

J.J. McDONALD & SONS MINING PTY LTD

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EXPLORATION LICENCE NO. 17/2002

MAYDENA, TASMANIA

ANNUAL REPORT

TO

10 January 2004

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DECEMBER 2003

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ABSTRACT

First year activities in EL 17/2002 have identified two silica rock/flour prospective areas for further follow-up.

The search for a substantial resource of high quality dolomite has been discontinued due to discouraging market conditions in Tasmania.

Keywords:

Maydena; Kallista,
Silica rock; Silica flour,
Dolomite;

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1. INTRODUCTION

Interest in the ground covered by this exploration licence arose as a result of J J McDonald & Sons Mining Pty Ltd activities at the Pine Hill silica sand deposit located within EL 17/1998 immediately adjacent to this tenement in the east.

Regional mapping by MRT geologists indicates that the geological formations potentially prospective for additional resources of silica sand and flour extend into this area in a north westerly direction from the Pine Hill deposit.

An added attraction is the availability of basic access to the main zone of interest.

This report details activities by J J McDonald & Sons Mining Pty Ltd in EL 17/2002 in the first year of tenure to 10.01.2003.

2. TENURE

On the 30th of April 2002 an application was lodged for an exploration licence of 13 sq km covering ground potentially prospective for silica sand/flour and silica rock associated with lower Cambrian sequences 7-10 km WSW of Maydena.

The area applied for is contiguous to the west with EL 17/1998 (now subject to Retention Licence application 2/2003) where a limited resource of potentially limited economic, good quality silica flour and silica sands has been delineated.

Ministerial consent to the grant of this exploration licence was obtained on 28/01/03 effective for 5 years to 10th January 2008.

The tenement comprises:

State Forest – Multiple use forest land

Private land

A Crown Reserve – (part of 14 Mile Creek)

MDC Informal Reserve Areas

2 small Mining Leases (held by Norske Skog)

3. LOCATION AND INFRASTRUCTURE

EL 17/2002 lies to the west of Pine Hill with its eastern boundary approximately 6 km west of Maydena and about 90 km by sealed road west of Hobart (Fig.1).

Basic access to the northern and central segments of the area is provided by the sealed Gordon River Road. The southern and western segments are serviced by Maynes Road, with the south eastern section comprising private land given to pine plantations, containing a network of logging tracks

Basic facilities, including housing and labour, are available in the small township of Maydena (pop. ca, 400) and surrounding district.

A single strand power line follows the Gordon River Road through the tenement.

A 700 m long, east-west oriented, fair weather gravel airstrip is located just off the eastern boundary of the tenement.

A narrow gauge railway line from New Norfolk to Maydena has been progressively upgraded as far as the entrance to the Mt Field National Park. There are plans to complete the remaining 15 km section to Maydena within the next 2-3 years.

4. OBJECTIVES AND TARGETS

The overall objective of the exploration activities during tenure of this exploration licence is to add commercially viable resources of high purity silica sand and flour to those already outlined by J J McDonald & Sons Mining Pty Ltd at the Eastern Quarry, Pine Hill, in the adjacent EL 17/1998.

A subsidiary aim, in response to a market enquiry, will be to search for and outline occurrences of high quality, low silica dolomite resources potentially suitable for production of magnesium metal, essentially via a chemical route. Tied to this process is the need for silica rock for the production of ferrosilicon used in a stage of the overall manufacturing process. It is possible that some of the silica rock could be sourced from this tenement.

Following general reconnaissance, the main target will be a 4 x 1 km belt of steeply dipping, lower Cambrian sediments with carbonate sequences, which extend in a north westerly direction from Pine Hill.

1:25,000 scale mapping of the Maydena Sheet was completed by MRT geologists Calver & Forsyth in 1999, providing a basic, up-to-date geological framework for this area. In this context, the first year's activities were to:

* secure access to, and through, private land in the tenement

- * negotiate compensation agreements, if necessary
- * familiarisation and orientation reconnaissance to check basic geology as mapped by MRT geologists
- * reconnaissance sampling - rock float and surficial material of interest
- * selection of sub-areas for further follow-up in year 2

5. PREVIOUS EXPLORATION

Although the area was part of BHP's EL 13/65 and EL 8/79 and later also fell within Amoco's EL 14/84, neither company undertook any work related to industrial minerals in this segment of their tenements (Ellis, in Jones, 1989).

Pioneer Silicon Industries Pty. Ltd. (PSI) embraced the area within its EL 14/88 but little, if any, work was carried out in this segment west of Pine Hill.

On taking over PSI's tenement in 1992, the Northwest Bay Co Pty Ltd successfully outlined a small resource of about 355,000 tonnes of good quality, open cuttable dolomite on the southern slopes of Kallista Hill situated approximately 2 km west of Pine Hill (Forster, 1993). Due to the demise of the operator, no production ensued and the ground was ultimately relinquished.

Two small mining leases in the tenement are owned and operated by Norske Skog to source crushed road metal (mostly Cambrian basalt) on an "as needs basis" for its forestry operation haulage roads.

In the early 1990s, Mineral Resources Tasmania (MRT) completed three shallow diamond drill holes as part of its reconnaissance of the Tertiary/Quaternary sequences of the area (for locations see Calver and Forsyth, 1999) :

Hole Styx 2	:	0 - 31m	:	Quaternary sediments
Hole Styx 3	:	0 - 32	:	Quaternary sediments
		32 - 35	:	Cambrian sandstone
Hole Styx 6	:	0 - 21	:	Quaternary sediments
		21- 22	:	Ordovician

6. CURRENT ACTIVITIES

6.1 Work Done:

- * completion of desk top data review
- * acquisition of air photographs and most recent access maps
- * secured access to private land owned by Norske Skog under terms and conditions imposed by Norske Skog
- * orientation and confirmatory geological traverses throughout the area, supported by limited float sampling
- * preliminary geological mapping, supported by tape and compass survey, of a 1100 x 500 m sub-area in the central west part of the tenement, accompanied by silica rock float sampling
- * limited reconnaissance sampling of an occurrence of silica sand/flour in the north west of the tenement
- * completed dolomite market study
- * inspected Kallista Hill dolomite prospect
- * scoping discussions with CODES re possible ground geophysical test traverses by honours student

6.2 Statistical Summary:

Analyses	rock float samples	:	8
	silica sand/flour	:	10
No. of determinations:	rock float samples	:	80
	silica sand/flour	:	110
	prospect recce	:	(1100 x 500m) = 0.55 sq km
	tape & compass survey	:	2000 line m approx.
	Total expenditure to 30.09.03	:	\$9,263.00
	Estimated expenditure for full year of tenure	:	\$11,000.00

7. RESULTS

7.1 Tenement Geology:

The tenement embraces the upper and middle reaches of the Kallista Creek drainage basin with consequent widespread cover of Quaternary alluvium, including gravel, sand and clay.

