and basalt talus up to 9m thick. Basalt fragments were recovered from B.H.13 and it is likely therefore that there is a 10m+ layer of Quaternary sediments overlying Tertiary limestone on Coffeys Hill (fig.3) and possibly to some extent on Michaels Hill.

It is anticipated that basalt talus also covers the limestone around the western margin of the plain, which would be best tested by excavator as it would be difficult drilling. This area forms part of the inferred limestone resource.

Sample Recovery:

The volume of rock chips and dust returned from dolomite drilling was about double the return from the Tertiary limestone drilling. If the former represents full (100%) recovery then recovery in limestone drilling is 50%, which suggests that the limestone may have high porosity due to the presence of cavities.

Penetration Rate:

In general, dolomite was slower to penetrate than the limestone which is partly due to differences in hardness, (Dolomite is 3.5 - 4 and limestone is 3 on Mohs Hardness Scale), but also, due to cavities in the limestone, the dolomite was more uniform in drilling rate than the limestone.

The limestone is strongly sculpted by erosion at surface and variation in penetration rates during drilling indicated the presence of alternating textures. The chemistry of the limestone proved to be remarkably uniform in depth and showed no evidence of this variation. The boreholes were sampled at 3m intervals but from the uniformity of results it does not appear likely that a closer interval would have produced a different result. It requires open pitting to investigate this aspect further.

ii) Diamond Drilling

Details:	Dates of drilling:	4 - 8.11.91
	Machine	Foxmobile
	Contractor	H. Stacpoole
	No. of holes	7
	Total depth	70m

This programme was conducted in association with Melocco Pty. Ltd. of N.S.W., which had verified that the pink limestone from outcrop took a high polish with an attractive appearance and was a potential dimension stone.

Seven holes were drilled on Michaels Hill but only those which were collared on outcropping limestone were cored. The remaining four holes which were drilled close to outcrop remained in overburden to 10m, indicating near vertical-sided limestone outcrops or pinnacles separated by voids. All seven holes are prefixed "D" to differentiate them from the earlier percussion programme.

Two of the cored holes were drilled in limestone (Nos 5 and 6) and one in Smithton Dolomite (No.7). Borehole logs are given in appendix 1. Density and water absorption of the limestone (Appendix 1) indicate a deterioration at about 5m depth due to solution and iron staining which appear to be a water table effect.

The diamond drilling programme was not extended to include Coffeys Hill because the steep slopes, thick overburden and sparse outcrop suggested it to be less likely to produce dimension stone than Michaels Hill.

D7 was drilled to 10.5m in Smithton Dolomite, 8m of broken stone followed by 2.5m which was relatively unbroken. The chemical analysis resultls are consistent with the percussion hole and surface samples.

3. Discussion of Test Results:

Chemical Analysis

i) Surface sampling of Tertiary limestone by the Licence Holder at 17 localities averaged 53% CaO or 95% $CaCO_3$ (analysis by Analabs).

ii) Surface sampling by representatives of David Mitchell Estate at eleven localities averaged 53.5% CaO or 95.5% $CaCO_3$ (analysis by D.M.E. Tech. Services).

iii) Borehole samples. A 26-hole drilling programme by the Licence Holder has shown that the same quality extends to the bottom of the limestone (analysis by Tas. Division of Mines).

The underlying Precambrian dolomite is represented by surface samples E 5, 7, 8, CR7 and percussion boreholes 1, 23, 25 and 26 and diamond drill hole D7.

The Smithton Dolomite formation varies in composition from magnesian limestone to nearly pure dolomite. The following table compares the MgO/CaO ratio in the above samples with that of pure dolomite. On the assumption that all MgO is present as dolomite and all CaO is present as calcite or in dolomite, the above ratio represents the proportion of dolomite in the sample.

	MgO/CaO	Dolomite Content %
E 5	0.57	80
7	0.26	37
8	0.44	62
CR 7	0.58	82
*BH 1	0.63	89
23	0.1	14
* 25	0.40	56
* 26	0.60	83
Dolomite	0.71	100

* Mean value

4. Resource Assessment

Location	Area (m^2)	Restrictions	Available Area (m)	Average Thickness (m)	Volume	Status*
Limestone						
Coffeys Hill	100 000	10m basalt talus capping resource	10 000	5	50 000	Indicated
Michaels Hill	100 000	Outcrop occupies <30% of area	30 000	9	270 000	"

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Location	Area (m^2)	Restrictions	Available Area (m)	Average Thickness (m)	Volume	Status*
East of basalt and above 50m contour - horiz. hatching fig.2	200 000	unknown over-		5?	1000 000	inferred
Isolated areas: BHs 1,3,5 N of Kings Road	5 000	50% outcrop and low-lying therefore shallow depth	3 000	2	10 000	indicated
Edwards Residence	20 000	House and building		5	100 000	inferred
Dolomite						
South of Kings Rd	> 1 km^2			>20	20 x 10^6	indicated inferred.

*Status of ore deposit reporting Joint Comm. of AIMM & AMIC (March 1987)

For practical purposes the isolated areas on Kings and Edwards properties are insignificant and the principal limestone resource is Michaels Hill and Coffeys Hill, which amounts to around 1M t. This would be reduced if the subsurface limestone is unsuitable for metallurgical purposes. There is an inferred resource above the 50m contour (fig.2) which has the potential to more than double this tonnage.

5. Mining Feasibility

Limestone

Isolated hillocks of limestone projecting a few metres above the level of the plain are too insignificant to be included in the minable resource.

The economics of limestone extraction on the slopes of Coffeys Hill and against the basalt scarp in the west of the licence can only be assessed after test pitting to determine the overburden thickness and ratio.

At this stage of the investigation, Michaels Hill is the most promising mining prospect, where up to 9m of limestone occurs - with lesser thickness on the slopes as the level of dolomite is approached.

Dolomite

White dolomite occurs at B.Hs 1, 24, 25 and 26, grey magnesian limestone at B.H.23 on surface and under the limestone in B.Hs 16, 18 and 22. Precambrian bedrock consisting of Smithton Dolomite and Caroline Creek Formation crops out on the eastern lower slopes of Michaels Hill and more detailed mapping is required in this area to determine the field relationship.

The potential dolomite resource covers a large area and exhibits karst topography features. Ground water was intersected at 12m in B.H.1, 9m in B.H.24 and 15m in B.H.25. B.H.26 drilled to 21m (limit of available drill rods) without intersecting water. Careful selection of quarry site to avoid the most obvious sink holes would be necessary but the low lying nature of the resource indicates that any site would require pumping and disposal of water.

Exploration Programme 1992-3

Excavation of two or three test pits to assess the continuity and quality of the limestone for metallurgical purposes. These would be located on the south-facing slopes of Michaels and Coffeys Hills and would thus be out of sight from Bass Highway and therefore the most suitable quarry location.

These pits would consist of 3 x 3m high faces on the hill slope and would aim to expose the limestone from the underlying Precambrian beds to the top of the outcrop,

Mapping of these exposed faces and sampling for chemical and physical

testing (if warranted) would resolve the matter of continuity, presence of voids and rock quality at depth.

There is no intention of further investigation of the dolomite resource in the 92-93 programme unless a market can be developed for it.

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Dept Mines Tas (unpub.)

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Division of Mines Tas.

Scott P. (1956) Variability of Annual Rainfall in Tasmania
Pap.Proc. Roy.Soc.Tasm 90 (49-57)

Twelvetrees W.H. (1908) Outlines of Geology in Tasmania
Ann.Rept Secy Mines (p157)

FIGURE 1

LOCALITY MAP 31/90 – REDPA
MINERAL HOLDINGS AUSTRALIA PTY. LTD.

EL31/90 Redpa (Carbonate Hills)
EL32/90 Brittons Swamp (portion of)
EL33/90 Montagu Plains (portion of)
Tertiary basalt
Scale 1 : 100 000 (Hunter)

June 91 Vic Threader & Assoc. Pty. Ltd.

5 cm

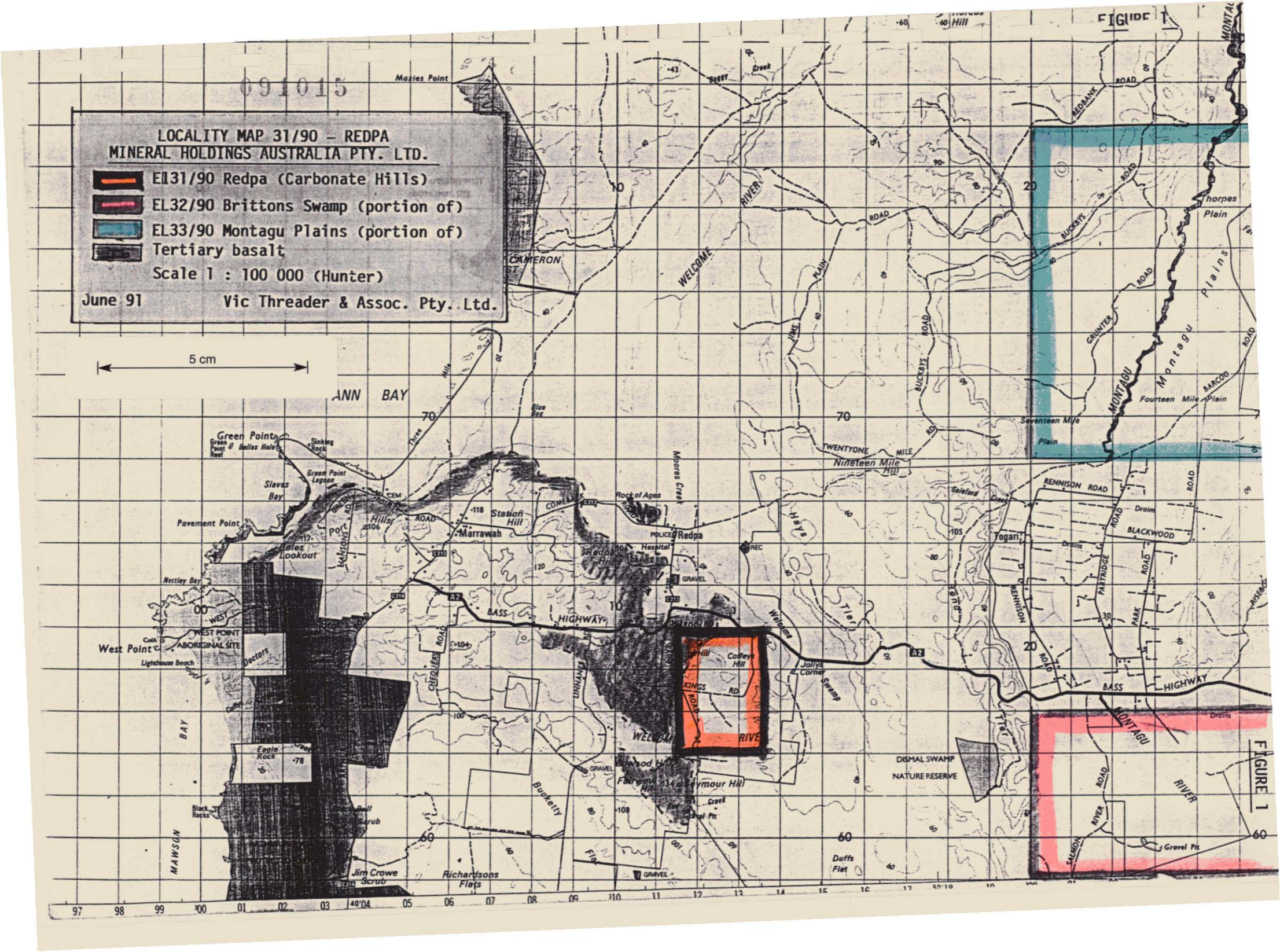
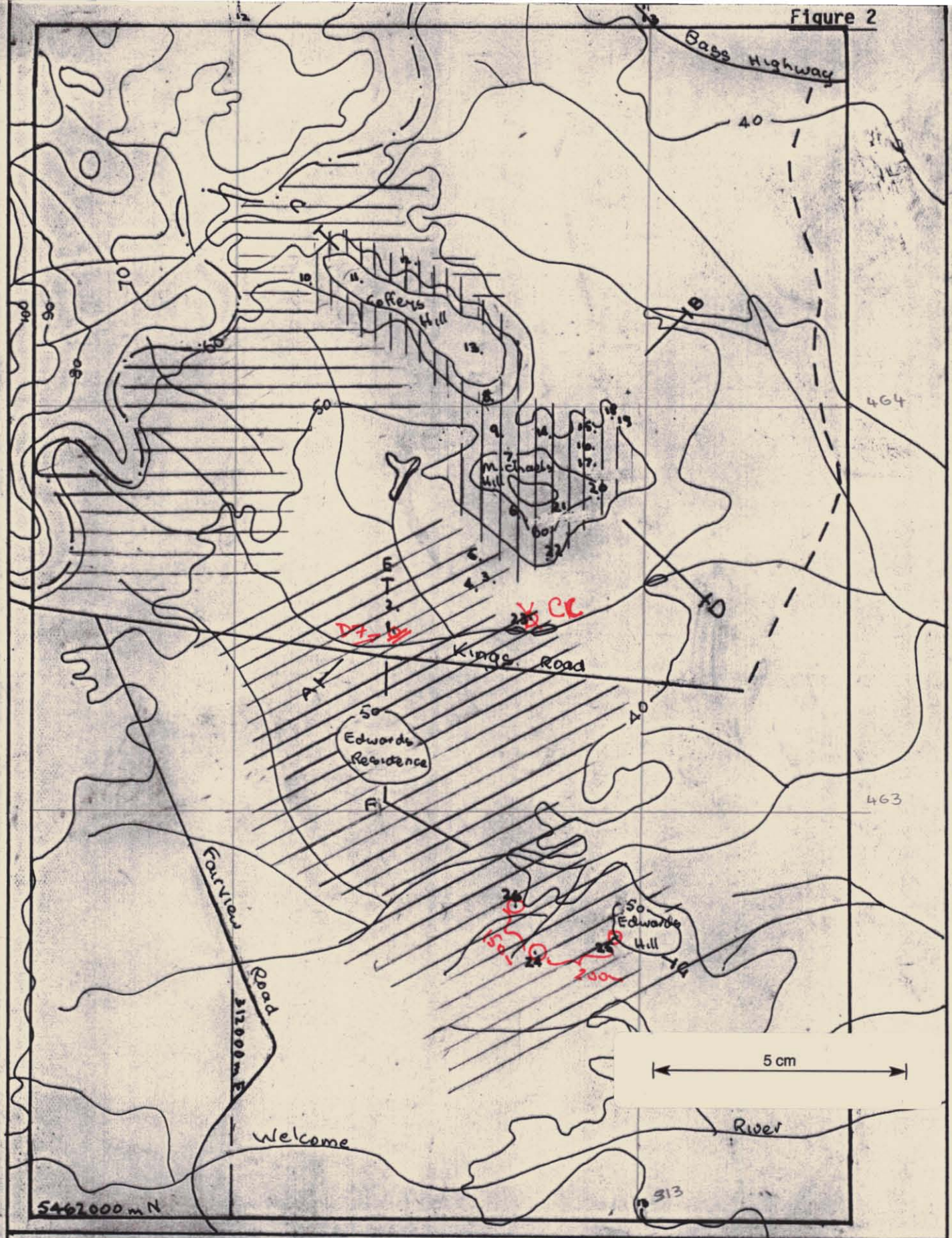


FIGURE 1

Figure 2



EL31/90 Redpa - MINERAL HOLDINGS AUSTRALIA PTY. LTD.

