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CRA EXPLORATION PTY. LIMITED

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EL 43/70 ARTHUR RIVER AREA

REPORT ON EXPLORATION FOR 12 MONTHS

TO 15TH OCTOBER, 1987

*Move to Reference File
for file of DLs 8717 and
8718 and all subsequent
DLs.*

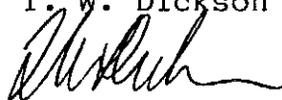
SHAD 2/8/92.

AUTHOR: F. R. Funnell

DATE: September, 1987

SUBMITTED TO: T. W. Dickson

ACCEPTED BY:



COPIES: CRAE Hobart
CIS Canberra
Mineral Holdings Australia P/L
Department of Mines, Tasmania

CRAE Report No. 14728

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1. SUMMARY

Over the past 12 month period work has consisted almost entirely of collecting bulk samples of magnesite for metallurgical testing in Australia and overseas. In the latter part of 1986 two samples of 80 tonnes and 30 tonnes were shipped overseas for evaluation as a source for magnesium metal production.

A search was then initiated for a large sample site capable of supplying large samples of differing grades of magnesite and which could ultimately be the focus of any new mining activity. Three sites were tested and costeans were established at two localities. An area of high grade magnesite at Cann Creek was also sampled.

2. INTRODUCTION

CRA Exploration Pty. Limited has conducted detailed drilling and evaluation programmes over the three magnesite deposits at Lyons River, Arthur River and Cann Creek, under the terms of a Joint Venture Agreement signed with Mineral Holdings Australia on 8th April, 1982.

The area is close to existing infrastructure and is less than 40km from the major part of Burnie and large reserves of magnesite have been identified. Metallurgical test work is now underway to assist in future development of the deposits.

3. CONCLUSIONS

Large reserves of magnesite have been identified and are currently being evaluated. The bulk samples taken to date have come from a series of small magnesite pinnacles at the Pinner and M1 areas and there is now a need to open a large face to supply large volumes of magnesite of different grades and textures for additional testwork and market evaluation studies.

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The large outcrop at the M1 area north of the Arthur River appears to be the only suitable sample site that does not require the removal of large volumes of clay overburden.

4. RECOMMENDATIONS

The M1 area outcrop should be developed as the source for all further bulk samples for metallurgical and marketing studies.

5. BULK SAMPLING

5.1 Pinner Area

(Lions River)

A 30 tonne sample of magnesite was collected from the Pinner Outcrop at the same site as the sample previously taken and shipped to Humboldt-Wedag. The sample was washed and crushed to -5mm. Part of the material was upgraded by floatation at the Department of Mines metallurgical laboratory and despatched to Norsk Hydro for testing as a source of magnesium metal.

Three samples of the bulked material (pre-beneficiation) samples 119888-119890 (Appendix 1) averaged 37.4% MgO, 11.3% MgO and 0.28% Fe₂O₃.

!CaO perhaps?

5.2 M1 Area Arthur River

(M1)

An 80 tonne sample was collected from a small pinnacle outcrop to the east of the Main Arthur River outcrop. The sample was washed and crushed to 0.5-5.0 inch size and loaded into containers for shipment to M.P.L.C. in England. The crushing resulted in considerable loss (undersized material) and just over 52 tonnes was shipped. Again, the material was to be evaluated as a source of magnesium metal.

Samples 1154887-890 and 119884-87 (see Appendix 1) were collected from the sample site and the bulk sample. They average 44.1% MgO, 2.24% CaO, 1.06%

As part of the search for a large sample site the main M1 outcrop at Arthur River, immediately to the west of the above sample site, was cleaned up and prepared for sampling. A zone 60m long and 1-2m high around the base of the outcrop was cleared off by jackhammer to expose the magnesite. Some 40 samples have been collected to examine mineralogical and chemical zoning around the outcrop. Assay results are still awaited. \ 20WGF

5.3 Lyons River Costean (No 1)

A large costean was established adjacent to the Lyons River. Fine grained and coarse recrystalline magnesite was known from small outcrops and the costean was developed to establish a face for later bulk sampling of various types and grades of magnesite. The clay overburden extended to below creek level and attempts to establish a large sample face had to be abandoned.

Three outcrops within the costean were sampled. A plan of the costean site is also attached (see Plan TASH 3492). Assay results are included on this plan.

On abandonment the costean was filled in and 250 young Myrtle, Peppermint and Stringy Bark trees were planted to rehabilitate the area.

5.4 Lyons River East

A large outcrop of magnesite east of the Lyons River costean and close to the collar position of DD 82 LR 1 was sampled as a possible costean site. Plan TASH 3386 indicates the sample sites and the assays are listed in Appendix 2. In general, the magnesite in this area was considered to have too high silica and iron content for a suitable sample site.

5.5 DD 83 AR 2 Site

This area was considered as a possible bulk sample site. A large hill occurs to the west of the AR 2 drill site and it was thought that magnesite could be present at shallow depth. A line of shallow auger holes, however, failed to locate magnesite at shallow depth and no further work was attempted.

5.6 Cann Creek

This area, about 5km north of Arthur River, contains some of the highest grade magnesite with extremely low iron content. Mineral Holdings Australia have opened up one small outcrop of high grade magnesite and have costeamed 40m to the north. High grade magnesite averaging 44.2% MgO, 3.6% Cao, 1% SiO₂ and only 0.06% Fe₂O₃ was exposed. Approximately 285,000 tonnes of this material is available in this area and further costeaning south of the creek is warranted.

An appraisal of the area with assay results if appended (Appendix 3) and a plan of the costean and sample sites is shown on Plan TASH 3455.

6. ORE SORTING TESTS

Trial samples of magnesite and mixed magnesite-dolomite rock were supplied to Group Special Equipment (CRA) for tests on ore sorting as a method of upgrading the magnesite. The initial tests were encouraging and a report on the results is appended (Appendix 4).

F. R. FUNNELL

006

872007

LOCALITY

Burnie

1:250,000 Sheet

SK 55-3

KEYWORDS

Magnesite,

Bulk Sampling,

Geochem. Rock.

LIST OF PLANS

<u>Plan No.</u>	<u>Title</u>	<u>Scale</u>
TASH 2664	Arthur River E.L. 43/70 DO 85 cc2 Section	1:1000
TASH 3386	Outcrop South West of DD 82 LR 1 Sample Number Locations	1:250
TASH 3455	Cann Creek Prospect Geology and Sample Number Location Plan	1:2,000
TASH 3476	Arthur River EL 43/70 Location Plan Showing Areas To Be Retained	1:100,000
TASH 1350A&B	Geological Map Lyons River - Arthur River Magnesite Horizon (Northern Sheet)(with sample location and assay results)	1:5,000
TASH 3492A&B	Lyons - Arthur River Magnesite Reconnaissance Rock Chip Sample Number Locations and Assay Data	1:5,000

LIST OF APPENDICESAPPENDIX

- 1 Assay Sample of Bulk Sample Shipments
- 2 Assay Results - Lyons River East
- 3 Appraisal and Assay Results - Cann Creek Area
- 4 Ore Sorting Test Results

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APPENDIX 1

Assay Sample of Bulk Sample Shipments

Pinner and M1 Areas

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Magnesite	Initial sample collected by K Pinner from the M1 area
1154887-890	Samples collected from site of M1 bulk sample
119884-887	Samples collected from M1 bulk sample material
119888-890	Samples collected from Pinner outcrop bulk sample material

010

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ANALYSIS - %

SAMPLE MARK	MAGNESITE
SiO ₂ - Silica	2.17
TiO ₂ - Titanium Oxide	<0.01
Al ₂ O ₃ - Aluminium Oxide	0.04
Total Iron as Fe ₂ O ₃	0.93
MnO - Manganese Oxide	0.10
MgO - Magnesium Oxide	46.8
CaO - Calcium Oxide	0.29
Na ₂ O - Sodium Oxide	0.02
K ₂ O - Potassium Oxide	<0.01
P ₂ O ₅ - Phosphorus Pentoxide	0.03
LOI - Loss On Ignition	50.2
Total	100.6

Method: H1/1

011

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amdel

Analysis code H1/1

Report AC 25/87

Page I1

NATA Certificate

Results in percentages

1154887 1154888 1154889 1154890

SiO2	1.82	3.22	3.54	4.16
TiO2	<0.010	0.01	<0.010	<0.010
Al2O3	0.03	0.01	0.03	0.04
Fe2O3	1.49	1.01	1.35	1.38
MnO	0.09	0.09	0.09	0.08
MgO	45.1	44.9	44.7	43.5
CaO	1.10	1.31	1.82	2.48
Na2O	0.09	0.08	0.06	0.08
K2O	0.03	0.13	0.01	0.05
P2O5	0.04	<0.010	0.03	0.06
LOI	50.9	49.8	49.2	48.7

Totals	100.7	100.6	100.8	100.5
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Total FE as Fe2O3



amdel

Analysis code H1/1

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NATA Certificate

Results in percentages

	119884	119885	119886	119887	119888
	← MI		→ Pinne →		
SiO ₂	2.52	2.70	5.05	4.36	8.40
TiO ₂	<0.010	<0.010	<0.010	<0.010	0.02
Al ₂ O ₃	0.14	0.11	0.14	0.16	0.39
Fe ₂ O ₃	0.77	0.71	0.87	0.88	0.34
MnO	0.09	0.10	0.11	0.09	0.06
MgO	44.4	44.8	42.2	43.3	35.1
CaO	2.20	2.70	4.68	1.63	13.2
Na ₂ O	0.03	0.03	0.04	0.03	0.04
K ₂ O	<0.010	<0.010	<0.010	0.01	0.02
P ₂ O ₅	0.07	0.12	0.20	0.12	<0.010
LOI	48.1	47.1	45.4	48.1	40.5
Totals	98.3	98.3	98.7	98.7	98.1

Total FE as Fe₂O₃

013

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amdel

Analysis code H1/1

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NATA Certificate

Results in percentages

119889 119890

SiO2	5.35	4.66
TiO2	<0.010	<0.010
Al2O3	0.26	0.24
Fe2O3	0.15	0.23
MnO	0.05	0.07
MgO	35.0	42.0
CaO	13.8	7.00
Na2O	0.04	0.05
K2O	0.03	0.03
P2O5	<0.010	<0.010
LOI	43.6	44.2

Totals 98.3 98.5

Total FE as Fe2O3

014

872015

APPENDIX 2

Assay Results - Lyons River East

015

872016

Arthur Kive & Geddy.



C.R.A. EXPLORATION PTY. LIMITED

(INC. IN N.S.W.)