Underlying, and occasionally protruding through the alluvium are steeply dipping, folded and faulted sequences of lower Cambrian sediments resting on basalts and overlain by Cambro-Ordovician Dennison Group sediments (Calver & Forsyth, 1999). These sequences contain beds of dolomite potentially available for replacement by silica transported by hydrothermal fluids in favourable structural settings.

A 4 x 1 km, north-west trending block of these sequences occupies the central portion of the tenement, with Kallista Hill near its southern end and Hedgehog Ridge in the north. This represents the main target zone to be investigated for the presence of deposits of silica sand/flour and high quality dolomite.

Dolerite talus occupies a narrow zone on the steep slopes along the central section of the western tenement boundary.

7.2 Silica Prospects

7.2.1 Hedgehog Ridge (Fig 2):

This elongate area straddles the Gordon River Road for a distance of at least 1.5 km in a north westerly direction in the central north of the tenement. This section of the road follows an outcrop of Cambrian carbonaceous dolomitic sediments flanked to the north and west by an apron of white floury silica sand of unknown depth extent. To the south west of the road the ground falls off to a broad, scrubby plain subject to swampy conditions in winter. To the north and north east the terrain is more varied, with swampy ground around Kallista Creek in the north east and more hilly topography in the north. There is again thick vegetation and rain forest cover.

Localised, minor quartz veining and indications of silica replacement of the sediments are evident in a section of the road cuttings along the northern part of this outcrop.

Two channel and 8 shallow hand auger samples of the silica sand were collected at two localities about 500m apart in the northern section of this zone. (samples 70454 – 70463 incl.).

These samples provided encouraging assay results (Appendix 1). Significant are the low values for Fe_2O_3 , which in three instances are below 10 ppm, Cr_2O_3 (mostly 1 ppm or less) and cobalt (all below 1 ppm). Aluminium, calcium, magnesium, potassium and sodium report on the low side. However, LOI readings in the range of 0.19 - 0.46% are somewhat higher than expected.

This near-surface material appears to contain a relatively high proportion of fines.

These promising scout results require follow-up by further, more detailed, grid-based sampling and mapping to determine the lateral and depth extent as well a overall quality of this silica sand and flour occurrence.

7.2.2 Loading Bay Spur:

This area is located near the far west-central boundary of the tenement (Fig.2). Clear felling of a coupe of timber provided access and some new geological information.

The upper and middle slopes of this segment are covered by a thick blanket of Jurassic dolerite talus and contain some dolerite outcrop in the upper reaches. On the lower slopes and along the fire track bordering the coupe in the east there is wide-spread float of chert, quartzite, greywacke and other silicified sediments similar to those encountered and sampled on the 14 Mile Creek track some 2 km to the east (see section 7.2.3. below).

In cuttings at the northern extremity of the track are exposures of very weathered, heavily ironstained, sheared, phyllitic lithologies.

Of interest are three previously unrecorded occurrences of silica rock gravels comprised of heavily leached, lacy, honeycombed, chalcedonic quartz, mostly white in colour, but becoming more iron stained with depth. This material appears to share a number of similarities with the silica vein feeder material at the Pine Hill silica sand deposit.

The largest of these accumulations extends eastwards for about 300m down a prominent, steep spur, herein referred to as the Loading Bay Spur, towards the fire track along which two smaller patches of similar material were noted.

The ultimate source of this material is unknown at this stage, but it is clear that it has been transported to its present site, possibly by glacial action, and re-distributed.

The assay results of the composite grab samples collected from the three localities

(samples 70450 - 70453) report encouragingly low values, including alumina, iron, titanium and chromium.

In summary:

Al ₂ O ₃	0.011 - 0.030%
Fe ₂ O ₃	0.007 - 0.016%
TiO ₂	0.019 - 0.030%
Cr ₂ O ₃	-1-2 ppm

Further assay details are provided in Appendix 1.

This area warrants further investigation, despite its apparent low tonnage potential as it may offer a supply source for small quantities of good quality silica rock.

7.2.3 14 Mile Creek Track

This area was of interest because of a small patch of silica sand recorded here (Fig 2) by MRT mapping.

A reconnaissance traverse did not locate any significant, in-situ occurrences of silica sand, except as road surfacing.

However, a 200 m wide zone of float comprising pebbles, cobbles and boulders of chert, quartzite, silicified sandstone and rare quartz fragments was noted to extend along 14 Mile Creek track northwards from near its junction with Maynes Road.

Four separate composite samples of this material were submitted for assay (samples 70446 - 70449 incl.).

These showed the following results:

Al ₂ O ₃	1.22 - 1.80%
Fe ₂ O ₃	0.235 - 1.11%
TiO ₂	0.059 - 0.186%
Cr ₂ O ₃	11 - 26 ppm

in addition to elevated values for MgO, K₂O and Na₂O.

Further assay details are presented in Appendix 1.

This low purity material and its bedrock source is of no further interest as a supply of silica rock.

7.3 Dolomite

An enquiry about the potential availability of high quality, crushed dolomite as base feed for the production of magnesium via a "chemical" route prompted a review of the Kallista dolomite deposit outlined in 1992/93 by the Northwest Bay Co Pty Ltd. This also brought into focus the additional dolomite potential of the tenement.

Fines generated in the process of crushing the dolomite would most likely be suitable for local agricultural and chemical applications, particularly in southern Tasmania. In this context, a brief market survey on dolomite use and demand was commissioned to help gauge possible off-take and price parameters.

7.3.1 Kallista Hill Dolomite Deposit:

Activities leading to the discovery and delineation of a small, open-cuttable resource at this locality (Fig.2) included limited surface sampling, costeaning and the completion of 4 shallow air-track holes by the Northwest Bay Co Pty Ltd.

Of the four holes drilled, three intersected high grade dolomite to a drilled depth of 21 m in an area some 35 x 200 m on the south flank of Kallista Hill.

Overburden is reported as varying from 1-4m.

A resource of at least 355,000 tonnes of dolomite has been inferred, grading about 30.6% CaO, 20.5% MgO, 1.6% SiO₂, 0.2% Fe₂O₃ and 0.02% TiO₂.

These activities are recorded by Forster (1992 & 93) who raised a proposal for the establishment of a small dolomite quarry at the site to supply local demand.

The deposit has not been closed off. It remains open laterally and in depth.

The Cambrian sequences containing this dolomite horizon extend at least another 3 km to the north west (Calver & Forsyth, 1999), suggesting further potential for open-cuttable material in the area.

7.3.2 Market Survey:

The outcomes of this preliminary survey were disappointing. A copy of the report is attached as Appendix 2.