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———	E.L. Boundary	—50—	Contour Line
— —	Geological Boundary	||||	Resources: Limestone indicated
A— —B	Section Line (Figure 5)	═══	" " inferred
1.	Hammer Drill Hole	///	" dolomite indicated
	Scale 1 :12500	⊙	DD1 Proposed diamond drill hole

July 1991

Vic Threader and Associates Pty. Ltd.

Figure 3

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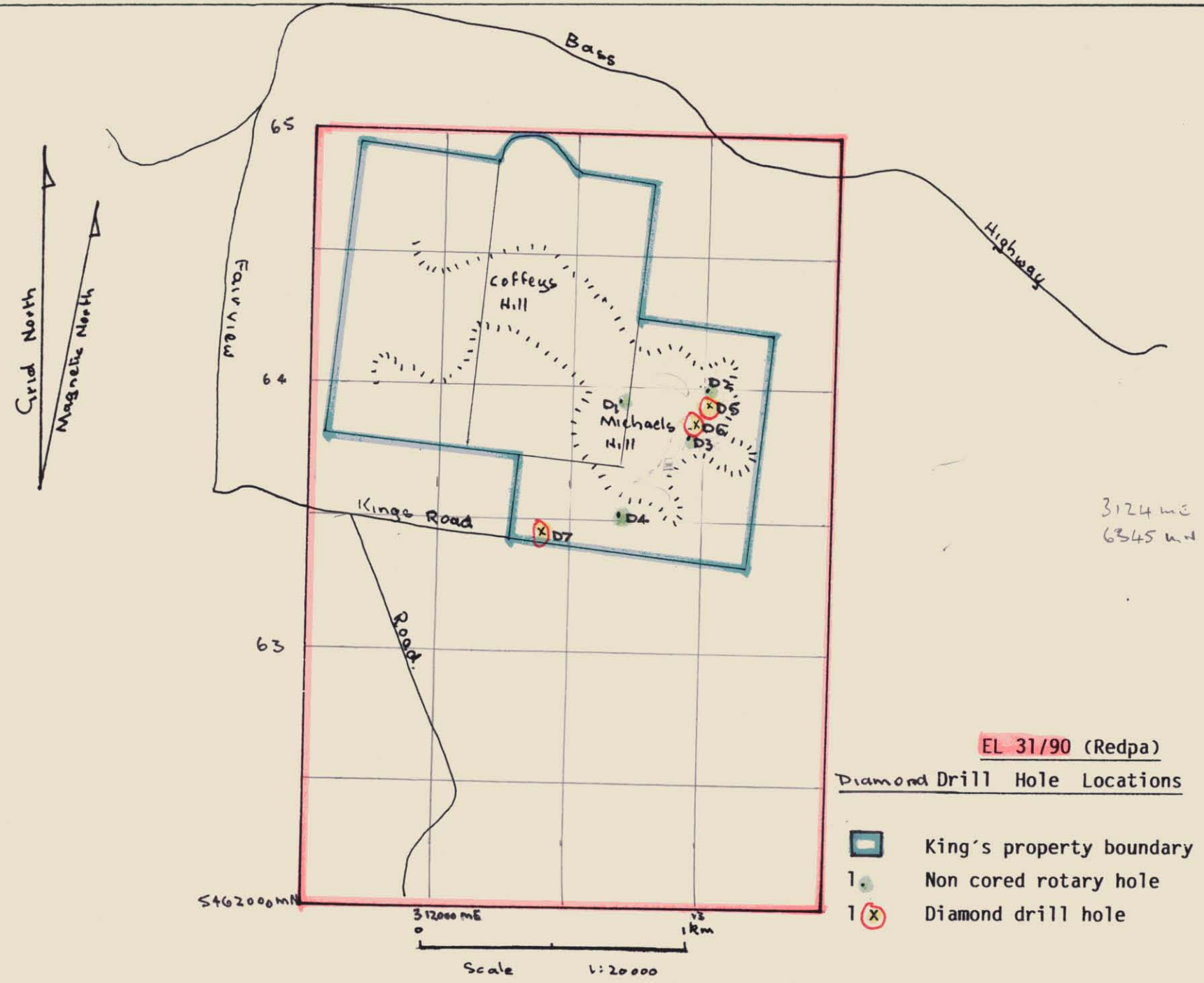


3124 mE
6345 mN

EL 31/90 (Redpa)

Diamond Drill Hole Locations

King's property boundary

Non cored rotary hole

Diamond drill hole

5 cm

016

017

Limestone Sampling on EL31/90

Figure 4

o water bore (with limestone depths indicated)

C, E, M. surface sample locations (Nov 90)

Scale 1:2000

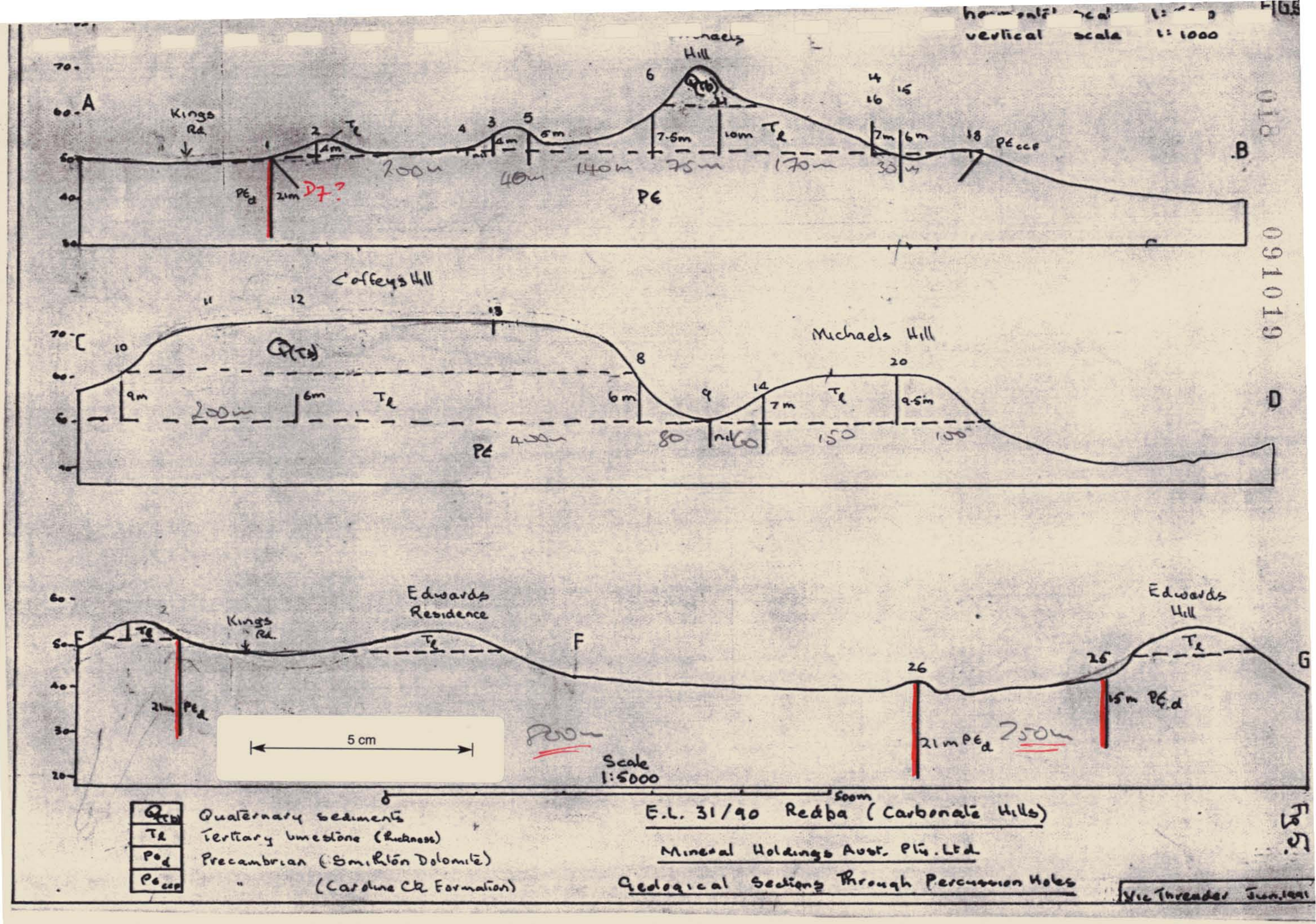
(from colour photography N.W Forests 1054-92 MA86. 27 Jan 86)

V.T. April 1991

Detail in Appx 2

5 cm

091018


vertical scale 1: 1000
Hill
A
Kings Rd.
Tℓ
4m
6m
5m
7.5m
10m
7m
6m
18
PЄccf
B
200m
40m
140m
75m
170m
30m
PЄd
21m
D7?
PЄ
Coffeys Hill
Q(Tℓ)
C
9m
6m
200m
Michaels Hill
7m
9.5m
D
400m
80
60
150
100
PЄ
Edwards Residence
Kings Rd.
E
F
Edwards Hill
G
26
25
21m PЄd
15m PЄd
21m PЄd
800m
250m
5 cm
Scale 1:5000
0
500m
Q(Tℓ) Quaternary sediments
Tℓ Tertiary limestone (thickness)
PЄd Precambrian (Smithton Dolomite)
PЄccf " (Caroline Ck Formation)
E.L. 31/90 Redpa (Carbonate Hills)
Mineral Holdings Aust. Pty. Ltd
Geological Sections Through Percussion Holes
Vic Threader Jun. 1991
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APPENDIX 1

Borehole Logs and Locations

1) Water Bores

2) Percussion (Hammer) Drill Holes

3) Diamond Drill Holes

Water Bore Data

Waterbore data indicates an irregular distribution of limestone (fig.4). These holes were logged by the driller. The following geological logs are interpretations of drillers descriptions by D. Seymour, geologist, D.M.M.R.

No.	Geological Unit	Depth	Thickness
1	Surface clay	0 - 4.9	4.9
	Tertiary limestone	4.9 - 24.7	19.8
	Smithton Dolomite	24.7 - 25.9	>1.2
2.	Surface clay	0 - 2.8	2.8
	Gravel	2.8 - 14.6	11.8
	Broken Tertiary Limestone	14.6 - 17.7	3.1
	Tertiary Limestone	17.7 - 25.9	8.2
	Crimson Creek Formation (Eocambrian Argillite & Volcanics)		
3.	Surface clay	0 - 2.7	2.7
	Crimson Creek Formation: top 2.5m broken	2.7 - 15.2	>12.5
4.	Surface clay	0 - 9.8	9
	Weathered basalt	9 - 29.9	>20.9
5.	Surface clay	0 - 9.8	9.8
	Smithton Dolomite	9.8 - 48.8	>39.0
6	Surface clay	0 - 9.1	9.1
	Broken limestone	9.1 - 15.2	6.1
	Tertiary limestone	15.2 - 20.7	>5.5
7	Surface clay	0 - 9.1	9.1
	Smithton Dolomite (top 0.7m broken)	9.1 - 11.0	>1.9
8	Surface clay	0 - 9.1	9.1
	Tertiary limestone or Smithton Dolomite	9.1 - 21.3	>12.2
9	Surface clay	0 - 6.7	6.7
	Gravel	6.7 - 10.1	3.4
	Tertiary limestone	10.1 - 12.2	>2.1

Four and possibly five of these holes did not contain limestone. In the remainder, the thickness of limestone was 19.8m in no.1, 8.2 (or 11.3)m in no.2, 5.5 (or 11.6)m in no.6 and >2.1m in no.9. On this evidence, drilling between the limestone outcrops would be a dubious proposition. Borehole sites, therefore are recommended on outcrop only, for the present.

Borehole Summary (thicknesses in metres in designated formation)

BH No.	Limestone	Dolomite	Crimson Ck Fmn	Not on Outcrop	Thickness of cavity	Water Struck	Remarks
1		(21+)				12	
2	4						
3	4				6		
4				1			
5	6				3		
6	7.5				1.5		
7	10				5		
8	9						
9				5.5			
10	9						
11				5.5			
12	6						
13				3			
14	6				7		
15	7.5				1.5		
16	7						Drilled into Crimson Ck FMN at bottom of hole
17	8.7						
18			3				
19	2.5						
20	9.5				2.5		
21	10						
22	7						Drilled into Crimson Ck FMN at bottom of hole
23			6				
24		(9+)				9	
25		(15+)				15	
26		(21+)					
	av. 7.1m						

All holes in limestone except nos 16 and 22 terminated in cavities. Where possible the hole was continued to bottom of cavity as indicated above.

Hammer Drill Logs 31/90

BH No.	Depth From	Depth To	Thickness (m)	Sample No.	Time (Mins) Rate m/min	Water Struck (m)	Rock Type	Colour	Remarks
(1)	0	3	3	1	1.0		Dolomite	White	Uniform drilling throughout
*	3	6	3	2			"	"	
	6	9	3	3			"	"	
*	9	12	3	4		12	"	"	
	12	18	6	5			"	Brown	Wet sample
	18	(21)	3	6			"	off white	Dry sample
2	0	3	3	1	1.0		Limestone	Pink	
	3	4.5	1.5	2			Cavity		
2a	0	1.5	1.5	NS			Limestone	Pink	4m from no.2 Cavity at 1.5m
2b*	0	3	3	1	1.0		Limestone	"	
	3	4	1	2			"	Deeper Pink	20m from no.2a. Cavity at 4m.
3	0	3	3	1	1.0		"	Pink	
*	3	4	1	2			"	"	
	4	10	6		-		6m cavity		Hard bottom at 10m.
4	0	4	4	NS			Soil & clay		Unable to penetrate ground due to clay blocking air holes.
5	0	3	3	1	1		Limestone	Pink	
*	3	5	2	2	2.5		"	"	Alternating hard and soft drilling
	5	9	4				4m cavity		Hard bottom at 9m.
6	0	3	3	1	0.7		Limestone	Pink	Soft
*	3	7.5	4.5	2	0.6		"	"	"
	7.5	9.0	1.5	(3)			1.5m cavity		Hard bottom at 9m. Sample taken from bit.