1207 TASMAN HIGHWAY, CAMBRIDGE, TASMANIA 7170

P.O. BOX 138
 BELLERIVE 7018
 TELEGRAMS: CRAEX
 TELEX: AA57144
 TELEPHONE: 48 5499
 AREA CODE: (002)

IN REPLY PLEASE QUOTE

FRF.W4.7.43/70

23 April 1987

Memorandum to: T W DICKSON
 From: F R FUNNELL



ARTHUR RIVER MAGNESITE

Attached is a copy of the assays for the channel sampling carried out around the outcrop east of the Lyons River costean. Note the high Fe_2O_3 , SiO_2 and relatively low MgO values. These assays are, if anything, less encouraging than the ones we obtained from the Lyons River costean. Consequently I do not think we should consider further costeaning in this area around DD82 LR1.

It is interesting to compare these assays with 1239262, a sample of impure?? magnesite collected while examining the outcrop exposed at the Cann Creek bulk sample site (courtesy of Neil Thomas). He mentioned to me that he was sending some material to England for testing to determine its suitability for use as a feed to produce fused products. **What is he really up to?**

Regards,

F.R. Funnell.

FRED FUNNELL

Encs (2)

CRA EXPLORATION PTY. LTD.

017

SAMPLE NUMBER	LOCATION		Sample Type	ANALYSES											Geological Observations		
	Easting	Northing		Al ₂ O ₃	CaO	TOTAL	K ₂ O	MgO	MnO	Na ₂ O	P ₂ O ₅	SiO ₂	TiO ₂	LOI		Ni	
						Fe											
232951			5m g/s	0.16	18.4	1.24	0.10	18.8	0.09	0.07	0.02	22.7	ltd	35.8	0.002		
2452			"	ltd	2.42	1.26	0.10	35.2	0.13	0.03	ltd	16.5	ltd	42.0	0.002		
2453			"	ltd	3.84	1.23	0.28	42.2	0.10	0.02	0.02	0.65	ltd	49.9	0.001		
2454			"	ltd	2.00	1.80	0.14	43.8	0.12	0.02	ltd	50.010	ltd	50.4	0.001		
2455			"	ltd	3.00	0.90	0.08	41.8	0.07	0.03	ltd	5.65	ltd	47.8	0.002		
2456			"	ltd	0.90	1.51	0.10	41.6	0.12	0.04	0.02	6.10	ltd	47.8	0.002		
2457			"	0.03	4.70	1.52	0.12	32.5	0.13	0.05	ltd	11.4	ltd	43.5	0.002		
2458			"	ltd	6.95	1.47	0.10	38.8	0.13	0.04	0.02	3.20	ltd	48.3	0.003		
2459			"	0.05	2.36	0.78	0.14	31.5	0.07	0.05	0.01	26.3	ltd	36.9	0.003		
260			"	ltd	0.41	0.90	0.11	40.0	0.08	0.02	ltd	12.0	ltd	44.7	0.003		
27261			"	ltd	0.13	0.67	0.07	35.2	0.08	0.02	ltd	22.2	ltd	34.7	0.001		
34262			g/s	ltd	3.28	ltd	0.10	45.4	ltd	0.04	ltd	ltd	ltd	51.5	0.002	Conn Ch sample site - Lyons May site, located just inside a major shear zone.	
				ltd - below detection limit													
				All results in %													
DETECTION LIMIT				0.010	0.010		0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	
ANALYTICAL METHOD				ORE 2/1											ORE 2/2		

Project	1 250 000 Sheet : BURNIE SK55-3AMG Zone :	Sheet No. : 01
Tenement	ARTHUR Rv EL 43/70	Laboratory : AMDEL
Area / Prospect	JUTCROP EAST OF LYONS Rv COSTEAN	Collected By : FRF
	DPO's : 38717	Date : 27-3-1987

872017

APPENDIX 3

Appraisal and Assay Results - Cann Creek Area

019

872019



CRA EXPLORATION PTY. LIMITED

(INC. IN N.S.W.)

54 RAGLAN STREET, PRESTON, VICTORIA 3072, AUSTRALIA

P.O. BOX 93
 NORTHLAND CENTRE 4072
 TELEGRAMS CRAEX
 TELEX AA37474
 TELEPHONE 480 1866
 AREA CODE 031

IN REPLY PLEASE QUOTE

Tas. Corresp. File

10th August, 1987

NOTE TO: File

FROM: T. W. Dickson

Cann Creek Magnesite

Neil Thomas has recently opened up the largest and highest grade of the Cann Creek magnesite outcrops. The outcrop is approximately 10 metres north of Cann Creek and has been exposed over a distance of 18 metres along an access track. Dolomitic talc schist is exposed for 15m to the west and 30 metres to the east of the outcrop.

A costean was constructed 40 metres north of the track, but only a very thin 0.2 metre section of badly weathered carbonate was exposed in the 100m trench.

The amount of high grade magnesite available is therefore severely limited and extends no more than 30 metres north of the creek or approximately 1500 tonnes/vertical metres north of the creek. This material averages 44.2% MgO, 3.6% CaO and 1.0% SiO₂. Iron is very low and averages 0.06% Fe₂O₃.

The magnesite does not outcrop south of Cann Creek, but a drill hole (DD 85 CC 2) traverses the section 20m south of the creek and at 100m depth. Only two thin dolomitic magnesite sections, 35-37% MgO, 13-10% CaO and 6-8% SiO₂ were intersected. There is no doubt that CC 1 traversed the full section even if the dip is slightly to the west. A second hole, DD 84 CC 1, a further 450 metres to the south, intersected only dolomite. It would appear that the good grade magnesite facies changes to lower grade magnesite and dolomite with depth and to the south.

It is probably very unlikely but even if the magnesite were to extend to 100 metres south of the creek and could be worked to a depth of 40 metres (a waste to ore ratio of 2.2 to 1) then a maximum of 220,000 tonnes could be available (very optimistic).

If the material north of the creek could also be worked to 40 metres below creek level, then an additional 65,000 tonnes of magnesite could be available.

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872020

The extent of magnesite south of the Cann Creek could best be checked by a series of back hoe trenches at 40, 100 and perhaps 150m south of the creek.

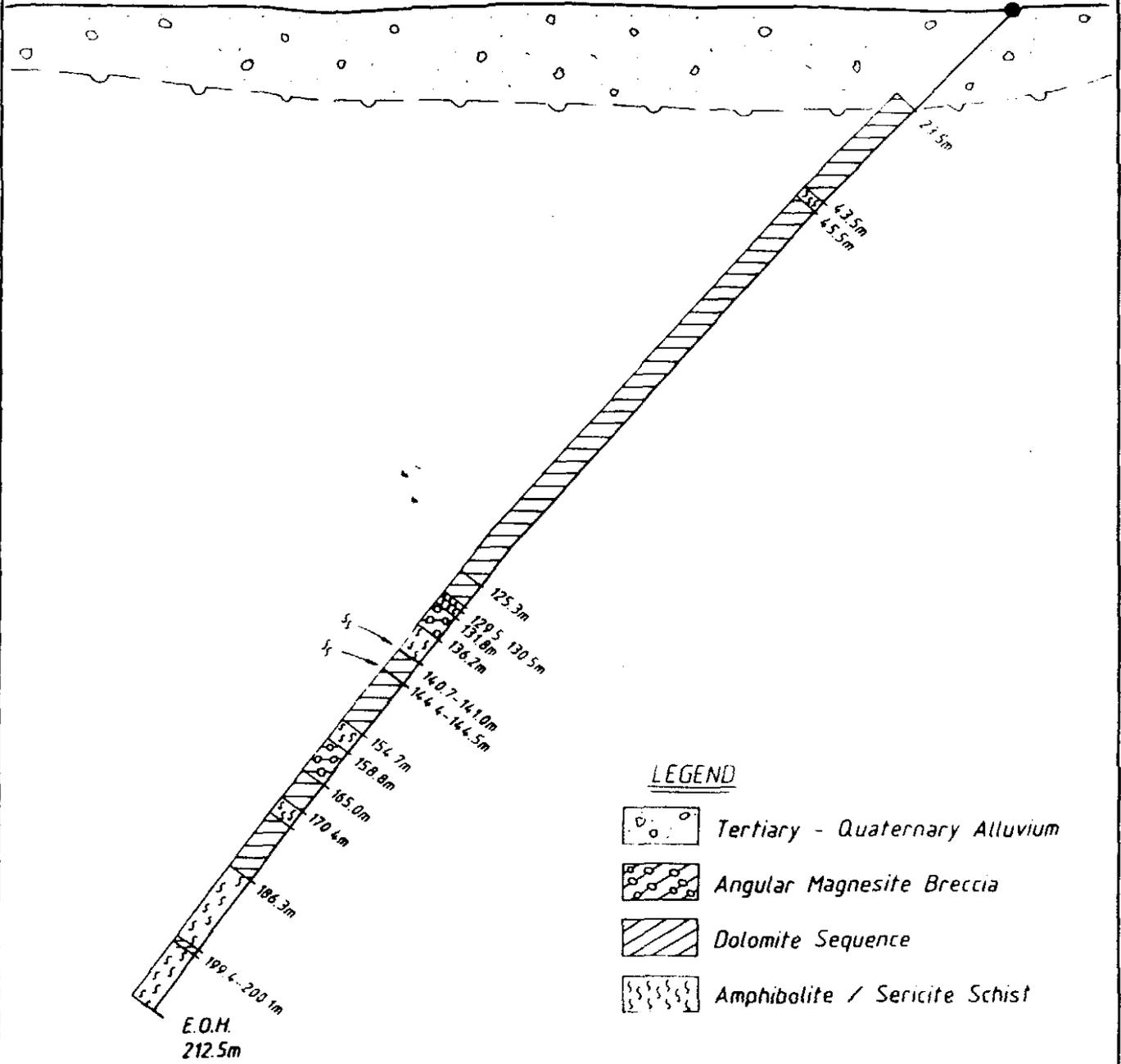


T. W. DICKSON

023

872022

DD85 CC 2
Inclination : -46°
Azimuth : 285° (mag)



LEGEND

- Tertiary - Quaternary Alluvium
- Angular Magnesite Breccia
- Dolomite Sequence
- Amphibolite / Sericite Schist

5 cm

CRA EXPLORATION PTY. LIMITED

ARTHUR RIVER E.L. 43/70
DD85 CC 2
SECTION

REF.	SX55 - 3	DRAWN	R.T.
SCALE	1 : 1000	REPORT N	11 778
AUTHOR	SJC		

024

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Analysis code ORE2/1+2 Report AC 117/88