The total potential dolomite market in southern Tasmania is gauged to be in the region of 20-30,000 tpa. Market growth appears limited and small, although "one-off"

construction projects could have short-term positive effects in the market place.

It is also apparent that dolomite sourced from the Kallista Hill area would be price competitive only in southern Tasmania, with low margins and low total net revenue generated from what would amount to a relatively small market share.

These conclusions do not encourage a stand-alone operation solely dependent on the Tasmanian market and cast doubt on the eventual viability of the fines product.

7.3.4 Outcomes:

Although the levels of CaO, MgO, Fe₂O₃ and TiO₂ for the Kallista Hill deposit were acceptable by the proponents of the magnesium project, SiO₂ at 1.6% was considered undesirably high. Material with a lower silica content was located in North West Tasmania and there was no further expression of interest in the Kallista Hill resource.

This outcome, together with the disappointing findings of the market survey prompted a review of this company's commitment to a possible dolomite project.

As a result, further work on this project was deferred indefinitely.

8. CONCLUSIONS

8.1 Two sub-areas have been identified for further follow-up. One is prospective for a limited quantity of high quality silica rock, the other for high quality silica flour and sand.

8.2 Although the area remains prospective for significant quantities of good quality dolomite, no further work on this aspect is currently warranted due to loss of demand for this material for magnesium production and only a small off-take and low demand growth for agricultural applications in southern Tasmania.

9. RECOMMENDATIONS

9.1 Suspend the search for a large, high quality dolomite deposit.

9.2 Continue with the assessment of the occurrences of silica sand/flour and silica rock outlined in the north west of the tenement.

10. PROPOSED FUTURE ACTIVITIES

- 10.1** Loading Bay Spur: Undertake further surface sampling and mapping of the silica rock gravel occurrences in the north west of the tenement to confirm extent, quantity and quality of available material.
- 10.2** Hedgehog Ridge: Assessment, on a first pass basis, to obtain a better impression of the extent, quality and nature of the silica sand/flour occurrence at this prospect by grid-based, geological mapping and shallow (hand?) auger sampling.
- 10.3** Regional: Further geological reconnaissance between Kallista Hill and Hedgehog Ridge to check for possible occurrences of silica flour and sand.

11. REFERENCES

- | | | |
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| McBain, M | 2003 | Market Survey – Dolomite in Tasmania AusITech Services Report. |

Appendix 1

Assay Results

CERTIFICATE OF ANALYSIS



ALS Chemex

Batch: ST38827
Sub Batch: 0

CONTACT: MR GERHARD KRUMMEI
CLIENT: JJ MCDONALD & SONS MINING P/L
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487 ST KILDA ROAD
MELBOURNE VICTORIA 3004

LABORATORY: BRISBANE
DATE RECEIVED: 01/08/2003
DATE COMPLETED: 11/09/2003
SAMPLE TYPE: ROCK
No. of SAMPLES: 8

ORDER No.: ALS224175

PROJECT:

COMMENTS

NOTES

This is the Final Report and supersedes any preliminary reports with this batch number.
Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

ISSUING LABORATORY: BRISBANE

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Signatory

LABORATORIES

AUSTRALIA
Brisbane Orange
Alice Springs Perth
Kalgoorlie Townsville

NORTH AMERICA
Vancouver Fairbanks Thunder Bay
Chihuahua Guadalajara Toronto
Elko Reno

SOUTH AMERICA
Santiago Calama Mendoza
Antofagasta Copiapo Quito
Arequipa Lima

AFRICA
Mwanza

Batch: ST38827

Sub Batch: 0

Date of Issue: 11/09/2003

Client: JJ McDONALD & SONS MINING P/L

Client Reference:

CERTIFICATE OF ANALYSIS



SAMPLE	Element Unit Method	Al2O3 %	Fe2O3 %	TiO2 %	Cr2O3 ppm	CaO %	MgO %	MnO %	V2O5 %	K2O %	Na2O %		
70446	M289-1 LOR	1.54	0.517	0.087	21	0.009	0.112	0.002	0.002	0.001	0.001		
70447	M289-1 LOR	1.54	0.586	0.069	11	0.252	0.253	0.021	0.001	0.586	0.076		
70448	M289-1 LOR	1.80	1.11	0.186	26	0.034	0.218	0.008	0.003	0.762	0.096		
70449	M289-1 LOR	1.22	0.235	0.059	12	0.005	0.094	<0.001	0.001	0.806	0.107		
70450	M289-1 LOR	0.024	0.014	0.030	<1	0.013	0.005	<0.001	<0.001	0.784	0.015		
70451	M289-1 LOR	0.011	0.016	0.019	1	0.010	0.004	<0.001	<0.001	0.009	0.005		
70452	M289-1 LOR	0.030	0.015	0.022	2	0.122	0.047	<0.001	<0.001	0.004	0.004		
70453	M289-1 LOR	0.014	0.007	0.030	<1	0.013	0.004	<0.001	<0.001	0.004	0.002		

Batch: ST38827
 Sub Batch: 0
 Date of Issue: 11/09/2003
 Client: JJ McDONALD & SONS MINING P/L
 Client Reference:

QUALITY CONTROL REPORT



SAMPLE	Element Unit Method	Al2O3 %	Fe2O3 %	TiO2 %	Cr2O3 ppm	CaO %	MgO %	MnO %	V2O5 %	K2O %	Na2O %
	LOR	M289-1 0.001	M289-1 0.001	M289-1 0.001	M289-1 1	M289-1 0.001	M289-1 0.001	M289-1 0.001	M289-1 0.001	M289-1 0.001	M289-1 0.001
	BLANK	<0.001	<0.001	<0.001	<1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	70446 Original Result	1.48 1.54	0.511 0.517	0.089 0.087	21 21	0.008 0.009	0.122 0.112	0.002 0.002	0.002 0.002	0.664 0.586	0.082 0.076
	STANDARD I.D. RESULT OF STANDARD TARGET RANGE	0.816	0.810	0.155	150	1.63	0.038	0.157	0.002	0.148	0.049

BLANKS

DUPLICATES

If applicable, duplicate results for fire assay golds are shown in the main body of the report.

REFERENCE STANDARDS

The data that appears on this report are results for the internal standards analysed in conjunction with this batch.