Analyses in app x . 2.

BH No.	Depth From	Depth To	Thickness (m)	Sample No.	Time (Mins) Rate m/min	Water Struck (m)	Rock Type	Colour	Remarks
7	0	3	3	1	0.7		Limestone	Pink	Alternating hard and soft
*	3	6	3	2	0.7		"	"	" " " "
	6	10	4	3	0.7		"	"	" " " "
	10	15	5	-			5m cavity		Hard bottom at 15m
8	0	3	3	1			Limestone	Pink	Small sample
*	3	6	3	2			"	"	
	6	9	3	3	0.7		"	"	
*	9	12	3	4	0.3		"	"	
	12	13.5	1.5	5			"	"	Small sample
	13.5	15	1.5	-			1.5 cavity		Hard bottom at 15m
9	0	5.5	5.5	-	2		Soil & clay	Red,brown	Unable to penetrate due to blocking of bit
10	0	3	3	1			Limestone	Pale pink	
*	3	6	3	2			"	" "	
	6	9	3	3			"	" "	Cavity at 9m
11	0	5.5	5.5	-	1.5		Soil & clay	Red,brown	same as 9
12	0	6	6	1	0.9		Limestone	Light brown	Small outcrop, small sample. Clay on bit at end of hole, no sample return.
13	0	3	3	-	2		Soil, clay & rock chips	Red, brown	Unable to penetrate due to blocking of bit.
14	0	3	3	1	0.7		Limestone	Pink	Hard bottom at 13m
*	3	6	3	2	1.0		"	"	
	6	13	7	3			7m cavity		Sample 3 consists of clay from bit.

BH No.	Depth From	Depth To	Thickness (m)	Sample No.	Time (Mins) Rate m/min.	Water Struck	Rock Type	Colour	Remarks
15	0	3	3	1	0.7		Limestone	Pink	
*	3	6	6	2	1.0		"	"	
	6	7.5	1.5	3	1.3		"	"	
	7.5	9.0	1.5	-	-		1.5m cavity		Hard bottom at 9.0m.
16	0	3	3	1	0.8		Limestone	Pink	
*	3	6	3	2	0.9		"	"	
	6	8	2	NS	3.0		"	"	Contaminated sample (not kept)
							+ Precambrian bedrock	dark grey	
17	0	3	3	1	1.1		Limestone	Pink	} Full recovery
*	3	6	3	2	0.9		"	"	
	6	8.7	2.7	3	0.7		"	"	Cavity at 8.7m
18	0	3	3	1			Precambrian bedrock		Strike 293° mag. Dip 55°S
19*	0	1.5	1.5	1			Limestone	Deep pink	
	1.5	3	1.5				Clay		
20	0	3	3	1	0.4		Limestone	Pink	
*	3	6	3	2	0.7		"	"	
	6	9	3	3	0.7		"	"	
*	9	9.5	0.5	4	1.0		"	"	
	9.5	12	2.5				2.5m cavity		
				5					Clay sample off rods.
21	0	3	3	1			Limestone	Pink	
*	3	6	3	2			"	"	
	6	9	3	3			"	"	
*	9	10	1	4			"	"	
				5					Clay sample off rods.

BH No.	Depth From	Depth To	Thickness (m)	Sample No.	Time (Mins) Rate m/min.	Water Struck	Rock Type	Colour	Remarks
22	0	3	3	1			Limestone	Pink	
*	3	6	3	2			"	"	
	6	7	1	3			"	'	Small sample
	7	9	2	4					Contaminated sample.
							Limestone into Precambrian (dolomite?)		
23	0	3	3	1	1		Dolomite(?)	Grey	
*	3	6	3	2			"	"	
24	0	3	3	1			Dolomite	White	
	3	6	3	2	2		"	"	
	6	9	3	3	1	9	"	Yellow	Sample discoloured due to water
25	0	3	3	1	-		Dolomite	White	
*	3	6	3	2	0.8		"	"	
	6	9	3	3	1.3		"	"	
*	9	12	3	4	2.0		"	"	
	12	15	3	5		15m	"	Brown	Discoloured at water table.
				6					Clay sample off bit.
26	0	3	3	1	-		"	White	
*	3	6	3	2	1.3		"	"	
	6	9	3	3	-		"	"	
*	9	12	3	4	2		"	"	
	12	15	3	5	-		"	"	
*	15	18	3	6	-		"	"	
	18	21	3	7	2		"	"	Stopped in white dolomite at limit of available rods.

Water Absorption and Density Measurements of Diamond Drill Core

B.D.No.	Sample No.	Dry Mass (g) at 100°C (M1)	Mass after 24 hr Immersion (g)(M2)	W.A.	Mass in Water (M3)	R.D.
BH5 D5	1	221.3	223.2	0.9	135.5	2.58
	2	276.4	278.2	0.7	169.3	2.58
	3	289.2	291.9	0.9	176.7	2.57
	4	574.1	580.8	1.2	347.1	2.53
	5	560.1	578.8	3.3	333.0	2.47
	6	145.8	168.3	15.4	72.0	1.97
	7	413.2	429.4	3.9	242.0	2.41
	8	401.8	404.8	0.7	245.3	2.57
	9	344.6	348.2	1.0	206.3	2.45
	10	452.9	457.1	0.9	275.0	2.54
	11	491.4	537.5	9.4	280.0	2.32
D6 BH6	1	306.8	311.2	1.4	185.3	2.52
	2	238.7	263.3	10.3	131.5	2.23
	3	518.3	525.7	1.4	311.8	2.52
	4	433.5	451.2	4.1	248.0	2.34
	5	271.2	288.2	6.3	135.0	1.99
	6	302.0	335.2	11.0	145.0	1.92

W.A. (Water absorption %) $= \frac{M2 - M1}{M2} \times 100$

R.D. (Relative Density) $= \frac{M1}{M1-M3}$ (pure limestone : 2.60)

Note. R.D. of samples having high W.A. are slightly less than true values due to absorption of water during the measurement of M3

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Diamond Drilling Logs D5, D6, D7

DD No.	Depth From	(m) To	Thickness (m)	Core Recovery %	Core Lengths (mm)	Log
D5	0	1.5	1.5	97	260, 670, 50[1], 410, 70[2]	Pink l.s. with numerous
	1.5	3.0	1.5	93	430, 450, 245, 200, 75[3]	small cavities to 4.7m.
	3.0	4.5	1.5	95	695, 130, 155, 300, 145[4]	Breaks 90° to core length probably fresh.
	4.5	6.0	1.5	96	320, 170, 30, 260, 155[5] 130, 60[6], 60, 50, 130, 80	4.7-6.2 Slight iron staining.
	6.0	7.5	1.5	91	260, 115[7], 30, 210, 75, 175, 245, 255	Angular joints below 5.9m 6.2-7.9 pink l.s.
	7.5	9.0	1.5	95	100[8], 35, 45, 130, 90, 50 145, 45, 40, 285, 35, 80, 35, 210, 100[9],	7.9-11.5 mottled texture pink and brown honeycomb with increase in cavities
	9.0	10.5	1.5	99	50, 310, 525, 120[10], 110 165, 110, 105	below 8m. 11.5-12.2 brown honeycomb
	10.5	11.1	0.6	93	200, 50, 30, 50, 30, 50, 65, 85.	textured limestone.
	11.1	11.4	0.3	nil	Cavity (300mm)	
	11.4	12.0	0.6		165[11], 185, 185	
	12.0	12.2	0.2	70	30, 80, 30	
	12.2	14.9	2.7	nil	Cavity, ironstone at bottom.	
D6	0	1.5	1.5	79	60, 190, 85[1], 160, 260, 200, 120, 85, 30.	Pink l.s. to 1m followed by very broken core to
	1.5	3.0	1.5	30	20 fragments over 100mm. 50[2], 50, 60, 20, 65, 70, 90[2]	cavity at 3.0-3.7 Relatively unweathered
	3.0	3.7	0.7	nil	Cavity	l.s. 3.7-5.9 with
	3.7	4.5	0.8	100	110, 75	angular joints below
	4.5	6.0	1.5	92	260, 150[3], 285 in 6 fragments, 440, 250	5m 5.9-10.5 brown honeycomb textured l.s.
	6.0	7.5	1.5	35	40, 12 fragments over 100mm, 100, 60, 30, 40, 30, 120, 120[4].	
	7.5	8.3	0.8	70	40, 70, 100, 60[5], 30, 40, 30, 80, 60, 55[5].	
	8.3	9.0	0.7	nil	Cavity	
	9.0	10.5	1.5	82	85, 50, 155, 20mm rubble 125[5], 60, 115, 125, 200[6] 300.	

(Water absorption and density sample Nos indicated)

				Sample No. m	No.	
0	8.0	8.0	100	2.3 - 4.8	1	Broken white dolomite
8.0	10.5	2.5		4.8 - 7.2	2	Relatively unbroken dolomite
				7.2 - 10.5	3	

(Stopped at target depth)

APPENDIX 2

CHEMICAL ANALYSES

Surface sampling by Mineral Holdings Aust. Pty. Ltd.
(Analysis by Analabs) (Locations on fig.4)

Surface sampling by David Mitchell Estate
(Analysis by D.M.E.)

Borehole samples (Locations on fig.2 and 3)
(Analysis by Division of Mines)

Calcination Test of Limestone by D.M.E.

Miscellaneous Reports :

Colour and Brightness of Dolomite

Tests: Helawit

A.P.P.M.

Comalco

Magnetic material in crushed dolomite and Limestone: R.S. Bottrill (D.M.M.R.)

Mineralogy of dolomite - do -

CHEMICAL ANALYSIS SURFACE SAMPLES

Sample	SiO2	TiO2	Al2O3	Fe2O3	MnO	MgO	CaO	K2O	P2O5	SO3	Na2O	LoI	Total	Moisture
M1A	0.86	0.02	0.40	0.32	0.05	0.80	53.5	0.04	0.057	0.09	0.04	43.1	99.28	0.31
M2	0.98	0.01	0.34	0.41	0.06	0.70	53.8	0.03	0.050	0.09	0.04	43.2	99.71	0.29
M3	0.80	0.02	0.35	0.25	0.03	0.80	53.8	0.04	0.050	0.10	0.05	43.3	99.64	0.27
M3A	0.25	<0.01	0.07	0.03	<0.01	7.50	47.0	0.02	0.017	0.01	0.04	44.8	99.72	0.10
M4	0.45	<0.01	0.10	0.04	0.02	0.95	54.4	0.02	0.052	0.13	0.05	43.7	99.91	0.19
M4A	0.60	<0.01	0.14	0.05	<0.01	0.55	54.6	0.02	0.057	0.07	0.04	43.5	99.93	0.21
M5	17.4	0.02	0.50	0.20	0.01	0.63	44.8	0.12	0.038	0.09	0.05	36.0	99.86	0.19
M6	0.98	0.01	0.39	0.41	0.03	0.74	54.0	0.05	0.055	0.10	0.05	43.1	99.96	0.18
E1	1.11	0.02	0.45	0.45	<0.01	0.79	53.2	0.04	0.118	0.11	0.05	43.2	99.35	0.25
E2	0.92	<0.01	0.09	0.03	<0.01	1.75	53.2	<0.01	0.015	0.05	0.05	43.6	99.69	0.20
C1	1.05	0.01	0.18	0.08	0.01	0.54	54.4	0.02	0.081	0.15	0.05	43.3	99.86	0.16
C2A	2.25	0.03	0.65	0.37	0.02	0.74	52.8	0.06	0.790	0.12	0.05	41.7	99.58	0.34
C2B	0.59	<0.01	0.17	0.05	<0.01	0.90	53.7	0.02	0.069	0.14	0.05	43.9	99.49	0.15
C3	0.50	<0.01	0.15	0.06	0.02	0.50	55.2	<0.01	0.053	0.05		43.4	99.9	0.19
C4	0.57	0.01	0.21	0.10	0.01	1.05	54.1	0.01	0.052	0.13		43.4	99.62	0.26
C5	0.35	<0.01	0.15	0.04	<0.01	1.10	54.0	0.01	0.043	0.18	0.7	43.7	99.65	0.12
C6	0.60	0.01	0.18	0.12	0.01	0.94	54.2	0.02	0.047	0.13	0.05	43.9	100.21	0.14
E3	11.8	0.02	0.70	0.35	0.03	0.89	47.6	0.16	0.054	0.14	0.03	38.1	99.87	0.10
E4	1.00	<0.01	0.10	0.03	<0.01	20.1	32.2	0.01	<0.005	0.05	0.03	46.9	100.42	0.04
E5	0.35	0.01	0.20	0.06	<0.01	19.1	33.4	0.03	<0.005	0.02	0.03	46.9	100.1	0.04
E6	1.45	0.02	0.60	0.69	0.01	0.81	52.8	0.08	0.092	0.08	0.01	42.9	99.54	0.11
E7	0.50	<0.01	0.25	0.05	<0.01	11.2	42.5	0.06	0.012	0.06	0.01	42.9	99.54	0.11
E8	1.75	<0.01	0.30	0.03	<0.01	16.0	36.1	0.05	0.011	0.04	0.01	45.8	100.09	0.03

Surface Sample Descriptions

Michaels Hill

M1A	Mottled pink limestone, surface (over 16 metres)
M2	Mottled pink and white limestone, surface massive hard (over 25 metres) of 3 metre high outcrop.
M3	Mottled pink and white lilmestone, top of hill 100 metres west of M1 original sample
M3A	Grey limestone magnesia enriched, dip 60°north.
M4	Pale pink and off-white limestone (15 metres from top of hill)
M4A	Lower sample off-white limestone and slightly pink (15 metres below M4)
M5	Pale pink and off-white limestone (over 12 metres)
M6	Pink-brown limestone. Sample over 3 metres in height.