Page II

NATA Certificate

Results in percentages

1652701 1652702 1652703 1652704 1652705

SiO ₂	3.28	1.63	1.53	0.35	0.31
TiO ₂	<0.010	<0.010	<0.010	<0.010	<0.010
Al ₂ O ₃	<0.010	<0.010	0.07	<0.010	<0.010
Fe ₂ O ₃	0.08	0.07	0.04	<0.010	0.03
MnO	<0.010	<0.010	<0.010	<0.010	0.01
MgO	43.6	41.9	45.9	46.6	45.7
CaO	3.14	6.20	1.25	1.60	1.94
Na ₂ O	<0.010	<0.010	<0.010	<0.010	<0.010
K ₂ O	0.18	0.18	0.17	0.20	0.17
P ₂ O ₅	0.04	0.04	0.04	0.04	0.04
LOI	48.1	48.7	49.7	50.6	50.7

Totals	98.4	98.7	98.7	99.3	98.9
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NI	0.009	0.004	0.008	0.008	0.011
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Total FE as Fe₂O₃

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Analysis code ORE2/1+2 Report AC 117/88

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NATA Certificate

Results in percentages

1652706 1652707 1652708 1652709 16527010

SiO2	0.46	0.47	0.37	0.36	0.88
TiO2	<0.010	<0.010	<0.010	<0.010	0.02
Al2O3	<0.010	<0.010	<0.010	<0.010	0.12
Fe2O3	<0.010	0.13	<0.010	0.03	0.15
MnO	<0.010	<0.010	<0.010	<0.010	0.01
MgO	44.3	44.7	44.8	42.4	42.2
CaO	4.16	2.58	3.66	5.35	5.80
Na2O	<0.010	<0.010	<0.010	<0.010	<0.010
K2O	0.17	0.17	0.17	0.17	0.16
P2O5	0.05	0.04	0.04	<0.010	0.03
LOI	50.2	50.4	50.2	49.8	49.3

Totals	99.3	98.5	99.2	98.1	98.7
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NI	0.003	0.004	0.004	0.009	0.004
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Total FE as Fe2O3

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Results in percentages

16527011 1652714

SiO2	0.67	94.4
TiO2	0.02	0.16
Al2O3	0.11	1.90
Fe2O3	0.35	1.60
MnO	0.02	0.03
MgO	43.1	0.60
CaO	4.80	0.05
Na2O	0.02	0.02
K2O	0.16	0.42
P2O5	0.04	0.07
LOI	49.9	1.39

Totals 99.2 100.6

NI 0.005 0.004

Total FE as Fe2O3

027



technology and enterprise

Amdel Limited - Inc. In S.A.

Amdel
31 Flemington Street,
Frewville, S.A. 5063

Telephone: (08) 372 2700

Address all correspondence to:
P.O. Box 114,
Eastwood, S.A. 5063

Telcx: AA82520
Facsimile: (08) 79 6623

24 July 1987

CRA Exploration Pty. Limited,
P.O. Box 138,
ROSNY PARK, TAS. 7018

ATT: MR. F.R. FUNNELL

REPORT G 7152/88

YOUR REFERENCE:	DPO No. 38730
IDENTIFICATION:	165713-13
MATERIAL:	Two rock samples
DATE RECEIVED:	10 July 1987
WORK REQUIRED:	Petrography (2 Code MA1.1)

Investigation and Report by: Frank Radke

Acting Manager - Geological Services: Dr Alan W Webb

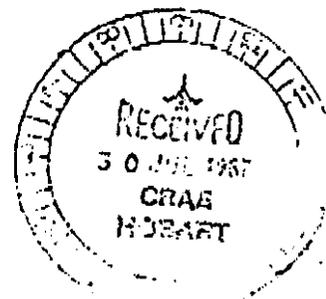
Alan Webb
→

for Dr William G Spencer
General Manager
Applied Sciences Group

c.c. CRA Exploration Pty. Limited,
P.O. Box 138,
ROSNY PARK, TAS. 7018
ATT: DISTRICT ADMIN. OFFICER

CRA Exploration Pty. Limited,
P.O. Box 656,
FYSHWICK, A.C.T. 2609
ATT: CHIEF GEOLOGIST INFORMATION SERVICES

bp



Sample No. (Thin Section No.) ROCK NAME	Major Mineralogy and Texture	Minor Minerals	Alteration	Comments
1652712 (TSC49088) MAGNESITE- TALC BRECCIA	Deformed rock with variable texture comprised mainly of magnesite with localised talc-rich clasts. Magnesite forms granular mosaics with localised finely granulated texture and deformational lamellae. Talc-rich clasts tend to be foliated.	Chlorite Opagues	Talc shows minor replacement by chlorite. Some narrow recrystallised magnesite veinlets transect rock.	Deformed magnesite-rich rock.
1652713 (TSC49089) MAGNESITE BRECCIA	Finely granular magnesite clasts separated by coarser grained mosaic of magnesite. Narrow veinlets in clasts also coarser grained, recrystallized magnesite. Coarser grained magnesite has deformational lamellae. Minor talc forms small disseminated flakes in fine-grained magnesite clasts. Magnesite and talc identified by XRD.	Chlorite Opagues	Talc flakes show minor replacement by chlorite.	Magnesite-rich rock with fragmental texture. Clasts contain narrow veins of recrystallized appearing magnesite.

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029

872028

APPENDIX 4

Ore Sorting Test Results

830

FROM: CRA MINERAL RESOURCE STUDIES
MELBOURNE

TO: CRAE
PRESTON

ATTN: TOM DICKSON

COPY: R.L. KAY
J.L. DUNBAR
P. HAWKINS (PRESTON)

DATE: 28/10/86

FILE: 7-2-6

RE: TASMANIAN MAGNESITE
PRELIMINARY ORE SORTING TESTWORK

CONFIRMING OUR 28TH OCT TELEPHONE DISCUSSION.

TO INITIATE PRELIMINARY ORE SORTING TESTWORK, THREE, ONE KILOGRAM, SAMPLES OF TYPICAL MAGNESITE ORE ARE TO BE SELECTED AND FORWARDED TO:

MR. PETER HAWKINS,
C/O CRA LTD, ADVANCED TECHNICAL DEVELOPMENT,
GROUP SPECIAL EQUIPMENT,
40-42 SWANSTON STREET,
PRESTON, VICTORIA, 3072.

THE SAMPLES ARE TO BE BULK SAMPLES (I.E LUMP RATHER THAN DRILL CORE) AND WILL BE BROKEN DOWN BY GSE TO A MINUS 2 INCH PLUS HALF INCH SIZE RANGE.

THE SAMPLES ARE TO REPRESENT LIKELY MAGNESITE "ORE" AND TO REFLECT A RANGE OF QUALITIES I.E.

SAMPLE A HIGH GRADE MAGNESITE ORE
SAMPLE B AVERAGE GRADE MAGNESITE ORE
SAMPLE C AVERAGE-LOW GRADE MAGNESITE ORE.

A BRIEF MINERALOGICAL AND LOCATION DESCRIPTION FOR EACH SAMPLE IS TO BE PREPARED AND PROVIDED TO MRS AND GSE.

INITIALLY GSE WILL DETERMINE THE POTENTIAL SCOPE TO UPGRADE THE MAGNESITE "ORE" USING ORE SORTING TECHNIQUES.

GIVEN ENCOURAGING RESULTS, FURTHER TESTWORK WILL BE CONDUCTED ON A CONTROLLED ANALYTICAL BASIS.

YOUR ASSISTANCE IN PROVIDING THE NECESSARY SAMPLES IS APPRECIATED.

REGARDS,

LAVERTY

872030

Hodder River - Germany



GROUP SPECIAL EQUIPMENT

Division of CRA Services Ltd
55 Collins Street, Melb. Vic.

Mail and Delivery Address
40-42 Swanston Street
Preston Vic 3072
Australia

Telephone 658 4588
STD (03) 480 4177
Telex GSEQUIR-AA128736
In Reply Please Quote

12 NOV 1986

CRAE
PRESTON

MEMORANDUM

DATE :	11th November, 1986	REF NO :	APH/WP/0427A
TO :	T. Dickson	FROM :	A.P. Hawkins
AT :	CRAE, Preston	AT :	GSE, Preston
C.C. :	K. Hamilton		
AT :	39/55		

RE : TASMANIAN MAGNESITE - PRELIMINARY ORE SORTING TESTWORK

Magnesite lump samples received at GSE on 5/11/86 have been subjected to very preliminary ore sorting evaluation using our computer image processing system. The scope of the tests was as set out in the attached memo of 28/10/86 from Mick Laverty.

Based on the procedure described below, it was found that the categories of Dolomite and Dominant Dolomite-Lesser Magnesite were readily distinguishable from categories of Dominant Magnesite-Lesser Dolomite, and Amorphous Magnesite. Also, separation could be made between the Dolomite category and the Dominant Dolomite-Lesser Magnesite category.

Given the usual qualifications that this is based on a most preliminary sample suite, it appears that photometric sorting should be considered further, and that arrangements be made to subject more meaningful quantities of material for further evaluations.

A.P. HAWKINS

APPENDIX

OUTLINE OF TEST PROCEDURE

Four lump samples of approximately 1kg were received for initial sorting evaluations. These were labelled as follows :

- 1: Amorphous Magnesite
- 2: Dominant Magnesite with lesser Dolomite
- 3: Dominant Dolomite, lesser Magnesite
- 4: Dolomite

(All Pinner Outcrop)

Each sample in turn was broken down by hammer to provide a number of clean-surfaced fragments in the 1" to 2" size range.

These were laid out in category groups and images captured and stored on an Imaging Technology PC Vision system. Two sets were taken, one with dry surfaces, the other wet, which is a more usual way of presenting material to a photometric sorter.

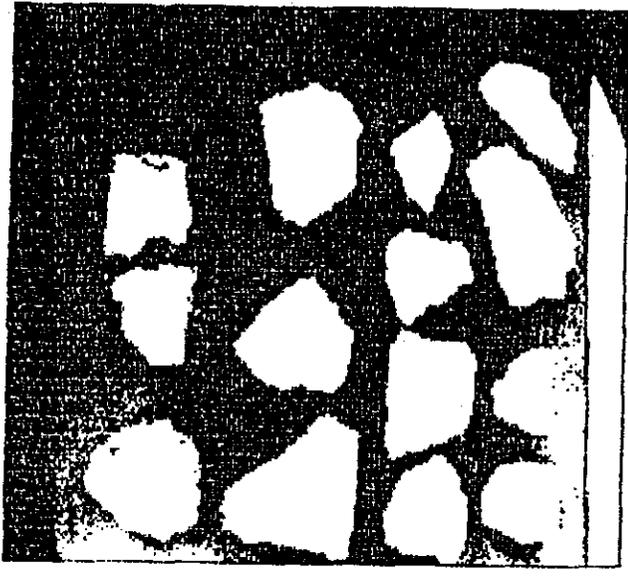
A series of different grey thresholds were set between black (0) and white (256). In the printouts below, the white areas are those where the reflectivity of the rock exceeds the indicated threshold. So for example on the wet surface series, the dolomite pieces (numbered 14, 13 & 12) start to drop out at a threshold setting of around 120-130; dominant dolomite (11, 10 & 9) 170-180; dominant magnesite (8, 7, 6 & 5) 190-210; and magnesite (1, 2, 3 & 4) above 210.