CERTIFICATE OF ANALYSIS



ALS Chemex

Batch: ST38827
Sub Batch: 1

CONTACT: MR GERHARD KRUMMEI
CLIENT: JJ MCDONALD & SONS MINING P/L
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MELBOURNE VICTORIA 3004

LABORATORY: BRISBANE
DATE RECEIVED: 01/08/2003
DATE COMPLETED: 11/09/2003
SAMPLE TYPE: SAND
No. of SAMPLES: 10

ORDER No.: ALS224175

PROJECT:

COMMENTS

NOTES

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Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

ISSUING LABORATORY: BRISBANE

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Signatory

LABORATORIES

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Chihuahua Guadalajara Toronto
Elko Reno

SOUTH AMERICA
Santiago Calama Mendoza
Antofagasta Copiapo Quito
Arequipa Lima

AFRICA
Mwanza

Batch: ST38827
 Sub Batch: 1
 Date of Issue: 11/09/2003
 Client: JJ McDONALD & SONS MINING P/L
 Client Reference:

CERTIFICATE OF ANALYSIS



SAMPLE	Element Unit Method LOR	Al2O3 % M289-1 0.001	Fe2O3 % M289-1 0.001	TiO2 % M289-1 0.001	Cr2O3 ppm M289-1 1	CaO % M289-1 0.001	MgO % M289-1 0.001	V2O5 % M289-1 0.001	K2O % M289-1 0.001	Na2O % M289-1 0.001	Co ppm M289-1 1	LOI % OA-GRA 0.01
70454		0.029	<0.001	0.014	1	0.042	0.018	<0.001	0.006	0.005	<1	0.30
70455		0.067	0.013	0.032	1	0.055	0.041	<0.001	0.007	0.003	<1	0.25
70456		0.044	0.005	0.044	<1	0.024	0.023	<0.001	0.004	0.003	<1	0.24
70457		0.100	<0.001	0.019	1	0.049	0.029	<0.001	0.008	0.004	<1	0.27
70458		0.079	0.006	0.151	3	0.046	0.037	<0.001	0.008	0.005	<1	0.46
70459		0.046	0.004	0.010	<1	0.024	0.017	<0.001	0.002	0.003	<1	0.19
70460		0.026	0.007	0.010	<1	0.048	0.033	<0.001	0.001	0.002	<1	0.24
70461		0.036	0.014	0.032	1	0.109	0.072	<0.001	0.002	0.002	<1	0.25
70462		0.025	<0.001	0.047	2	0.053	0.039	<0.001	0.002	0.002	<1	0.21
70463		0.028	0.033	0.072	1	0.018	0.013	<0.001	0.004	0.008	<1	0.42

Batch: ST38827
 Sub Batch: 1
 Date of Issue: 11/09/2003
 Client: JJ McDONALD & SONS MINING P/L
 Client Reference:

QUALITY CONTROL REPORT



SAMPLE	Element Unit Method	Al2O3 % M289-1	Fe2O3 % M289-1	TiO2 % M289-1	Cr2O3 ppm M289-1	CaO % M289-1	MgO % M289-1	V2O5 % M289-1	K2O % M289-1	Na2O % M289-1	Co ppm M289-1	LOI % OA-GRA
	LOR	0.001	0.001	0.001	1	0.001	0.001	0.001	0.001	0.001	1	0.01
BLANKS												
BLANK		<0.001	<0.001	<0.001	<1	<0.001	<0.001	<0.001	<0.001	<0.001	<1	
DUPLICATES												
If applicable, duplicate results for fire assay golds are shown in the main body of the report.												
70462 Original Result		0.026	<0.001	0.047	2	0.056	0.040	<0.001	0.002	0.002	<1	
70463 Original Result		0.029	0.037	0.070	2	0.020	0.014	<0.001	0.003	0.009	<1	0.21
		0.028	0.033	0.072	1	0.018	0.013	<0.001	0.004	0.008	<1	0.42
REFERENCE STANDARDS												
The data that appears on this report are results for the internal standards analysed in conjunction with this batch.												
STANDARD I.D. RESULT OF STANDARD TARGET RANGE		0.849	0.843	0.164	149	1.74	0.042	0.002	0.138	0.052	9	

Appendix 2

Market Survey – Dolomite in Tasmania

MARKET SURVEY

DOLOMITE IN TASMANIA

For

J.J. McDonald & Sons Mining Pty Ltd

By

Aus ITech Services

Mike McBain

August 2003

Attention: Gerhard Krummei

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1. Introduction

Mr Gerhard Krummei consultant geologist to J. J. McDonald Mining Pty Ltd has identified a Dolomite deposit on exploration leases held in the Maydena area of southern Tasmania and requested a broad market survey with emphasis on the potential market in southern Tasmania.

Mike McBain of Aus ITech Services has had an involvement with limestone and lime production in Tasmania for over 47 years including the mining and calcination of limestone from the Juneec quarry at Maydena for Australian Newsprint Mills now Norske Skog at Boyer and also from the Mole Creek quarry for David Mitchell Tasmania now Unimin Pty Ltd. During this period Dolomite has always been an associated mineral and at times a very competitive product in several markets.

Contacts developed over many years have been used in the preparation of information for this report and all figures and facts used are current, up to date and confirmed.

2. Summary

This preliminary market study for dolomite products in the Hobart and southern Tasmanian districts has been prepared on the basis that production would be from J.J. McDonald's & Sons Mining lease tenements at Maydena.

Comments have not specifically dealt with potential supply separately into Hobart and south of Hobart because supply of product will generally be price and quality competitive with northern suppliers from part way down the midlands highway and more competitive in markets further south.

The current markets are detailed quite accurately and market growth is not likely to be significant unless one off type projects occur or new industries are attracted to Tasmania following the introduction of reticulated natural Gas. These effects have not been forecast.

3. Limestone's & Dolomite in Tasmania

The quarrying of limestone is the earliest recorded mining activity in Tasmania for non-metallic minerals other than coal. The occurrence of Dolomite is extensive in the far North West and Western areas of the State, there are extensive deposits in the Maydena area, there are smaller deposits in the North and there are extensive deposits in the South West.

Many of the western and south western deposits occur in, or close to, National Parks, World Heritage or recognised National Estate areas and are considered environmentally unacceptable for mining now or in the foreseeable future.

Production of non-metallic minerals occurs throughout Tasmania. The areas currently being mined specifically for Dolomite are Circular Head at Smithton and Cressy south West of Launceston. There are other areas currently being mined specifically for calcium carbonate or limestone and these are Railton for Cement, Mole Creek for Quicklime and Hydrated Lime production, Flowery Gully for Fine Ground Limestone and Agricultural Lime production and Lynchford south of Queenstown for road material production.

4. Current Productions

The following Table I of productions for the past four years is based on compulsory returns to the Department of Mineral Resources Tasmania with some additional dissection and the addition of quarterly figures not yet received by the department.

In the table of productions below it should be noted that Beams Bros produce both limestone and dolomite, Circular Head Dolomite produce dolomite only and David Mitchell Tasmania (now Unimin) produce limestone products only. Dolomite has only been produced in quantity by Beams Bros and by Circular Head Dolomite Pty Ltd and the total tonnage, for example in 2001/2002, of 119,206 tonnes can broadly be considered to be 37% for agricultural purposes, 40% for industrial fluxing purposes and 23% for other purposes.