Edwards Hill and West Sampling

E1	Pink-salmon limestone. Sample over 2 metres.
E2	Dark grey limestone. Chip sample medium-coarse crystal only
E3	Taken down 10 metres of outcrops pink limestone from the top of the hill to almost the bottom
E4	Taken down 2 metres at the bottom of the hill
E5	Taken across 15 metres white to off-white looks like dolomite
E6	Taken across 50 metr5es of pink outcrop
E7	Taken across 10 metres of dark grey material
E8	Taken across 15 metres white to light grey also looks like dolomite at Edwards Hill S.W. outcrop
C1 to C6	Taken over small isolated outcrops on the flanks of Coffeys Hill - 2 metres true thickness

DAVID MITCHELL LIMITED

(INCORPORATED IN VICTORIA)

Registered Office and Sales Department
CAVE HILL, LILYDALE, VIC. 3140, AUSTRALIA
Correspondence: P.O. Box 486, Lilydale, Vic. 3140, Australia
Telex: AA35660 Melbourne. FAX: 735 4574
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LIMIL

Lime Products for Industry and Agriculture — Cement — Building Materials — Refractories

REPORT ON AN INSPECTION OF EXPLORATION LICENCE APPLICATION 31/90 NEAR REDPA, NORTHWEST TASMANIA, A PROPERTY OF MINERAL HOLDINGS AUSTRALIA PTY.LTD.

MARCH 1991

G.W.COCHRANE
W.G.RUNGE

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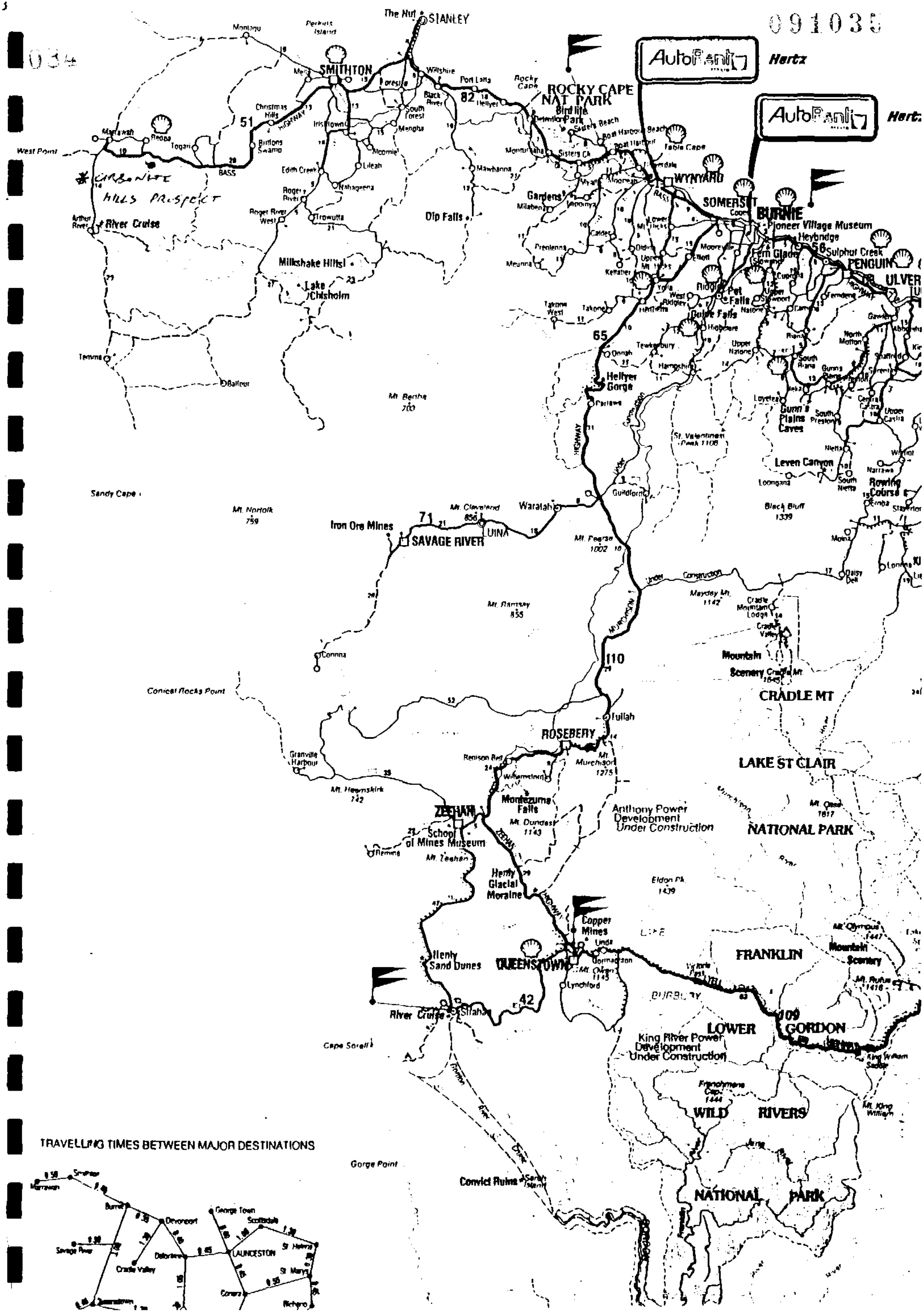

The Nut
STANLEY
Montagu
Perkins Island
SMITHTON
Wiltshire
Port Latta
Rocky Cape
ROCKY CAPE NAT PARK
Bird life Park
Sisters Beach
Boat Harbour Beach
Table Cape
AutoRent
Hertz
WYNYARD
SOMERSET
BURNIE
Pioneer Village Museum
Heybridge
Sulphur Creek
PENGUIN
ULVER
Forest
Black River
South Forest
Mengha
Christmas Hills
HIGHWAY
Irishtown
Alcomie
Lileah
Edith Creek
Nabageena
Roger River
Roger River West
Trowutta
Marrawah
Redpa
Togari
Buttons Swamp
BASS
West Point
CARBONITE HILLS PROSPECT
Arthur River
River Cruise
Dip Falls
Mawbanna
Milkshake Hills
Lake Chisholm
Gardens
Milabena
Yolla
Ridgley
Guide Falls
Pet Falls
Fern Glade
Hampshire
Tewkesbury
Takone
Takone West
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Sandy Cape
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Iron Ore Mines
SAVAGE RIVER
Mt. Cleveland 856
LUINA
Waratah
Guildford
Mt. Pearse 1002
Under Construction
Mayday Mt. 1142
Cradle Mountain Lodge
Cradle Valley
Daisy Dell
Mt. Ramsay 855
MURCHISON
Corinna
Mountain Scenery
Cradle Mt. 1545
CRADLE MT
Conical Rocks Point
Tullah
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Mt. Dundas 1143
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School of Mines Museum
Mt. Zeehan
Henty Glacial Moraine
Eldon Pk. 1439
Copper Mines
FRANKLIN
Mountain Scenery
Henty Sand Dunes
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LOWER
GORDON
River Cruise
Strahan
King River Power Development Under Construction
King William Saddle
Cape Sorell
Frenchmans Cap 1444
WILD
RIVERS
Mt. King William
Gorge Point
Convict Ruins
Sarah Island
NATIONAL
PARK
TRAVELLING TIMES BETWEEN MAJOR DESTINATIONS
Smithton
Marrawah
Burnie
Devonport
George Town
Scottsdale
Savage River
Cradle Valley
Deloraine
LAUNCESTON
St. Helens
St. Marys
Campbell Town
Queenstown

INTRODUCTION

On Sunday and Monday, February 3rd and 4th, W.G.Runge and G.W.Cochrane inspected the "Carbonate Hills" limestone property of Mineral Holdings Australia Pty.Ltd. Mr. Kevin Pinner accompanied the party on February 3rd and introduced them to the owners of the private land on which the limestone occurs. The objectives of the visit were to inspect and sample the source of the good quality, pink Tertiary limestone specimens, that Mr. N. Thomas had given to David Mitchell Ltd. personnel previously.

TITLE

It is understood that Mineral Holdings has submitted Application No. 31/90 for an Exploration Licence over an area of about six sq.kms. to cover the "Carbonate Hills" prospect.

LOCATION

The property is located on the southern side of the Smithton-Marrawah Road, about 4 kms. south southeast of the settlement of Redpa and 40 kms. by road from Smithton. Smithton is about 30 kms. west of the deep-sea port of Port Latta. The limestone deposits are on open grazing land, owned on the northern side by Mrs. King and on the southern side by Mr. Edwards.

Much of the property occupies low-lying alluvial flats on the western side of Welcome River. The highest ground is in the northwestern corner and a ridge, called Coffey's Hill, extends out from this corner in a northwest-southeast direction across Mrs. King's land. There are also several small, low, isolated hills on Mr. Edward's property.

As indicated on the Burnie 1:250 000 geological sheet, published by the Geological Survey of Tasmania, four geological formations are represented in the area. From youngest to oldest, they are:-

4. Recent alluvium
3. Tertiary basalt
2. Tertiary limestone
1. Precambrian sedimentary rocks

The terms Recent, Tertiary and Precambrian refer to the age of the rocks.

1. Precambrian sedimentary rocks.

The bedrock throughout northwestern Tasmania consists of strongly-folded Precambrian sedimentary rocks. Small outcrops of carbonate rocks belonging to this formation are seen in places at Carbonate Hills over the low-lying areas and along the foot of some of the ridges and small hills. The eroded upper surface of the Precambrian rocks is probably more or less horizontal.

Good quality dolomite has been recorded from many localities in the Duck River area and is currently produced from the Circular Head Dolomite quarry near Smithton.

2. Tertiary limestone

The Tertiary limestone probably was deposited originally as a widespread sheet on the Precambrian basement over the northwestern corner of Tasmania. Subsequently much of it has been removed by erosion. South of Redpa, outcrops of the limestone are now best exposed along the lower slopes of Coffey's Hill and on low hills on Mr. Edwards' property, e.g. Edwards Hill

The limestone is white to pink in colour and generally compact in texture. However, in places on the lowest slopes it is strongly weathered to a sugary texture.

In Mineral Resources No. 10 "Limestones in Tasmania" (Geological Survey of Tasmania), the formation is reported to be 15 to 30 metres in thickness. In borehole data from the Redpa district collected by V.Threader, (geological consultant to Mineral Holdings), limestone intersections are reported to vary from 3 to 18 metres, apart from one intersection of 22 metres. However over the Carbonate Hills property, the thickness rarely exceeds 10 metres. Over the southeastern end of Coffey's Hill, (or Michaels's Hill), where the limestone is best exposed, the thickness is mostly under 6 metres.

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Geology (continued)

3. Tertiary basalt

Basalt covers most of the hilly country between the northwestern part of Application 31/90 and Marrawah. Eroded remnants of the basal part of the lava cap the Tertiary limestone along Coffey's Hill.

4. Recent alluvium

Recent alluvium is the most extensive formation. A veneer covers the Precambrian rocks and perhaps some Tertiary limestone over the Welcome River alluvial flats.

INVESTIGATION OF THE LIMESTONE

Mr. Neil Thomas made available the analytical results for chip samples of Precambrian and Tertiary limestone collected previously by Mineral Holdings representatives. These included the C-, E- and M- series of numbers. The results suggested that the Tertiary limestone is generally high grade with over 52% CaO, whereas the Precambrian limestones contain variable amounts of magnesia. Two samples were siliceous limestones, namely E3 from near Mr. Edwards' house and M5 from the southeastern end of Michael's Hill.

Eleven additional chip samples were collected during the recent visit and also larger lumps for muffle furnace testing. The preferred sites for sampling the Tertiary limestone were those where there are fairly continuous outcrops up the side of a ridge or hill. Such conditions are only available however over the eastern end of Michael's Hill and at the small Edwards Hill. Along the western end of Coffey's Hill, there are only scattered patches of limestones available for sampling. Most of the hillside is covered by soil.

Soil cover prevents the boundary between the basalt and Tertiary limestone being traced accurately. Based on the evidence of a few outcrops, it is probably an irregular surface, that is to say the basalt flowed over an eroded limestone surface.

The locations of the recent samples (numbered CR 1 - CR 11 inclusive) are shown on the enclosed photocopy of an aerial photograph of the area enlarged to a scale of about 1: 10 000

The samples are listed in Table 1 and their chemical analyses are given in Table 2. The results of various phases of sampling are discussed in the following sections.

CHEMICAL ANALYSES OF REDPA LIMESTONE SAMPLES

1. Mineral Resources No.10 (Geological Survey of Tasmania)

Three analyses are given for samples reported to have come from the Redpa Tertiary limestones. They all contain low insolubles, but are dolomitic with the MgO content ranging from 12.4% to 20.0%.

As will be shown below, these results differ greatly from those obtained by either the Mineral Holdings or David Mitchell Ltd. chip sampling. It seems likely that the Geological Survey results applied to Precambrian dolomite in the Redpa district rather than to the pink Tertiary limestone.

2. Mineral Holdings Australia Pty.Ltd.

Tertiary limestone: King's property

Fig 4, main text

Samples M1A, M2-M4, M4A, M5, M6, C1, C2A, C2B, C3-C6 - all by description seem to have been taken (over various lengths) from the cream to pink Tertiary limestone.

With the exception of M5, a siliceous rock, they all appear to be good quality limestones with analyses in the following ranges:

	%
CaO	52.8 - 55.2
MgO	0.5 - 1.75
Fe_2O_3	0.04- 0.41
$SiO_2+Al_2O_3$	0.5 - 2.9

The only probable Precambrian rock (M3A) is a magnesian limestone with:

	%
CaO	47.0
MgO	7.50
$SiO_2+Al_2O_3$	0.32
Fe_2O_3	0.03

Tertiary limestone: Edwards property

Samples E1, E1A, E3, E6.

Sample E3 is a siliceous limestone from outcrops on the hill on which Mr. Edwards' house stands. The remaining samples from Edwards Hill are good quality limestones with analyses in the following ranges:-

	%
CaO	52.8 - 53.2
MgO	0.79 - 1.75
Fe_2O_3	0.03 - 0.69
$SiO_2+Al_2O_3$	1.56 - 2.05

On the air photo photocopy received from Mineral Holdings, the site of E6 should probably be moved eastward to Edwards Hill.

Chemical Analyses of Redpa Limestone Samples (continued)

Precambrian rocks: Edwards property

Samples E4, E5, E7, E8.

Two of these samples, E4 and E5, are close to pure dolomite with MgO contents of 20.1% and 19.1% respectively. The other two, E7 and E8, are dolomitic limestones with MgO contents of 11.2% and 16.0% respectively.

3. David Mitchell Ltd.

Tertiary limestone: King's property

Samples CR 2- CR 6 inclusive, CR 9-CR 11 inclusive.

These are all good quality limestones with analyses in the following ranges:-

	%		
CaO	53.3	-	54.87
MgO	0.71	-	1.35
Fe_2O_3	0.06	-	0.44
acid insolubles	0.64	-	2.70

Only one Precambrian sample (CR 1) was taken. Surprisingly this grey rock contained low acid insolubles (1.16%) and less magnesia (3.88%) than any other Precambrian sample taken in this area. A moderately high CaO content of 50.4% was recorded.

