TASMANIA MINES LIMITED
RL 9001 HAMPSHIRE
RELINQUISHMENT REPORT

SEPTEMBER 1998

Prepared by

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for

McKEOWN MINING PTY LTD
RIDGLEY, TASMANIA
(phone 03 6435 7560)

on behalf of

TASMANIA MINES LIMITED

IMPORTANT NOTE

This report is not intended for use as a public document or, in whole or in part, in a public document.

This report has been prepared using information and data available to the author at the time of writing.

ABBREVIATIONS

textual abbreviations

EL	Exploration Licence
RL	Retention Licence
Tasmines	Tasmania Mines Limited

SUMMARY

Retention Licence 9001 at Hampshire was granted to Tasmania Mines Limited (Tasmines) in 1990.

RL 9001 was granted to cover deposits of magnetite and wollastonite.

During the tenure of RL 9001, investigations to determine the metallurgical characteristics of the wollastonite mineralisation were commissioned.

The metallurgical testwork suggested that a relatively high grade wollastonite concentrate could be made by fine grinding followed by flotation.

A large investment in plant would be required to achieve the relatively fine grind and flotation. Consequently, Tasmines management decided that development of the wollastonite deposits was not economically viable and, so, RL 9001 has been relinquished.

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1 INTRODUCTION

Retention Licence 9001 at Hampshire was granted to Tasmania Mines Limited (Tasmines) in 1990 and expired on the 24th of May 1998. RL 9001 lay immediately to the north of, and was contiguous with Tasmines' operating mine lease at Kara No 1, Consolidated Mineral Lease 1371P/M .

RL 9001 was granted to cover "proven deposits of both magnetite and wollastonite which at the present time could not be commercially developed" (Whitehead, 1990). Two specific deposits were cited: Hampshire magnetite and Limestone Creek wollastonite.

Since 1990, Joint Venture partners were sought for the development of the wollastonite resources. However, the question of the quality of the wollastonite arose in discussions with potential Joint Venture partners. Consequently, in 1996, investigations to determine the metallurgical characteristics of the wollastonite mineralisation were commissioned.

2 HISTORY

Magnetite in the Hampshire area was first reported by George Renison Bell in the late 1800s. From that report until the 1960s, the only recorded investigations in the Hampshire area were carried out by staff of the Tasmania mines Department. Reid (1924) visited the area and Hughes (1950) recorded the first known anomalous tungsten analyses ranging from 0.3% to 0.9% H_2WO_4 from samples taken near Kara No. 1. Longman (1961) identified wollastonite in outcrop in the valley of Limestone Creek.

In 1968, Tasminex N.L. commenced work on Exploration Licence 17/68. This was to result in the discovery of the Kara No 1 scheelite skarns in 1970, and development of the Kara No 1 mine where scheelite production commenced in 1977. Tasminex N.L. later changed its name to Tasmania Mines Limited and the mine has been in continuous operation since 1977. EL 17/68 was finally completely relinquished in 1991 (Whitehead, 1991).

Note that Wollastonite Creek is sometimes referred to in older reports as Limestone Creek.

3 GEOLOGY

Several magnetite skarns lie within, or adjacent to, the outcrops of the Housetop, Ringwood and Kara granites. Turner (1989) listed magnetite skarns at Kara No 1, Kara No 2, Sutton's, Hampshire (near the railway crossing), Redwater Creek, Laurel Creek and Peak Hill Farm. The geology of the Kara area has been generally described by Burrett and Martin (1989):

> "Several scheelite-bearing garnet-diopside-magnetite-amphibole-vesuvianite skarns have formed at a transitional boundary between siliceous sandstone and quartzwacke (Moina Sandstone) and overlying Gordon Group limestone. Most deposits are within a synformal structure in the Ordovician sedimentary rocks which are underlain and intruded by porphyritic and equigranular biotite-hornblende granite of the magnetite-series of the Devonian Housetop Granite."

Kara No 1, the largest known skarn deposit, is currently being mined by Tasmines for the production of magnetite and scheelite. Table 1, from McKeown (1994), lists the minerals which have been described from the Kara No 1 skarns.