Prior to the 1990's there was a significant government rail subsidy on the transport of agricultural liming materials within Tasmania that caused Dolomite to be transported to the North East and South of the State in equivalent quantities to the North West.

Beams Bros opened their Dolomite quarry at Cressy in the late 1990's and were successful in luring the nearby Temco Dolomite fluxing business from Circular Head Dolomite on the basis of a price/quality competitiveness. They mine the dolomite at Cressy transport it to their existing limestone crushing plant at Flowery Gully and distribute from there to the agricultural and industrial fluxing markets.

Both Circular Head Dolomite and Beams Bros operate their own efficient 25 tonne capacity trucking fleet and marketing, particularly to the agricultural sector, has stressed the benefits of Dolomite for magnesium deficient soils as well as an Australian wide push for ongoing neutralisation of acid soils.

The downturn of agricultural liming materials production, from a record in 2000/2001, is related to a general agricultural sector downturn combined with increased selling prices for liming materials. The other major factor involved is that many producers have become aware of a magnesium deficiency in their soils and have switched their funds for liming from high calcium limestone to the more expensive Dolomite materials.

Chemical and Metallurgical use for both limestone and dolomite has been relatively stable since 1998 when the Burnie Paper Mill discontinued their pulping process. It is now predominantly used by Temco at Bell Bay in the North with minor quantities consumed by the West Coast Mines, Goliath Cement and other industries.

A small limestone operation at Lynchford on the West Coast and several other small road material limestone producing quarries generally operate on calcium carbonates of below 95% or even 90% CaCO₃ as does the Australian Cement operation at Railton whereas the lime and limestone operation of David Mitchell Tasmania (now Unimin) at Mole Creek utilises a high grade chemical limestone of plus 96% CaCO₃. The Circular Head Dolomite operation is based on a very extensive and high grade dolomite of plus 30.0% CaO 21.5% MgO whereas the Beams Bros Cressy deposit is similar to the McDonald Mining Maydena deposit at plus 30% CaO 20% MgO.

5. Table I - Annual Non-Metallic Mineral Production 1999 – 2003

PRODUCTION OF NON-METALLIC (EXCLUDING FUEL) MINERALS, Tasmania				
	1999 - 00 Tonnes	2000 - 01 Tonnes	2001 - 02 Tonnes	2002 - 03 Tonnes
Clay				
Cement	85,081	77,687		
Brick	24,943	15,078		
Other	14,110	-		
Kaolin	926	5,265		
Dolomite	6,176	7,214	5,900	7,166
Limestone				
Agricultural	145,558	161,798	135,811	126,606
Cement	1,230,339	1,612,923	1,664,805	1,551,968
Chemical and metallurgical	39,467	62,096	67,595	63,014
Construction & Roads	29,659	46,369	48,730	45,427
Other	67,790	56,822	65,971	61,500
Silica (glass & other)	139,888	163,381		
Sulphuric acid(a)	446,735	291,199		
Beams Bros Pty Ltd				
Total Production		150,000		
Limestone plus Dolomite		85,000		20,000 est
Dolomite		38,000	48,264	50,000 est
Limestone Flux		15,200	12,588	
Drains		400	8,257	
Road Materials		1,400	1,146	
Dolomite By-Products			4,573	
Employees		25	25	
Circular Head Dolomite				
Screenings		5,000	6,860	
Powdered Dolomite		38,000	39,718	45,000 est
Ready Mix Concrete		10,000	13,891	
Employees		11	11	
David Mitchell Tasmania				
Crushed Rock		8,800	13,900	12,000 est
Screened Rock		1,500	1,100	1,000 est
Aglime		42,000	51,000	45,000 est
Kilnstone		60,000	57,400	55,000 est
Employees		28	28	
Pasminco				
Paragoethite			124,055	

Total Dolomite Production =

120,000 TPA

6. Dolomite & Uses

There are three commercially significant carbonates as important constituents of limestone, dolomite or magnesite, they are:-

	Formula	MolWt	S.G.	Mohr	Crystal Type
Calcite	CaCO ₃	100.1	2.72	3.0	Rhombohedral
Magnesite	MgCO ₃	84.3	3.00	3.5-4.5	Rhombohedral
Dolomite	CaCO ₃ .MgCO ₃	184.4	2.84	3.5-4.0	Rhombohedral

The pure minerals have the following compositions:-

CaCO ₃ :	CaO 56.0%.CO ₂ 44.0%
CaCO ₃ .MgCO ₃ :	CaO 30.4%.MgO 21.8%.CO ₂ 47.8%
MgCO ₃ :	MgO 47.7%.CO ₂ 52.3%

The most important impurities are:-

Silica	SiO ₂ as quartz, chert, clay, shale, feldspar etc.
Aluminium & Iron oxide	Al ₂ O ₃ & Fe ₂ O ₃
Sulphur	S in pyrite, gypsum and anhydrite.

Although there are many different uses for Dolomite and not all of these are applicable in Tasmania they will be listed here for the record.

Tasmania does have an iron ore briquetting industry, a Ferro alloy industry, a fertiliser production industry and a wide ranging agricultural industry for which dolomite can be an important raw material.

6.1 Ferro – Manganese

The specifications of dolomite for use in Ferro - manganese are more or less similar to refractory grade dolomite. Physically the dolomite should be hard and fine grained because crystalline dolomite gives fritting affects in the furnace.

The Ferro alloy industry actually consumes dolomite with MgO 19 to 20%, CaO 28 to 30%, SiO₂ 2 to 5% and R₂O₃ 2 to 2.5%.

6.2 Glass:

High-grade dolomite with as low an iron content as possible is required by the glass industry. Glass grade dolomite is typified by its purity and consistency. The MgO and CaO content should not vary by more than 0.5%. The chief undesirable impurities are iron followed by chromite, manganese, vanadium and lead, all of which colour glass or they may cause defects in the glass. For certain commercial coloured glass, an Fe₂O₃ content up to 0.25% is permissible, but for truly colourless glass, Fe₂O₃ content of 0.04% max. is specified.

Tasmania no longer has a glass production plant due to a lack of scale in the market.

6.3 Fertilizer Industry:

Dolomite for use in the fertilizer industry must have $\text{CaCO}_3 + \text{MgCO}_3$ 90% min. and SiO_2 5% max.

Inferior grade dolomite limestone of 15 – 20% MgO can be used as soil conditioner. Ground dolomite, 50% of which must be 100 BS mesh size can be considered suitable as a soil conditioner if it is applied at the rate of 2-3 ton per acre.