Edwards property

Only one sample each of Tertiary (CR 8) and Precambrian (CR 7) rocks was taken.

Sample CR 7 was from the same site as Mineral Holdings E5 and yielded a very similar result, namely:-

33.1% CaO, 19.1% MgO, 0.05% Fe_2O_3, 0.7% acid insolubles.

Sample CR 8 from Edwards Hill is similar to Mineral Holdings sample E6 from the same area with 53.4% CaO, 0.76% MgO, 0.23% Fe_2O_3, 2.37% acid insolubles.

The above results show a good agreement between those of Mineral Holdings and David Mitchell. This agreement applies to both the range of values found over the whole area and at individual sites where both Companies took samples.

It is not possible to use the results to estimate the average grades of the rocks, as the samples were mainly taken over short intervals from relatively small outcrops in otherwise soil-lowered terrain. Nevertheless in the case of the Tertiary limestone, most of the outcropping formation appears to contain 53% or more CaO, less then 1.5% MgO and less than 2.5% acid insolubles.

Chemical Analyses of Redpa Limestone Samples (continued)

A cream variety of the Precambrian basement rock occurring on Mr. Edwards' property is nearly pure dolomite, but the more common grey basement rocks are generally dolomitic limestones with 12-18% MgO. Around at least one locality, (sample CR 1), the MgO content is relatively low at less than 4%.

The near-pure dolomite is probably similar to the product of the Circular Head Dolomite quarry at Smithton. Other similar dolomite and dolomitic limestone occurrences have been worked at various localities in Northwestern Tasmania in the past.

LIMESTONE RESERVES

1. Tertiary limestone

There is a discontinuous, relatively thin sheet of good quality Tertiary limestone within the area referred to as "Carbonate Hills". The largest and most accessible deposit occurs along Coffey's Hill on the farmland owned by Mrs. King. Further investigation is needed to enable a reliable estimate of the reserves to be made.

It is suggested, that once the Exploration Licence is granted, the following programme of investigation should be carried out.

(i) An aerial survey so that a large-scale topographic map can be prepared.

(ii) Percussion drilling on a widely-spaced grid pattern to provide information about the thickness of overburden (basalt) and limestone, and the quality of the limestone available at various localities.

The drill sites should be plotted on the topographic map and reserves could then be calculated.

2. Precambrian carbonate rocks

Precambrian rocks, possibly consisting largely of carbonate types, form the basement formation throughout the area.

Over most of Mr. Edwards property within the Exploration Licence application these rocks are either at the surface or probably close to it under a veneer of alluvium. The total reserves of carbonate rocks are probably very large, but because of the sparse outcrops it is not possible to determine the reserves of high grade dolomite as opposed to other varieties of magnesia-rich carbonate rocks. In any case, present demand for dolomite is probably fulfilled by production from the Circular Head Dolomite quarry at Smithton.

TABLE 1.

LIST OF SAMPLES

Sample Identification

CR 1	Grey Precambrian limestone from the end of a ridge on the southern side of Michael's Hill - sampled across 10 metres.
CR 2	Orange to pink Tertiary limestone, 3 mtrs. thick, overlying sample CR 1.
CR 3	Sampled Tertiary limestone across four patches of outcrops, totalling 10 to 12 mtrs. in thickness. Lower outcrops deeply weathered to a sandy texture: cream colour on southwestern side of Michael's Hill.
CR 4	Similar traverse, west of CR 3, across scattered buff-coloured Tertiary limestone outcrops very weathered over lowest 4 metres.
CR 5	Cream and pink Tertiary limestone - about 5 mtrs. thick - on northeastern side of Michael's Hill.
CR 6	Similar scattered outcrops northwest of CR 5. Basalt occurs on top of ridge further to the west.
CR 7	White massive Precambrian dolomite, dipping 60° to the southwest - small, low outcrops, southeast of Mr. Edwards' house.
CR 8	Pink Tertiary limestone about 6 metres thick at the northeastern corner of Edwards' Hill and overlying Precambrian magnesian limestone.
CR 9	Tertiary limestone - poor outcrops - northwestern flank of Michael's Hill. Total thickness probably about 10 metres: basalt on top of ridge to the east.
Cr 10	Tertiary limestone on southeastern flank of King's or Coffey's Hill - total thickness probably about 10 metres but poorly outcropping.
CR 11	Similar to CR 10 at the southwestern end of King's or Coffey's Hill.
CR 12	Specimen from Circular Head Dolomite quarry, Smithton.

TABLE 2

BHP TECHNICAL SERVICES

SIGNED:

TEST REPORT TO: N.THOMAS

DATE: 26/02/91

(ALL RESULTS REPORTED AS ZERO, NOT TESTED UNLESS OTHERWISE SPECIFIED)

SUBJECT: MINERAL HOLDINGS AUST. PTY.LTD. RESULTS.

I.D. NUMBER	SAMPLE DESCRIPTION	A.I.	Ash(%)	Fines(%)	LOI DIFF	A.INSOL	MOISTURE	Ca(OH)2
91MH0222/1	REDFA CR1	0.0	0.00	44.17	0.00	1.16	0.00	0.0
91MH0222/2	REDFA CR2	0.0	0.00	43.60	0.00	1.40	0.00	0.0
91MH0222/3	REDFA CR3	0.0	0.00	43.90	0.00	0.95	0.00	0.0
91MH0222/4	REDFA CR4	0.0	0.00	43.98	0.00	0.84	0.00	0.0
91MH0222/5	REDFA CR5	0.0	0.00	43.16	0.00	2.70	0.00	0.0
91MH0222/6	REDFA CR6	0.0	0.00	43.53	0.00	1.97	0.00	0.0
91MH0222/7	REDFA CR7	0.0	0.00	42.24	0.00	0.70	0.00	0.0
91MH0222/8	REDFA CR8	0.0	0.00	43.74	0.00	2.37	0.00	0.0
91MH0222/9	REDFA CR9	0.0	0.00	44.01	0.00	0.73	0.00	0.0
91MH0222/10	REDFA CR10	0.0	0.00	44.10	0.00	0.64	0.00	0.0
91MH0222/11	REDFA CR11	0.0	0.00	44.03	0.00	0.85	0.00	0.0

I.D. NUMBER	SAMPLE DESCRIPTION	CaO	MgO	Fe2O3	SiO2	Al2O3	Cu(ppm)	Mn(ppm)
91MH0222/1	REDFA CR1	50.4	1.08	0.09	0.00	0.00	0.0	0
91MH0222/2	REDFA CR2	53.7	0.97	0.11	0.00	0.00	0.0	0
91MH0222/3	REDFA CR3	54.8	0.67	0.07	0.00	0.00	0.0	0
91MH0222/4	REDFA CR4	54.6	0.87	0.06	0.00	0.00	0.0	0
91MH0222/5	REDFA CR5	53.5	0.98	0.34	0.00	0.00	0.0	0
91MH0222/6	REDFA CR6	53.6	0.88	0.29	0.00	0.00	0.0	0
91MH0222/7	REDFA CR7	55.1	19.19	0.05	0.00	0.00	0.0	0
91MH0222/8	REDFA CR8	51.4	0.26	0.23	0.00	0.00	0.0	0
91MH0222/9	REDFA CR9	53.7	0.71	0.04	0.00	0.00	0.0	0
91MH0222/10	REDFA CR10	53.7	1.35	0.06	0.00	0.00	0.0	0
91MH0222/11	REDFA CR11	54.0	1.04	0.07	0.00	0.00	0.0	0

MUFFLE FURNACE TESTS

Several months ago, a specimen of pink Tertiary limestone received from Mr. N. Thomas was heated in a laboratory muffle furnace to 1300° C. On completion of the test, the rock had disintegrated to a mass of sandy, khaki-coloured particles. It was therefore concluded that the limestone was unsuitable for quicklime production.

During the recent visit, five specimens of Tertiary limestone from various localities and two specimens of Precambrian rocks were collected and subjected to muffle furnace tests. The results of the tests are given in the report (Table 3) below by the Chief Chemist, J. Elhay. They indicate that four out of the five Tertiary limestones could be suitable for calcination in a vertical shaft kiln. The fifth specimen (CR 5) crumbled in a similar way to Mr. Thomas' specimen.

Some limestone outcrops are deeply weathered and crumbly. Two specimens disintegrated when heated to 1300° C. It therefore appears that trial pits should be opened up in the Tertiary limestone to enable further testing of typical unweathered rock to be carried out.

TABLE 3

NOTE:

Samples 91MH0222/1,2,3,5,7,9 & 10 were calcined in the box furnace using standard conditions.

1. Showed overburnt surface, was hard but was severely cracked.
2. Similar to 1, though less cracked.
3. As for 2.
5. Almost total disintegration - mostly powder with some lumps.
7. Calcined well, mainly white and quite hard.
9. As for 7, with somewhat overburnt surface.
10. As for 7.

CONCLUSIONS AND RECOMMENDATIONS

1. Based on an inspection of the "Carbonate Hills" property and scattered chip sampling, it appears that there is a relatively thin sheet-like resource of good quality limestone present over part of the area - either exposed at the surface or beneath shallow basalt cover.

2. There are much larger and probably higher grade deposits on the Australian mainland, but the "Carbonate Hills" deposits may have a future value for Tasmanian markets.

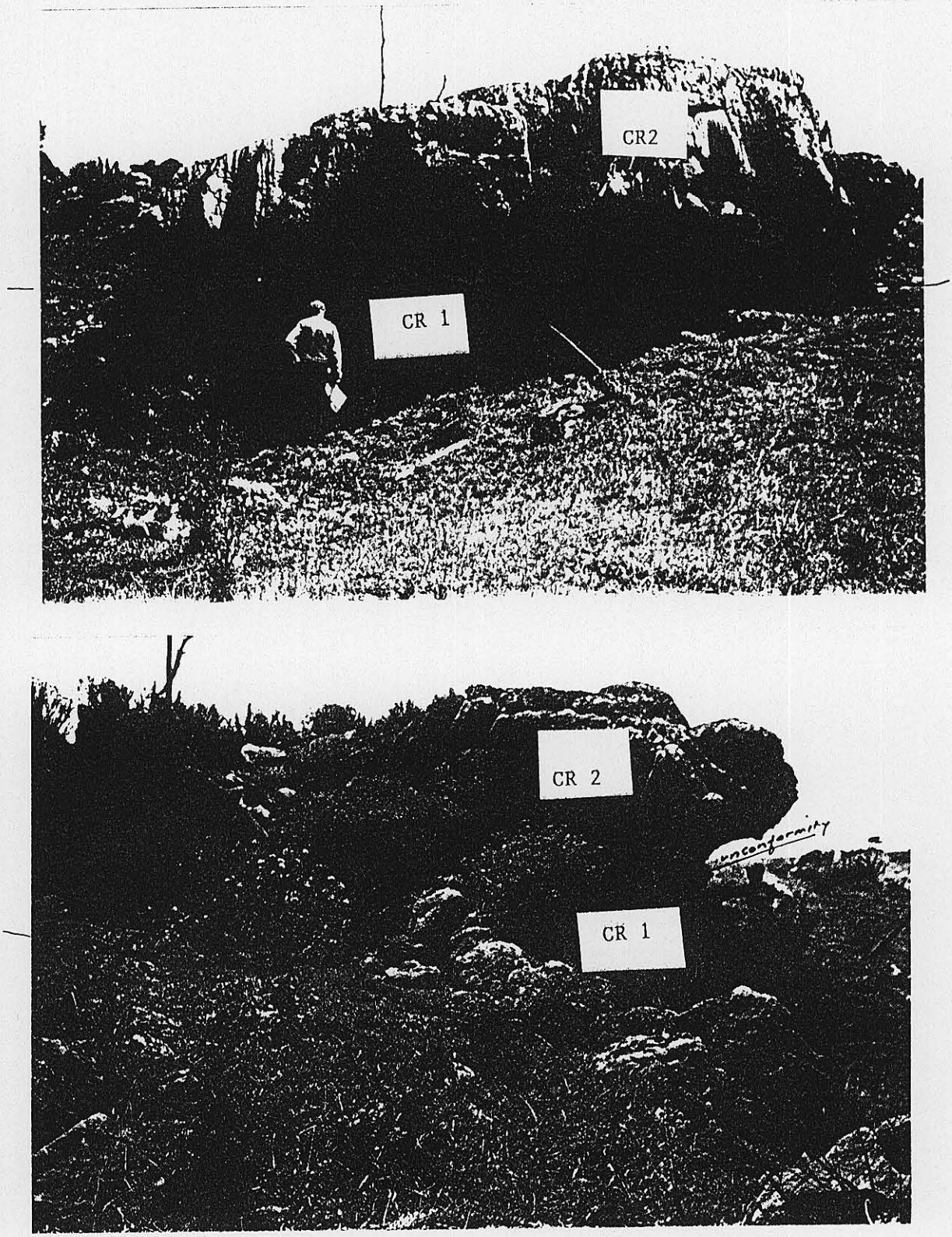
3. It is therefore recommended, that when an Exploration Licence is granted over the area, investigations should be continued by means of topographic mapping and drilling. Several small trial quarries could also be opened up to obtain bulk samples for calcination tests.

4. There is probably also some high-grade Precambrian dolomite on the property, but this is unlikely to have any commercial value at present given the ready availability of dolomite at an operating quarry in Smithton.