The normal analysis technique to exploit such differences would be a 'median analysis', where the area of rock above a preset threshold value as a fraction of the total rock area would be employed as the sorting parameter.

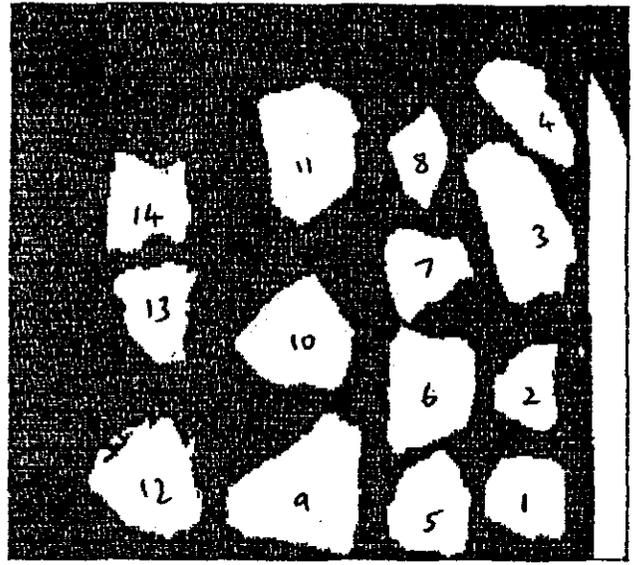
For further such tests with greater quantities of sample, a quantitative criteria such as the median analysis would be employed.