The BIS (IS: 5407 – Part 2-1985) has prescribed the specifications of limestone and dolomite to be used as soil amendments. According to this specification, 90% by mass of the materials should pass through 2mm (10 mesh) sieve and 50% by mass of materials to pass through 250 micron (60 mesh) sieve. The neutralizing value (express as CaCO_3) percent by mass shall not be less than 70%. The total lime and magnesia (as $\text{CaO} + \text{MgO}$) shall not be less than 50% by mass and the materials shall not contain more than 5% moisture by mass.

6.4 Fertilizer Extender:

For this purpose, dolomite must be very pure and in particular be free from colouring impurities such as oxides of iron, chromium, Manganese, etc. The Tasmanian fertiliser industry currently uses very little dolomite and this is a potential market for development.

6.5 Magnesium Metal:

Calcined dolomite of 200 mesh size is used in the extraction of magnesium metal. For this purpose calcined dolomite must contain MgO 40.5%, CaO 58.10%, Fe_2O_3 0.8% and insolubles 0.6%. Due to the recent failure of calcined magnesite to prove viable in Queensland it is considered that dolomite would be most unlikely to be used for this purpose.

6.6 Miscellaneous Uses

Dolomite chips are used in flooring tiles but the Tasmanian market would be small. Dolomite has a potential use in SO_2 emission control at coal-fired power plants but Tasmanian coal is relatively low in sulphur and at the main commercial user, Norske Skog newsprint mill, emissions are liberally licensed under pre-existing conditions.

Dolomite is used in the iron and steel industry as refractory raw material and as a flux but these industries are not currently present in the Tasmanian industrial scene.

6.7 Agricultural Dolomite Explained

Dolomite is a double carbonate of calcium and magnesium ($\text{CaCO}_3.\text{MgCO}_3$). Dolomite is a term used by geologists to describe rocks containing Carbonates of Calcium and Magnesium. Some deposits contain low levels of Magnesium Carbonate and should not be called Dolomite but high Magnesium Limestone's.

Dolomite neutralises soil acidity, in this application being more effective weight for weight than limestone. It provides the element Calcium essential to maintain plant cell functions. Provides Magnesium essential for chlorophyll production. Stimulates micro bacterial activity in the soil to aid plant nutrient availability. The availability of molybdenum is improved by the use of dolomite on acid soils.

Dolomite helps to ensure the breakdown of organic matter and increases the availability of nitrogen to plants.

Dolomite is used to correct the symptoms of Magnesium deficiency in bananas, citrus, tomatoes, potatoes, cauliflower's and cereals. To neutralise soil acidity caused by frequent application of ammonia and nitrogen based fertilisers. To promote efficient conservation of essential nutrients by soil bacteria. To restore the critical soil balance by normal cropping. To condition and conserve soil textures and properties.

On fruit trees and bananas year round application is beneficial but for best results apply prior to main growing season. On crops such as tomatoes, potatoes and cauliflower's apply during soil preparation and prior to seeding. It is spread by broadcast or bottom dump spreaders depending on particular applications. Typical economical application rate is between one tonne per acre and one tonne per hectare.

In Tasmania its use on apple orchards and in vineyards is just beginning to be appreciated and in the last few years all agricultural producers have become much more aware of the significant magnesium deficiency that occurs in most Tasmanian soils and the benefits of adding Dolomite to overcome this and neutralise their acidity at the same time. This is seeing a swing away from applying straight high calcium limestone's to the application of Dolomite as long as it is finely ground.

7. Potential Markets Tasmania Wide

The potential state-wide markets for Dolomite include:-

	Est. TPA
Temco - Bell Bay	50,000
Pasminco – Risdon	1,000
Savage River Mines - Port Latta	3,000
Western Metals Tailings – Hellyer	25,000
Pasminco – Rosebery	3,000
Renison Tin – Zeehan (Press report Appendix A)	3,000
Copper Mines of Tasmania – Queenstown	3,000
Mt Lyell AMD & Tailings Treatment – Queenstown	10,000
Beaconsfield Gold - Beaconsfield	3,000
Agricultural use as a Magnesium supplement - state wide	25,000
Agricultural use for neutralisation - state wide	25,000

Note that each of the unconfirmed mining industry potential uses has been estimated at a nominal 3,000 TPA.

Total Potential Dolomite market Tasmania wide = 151,000 TPA

8. Potential Markets - Southern Tasmania

From the above list only the following may be considered as southern Tasmanian potential markets:-

	Est. TPA
Pasminco – Risdon	1,000
Impact Fertilisers – Risdon	6,000
Agricultural use as a Magnesium supplement	10,000
Agricultural use for neutralisation	10,000
Norske Skog – Boyer	3,000

Total Potential Dolomite market Southern Tasmania = 30,000 TPA

It is noted that the current actual market for agricultural liming materials south of Campbell Town in central Tasmania is 20,000 TPA and is generally governed by the transport cost factor with the producers in the north and north-west of the State.

9. Quality Factors

It is not considered that quality of the Maydena dolomite product or its impurity content would be a barrier for any of the potential Tasmanian market uses as it may be if it were to be supplied to the Glass, Steel or Refractory industries. Similarly if the Maydena product were to be sold against the existing Beams Bros or Circular Head dolomite product even to Temco then the Maydena product would be a price/quality competitor influenced predominantly by production and transport costs.

10. Transportation Factors

Because both limestone and dolomite products are of relatively low value the cost of transport is a very significant factor in marketing them.

Within Tasmania road transport costs can be offset to a degree by utilising “B-Double” truck trailers and by organising back freight wherever possible. The current main freight movements for this type of transport are associated with Fertiliser distribution from southern Tasmania to the north-east and north-west cropping areas and so it is unlikely that dolomite transport from Maydena to the north of the State would be competitive with the two northern suppliers who can achieve some seasonal back freight loading.

Rail freight from the Derwent Valley is an option that may develop in the near future. There is currently a public outcry over proposed log truck movements from the Huon Valley via a new road into the Derwent Valley above New Norfolk and through the town and on to the woodchip export mill on the east coast.

As may be seen from copies of a recent press report attached as Appendix B there is a strong push to upgrade the existing rail line in the Derwent Valley to take this freight movement off the roads and any proposed dolomite transport from Maydena via rail could then take advantage of this and may even be encouraged by a subsidy once the Government bows to the expected people and voting pressure that is developing.

11. Environmental Factors

There are always objections in Tasmania to new mining proposals by the well organised and generally radical Green lobby bodies and an example of this is a proposal to mine limestone on the West Coast for the future Western Metals tailings treatment which has been opposed by several groups associated with the Tasmanian Conservation Trust. A copy of this objection is attached as Appendix C as an example of the form these generally take.