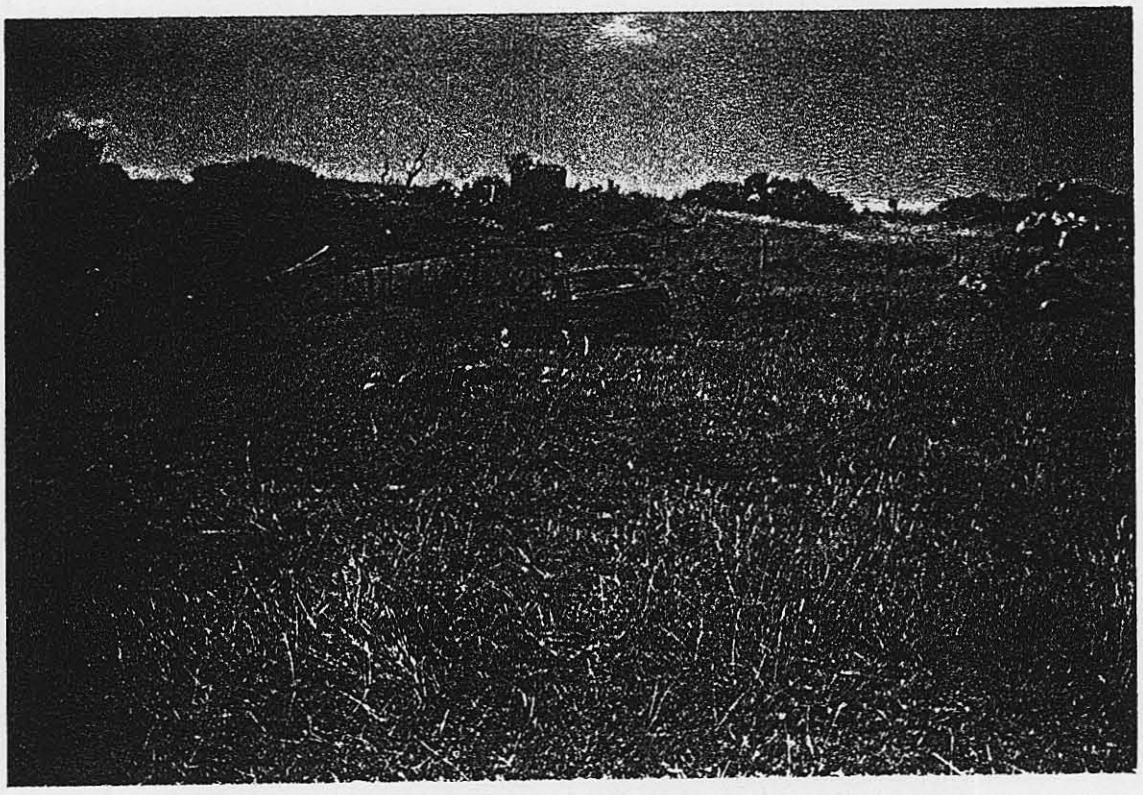
APPENDIX
(D.M.E.)

PHOTOGRAPHS OF SAMPLE SITES

AT CARBONATE HILLS



Southeastern corner of Coffey's Hill
(Michaels Hill)
Angular unconformity between flat-lying
Tertiary limestone (sample CR2) and
steeply inclined Precambrian magnesium
limestone (sample CR1)



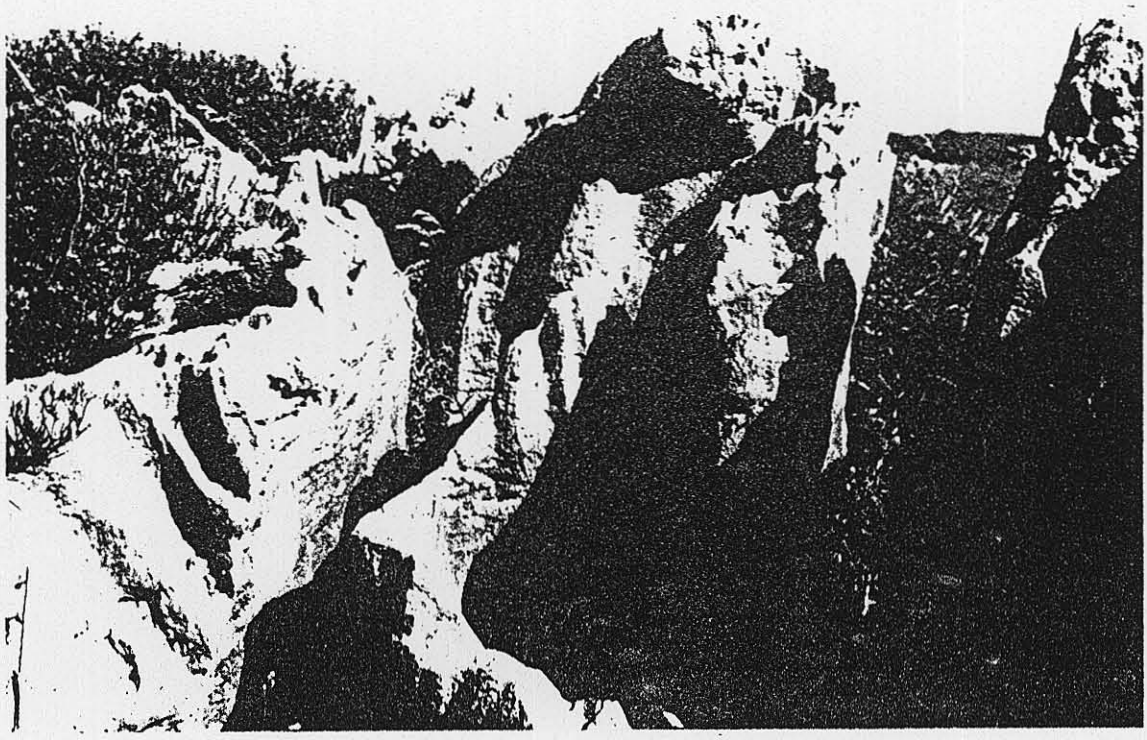
Sample CR 3

Collected along traverse trending north-easterly across outcrops in front of car: view looking north along southern side of Coffey's Hill (Michael's Hill)

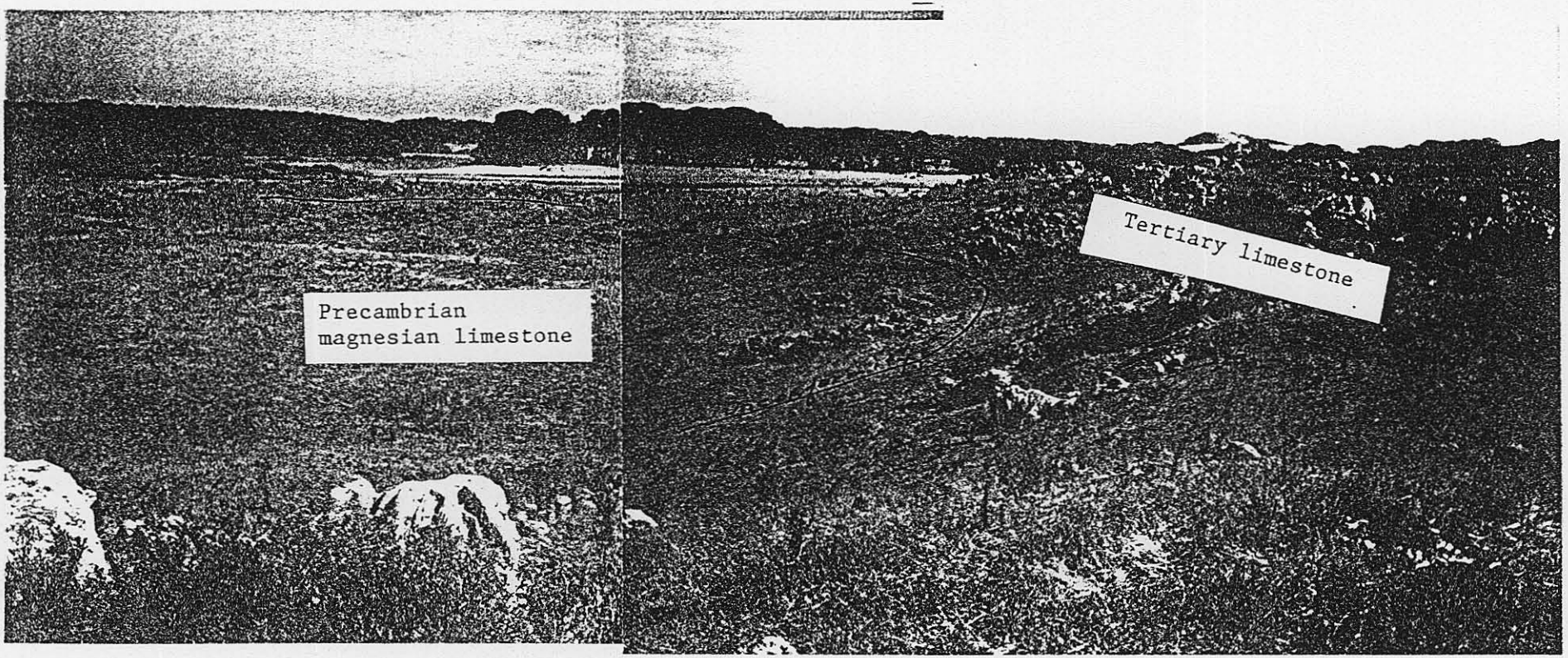
Tertiary limestone
central outcrop of sample CR 3

Sample CR 4

Discontinuous outcrops across lower
southwestern side of Michael's Hill

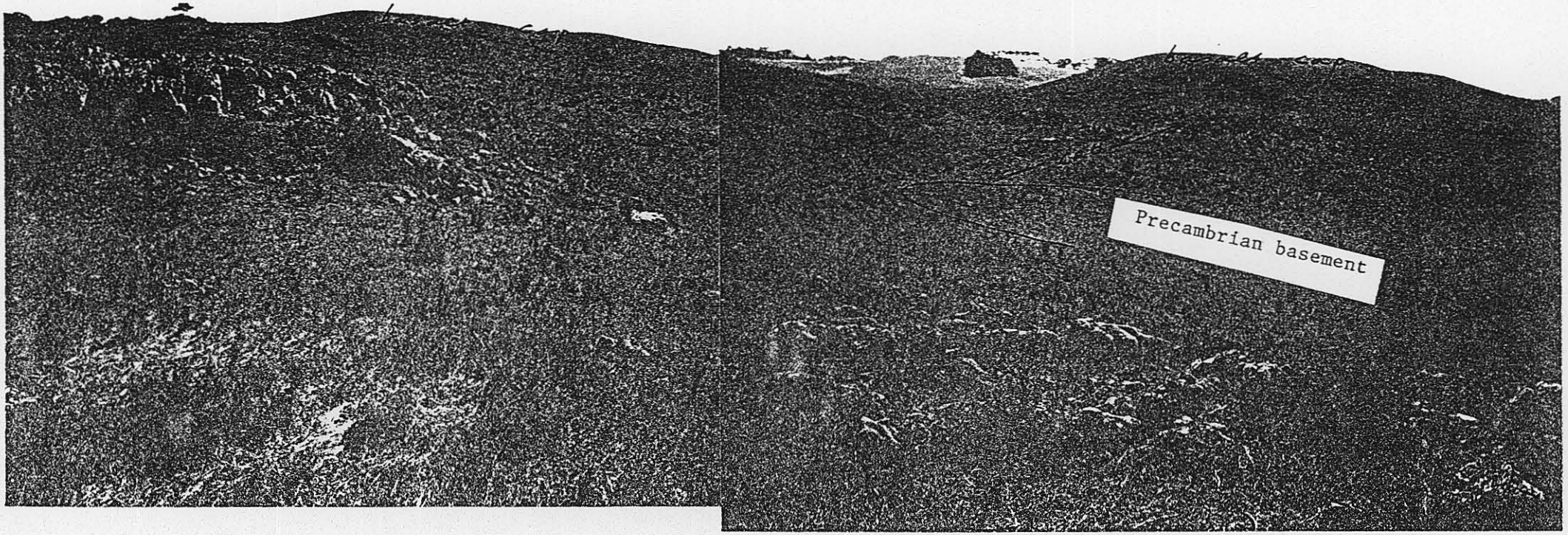


Prominent deeply eroded Tertiary
limestone outcrops along sample CR 5:
eastern side of Michael's Hill



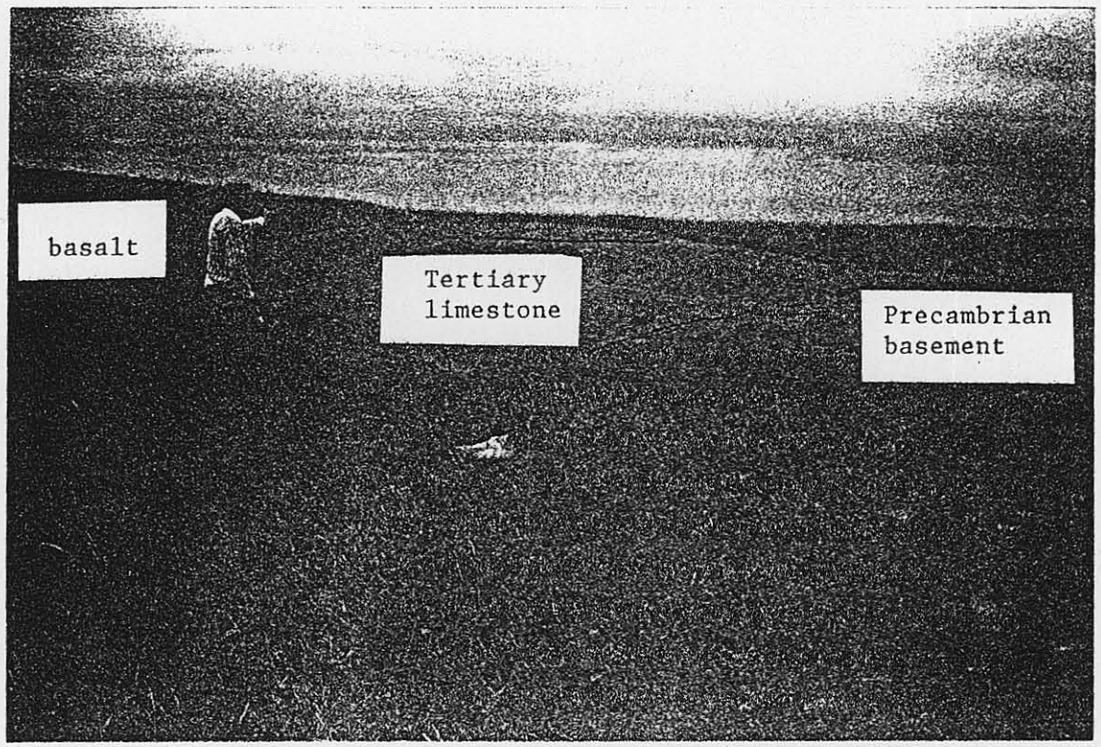
Sample CR 5

Taken across prominent outcrops on
eastern side of Michael's Hill

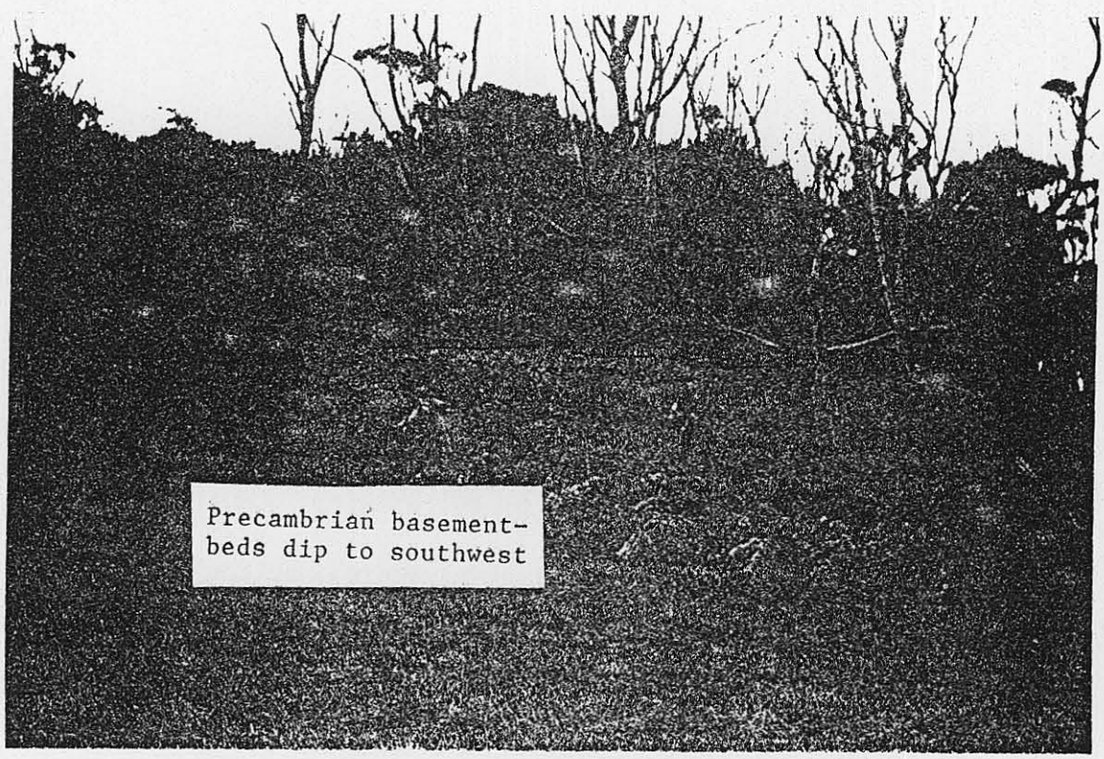


Sample CR 6

Scattered outcrops from northern part of
Michael's Hill (northwest of sample CR 5)