03A = Dolomite
Dolomite Magnesite
Magnesite

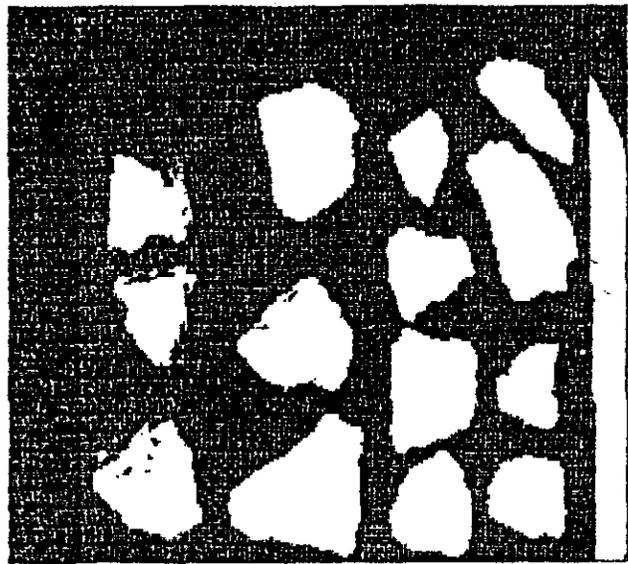
Wet Surface



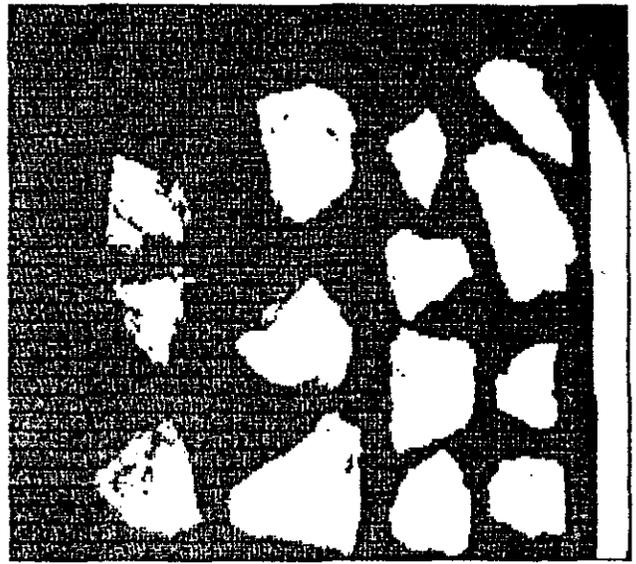
b:wm2 Threshold = 50



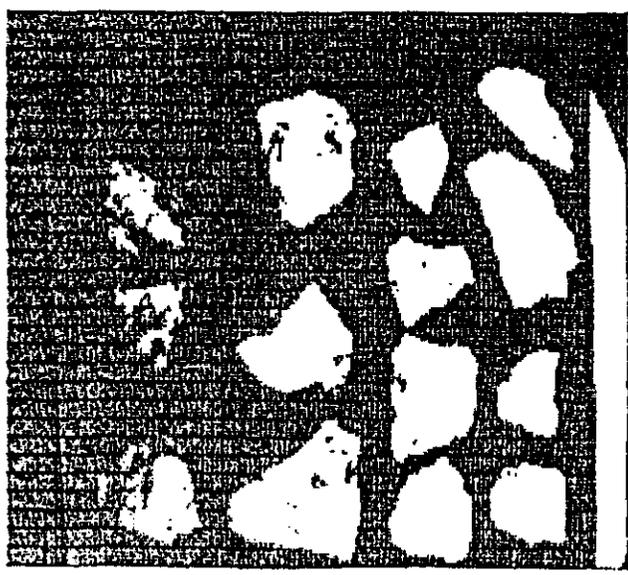
b:wm2 Threshold = 62



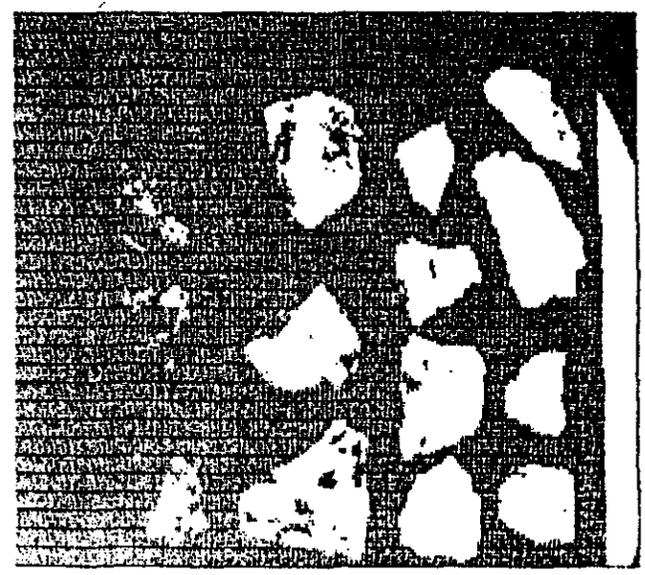
b:wm2 Threshold = 75



b:wm2 Threshold = 87



b:wm2 Threshold = 100



b:wm2 Threshold = 112

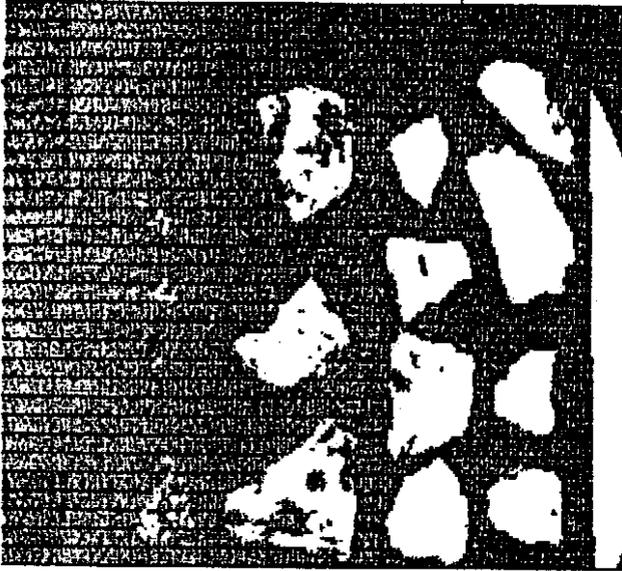


Image 1 Threshold = 125

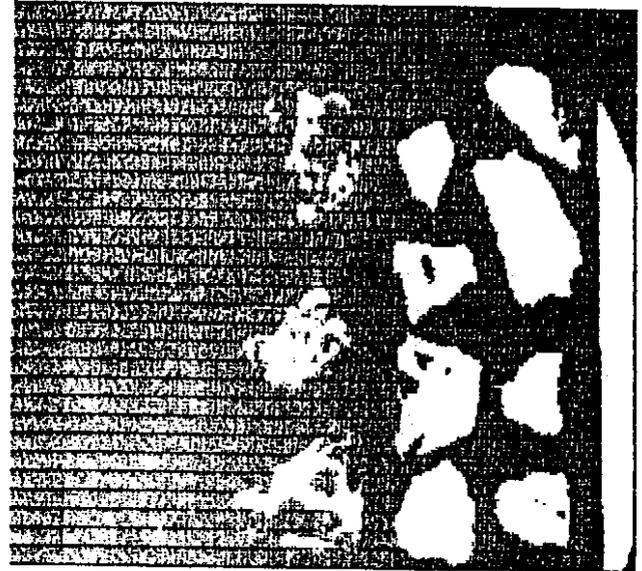


Image 2 Threshold = 137

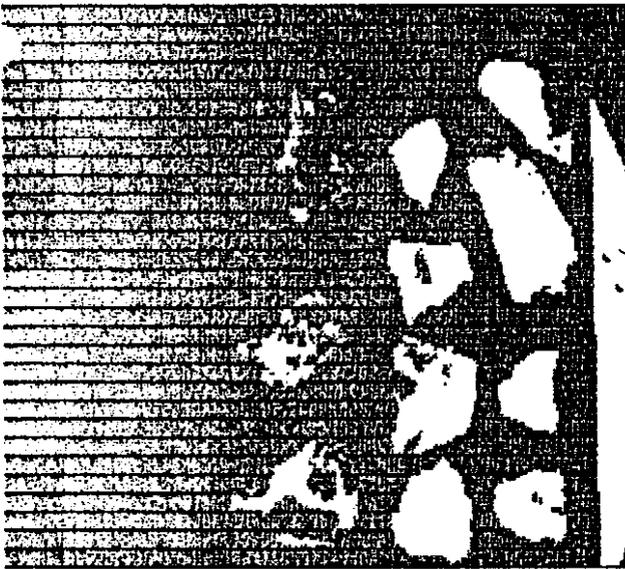


Image 3 Threshold = 150

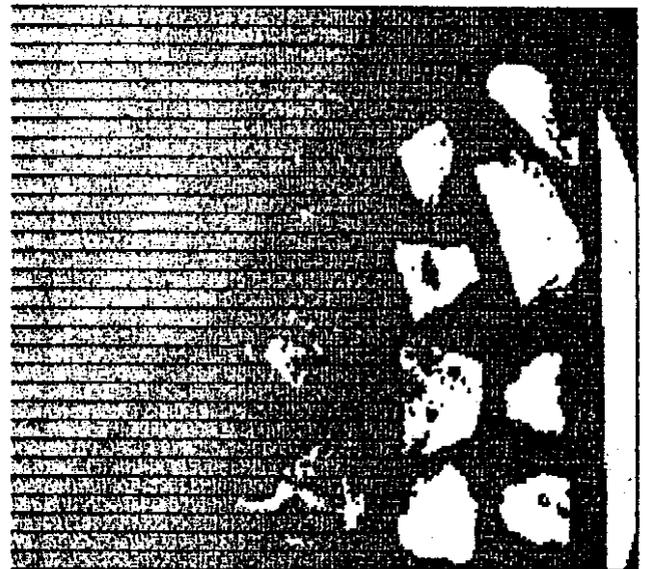


Image 4 Threshold = 162



Image 5 Threshold = 175

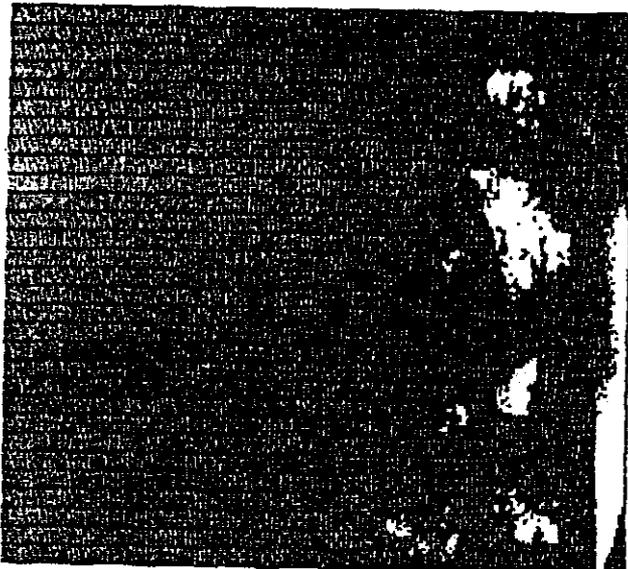


Image 6 Threshold = 187

036

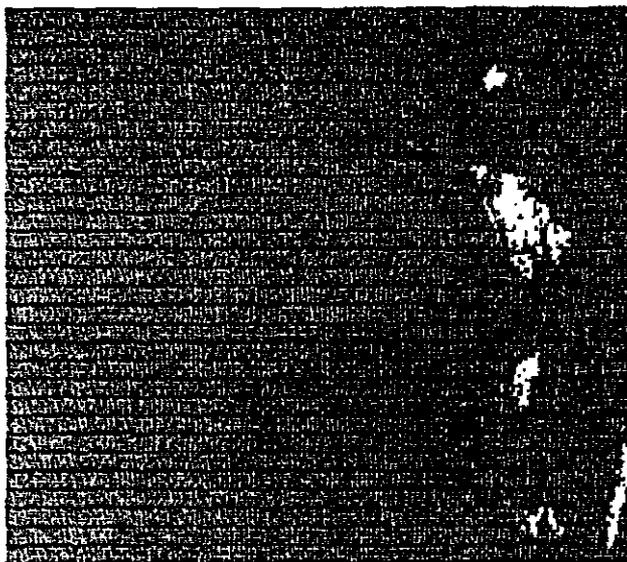
872035

3

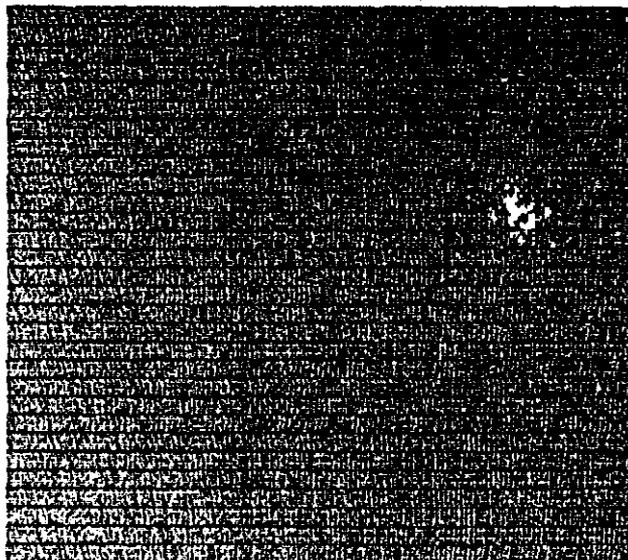


Wet surface

b:wm2 Threshold = 200



B:wm2 Threshold = 212



B:wm2 Threshold = 225

037

Volume

Dolomite

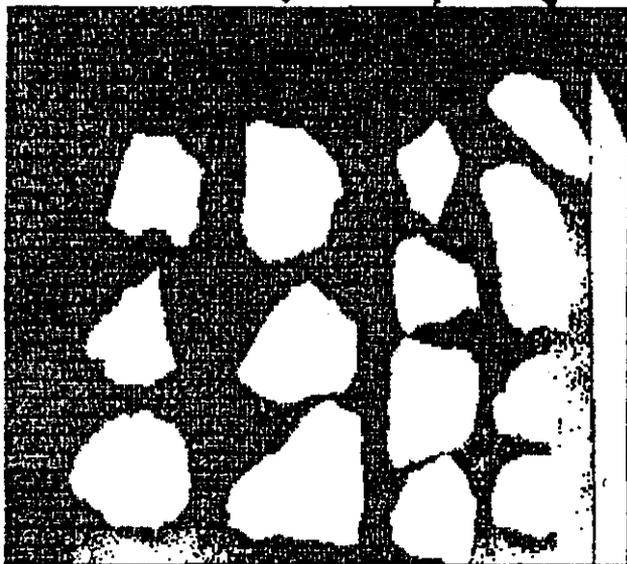
Magnesite

Magnesian
Magnesite

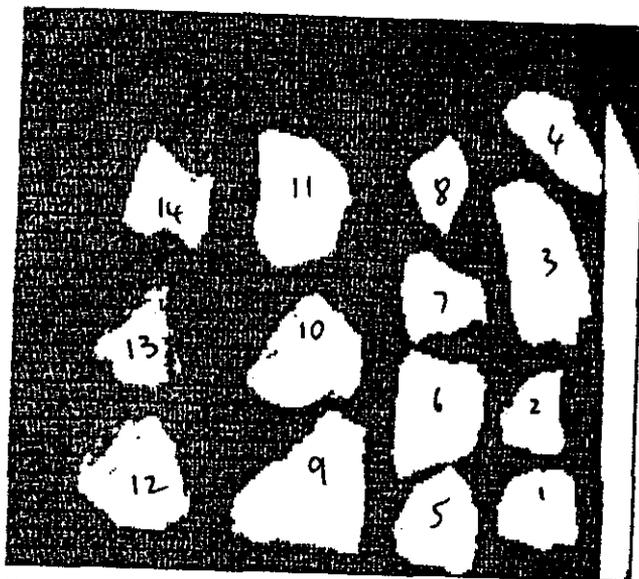
872036

Dry Surface

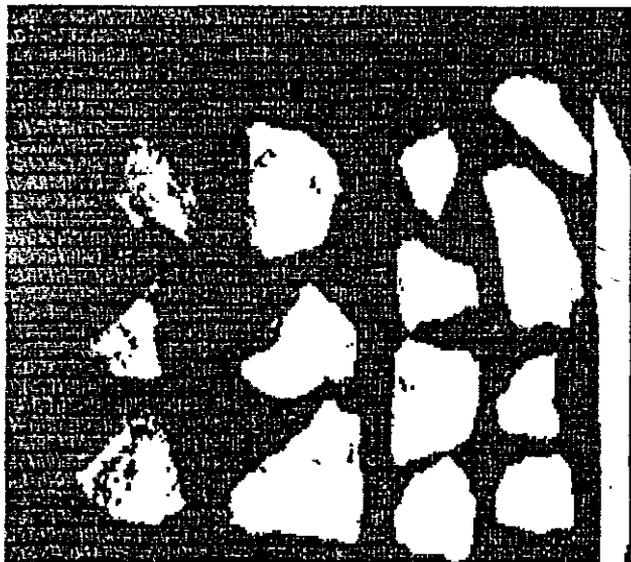
(4)