TABLE 1

KARA NO 1
MINERALS IDENTIFIED IN SKARNS

magnetite	garnet
scheelite	grossularite
powellite	andradite
chalcopyrite	epidote
haematite	vesuvianite
molybdenite	biotite
bismuthinite	tremolite
pyrite	ferrohastingsite
galena	chlorite
sphalerite	quartz
arsenopyrite	orthoclase
	sphene
	apatite
	fluorite
	calcite
	hedenbergite
	amphibole
	diopside
	wollastonite

Singoyi (1995), identified four paragenetic stages of skarn formation at Kara No 1, placing the formation of wollastonite in the earliest, scheelite poor, stage. Presumably, wollastonite formed from Gordon limestone during the introduction of silica from the intruding Devonian granite:

$$CaCO_3 + SiO_2 = CaSiO_3 + CO_2$$

4 WOLLASTONITE TESTWORK

In 1997, a sample of run-of-mine wollastonite mineralisation was submitted to Oretest Pty Ltd for metallurgical assessment (Barclay and Kyle, 1997).

Testwork showed that the sample contained about 20% wollastonite and 70% calcite and that, after grinding to 80% passing 75 µm, the wollastonite could be concentrated to 96% by flotation of calcite followed by flotation of wollastonite.

A copy of the Oretest report is attached as Appendix 1.

5 CONCLUSION

Although the metallurgical testwork suggested that a relatively high grade wollastonite concentrate could be made from the wollastonite mineralisation, a large investment in plant would be required to achieve the relatively fine grind and flotation. Consequently, Tasmines' management decided that development of the wollastonite deposits was not economically viable and, so, RL 9001 has been relinquished.

REFERENCES

Barclay, L. and Kyle, J., 1997. Beneficiation of wollastonite ore, 22 May 1997. Oretest Pty Ltd.

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98-4214A

214011

Appendix 1

Beneficiation of wollastonite ore

98-4214A

ORETEST

Metallurgical Testwork and Research

214012

BENEFICATION

OF

WOLLASTONITE ORE

CLIENT: Kanji Group Pty Ltd

JOB No.: 7103

DATE: 22 May 1997

Lee Barclay

Jim Kyle

Oretest Pty Ltd
12 Aitken Way Kewdale, Western Australia 6105
Telephone 61-9-353 3326 Facsimile 61-9-353 1028
Internet: http://www.oretest.com.au Email: email@oretest.com.au
A.C.N. 060 739 835

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SUMMARY

214014

A metallurgical testwork programme has been conducted on a Run-of-mine (ROM) wollastonite sample.

The testwork programme consisted of:

- Feed analysis and mineralogy
- Magnetic separation
- Desliming testwork
- Batch flotation testwork

The main aim of the testwork was to establish a beneficiation process for producing a wollastonite rich product from the ROM wollastonite ore.

Results of the testwork are summarised below:

HEAD ASSAY AND MINERALOGY

Initial mineralogical examination indicated the ore consists predominantly of calcite ($CaCO_3$) and wollastonite ($CaSi_3$). This is supported by the ICP scan which indicated 32.1% calcium and 12.4% silica.

The mineralogical examination also indicated a grind size of less than 100µm would be necessary for good liberation, and that at 38µm the wollastonite was totally liberated. As a result, a grind size of 80% passing 75µm was used for the remaining testwork.

MAGNETIC SEPARATION

Wet high intensity magnetic separation (WHIMS) resulted in 1.1% of the mass reporting magnetics. Mineralogical examination of the magnetics indicated it consisted mainly of tramp iron (from comminution) and other entrained material. Mineralogical examination of the non-magnetics indicated the Wollastonite was largely liberated and forms not more than 30% of the sample.

These results indicate that WHIMS does not promote upgrading of the wollastonite. As such, magnetic separation was not used during the remaining testwork.

DESLIMING TESTWORK

Desliming of the wollastonite sample resulted in 6.1% of the mass reporting to the overflow (slimes). The slimes were too fine for mineralogical examination, however examination of the underflow indicated no upgrade had been achieved. As such, desliming was deemed unnecessary and was not used throughout the remaining testwork.

FLOTATION

Two batch flotation tests were conducted. Firstly flotation of the calcite to give a wollastonite tail, and secondly flotation of the wollastonite to give a wollastonite concentrate.

TEST TYPE	PRODUCT TYPE	MASS %	WOLLASTONITE		CALC HEAD GRADE WOLL %
			MASS%	GRADE%	
CALCITE FLOTATION	TAIL	25.8	95	85	23
WOLLASTONITE FLOTATION	CON	14.5	94	96	15

Both methods of flotation were successful, with flotation of the wollastonite giving slightly better results.