It is possible to have these objections mediated successfully although there is a current strong campaign in progress associated with the Styx Valley of the Giants forest which is accessed via the road near the McDonald Mining leases at Maydena and which may cause a more than normal interest in any proposal for mining dolomite.

12. Infrastructure Factors

There can often be special market factors in Tasmania which may lead to “one off” projects that can form the basis of establishment of new production facilities which then continue at a reduced level. In the case of the Maydena dolomite project development the types of development that may occur or be worthwhile pursuing are:-

- 12.1 A requirement in one of the nearby National Park or National Estate areas for ready mixed concrete for Interpretation Centre or other construction.
- 12.2 An extension of the Strathgordon or other Dams in the area.
- 12.3 Road surfacing materials or aggregate for road sealing or rail ballast.
- 12.4 Problems with gravel pits for road building or maintenance caused by environmental factors, supply or transport economics for the Norske Skog wood supply forests in the Upper Derwent Valley.
- 12.5 An acid drainage problem or other neutralisation requirement.

With the nearest hard rock and screenings production facility at Bridgewater then a competitive road cartage distance from Maydena would probably be anything north of Rosegarland or Plenty.

When in fact the Government and Gunn’s Ltd do go ahead and construct the new log truck road from the Huon Valley to the Derwent Valley at Plenty then there would seem to be opportunities for Dolomite Screenings and Crushed Rock to be used in the construction and upgrading of this proposed route.

It would seem to make good sense to open early discussions with these groups to point out the benefits for local employment and development associated with a new Dolomite producing operation at Maydena specifically to supply these markets.

13. Production Factors

Dolomite for agriculture use must be ground fine for maximum benefit to be obtained and it is more difficult to grind than high calcium limestone. If the silica content is above 1.5% then the wear factor on grinding equipment can be significant and as a general rule it should be expected that crushing, screening & grinding costs will be at least \$2/tonne higher than for limestone.

The quarrying costs will vary depending on location and a range of other factors and productivity effects are always significant. As a guide, a 100,000 TPA operation with minimum overburden and rehabilitation costs can produce a dolomite screening product for between \$12 - \$16 per tonne ex-works and a fine ground product for \$14 - \$18/tonne.

14. Selling Prices

In Tasmania it is accepted that selling prices will be discounted for orders in excess of 100 tonnes for agricultural products and 1000 tonnes for industrial products.

As a guide the current average prices ex-works for these quantities of limestone and dolomite are:-

Limestone Agricultural	\$19.50 per tonne
Limestone Industrial	\$15.00 per tonne
Dolomite Agricultural	\$21.50 per tonne
Dolomite Industrial	\$17.50 per tonne

Transport in 25 tonne loads averages \$300 per 100 kilometres or \$500 per 200 kilometres. ie. \$12/tonne for a 100 kms or \$22/tonne for a 200 kms cartage leg. Cartage in “B-double” trucks and with back loading can significantly reduce these charges.

For comparison purposes, 100 tonnes of agricultural Dolomite can be delivered to Hobart from northern Tasmania for say \$43.50/tonne in 25 tonne truck loads and if production costs at Maydena were identical then 100 tonnes of product could be delivered to Hobart for \$33.50/tonne. Similarly the prices for supply to Launceston would be reversed.

As indicated elsewhere back loading and “B-double” transport favours cartage from north to south rather than from south to north.

Mike McBain
Aus ITech Services

11th Aug 2003

Appendix A Renison Tin – Zeehan Press report

Appendix B Derwent Valley Road Rail proposal

Appendix C

TASMANIAN CONSERVATION TRUST

The Tasmanian Conservationist

Number 272 September 2000

Proposal for a limestone quarry in NW Tasmania wilderness karst

Arthur Clarke

Introduction

Although Western Metals Resources Limited recently closed the silver/lead/ zinc Hellyer Mine it acquired from Aberfoyle in 1998, an exploration licence has been applied for – to establish limestone quarry sites in a 29 km² area in the nearby adjoining Mt Cripps karst. The limestone is required to neutralise a proposed “pressure oxidation (acid leaching) process” of the Hellyer Mine tailings prior to treating the leached sludge residue using a cyanide process to separate gold and silver.

Location of the Mt. Cripps limestone karst

The Mount Cripps karst area lies south of the Cradle Mountain Link Road and North Forest Products timber leases; is bordered in the east by Mackintosh Creek and the Vale River and in the south by the hydro-electricity impoundment (Lake Mackintosh). When constructed in 1981, Lake Mackintosh “submerged” the southern portion of the Mt Cripps limestone, including outflow caves and Aboriginal occupation sites that date to 10,000 years BP (Heap, 1999). Immediately west of the limestone, there are two sulphide ore mine operations: Que River Mine and Hellyer Mine.

Further significance of the Mt Cripps karst

Apart from 215 known caves, rare cave fauna, megafauna fossil deposits and archaeological sites, the particular significance of Mt Cripps karst area stems from its polygonal karst – a crowded network of small and large-scale closed depressions, separated by narrow ridge divides. Apart from being one of only four areas of polygonal karst in Australia (all in Tasmania), its significance is further highlighted because it is the only known area of polygonal karst subjected to multiple glaciations and still retaining its original (unlogged) myrtle-dominant rainforest cover.

Previous protection efforts and the RFA

The karst was proposed for inclusion in the World Heritage Area in a ministerial report (PWH, 1990) to the Tasmanian Government in 1990, that the government did not endorse. Prior to the RFA process, the Mt Cripps karst was in an area of deferred forest – as a Forestry Tasmania RAP (Recommended Areas for Protection). During the RFA, the Mt Cripps karst

was nominated for inclusion on the Register of the National Estate on the basis of its geo-heritage values (Dixon and Duhig, 1996) and recommended to be proclaimed as a Crown

Land reserve to protect the cave fauna communities (Clarke, 1997); both of these proposals were ignored by the RFA.

Objections to the limestone-quarrying proposal

Four organisations lodged objections to the exploration licence: the Australian Speleological Federation (ASF), Southern Tasmanian Caverneers (STC), Savage River Caving Club (SRCC) and the North West Walking Club. At a mediation session in Burnie with the Mineral Resources Tasmania (MRT) Registrar, Western Metals agreed to modify their licence to avoid some known high sensitivity karst sites in the east, reducing it from a 29 km² area to a 12 km² area. MRT ignored a submission from Launceston-based speleologist, Henry Shannon, who proffered the novel idea of lowering Lake Mackintosh to permit limestone quarrying on the present lake floor, with the lake being back-filled after the quarry was completed. Three organisations: ASF, SRCC and STC are maintaining their objections. MRT advise that the matter will now be referred to the Mining Tribunal for mention and subsequent determination. It will be the first time the new (1995) Mineral Resources Development Act of Tasmania has been tested and there is some doubt about the objectors being able to establish legal standing.