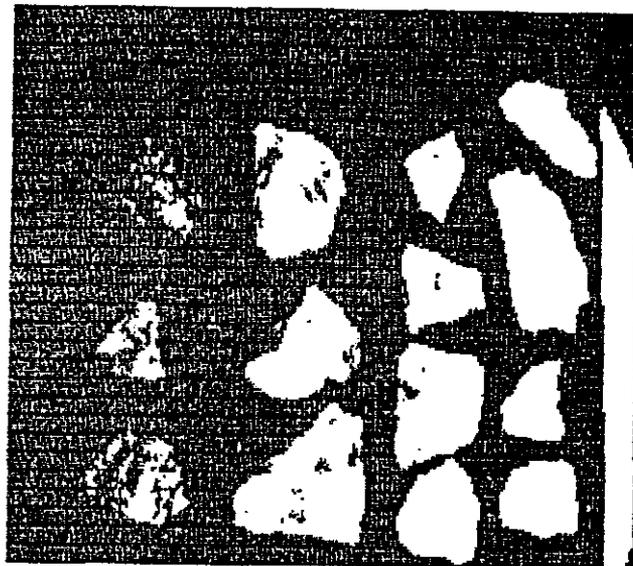
B:DM1 Threshold = 50



B:DM1 Threshold = 100



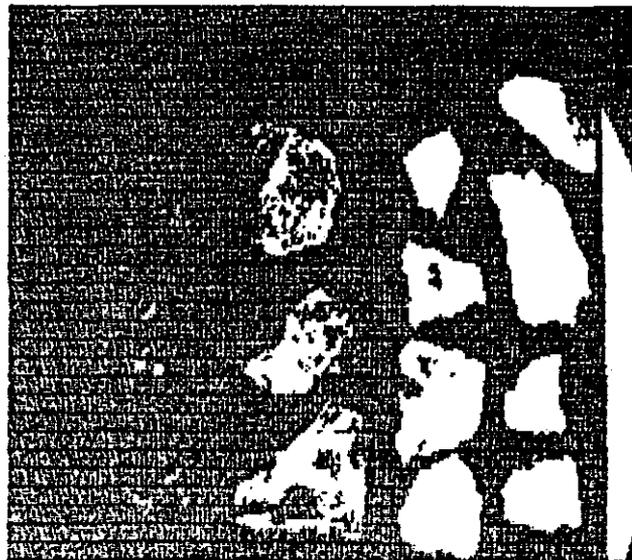
B:DM1 Threshold = 125



B:DM1 Threshold = 137



B:DM1 Threshold = 150



B:DM1 Threshold = 162

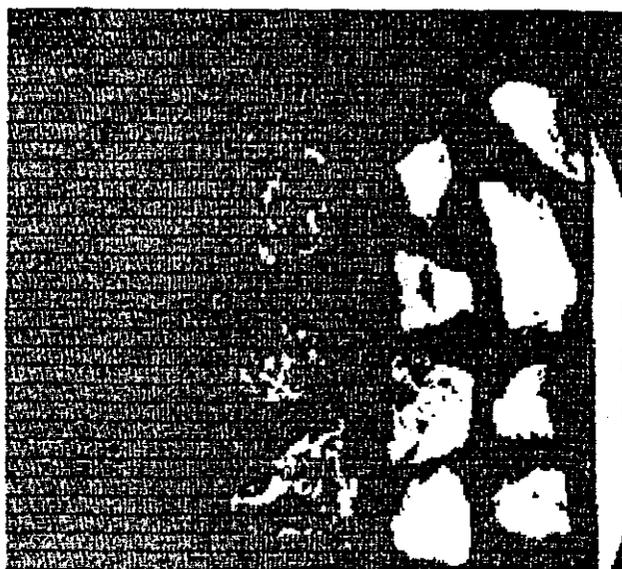
038

Dry surface

(5)



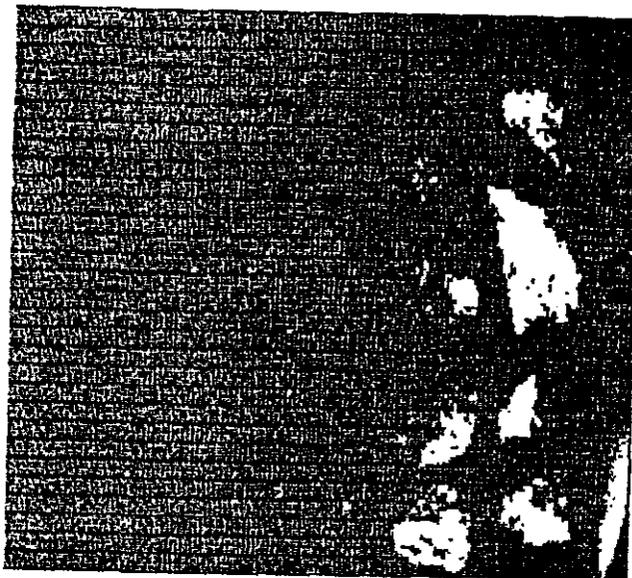
B:DMI Threshold = 175



B:DMI Threshold = 187



B:DMI Threshold = 200



B:DMI Threshold = 210



B:DMI Threshold = 225

039

872038

Arthur Kwiatkowski



GROUP SPECIAL EQUIPMENT

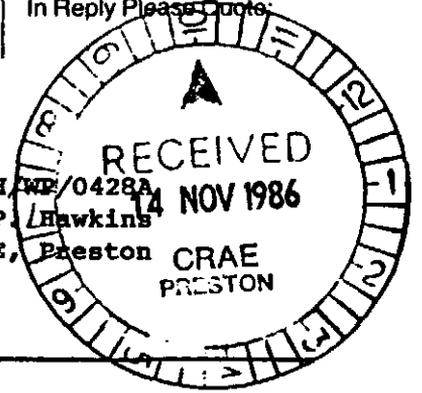
Division of CRA Services Ltd
55 Collins Street, Melb. Vic.

Mail and Delivery Address
40-42 Swanston Street
Preston Vic 3072
Australia
Telephone 658 4588
STD (03) 480 4177
Telex GEQUIP AA139736
In Reply Please Quote:

MEMORANDUM

DATE : 12th November, 1986
TO : T. Dickson
AT : CRAE, Preston
C.C. : K. Hamilton
AT : 39/55

REF NO : APH/ME/0428A
FROM : A.P. Hawkins
AT : GSE, Preston



ADDENDUM TO 11/11/86 MEMO ON TASMANIAN MAGNESITE ORE SORTING

Below quantitative results have been extracted from suite of rock images used in above testwork.

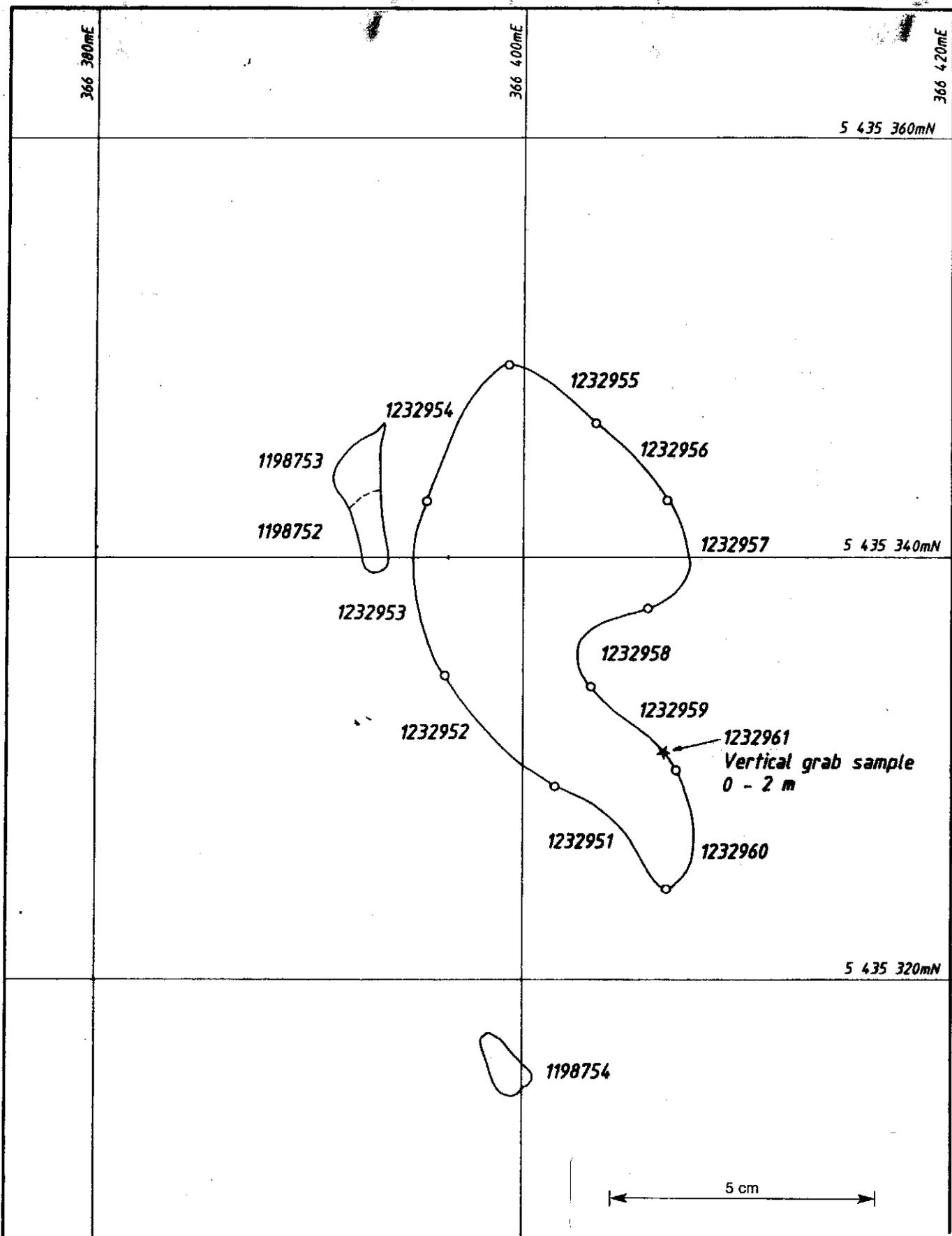
Maximum, mode or mean of picture element brightness levels could be used in a sorting system to separate the four groups.

ROCK PHOTOMETRIC STATISTICS

Category	Piece #	Max	Min	Mode	Mean	Std Deviation
Amorphous Magnesite	1	228	80	200	190	21
	2	228	52	172	193	21
	3	240	24	216	207	23
	4	232	28	200	197	20
Dominant Magnesite	5	212	152	196	191	9
	6	208	48	172	167	24
	7	216	36	172	166	30
	8	200	40	188	180	15
Dominant Dolomite	9	196	40	160	140	24
	10	196	48	152	144	24
	11	176	76	128	129	19
Dolomite	12	144	40	116	102	19
	13	152	60	96	100	17
	14	144	40	108	100	19