The wollastonite rich and calcite rich flotation products were also examined to determine the size and shape of the particles present. The results indicated the majority of particles were less than 50μm.

The wollastonite particle shapes are described in the following table:

SHAPE	LENGTH: WIDTH RATIO	MASS %
FIBRES	>3:1	70%
LAMELLAE	<3:1	30%

The calcite particle shape was described as Rhomb (oblique – angled parallelogram), with 60% less than 30μm.

CONCLUSION

The test results indicate that flotation is the best method of upgrading this ROM wollastonite ore to produce a wollastonite rich concentrate. Any other process steps prior to flotation, which are commonly used for wollastonite ores, are not required for this sample.

Mineralogical examinations conducted throughout the testwork programme indicated the ROM sample contains approximately 20% wollastonite (with approximately 70% calcite), which can be upgraded to 96% wollastonite in 15% of the mass at 94% recovery.

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1 INTRODUCTION

Mr Ken Broadfoot of Kanji Group Pty Ltd requested Oretest Pty Ltd to conduct a metallurgical testwork programme on a sample of run-of-mine (ROM) wollastonite ore.

The testwork programme consisted of:

- Feed analysis and mineralogy
- Magnetic separation
- Desliming testwork
- Batch flotation testwork

The main aim of the testwork was to establish a beneficiation process for producing a wollastonite rich product from the ROM wollastonite ore.

All assays were conducted by Analabs of Balcatta, Western Australia using the following methods:

- All elements - ICP - OES

Mineralogical examinations were conducted by Roger Townend and Associates of Welshpool, Western Australia, using optical microscopy.

All tests were conducted in Perth tap water.

2 SAMPLES / SAMPLE PREPARATION

Approximately 18kg of ROM wollastonite ore was received at Oretest's laboratory on 13 November 1996.

The ore was stage crushed to 100% passing 2mm and then rotary split into 1kg charges for testwork.

3 TESTWORK PROCEDURES AND RESULTS

The complete testwork programme is outlined in the flowsheet depicted in Figure 1 of Section 4.

3.1 HEAD ASSAY AND MINERALOGY

A sub-sample of the wollastonite ore was sent for a multi-element ICP scan and a second sub-sample for mineralogical analysis by Roger Townend and Associates.

A description of the mineralogical analysis procedure is presented in the formal report from Roger Townend and Associates. (Refer to Appendix 1).

The initial mineralogical examination indicated the ore consists predominantly of calcite ($CaCO_3$) and wollastonite ($CaSi_3$). This is supported by the ICP scan which indicated 32.1% calcium and 12.4% silica.

The mineralogical examination also indicated a grind size of less than 100μm would be necessary for good liberation, and that at 38μm the Wollastonite was totally liberated. As a result, a grind size of 80% passing 75μm was used for the remaining testwork.

Detailed mineralogy results are presented in Appendix 1. Detailed results from the ICP scan are presented in Table 1 of Section 4.

3.2 GRIND ESTABLISHMENT

Three 1kg portions of the wollastonite sample were ground for various times in a laboratory rod mill at 50% solids.

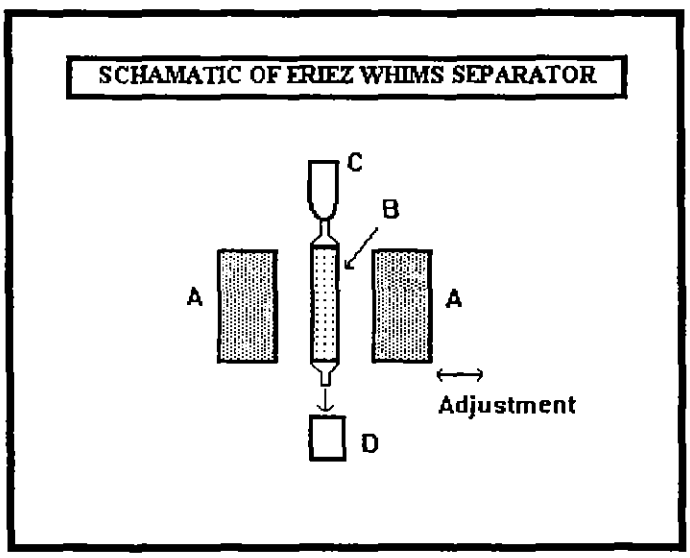
Size analyses were conducted on the ground slurries to determine the relationship between grind time and the resulting 80% passing size (P_{80}). From these results the grind times required to produce the desired P_{80} were established.