Basis for continued objection to limestone mining in the Mt. Cripps area

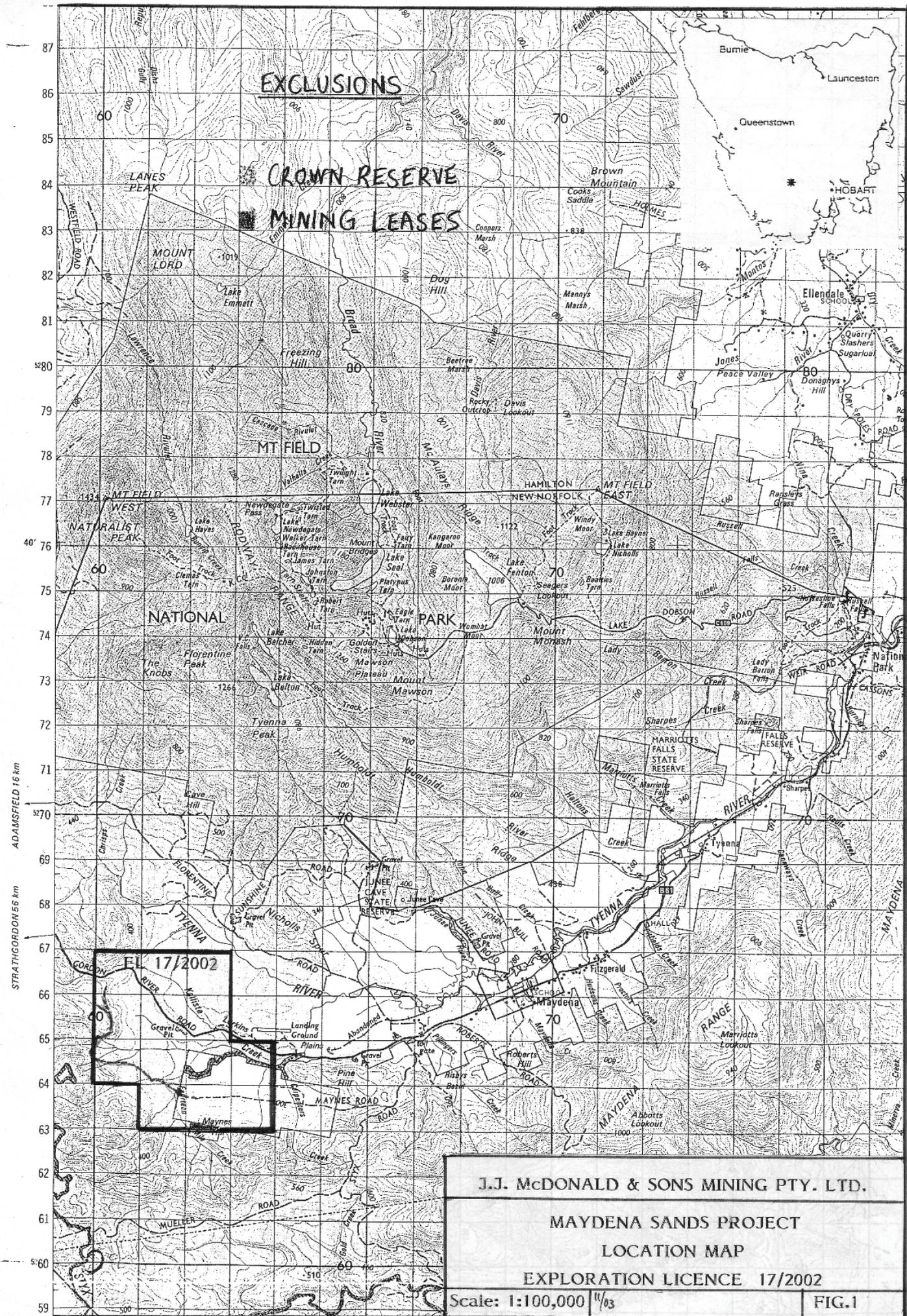
Following is a referenced summary of the Australian Speleological Federation’s concerns in regard to the modified exploration licence EL17/99:

- A area of 12 km² still appears to be an excessively large licence area for a limestone quarry, estimated to attain a size less than 200 m² (Grimes, 1999);
- ASF opposes the exploration and/ or mining of karst areas. There are many areas of carbonate rock including limestone, but karst is a comparatively rare feature (Kiernan, 1995). ASF supports the IUCN provisions and guidelines for cave and karst protection, and protection of karst catchments (Watson, et alia, 1997);
- The Mt Cripps area is a highly significant area of glaciated karst with rare polygonal karst, unknown subterranean drainage and unique cave fauna. The karst and its glacial cover support a natural vegetation comprising virgin, climax (myrtle-dominant) rainforest and mixed wet sclerophyll forest (Clarke, 2000; Heap, 1999; Kiernan, 1995);
- The entire Mt Cripps karst area has been proposed for inclusion in the World Heritage Area, nominated for inclusion on the National Estate and recommended as a Crown Land reserve (PWH, 1990; Dixon & Duhig, 1996; Clarke, 1997);
- The unit of Ordovician limestone in the modified 12 km² (western) area is the same contiguous geological rock unit as the eastern area with known high sensitivity karst features (Kiernan, 1995). The modified licence area is likely to feature a similar range of surface, sub-surface or subterranean karst features, along with significant cave fauna and other natural attributes (Clarke, 2000);
- ASF could not agree to a licence in the modified area where no “on-ground” surface karst investigations have been undertaken by cavers and karst experts. The Western Metals consultancy report records some large dolines and a possible small area of polygonal karst – west of Lake Mackintosh (Grimes, 1999);
- The absence of obvious surface karst features (possibly covered by glacial till deposits) does not negate the presence of subterranean karst features. There has been no indication of any course of action if surface, sub-surface or subterranean karst features are encountered during the exploration or mining of the limestone;
- ASF is concerned by the need for limestone as a “Category 3 (construction) mineral” in addition to a “Category 1 (industrial) mineral”. It is unknown whether the need for this “Category 3” limestone commodity (and the volumes required) is included within the estimated annual requirement of 160,000 tonnes of limestone (Clarke, 2000);

- There are unconfirmed reports from SRCC cavers of turbidity and flocculent in the Southwell River emanating from at the Hellyer Mine tailing dams. In addition to continued turbidity, there is concern that a cyanide treatment process could result in leakage into river systems and waterways which drain into the karst aquifer systems or through the karst: both could potentially impact on natural processes and the cave fauna ecosystems (Clarke, 2000).

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J.J. McDONALD & SONS MINING PTY. LTD.

MAYDENA SANDS PROJECT

LOCATION MAP

EXPLORATION LICENCE 17/2002

Scale: 1:100,000 11/03

FIG.1