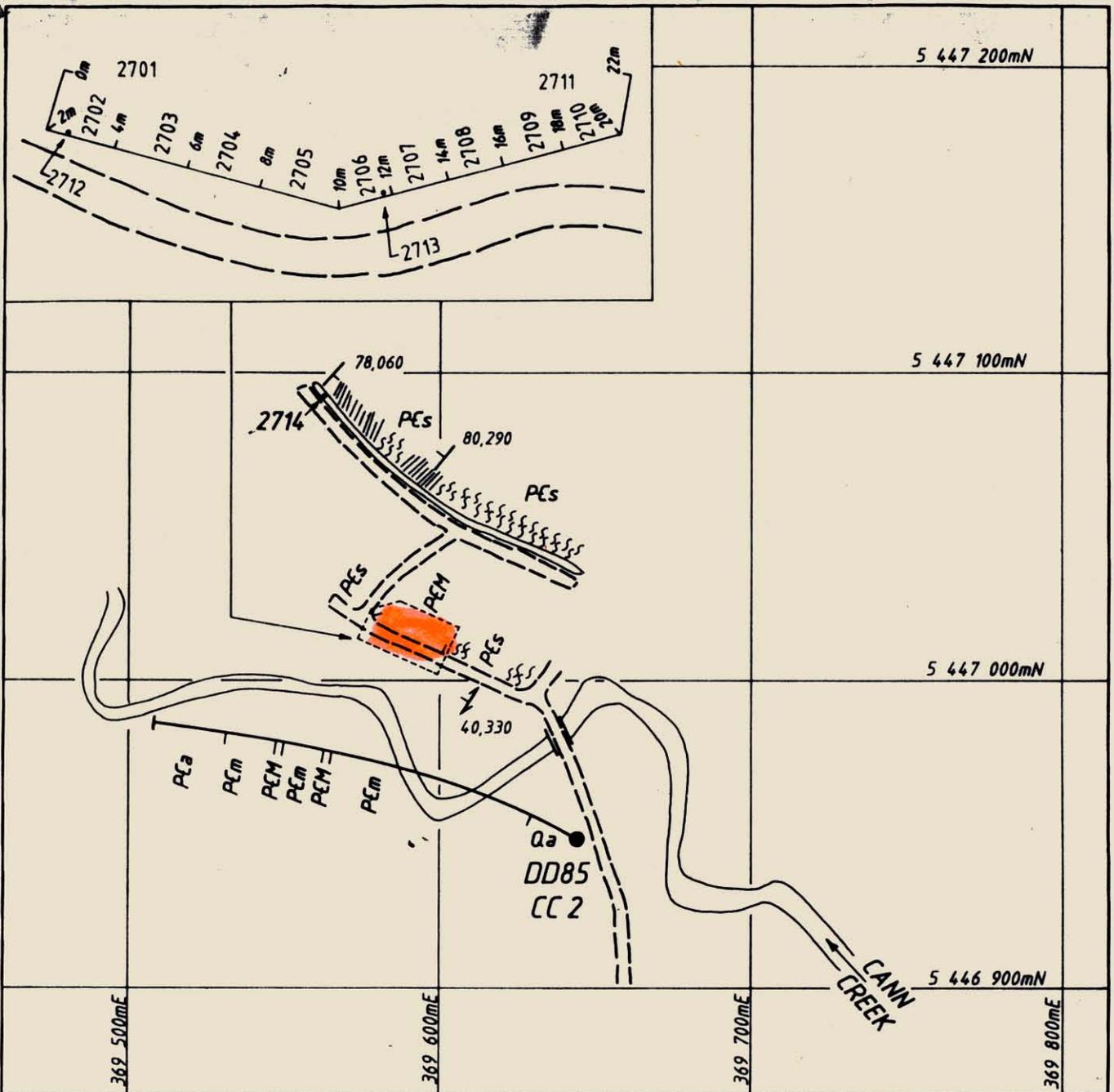
A.P. Hawkins

A.P. HAWKINS



CRA EXPLORATION PTY. LIMITED			
ARTHUR RIVER E.L. 43/70 OUTCROP SOUTH - WEST OF DD 82 LR 1 SAMPLE NUMBER LOCATIONS			
REF.	SK55 - 3	(7915)	
SCALE	1 : 250	DRAWN	R.T.
AUTHOR	F.R.F.	REPORT No.	14728
DATE	22 - 4 - 1987	PLAN No	TASh 3386

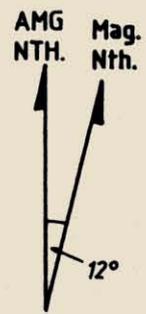
041



REFERENCE

- Qa Quaternary alluvium
- PEm Interpreted magnesite. In CC2 is nearly entirely Dolomite
- PEM Magnesite
- PEa Amphibolite
- PEs Keith Beds
- Shear Zone
- Approximate dip of bedding
- ✓ 40,330 Shear schistosity: dip, dip direction
- / 80,290 Bedding: dip, dip direction

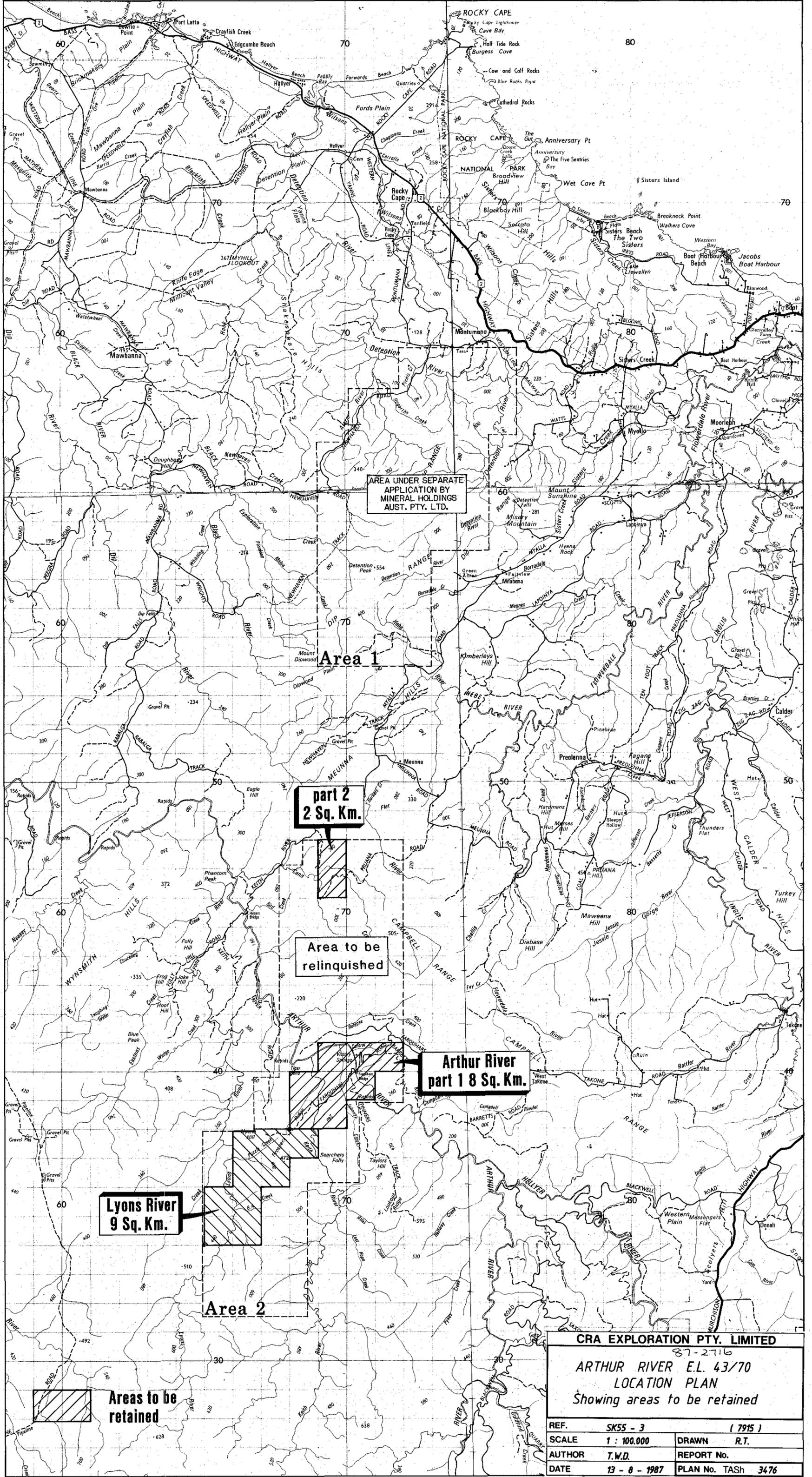
5 cm



CRA EXPLORATION PTY. LIMITED			
ARTHUR RIVER E.L. 43/70			
CANN CREEK PROSPECT			
GEOLOGY &			
SAMPLE No. LOCATION PLAN			
REF.	SK55 - 3	(7915)	
SCALE	1 : 2000	DRAWN	R.T.
AUTHOR	F.R.F.	REPORT No.	14728
DATE	8 - 7 - 1987	PLAN No.	TASh 3455

All sample numbers prefixed by 165

5 cm



AREA UNDER SEPARATE APPLICATION BY MINERAL HOLDINGS AUST. PTY. LTD.

Area 1

part 2
2 Sq. Km.

Area to be relinquished

Arthur River
part 1 8 Sq. Km.

Lyons River
9 Sq. Km.

Area 2

Areas to be retained

CRA EXPLORATION PTY. LIMITED	
87-2716	
ARTHUR RIVER E.L. 43/70	
LOCATION PLAN	
Showing areas to be retained	
REF. SK55 - 3	(7915)
SCALE 1 : 100,000	DRAWN R.T.
AUTHOR T.W.D.	REPORT No.
DATE 13 - 8 - 1987	PLAN No. TASH 3476

SAMPLE NO.	Al ₂ O ₃	CaO	Fe ₂ O ₃	SiO ₂	MgO	MnO	K ₂ O	P ₂ O ₅	SO ₃	LOI	TOTAL	Si	Al	Ca	Fe	Mg	Mn	K	P	S
1198770	45.010	4.300	1.760	60.010	18.1	0.22	0.010	0.010	3.80	0.010	49.8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
771	45.010	5.20	2.56	60.010	18.8	0.24	0.010	0.010	2.94	0.010	49.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
772	45.010	18.7	2.24	60.010	24.2	0.19	0.010	0.010	5.90	0.010	46.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
773	45.010	17.9	2.48	60.010	24.7	0.19	0.010	0.010	5.70	0.010	47.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
774	45.010	5.90	1.84	60.010	19.2	0.18	0.010	0.010	1.81	0.010	49.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
775	45.010	8.60	1.76	60.010	17.0	0.18	0.010	0.010	6.20	0.010	47.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
776	45.010	7.20	1.28	60.010	17.8	0.15	0.010	0.010	4.46	0.010	48.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
777	45.010	2.88	1.71	60.010	41.4	0.18	0.010	0.010	3.68	0.010	49.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
778	45.010	1.86	1.15	60.010	42.4	0.10	0.010	0.010	3.88	0.010	49.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
779	45.010	2.48	1.14	60.010	42.3	0.09	0.010	0.010	3.32	0.010	49.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
780	45.010	16.6	2.18	60.010	29.6	0.14	0.010	0.010	3.48	0.010	47.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
781	45.010	9.80	2.10	60.010	19.3	0.17	0.010	0.010	4.12	0.010	47.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
782	45.010	1.00	1.04	60.010	43.4	0.12	0.010	0.010	3.00	0.010	49.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
783	45.010	15.8	1.86	60.010	15.0	0.14	0.010	0.010	2.02	0.010	49.2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
784	45.010	7.75	2.12	60.010	19.4	0.19	0.010	0.010	4.60	0.010	46.8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
785	45.010	5.55	1.93	60.010	17.7	0.15	0.010	0.010	5.65	0.010	47.8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
786	45.010	20.7	2.12	60.010	23.9	0.24	0.010	0.010	3.30	0.010	43.4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
88	45.010	10.7	2.12	60.010	15.8	0.17	0.010	0.010	1.47	0.010	49.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
89	45.010	10.4	2.42	60.010	14.8	0.18	0.010	0.010	3.54	0.010	47.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	45.010	4.48	2.22	60.010	19.3	0.18	0.010	0.010	5.15	0.010	48.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
91	45.010	14.6	3.30	60.010	27.5	0.18	0.010	0.010	6.40	0.010	45.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000