The result was as follows:

SAMPLE	TIME FOR P80 = 75 µm (mins : secs)
WOLLASTONITE	10 : 48

3.3 HIGH INTENSITY MAGNETIC SEPARATION (WHIMS)

WHIMS tests were carried out using a batch separator manufactured by Eriez Magnetics, of Erie Pennsylvania. A schematic of the machine is shown below:



A Rare earth permanent magnets.

B Canister with matrix.

C Feed mixing reservoir.

D Slurry receival reservoir.

Separation of 'magnetics' takes place in a stainless steel canister (B) which is positioned in the magnetic field generated between rare earth permanent magnets (A).

The canister is filled with woven wire mesh as a matrix, to create magnetic gradients within the canister. 'Magnetics' are captured by the magnetic forces generated adjacent to the strands of woven wire.

The woven wire is a magnetic stainless steel and three mesh sizes are used:

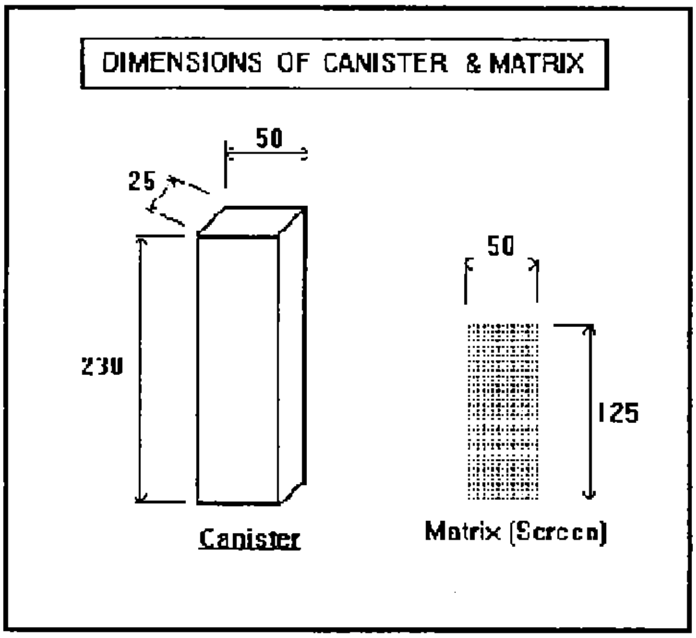
1) Fine - 1 mm square aperture.

2) Medium - 1.5mm square aperture.

2) Coarse - - 2mm square aperture.

The matrix is loaded fairly tightly within the canister, but allowing for free flow of slurry down through the packing. Fine matrix is used for capture of weakly (paramagnetic) minerals (e.g. haematite), while the coarse matrix is used for more strongly magnetic minerals (e.g. pyrrhotite, magnetite). Choice of matrix is also dependent on the maximum particle size in the slurry being processed.

The canister size is shown overleaf (dimensions in mm):



Strips of mesh 125 x 50 mm are inserted as shown; typically 110 g of fine mesh and 150 g of coarse mesh are used in the canister which has a working volume of 0.29 litre.

The canister with matrix inside is placed between the permanent magnets and the feed mixing reservoir (C) attached at the top. The field strength can be set by adjusting the width between the permanent magnets. Field strength in the air gap is variable between 2,000 gauss and 100 gauss.

A weighed amount of sample is mixed with the appropriate amount of water (to give the required solid:liquid ratio) and agitated in the feed mixing reservoir (C). The ball valve below the reservoir is opened fully and the feed slurry allowed to pass through the magnetized matrix under 'free flow'. Magnetics are collected in a container below the canister. The feed valve is closed and the appropriate amount of wash water then added to the feed reservoir. The valve is opened and the wash water then allowed to flow down through the matrix and flush out any entrained non-magnetics. Washings are usually collected together with the original non-magnetics.

Magnetics are flushed from the canister after removal from the magnetic field.

Products are filtered, dried, weighed and assayed.

Variations that can be carried out include:

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- Re-passing of magnetics (roughing, cleaning).
- Re-passing of non-magnetics (roughing, scavenging)
- Combination of the above.

The main parameters affecting the machine performance are:

- Field strength
- Matrix type
- Wash water volume and flowrate
- Feed pulp density

The WHIMS batch machine simulates the performance of the large scale 'Ferrous Wheel' separator, manufactured by Eriez.