Looking east southeast along southern side of Kings Hill (Coffey's Hill) - sparse outcrops of weathered Tertiary limestone (sample CR 10)



Northwestern corner of Edward's Hill Sample CR 8 from Tertiary limestone capping which overlies Precambrian dolomitec limestone.

CHEMICAL ANALYSES - HAMMER DRILL HOLES - LIMESTONES

REG NO.	GEOLOGIST NO. *	SiO2	TiO2	Al2O3	Total Fe as Fe2O3	MnO	MgO	CaO	Na2O	K2O	P2O5	SO3	TOTAL	LOI	Colour
910393	2B/1	1.95	0.05	0.47	0.57	0.04	1.44	52.75	0.03	0.01	0.10	0.09	100.23	42.73	Pink
394	3/2	1.49	0.04	0.51	0.52	0.04	1.00	53.64	0.06	0.02	0.10	0.07	100.48	42.99	Pink
395	5/2	6.28	0.06	0.88	0.76	0.03	1.49	50.54	0.09	0.03	0.10	0.07	100.96	40.63	Pink
396	6/2	1.74	0.05	0.53	0.42	0.03	1.20	53.49	0.09	0.02	0.09	0.15	100.72	42.92	Pink
397	7/2	1.29	0.05	0.48	0.38	0.02	0.88	53.98	0.04	0.01	0.11	0.07	100.38	43.07	Pink
398	8/2	1.27	0.05	0.49	0.39	0.03	0.89	53.93	0.08	0.02	0.10	0.07	100.46	43.14	Pink
399	8/4	1.29	0.05	0.54	0.41	0.03	0.87	54.05	0.06	0.02	0.10	0.07	100.58	43.10	Pink
400	10/2	1.20	0.03	0.41	0.30	0.03	0.92	53.94	0.05	0.02	0.10	0.09	100.31	43.23	Pink
401	14/2	2.28	0.04	0.50	0.48	0.04	0.97	53.13	0.03	0.02	0.11	0.09	100.28	42.58	Pink
402	15/2	1.56	0.04	0.55	0.62	0.04	1.04	53.14	0.02	0.01	0.10	0.09	100.11	42.90	Pink
403	16/2	2.75	0.05	0.75	0.85	0.06	1.44	50.96	0.01	0.02	0.11	0.09	99.29	42.20	Pink
404	17/2	1.22	0.03	0.54	0.54	0.04	1.07	53.56	0.03	0.01	0.11	0.10	100.33	43.07	Pink
405	19/1	2.00	0.06	0.91	1.44	0.06	1.75	51.09	0.03	0.02	0.12	0.09	99.98	42.42	Pink
406	20/2	1.05	0.04	0.40	0.34	0.03	0.79	53.93	0.02	0.01	0.10	0.06	100.03	43.26	Pink
407	20/4	1.71	0.04	0.66	0.54	0.03	1.15	52.82	0.02	0.01	0.10	0.07	100.00	42.85	Pink
408	21/2	0.90	0.03	0.33	0.34	0.02	0.86	54.45	0.03	0.01	0.09	0.07	100.54	43.42	Pink
409	21/4	1.35	0.07	0.53	0.45	0.03	1.00	53.41	0.05	0.01	0.09	0.08	100.21	43.14	Pink
410	22/2	1.33	0.05	0.57	0.96	0.05	0.89	53.15	0.13	0.02	0.10	0.10	100.22	42.88	Pink

* B.H. No./Sample No. – Appx. 1.

CHEMICAL ANALYSES – HAMMER DRILL HOLES – MAGNESIAN LIMESTONE

REG NO.	GEOLOGIST NO.	SiO2	TiO2	Al2O3	Total Fe as Fe2O3	MnO	MgO	CaO	Na2O	K2O	P2O5	SO3	TOTAL	LOI	Colour
910413	+5mm 25/2	0.25	0.01	0.10	0.10	0.01	10.42	43.55	0.07	0.01	0.07	0.04	100.02	45.39	Pink
414	-5mm 25/2	0.17	0.02	0.06	0.06	0.01	11.40	42.58	0.06	0.01	0.07	0.04	100.06	45.60	Pink
415	25/4	0.30	0.00	0.03	0.05	0.01	16.40	35.71	0.11	0.01	0.06	0.03	99.16	46.43	Pink
419	23/2	1.43	0.04	0.46	0.47	0.02	4.77	49.44	0.05	0.01	0.09	0.05	100.50	43.67	Grey

CHEMICAL ANALYSES – HAMMER DRILL HOLES – DOLOMITE

REG NO.	GEOLOGIST NO.	SiO2	TiO2	Al2O3	Total Fe as Fe2O3	MnO	MgO	CaO	Na2O	K2O	P2O5	SO3	TOTAL	LOI	Colour
910411	1/2	10.28	0.01	0.07	0.07	0.01	18.81	28.45	0.06	0.01	0.05	0.03	99.82	41.97	White
412	1/4	0.91	0.01	0.06	0.06	0.01	19.44	32.43	0.03	0.01	0.06	0.02	99.76	46.72	White
416	26/2	0.22	0.02	0.12	0.10	0.01	18.98	32.48	0.04	0.01	0.06	0.03	98.96	46.90	White
417	26/4	0.15	0.02	0.09	0.07	0.01	19.17	31.77	0.04	0.01	0.05	0.00	98.45	47.06	White
418	26/6	0.25	0.01	0.09	0.08	0.01	18.78	31.95	0.03	0.01	0.05	0.01	98.17	46.91	White
911337	D7/1	0.38	0.01	0.01	0.17	0.01	20.60	31.67	–	0.01	–	–	99.47	46.65	
911388	D7/2	0.57	0.01	0.07	0.14	0.01	21.89	30.82	–	0.03	–	–	99.27	46.56	
911339	D7/3	1.27	0.01	0.04	0.17	0.01	20.12	32.08	–	0.01	–	–	99.95	46.24	

091056

DAVID MITCHELL LIMITED

A.C.N. 004 406 688

REGISTERED OFFICE
Cave Hill, Lilydale, Vic. 3140 Australia
Correspondence: P.O. Box 486, Lilydale, Vic. 3140 Australia
Telephone: (03) 739 5844
Fax: (03) 735 4574

SALES DEPARTMENT
Telephone: (03) 735 0644
Fax: (03) 739 6189

11th July 1991

Mr. N. Thomas,
Mineral Holdings Australia Pty. Ltd.,
2nd. Floor,
100 Collins St.,
MELBOURNE VIC. 3000

RE: CARBONATE HILLS PROSPECT, REDPA, TASMANIA

Dear Mr. Thomas,

For your information, I am enclosing a copy of the report by our Chemist on the recent calcination tests of the Redpa specimens.

As you can see, the samples CR 3 and CR 11 remained white when heated to 1150° and 1250°C respectively, but your pink specimen overburnt when taken to 1350°.

The localities for CR 3 and CR 11 were given in our previous report.

Yours sincerely,

G R Cochran

GREG COCHRANE
GEOLOGIST

GWC:LJM.
encls.

N.B. 1. N. THOMAS. Pink specimen of limestone was taken from outcrop near CR6.

2. CR3 is located S.W. extremity of outcrop of limestone on Michael Hills.

3. CR11 taken about 1 kilometre N.W. of CR3 on the S.W. side of Coffey's Hill.

cc V. Threadgold 15/7/91

MEMO TO: G. COCHRANE

MEMO FROM: J. ELHAY

SUBJECT: BOX FURNACE CALCINATION OF MINERAL HOLDINGS LIMESTONE

DATE: 11TH JULY 1991

Three pieces of limestone were calcined in the box furnace individually. A pink limestone marked "Carbonate Hills" at 1350C, a white limestone marked CR 11 at 1250C and an off-white limestone marked CR 3 at 1150C.

General remarks on the testing

All pieces remained hard, with no tendency to crumble or to collapse to powder. Minor cracking was evident although not serious.

Preliminary indications suggest that the limestone is very likely to be subject to overburning in a shaft kiln.

If these three pieces are taken to be representative, then one might infer that the lime could well retain its physical integrity in its passage through a shaft kiln.

JACK ELHAY

JE: LJM
attachs.

APPENDIX

Box Furnace Calcination

An appopriately shaped piece of limestone or dolomite is placed in the box furnace.

The temperature is ramped at 200C/hr to the chosen maximum (typically from 1150C to 1350C) and is maintained for a chosen time (typically 60 to 150 minutes).

The piece is examined and tapped periodically, to judge its behaviour and strength. At the end of the soak time, the piece is allowed to cool naturally in the furnace. It is removed from the furnace when cool enough, and described.

Chemical tests may or may not follow on the piece.

091059

Herbert Lange Vertriebsgesellschaft mbH

helawit
MINERALPRODUKTE · FÜLLSTOFFE

Herbert Lange GmbH · Industriestr. 1 · D 2361 Wittenborn

Telefon: 04554—2055
Telefax: 04554—3837
Telex: 261639 (helaw d)
Bankkonten:
Kreissparkasse Segeberg
(BLZ 23051030) Konto-Nr. 3921
Commerzbank Wahlstedt
(BLZ 21240040) Konto-Nr. 8923500

Mineral Holdings
Australia PTY. Ltd.
Att. Chairman
Neil M. Thomas

Melbourne, Australia, 3000
L00613-650 3855

Ihr Zeichen	Ihre Nachricht vom	Unser Zeichen	Datum
		ehc-ba	17.02.92

Your Fax dated 11.02.92

Dear Mr. Thomas,

the lab-result of white dolomite (Carbonate Hills) is:

L = 90,67

a = -3,19

b = 5,23

This material is to dark (L) and the b-result is to high for us.

In comparison: our produkt heladol 30 has got a whiteness of 97,96 (L) and the b-result is 0,41.

Kind regards

Associated Pulp and Paper Mills

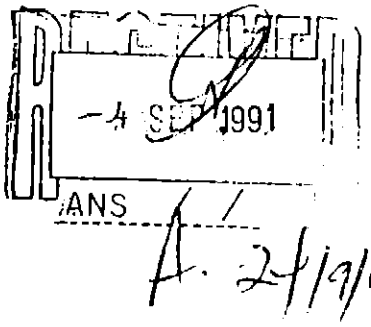
A Division of North Broken Hill Ltd.
A.C.N. 004 208 904

APPM

RESEARCH AND TECHNOLOGY GROUP

Marine Terrace
Burnie 7320
Tasmania, Australia
PO Box 201
Fax: Local (004) 307819
Intnl. +61 04 307819
Telephone:
Switchboard (004) 307777
direct (004) 30 7482

30 August 1991
JF:PG



A. 24/9/91.

Mr N. Thomas
Chairman
Mineral Holdings Aust. Pty Ltd.
2nd Floor, 100 Collins St
MELBOURNE VIC 3000

Dear Mr. Thomas,

Further to your letter dated 8 August 1991 regarding evaluation of a dolomite sample from your Percussion drill hole No. 26/4. We have now milled and evaluated this sample for colour and brightness and detail results below for your perusal.

		Mineral Holding Dolomite	APPM Clay
Brightness		75.6	81.6
Hunterlab colour factor	L	90.0	93.5
	a	-0.3	-0.8
	b	+3.3	+4.7

The above results clearly show the dolomite sample to be lower in brightness and colour than our current clay resource.

We enclose a sample of your dolomite after milling for your appraisal.

On the above evidence we do not, at this stage, envisage any potential use of this dolomite material in our papermaking operations.

We thank you for your interest in our company.

Yours faithfully,
ASSOCIATED PULP & PAPER MILLS

J French

Jim French
Manager - Technical Services

COMALCO
RESEARCH & TECHNOLOGY

MEMORANDUM

Technical Note

File: Kaolin Misc

Ref: TN.279/mdc:mp

Date: 19 August 1991

To: A.R. Kjar

From: M. Coghill

At: 38/55

At: CRC

cc: C. Goodes, CRC

Subject: ***Mineral Holdings Pty. Ltd. Dolomite Quality***

Mineral Holdings Pty. Ltd. supplied a unbeneficiated Dolomite sample, from Togari Tasmania, labelled:

EL 31/90 EL 32/90 EL 32/90
White Dolomite unbeneficiated
Percussion drill core sample
Hole 26 Sample 4 (25 metres of core)

for evaluation at CRC.

The Dolomite sample was ring ground at less than 45 microns prior to brightness and rheological analysis.