LEGEND

QUATERNARY
Qa ALLUVIUM, TERRACE DEPOSITS, SWAMPS

TERTIARY
Tb BASALT RUBBLE AND FLOAT.
Tg "GREYBILLY" SILICIFIED QUARTZ PEBBLE CONGLOMERATE

PERMIAN
Pm TAKONE MUDSTONE: Bluish grey mudstone and siltstone. Distinctive spheroidal weathering.
Pf FENESTELLA SHALE: Fossiliferous shale, (Pectens)
Pt VICTORY TILLITE: Poorly sorted glacial conglomerate

PINECAMPBRIAN
PEs KEITH BEDS: Grey quartz mica schists, schistose micaceous quartzites, gneisses, undifferentiated.
PEM MAGNESITE: Magnesite - Dolomite. Creamy white-pale brown amorphous, coarsely crystalline, brown porous limonitic rubble.
PEm INTERPRETED MAGNESITE: Magnesite - Dolomite. Beige-pale brown silty clay, frequently with rounded pebbles of quartz & secondary iron oxides, with irregular or white fine grained silica rock and brown siliceous conglomerate.

GOSSAN: Massive, cellular, stratiform, hematitic-limonitic-pyritic outcrop and float. Interpreted to represent the surface expression of stratiform pyritic carbonate (Magnesite, Magnesite-Dolomite, Dolomite) horizons.

Pca AMPHIBOLITE: Dark green (fresh), creamy grey (weathered) rock. Generally massive in outcrop. Includes undifferentiated basic units.
Pcu SEDIMENTS: Undifferentiated pale brown, grey, pink siltstone, shale, sericitic quartzite, phyllite.

ROADS ——— TRAVERSES
TRACKS - - - - - BOUNDARY OF QUATERNARY ALLUVIUM
RIVERS, CREEKS ——— GEOLOGICAL BOUNDARY
QUARRY ——— INTERPRETED GEOLOGICAL BOUNDARY
FAULT F — F DIP AND STRIKE OF BEDDING
OUTCROP DIMENSIONS ——— DIP AND STRIKE OF SCHISTOSITY
DIAMOND DRILL HOLE LOCATION, NUMBER AND DIRECTION DRILLED Ⓞ 007KRZ

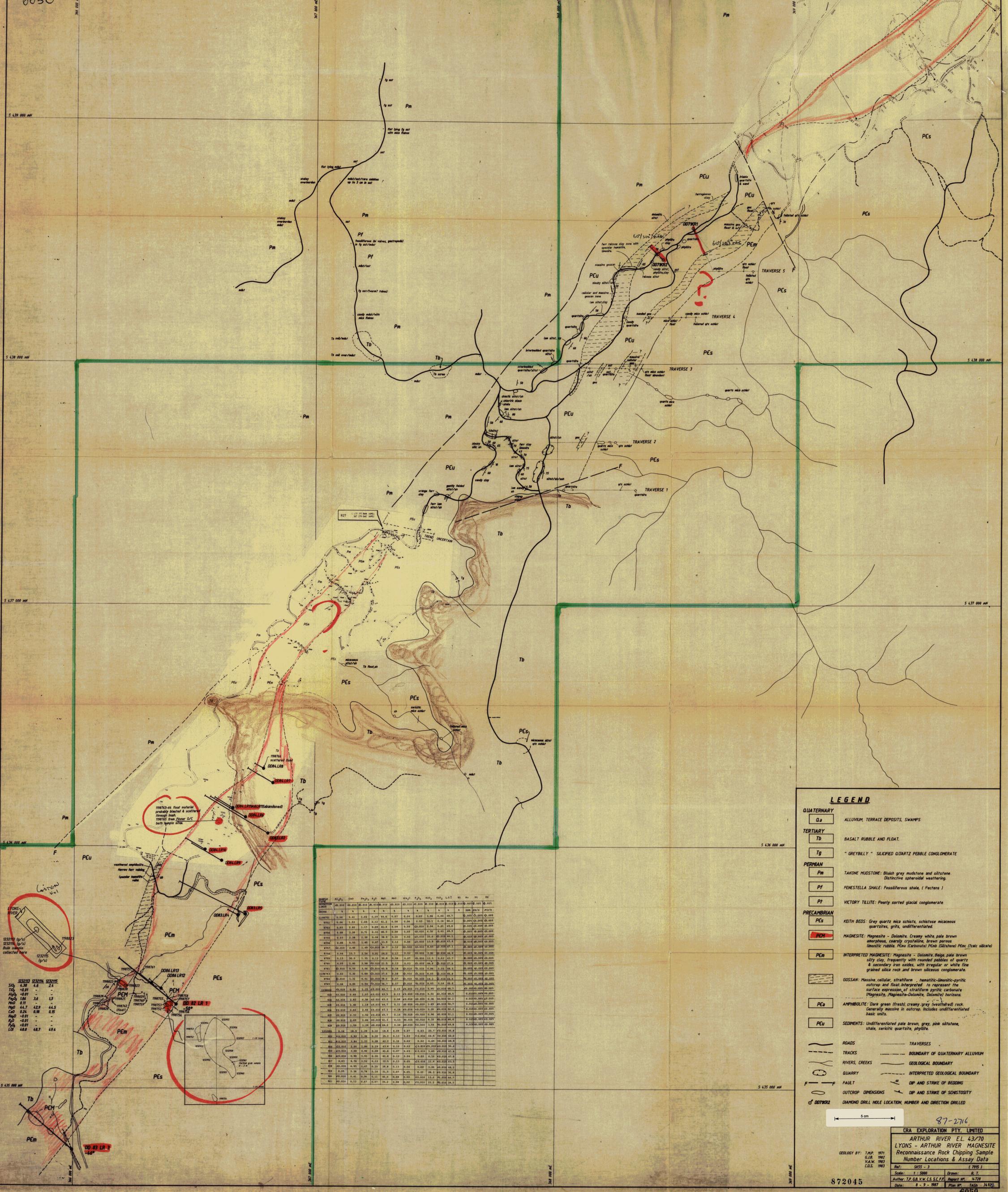
5 cm

87-276
 CRA EXPLORATION PTY. LIMITED
GEOLOGICAL MAP
LYONS RIVER - ARTHUR RIVER
MAGNESITE HORIZON
(Northern Sheet)

GEOLOGY BY: T.M.P. 1971
 G.J.B. 1982
 V.A.W. 1983
 C.D.S. 1983

Ref: SK55 - 3
 Scale: 1 : 5000
 Author: T.P. G.B. V.W. & C.S. Report No. 74728
 Date: 12 - 4 - 1983 Plan No. TASH 13508

872043
 Drawn: R. T.
 6048



123218 (g/s) 123219 (g/s) 123220 (g/s)

SiO₂ 4.39 4.6 2.4

TiO₂ 0.01 - -

Al₂O₃ 0.01 - -

Fe₂O₃ 1.86 3.6 1.3

MnO 0.71 4.29 44.5

CaO 0.26 0.18 0.25

Na₂O 0.01 - -

K₂O 0.01 - -

LOI 48.0 48.7 49.4

Sample No.	Unit	SiO ₂	TiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MnO	CaO	Na ₂ O	K ₂ O	LOI
123218	PEu	4.39	0.01	0.01	1.86	0.71	0.26	0.01	0.01	48.0
123219	PEu	4.6	-	-	3.6	4.29	0.18	-	-	48.7
123220	PEu	2.4	-	-	1.3	44.5	0.25	-	-	49.4

LEGEND

QUATERNARY
Qa ALLUVIUM, TERRACE DEPOSITS, SWAMPS

TERTIARY
Tb BASALT RUBBLE AND FLOAT.
Tg "GREYBILLY" SILICIFIED QUARTZ PEBBLE CONGLOMERATE

PERMIAN
Pm TAKONE MUDSTONE: Blueish grey mudstone and siltstone. Distinctive spheroidal weathering.
PF FENESTELLA SHALE: Fossiliferous shale, (Pectens)
PT VICTORY TILLITE: Poorly sorted glacial conglomerate

PRECAMBRIAN
PEs KEITH BEDS: Grey quartz mica schists, schistose micaceous quartzites, gneiss, undifferentiated.
PEm MAGNESITE: Magnesite - Dolomite. Creamy white, pale brown amorphous, coarsely crystalline, brown porous limonitic rubble. PEm (Carbonate) PEm (Siltstone) PEm (Talc silicate)
PEm INTERPRETED MAGNESITE: Magnesite - Dolomite. Beige, pale brown silty clay, frequently with rounded pebbles of quartz & secondary iron oxides, with irregular or white fine grained silica rock and brown siliceous conglomerate.
Gossan: Massive, cellular, stratiform, hematitic-limonitic-pyritic outcrop and float. Interpreted to represent the surface expression of stratiform pyritic carbonate (Magnesite, Magnesite-Dolomite, Dolomite) horizons.
Pca AMPHIBOLITE: Dark green (fresh), creamy grey weathered rock. Generally massive in outcrop. Includes undifferentiated basic units.
PEu SEDIMENTS: Undifferentiated pale brown, grey, pink siltstone, shale, sericitic quartzite, phyllite.

ROADS ——— TRAVERSES
TRACKS ——— BOUNDARY OF QUATERNARY ALLUVIUM
RIVERS, CREEKS ——— GEOLOGICAL BOUNDARY
QUARRY ——— INTERPRETED GEOLOGICAL BOUNDARY
FAULT ——— DIP AND STRIKE OF BEDDING
OUTCROP DIMENSIONS ——— DIP AND STRIKE OF SCHISTOSITY
DIAMOND DRILL HOLE LOCATION, NUMBER AND DIRECTION DRILLED

87-216

CRA EXPLORATION PTY. LIMITED
ARTHUR RIVER EL. 43/70
LYONS - ARTHUR RIVER MAGNESITE
Reconnaissance Rock Chipping Sample
Number Locations & Assay Data

GEOLGY BY: T.M.P. 1971
G.J.B. 1962
V.A.M. 1963
C.S.J. 1963

Scale: 1 : 5000
Author: T.P.G.V.M.C.S.C.F.F. Report No. 14728
Date: 8 - 9 - 1967 Plan No. TASH-34926

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