The wollastonite sample was tested using the following conditions:

- Mesh size medium
- Field strength 2000 gauss
- Pulp density 20% solids w/w
- Wash water 1 pass of equal volume

After testing, the magnetics and non-magnetics were filtered, dried (at <75°C), weighed and sent for mineralogical analysis.

The wet high intensity magnetic separation (WHIMS) resulted in 1.1% of the mass reporting magnetics. Mineralogical examination of the magnetics indicated it consisted mainly of tramp iron (from comminution) and other entrained material. Mineralogical examination of the non-magnetics indicated the wollastonite was largely liberated and forms not more than 30% of the sample.

These results indicate that WHIMS does not promote upgrading of the wollastonite. As such, magnetic separation was not used during the remaining testwork.

Detailed mineralogy results are presented in Appendix 2.

3.4 DESLIMING

A 1kg sub-sample of the wollatonite sample was deslimed using a cyclone feed pressure of 240kPa. The desliming cyclone configuration consisted of a 25mm diameter Mozley cyclone with a 3.2mm spigot and a 5.5mm vortex.

The feed sample was slurried in a mixing tank with tap water to give a pulp density of 7% solids by weight.

Slurry was pumped through the cyclone in closed circuit using the by-pass valve to obtain the required cyclone feed pressure.

Once steady, the full streams of underflow and overflow were collected.

Both streams were filtered, dried (at <75°C), weighed and sent for mineralogical analysis.

Desliming of the wollastonite sample resulted in 6.1% of the mass reporting to the overflow (slimes). The slimes were too fine for mineralogical examination, however examination of the underflow indicated no upgrade had been achieved. As such, desliming was deemed unnecessary and was not used throughout the remaining testwork.

3.5 FLOTATION TESTWORK

Two kinetic batch flotation tests were conducted on the wollastonite sample. Firstly flotation of the calcite to give a wollastonite tail, and secondly flotation of the wollastonite to give a wollastonite concentrate.

The following procedure was used:

- The charge mass of ore (1kg) was milled in a laboratory rod mill for the established time to achieve a P_{80} of 75µm.
- The ground slurry was washed directly into the flotation cell (2.5 litre).
- Flotation was carried out using the standard Agitair bench machine. Agitator speed was set at 700rpm and air flow rate was controlled using a rotameter to achieve good froth properties.
- The slurry was conditioned and floated maintaining the appropriate times and reagent additions. Froth removal was conducted with a stroke rate of 10 seconds.
- All reagent additions and air flow rates were recorded.
- The slurry was monitored for pH and mV at each stage of the float test.
- At completion, the concentrates and tail were filtered, dried, weighed and sent for mineralogical analysis.

The detailed test data (including reagent additions) and results are presented in Tables 2-3 of Section 4, and are summarised overleaf:

FLOTATION CONDITIONS

Test 1 – Calcite Flotation

STAGE	TIME (mins)		REAGENTS (g/t)			pH	mV
	Conditioning	Float	AERO 845	Diesel	MIBC		
Grind 1 kg						9.9	127
Concentrate 1	3	3	75	75	36	9.7	124
Concentrate 2	3	3	25	25	36	9.6	90
Concentrate 3	3	2	25	25	18	9.5	95
Concentrate 4	3	2	25	25	0	9.5	100

Note: Aero 845 is a collector manufactured by Cytec Australia Ltd, Diesel fuel is also used as a collector and MIBC is a frother manufactured by Shell Australia.

Test 2 – Wollastonite Flotation

STAGE	TIME (mins)		REAGENTS (g/t)		pH	mV
	Conditioning	Float	Flotigam K2C	Flotal B		
Grind 1 kg					9.9	39
Concentrate 1	2	2.5	200	36	9.9	69
Concentrate 2	2	2	50	36	9.8	64
Concentrate 3	2	1.5	50	18	9.7	77
Concentrate 4	2	1.5	50	0	9.6	80

Note: Flotigam K2C is a collector and Flotal B is a frother, both are manufactured by Hoechst Australia Ltd.

FLOTATION RESULTS

TEST TYPE	PRODUCT TYPE	MASS %	WOLLASTONITE		CALC HEAD GRADE WOLL %
			MASS%	GRADE%	
CALCITE FLOTATION	TAIL	25.8	95	85	23
WOLLASTONITE FLOTATION	CON	14.5	94	96	15

Detailed mineralogy results are presented in Appendix 3.

Both methods of flotation were successful, with flotation of the wollastonite giving slightly better results.