BRIGHTNESS

Table 1: Pigment Brightness

			Dolomite		*Omyacarb 2*	*Comalco Kaolin*
			CRC	*Mineral Holdings*	*calcium carbonate*	*(Filter Cake)*
ISO Brightness		%	81.2	-	93.2	86.3
CIE Colour	L*		94.0	87.7	97.8	96.2
	a*		-0.4	-0.2	-0.2	-0.5
	b*		3.3	5.5	0.9	3.2
Yelowness		%	6.1	-	1.6	3.9
Hunter Colour	L	%	92.4	-	97.2	95.0
	a		-0.4	-	-0.2	-0.2
	b		3.3	-	1.0	3.3

The -45 micron Dolomite sample was ground for 4 minutes using a IKA A10 mill and pressed into a tablet at 1.3 bar pressure. The optical properties evaluated using a Elrepho 2000 reflectometer (Table 1 and Figure 1) showed:

- The Dolomite brightness and whiteness was lower than the commercial calcium carbonate (Omyacarb 2) or Comalco Kaolin.
- The CRC values were higher than Mineral Holdings possibly due to sample preparation and their reflectometer.
- The Dolomite reflected less blue light producing a yellowish appearance.

Table 2: XRF analysis

		CRC	*Mineral Holdings*
SO_3	%	-	0.05
MnO	%	-	0.01
$A\ell_2O_3$	%	<0.1	0.10
Fe_2O_3	%	<0.1	0.03
SiO_2	%	0.1	0.35
TiO_2	%	<0.1	0.01
P_2O_5	%	<0.01	0.005
Na_2O	%	0.1	0.03
K_2O	%	<0.01	0.01
CaO	%	33.0	32.20
MgO	%	19.0	20.10
LOI	%	46.4	46.90

- XRF analysis (Table 2) showed a low mineral impurity content. The large Loss of Ignition (LOI) could be due to decomposition producing carbon monoxide and dioxide.

The low iron and titanium contents suggests that research in the Dolomites organic content, particle size range and shape is required. Therefore, mineral processing should be considered to improve the Dolomites optical properties.

RHEOLOGY

The -45 micron Dolomite sample was madedown at natural pH (i.e. pH 9.0) with distilled water. The 73% solids slurry Brookfield viscosity could not be determined. Although, dispersing the Dolomite with 0.25% w/w dry Nopcosperse L400 polyacrylate produced a Brookfield Viscosity (100 rpm) of 62 mPas at 73% solids and 54 mPas at 71% solids.

Therefore, the Dolomite sample viscosity and dispersant demand was typical for commercial calcium carbonates.

Conclusion

The unbeneficationated samples colour makes it unsuitable as a paper coating or filler pigment. It is recommended that:

- The Dolomites organic level should be determined.
- Beneficiation and colour improvement (i.e. ozone leaching) processing steps should be investigated.
- The effect of particle size on brightness and abrasion should be determined.

M. Coghill

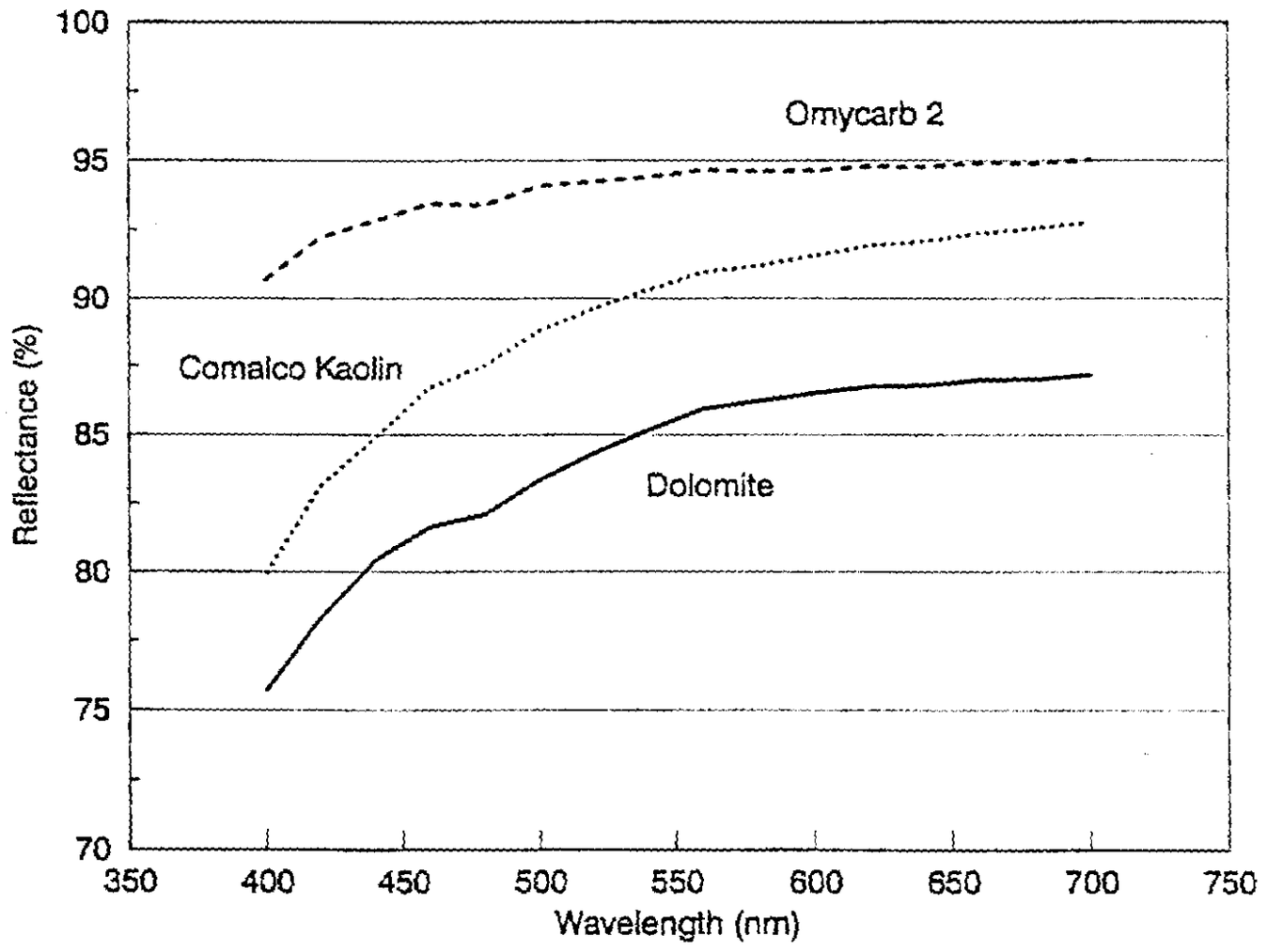


Figure 1: Pigment reflectance values.

091066

Department of Resources & Energy

DIVISION OF MINES & MINERAL RESOURCES

Enquiries: R.S. Bottrill
Phone: 30 8359
Your ref:
Our file: RSB47.91:LD

MINES
File Ref. 601.0
- 5 JUL 1991
Doc. Ref. 1992
Action Officer: CCM | Initials:
Document To: | Date:

- 5 JUL 1991

Mr D. Zani
Chief Chemist
ROSNY PARK

MAGNETIC MATERIAL IN LIMESTONE AND DOLOMITE

Two samples of material were submitted for identification of magnetic minerals, extracted from crushed limestone and dolomite, submitted by Mineral Holdings Pty Ltd, using a strong hand magnet. The samples extracted from limestone was registered as G102019, and the sample from dolomite is G102024.

The magnetic material in both samples are a mixture of metallic iron and fine grained, pulverent black material, probably magnetite.

A charge of $60.00 should be applied for these identifications.

R.S. Bottrill
MINERALOGIST/PETROLOGIST

091067

Department of Resources & Energy

DIVISION OF MINES & MINERAL RESOURCES

Enquiries: R.S. Bottrill
Phone: 30 8359
Your ref:
Our file: RSB55.91:JH

16 JUL 1991

Mr V Threader
43 Kingston Heights
KINGSTON BEACH TAS 7050

Dear Sir,

MINERALOGICAL EXAMINATION: DOLOMITE, EL 31/90 (REDPA)

A sample of percussion drill chips, + 5mm and labelled 1/2 was received for mineralogical examination and registered as G102020.

The sample was prepared as two thin sections for microscopic examination. Six of the seven chips examined in this manner appeared to be entirely carbonate, while one contained large amounts of cherty quartz. The sample was analysed by X-ray diffraction (~12 chips) and indicated about:
85% dolomite, 5% calcite, 10% quartz and 2% feldspar.

The texture is typical of dolomites, with a mosaic of anhedral, cloudy crystals of rather homogenous grainsize. The cloudiness is due to fine fluid inclusions rather than iron minerals: none of these were seen, although some iron is probably in solid solution in the dolomite lattice. No evidence was found for the original carbonate textures.

The grainsize is in the range 150-200 μm. The grainsize nomenclature of carbonates is complex, but the sample is sparry in the classification of Folk (1959), mesocrystalline (Bissett & Chilingar, 1967) or macrocrystalline (Frost's magnesite classification). There is no cryptocrystalline material present.

An invoice for $160.00 will be sent separately for this work.

Yours faithfully,

R.S. Bottrill
MINERALOGIST/PETROLOGIST

Appendix 3

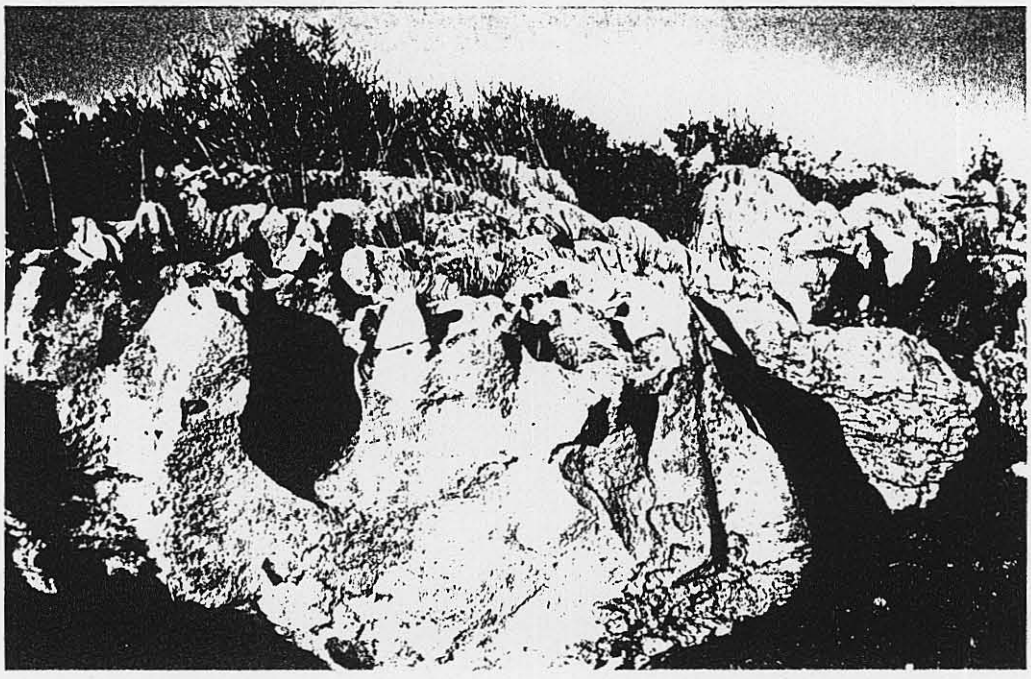
Photographs

1 and 2. Tertiary limestone Redpa showing eroded outcrop

3. Southern end Coffeys Hill showing outcrop distribution

4. Drilling B.H.No.9 between Coffeys and Michaels Hills

5. Precambrian dolomite (B.H.1) on Left and
   Low Hill of Tertiary limestone (B.H.2) on Right.



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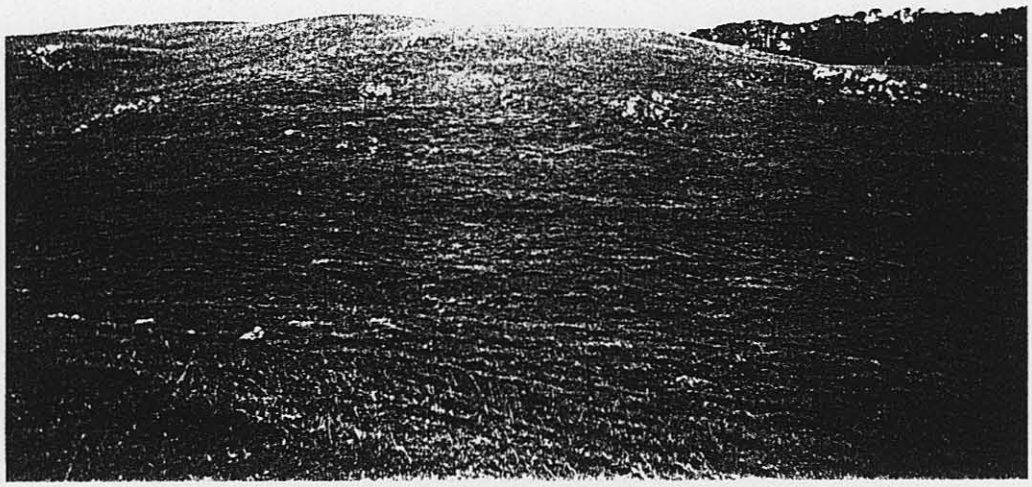

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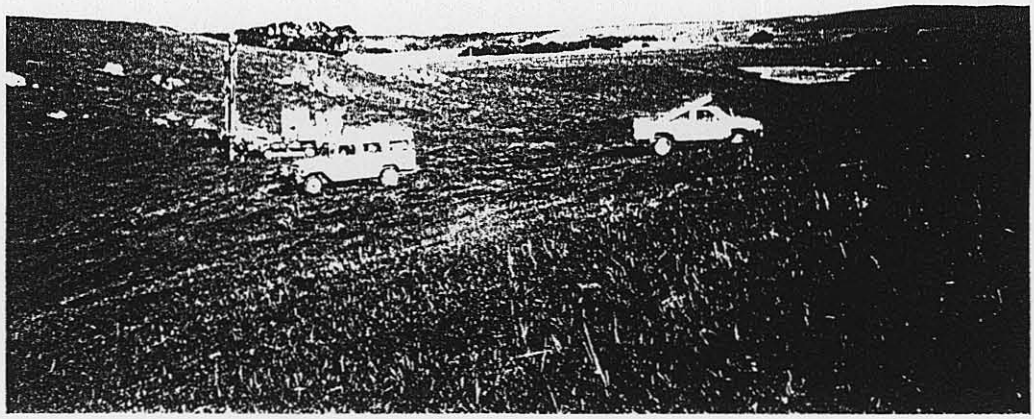

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