The wollastonite rich and calcite rich flotation products were also examined to determine the size and shape of the particles present. The results indicated the majority of particles were less than 50μm.

The wollastonite particle shapes are described in the following table:

SHAPE	LENGTH: WIDTH RATIO	MASS %
FIBRES	>3:1	70%
LAMELLAE	<3:1	30%

The calcite particle shape was described as Rhomb (oblique – angled parallelogram), with 60% less than 30μm.

Detailed mineralogy results for the particle size and shape determination are presented in Appendix 4.

3.6 CONCLUSION

The test results indicate that flotation is the best method of upgrading this ROM wollastonite ore to produce a wollastonite rich concentrate. Any other process steps prior to flotation, which are commonly used for wollastonite ores, are not required for this sample.

Mineralogical examinations conducted throughout the testwork programme indicated the ROM sample contains approximately 20% wollastonite (with approximately 70% calcite), which can be upgraded to 96% wollastonite in 15% of the mass at 94% recovery.

The flotation regime required to produce these results is very simple, with a cationic collector and an alcohol based frother being the only reagents used.

4 DETAILED TEST DATA

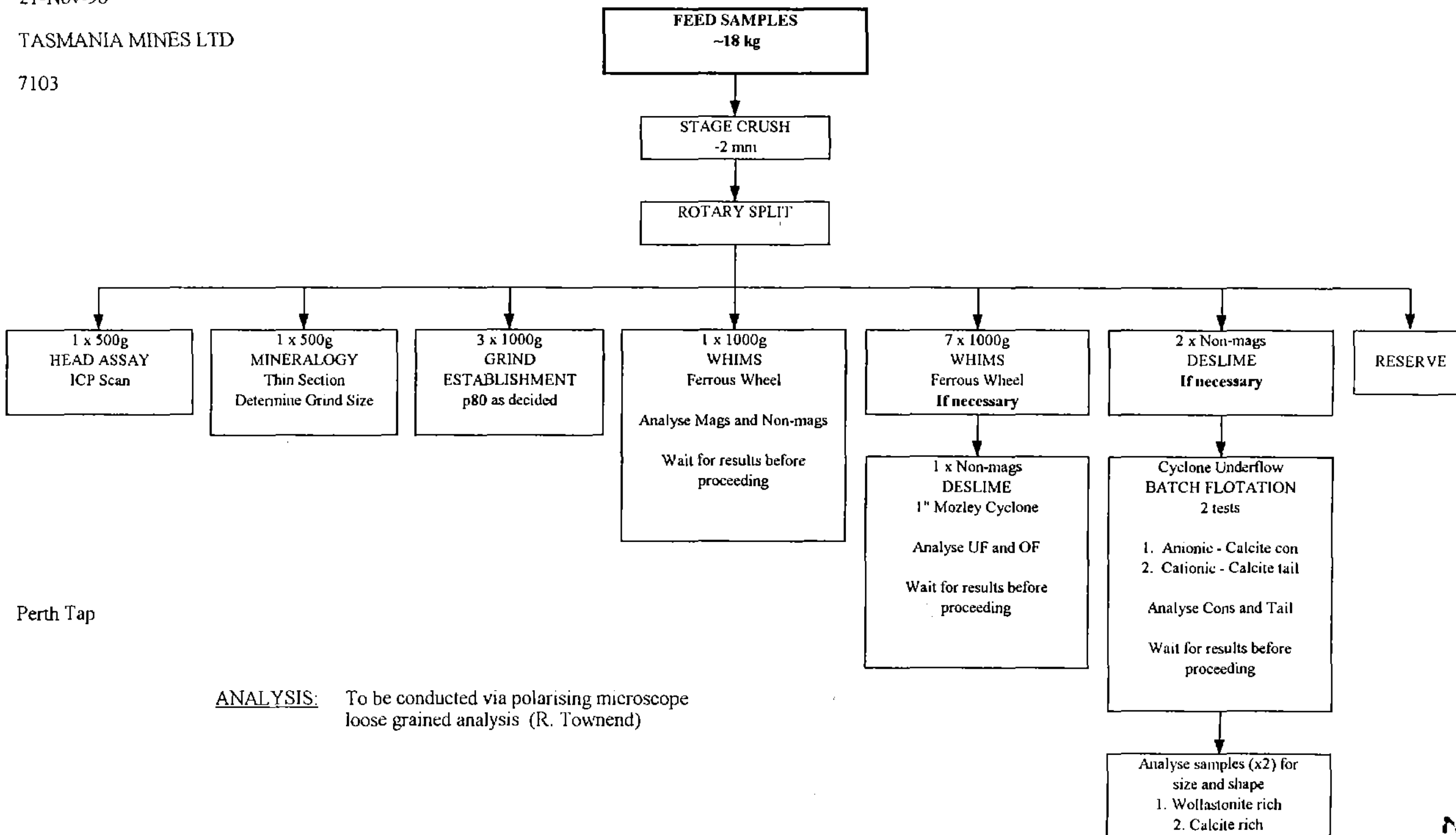
FIGURE 1
TABLES 1 - 3

Figure No.1 WOLLASTONITE BENEFICIATION TESTWORK

Date: 21-Nov-96

Client: TASMANIA MINES LTD

Job No.: 7103



Water: Perth Tap

ANALYSIS: To be conducted via polarising microscope loose grained analysis (R. Townend)

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TABLE 1

ICP SCAN RESULTS

Client Name: TASMANIA MINES LTD
Sample Description: Wollastonite
Job Number: 7103
Date: 16-Dec-96

Ag ppm	Al ppm	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe ppm	Ga ppm	K ppm	La ppm	Li ppm	Mg %
1	9210	16	103	<1	<10	32.14	<1	<5	46	25	7100	<10	5090	53	<10	1.36

Mn ppm	Mo ppm	Na ppm	Nb ppm	Ni ppm	P ppm	Pb ppm	Sc ppm	Si %	Sr ppm	Ta ppm	Ti ppm	V ppm	W ppm	Y ppm	Zn ppm	Zr ppm
136	<2	1020	39	9	781	9	7	12.4	833	<10	948	18	<10	22	21	37

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TABLE 2 BATCH FLOTATION

CLIENT NAME:	TASMANIA MINES LTD
SAMPLE DESCRIPTION :	Wollastonite ROM Ore
JOB NUMBER :	7103
TEST DESCRIPTION:	Flotation of Gangue
TEST NUMBER :	LB 498
DATE :	13-Jan-97

OBJECTIVES

1. Assess possible recovery and upgrading.

COMMENTS

Float @ 700 rpm
2.5L cell - approx 28% Solids

Mass and Metal Balances

PRODUCT	MASS		Cum	Wollastonite		Cum		Calcite		Cum				Cum	
	g	%	%	%	%dist	%	%dist	%	%dist	%	%dist	%	%dist	%	%dist
Feed	1000														
Con1	227.5	22.76	22.76	5	4.94	5.00	4.94	92	94.21	92.00	94.21				
Con2	242.5	24.26	47.03	0	0.00	2.42	4.94	0	0.00	44.53	94.21				
Con3	173.7	17.38	64.41	0	0.00	1.77	4.94	0	0.00	32.52	94.21				
Con4	98.2	9.83	74.23	0	0.00	1.53	4.94	0	0.00	28.21	94.21				
Ro Tail	257.5	25.77	100.00	85	95.06	23.04	100.00	5	5.79	22.23	100.00				
Calc'd Head	999.4	100.00		23	100.00			22	100.00						
Assay Head				16				60							

** All calcite and wollastonite percentages are estimated from the mineralogy.

SCHEDULE OF REAGENTS **WATER:** **Perth Tap Water**

Operation	Time (mins)		Collector		Frother		pH	mV
	Condtn.	Float (frth rmvl)	Aero 845 g/t	Diesel g/t	MIBC g/t			(Sat AgCl)
Grind 1 kg	10:48						9.9	127
Con 1	3	3	75	75	36		9.7	124
Con 2	3	3	25	25	36		9.6	90
Con 3	3	2	25	25	18		9.5	95
Con 4	3	2	25	25			9.5	100
TOTALS	12.45	10	150	150	90	0		

1 drop=0.018g

FLOTATION PROCEDURE

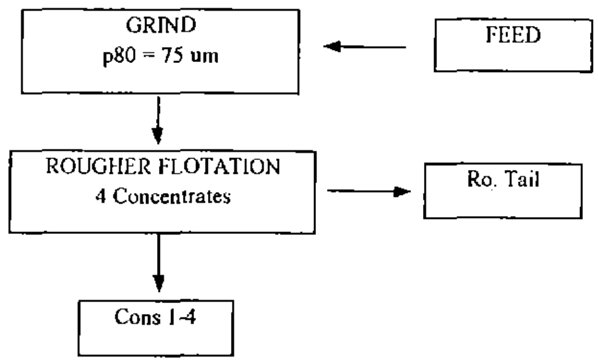

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TABLE 3 BATCH FLOTATION

CLIENT NAME:	TASMANIA MINES LTD
SAMPLE DESCRIPTION :	Wollastonite ROM Ore
JOB NUMBER :	7103
TEST DESCRIPTION:	Flotation of Wollastonite
TEST NUMBER :	LB 499
DATE :	13-Jan-97

OBJECTIVES

1. Assess possible recovery and upgrading.

COMMENTS

Float @ 700 rpm
2.5L cell - approx 28% Solids

Mass and Metal Balances

PRODUCT	MASS		Cum	Wollastonite		Cum		Calcite		Cum				Cum	
	g	%	%	%	%dist	%	%dist	%	%dist	%	%dist	%	%dist	%	%dist
Feed	1000														
Con1	145.0	14.52	14.52	96	93.99	96.00	93.99	1	0.34	1.00	0.34				
Con2	193.9	19.41	33.94	0	0.00	41.08	93.99	0	0.00	0.43	0.34				
Con3	128.3	12.85	46.79	0	0.00	29.80	93.99	0	0.00	0.31	0.34				
Con4	86.0	8.61	55.40	0	0.00	25.16	93.99	0	0.00	0.26	0.34				
Ro Tail	445.4	44.60	100.00	2	6.01	14.83	100.00	96	99.66	42.96	100.00				
Calc'd Head	998.5	100.00		15	100.00			43	100.00						
Assay Head				16				60							

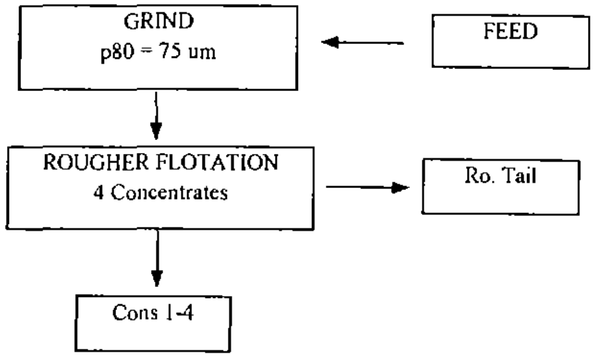
** All calcite and wollastonite percentages are estimated from mineralogy reports

SCHEDULE OF REAGENTS **WATER: Perth Tap Water**

Operation	Time (mins)		Collector		Frother		pH	mV
	Condtn.	Float (frth rmvl)	Flotigam g/t	g/t	Flotal B g/t			(Sat AgCl)
Grind 1 kg	10:48						9.9	39
Con 1	2	2.5	200		36		9.9	69
Con 2	2	2	50		36		9.8	64
Con 3	2	1.5	50		18		9.7	77
Con 4	2	1.5	50				9.6	80
TOTALS	8.45	7.5	350	0	90	0		

1 drop=0.018g

FLOTATION PROCEDURE



214031

214032

APPENDIX 1

FEED SAMPLE MINERALOGICAL REPORT

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214033

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our ref. 96414

your ref. 1/11932

Mineralogical Examination of wollastonite Ore.

R Townend

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Correspondence to Box 120 Bentley W.A. 6102
(PATALYN PTY LTD TRADING FOR THE TOWNEND FAMILY TRUST)

SAMPLE 7103/LB

INTRODUCTION.

A sample of a wollastonite head material was submitted for analysis with reference to wollastonite liberation.The sample was supplied partly crushed with particles from a mm+ to fine dust.

The sample was sized at 500 and 38 microns.The two coarser fractions were mounted and thin sections made.These were examined by petrographic microscope, with some counts of the different species, and associations. The -38 micron fraction was briefly examined in oil mounts. Photomicrographs were made of all fractions.

RESULTS.

HEAD +500 MIC 52%

CALCITE	32%
CALCITE>>CPYR/ORES/WOLL.	30%
WOLLASTONITE> CPYR/CALCITE	14%
WOLLASTONITE/CALCITE/ORES/CPYR.	20%
WOLLASTONITE /FELDSP./CPYR./ORES	2%
PREHNITE>FLUORITE/TITANITE	2%

The wollastonite is always composite. The wollastonite crystals show a considerable size range.

Where they are dominant, a few laths reach half a mm. The bulk of the dominant wollastonite are in the 0.1-0.3mm crystal length. These crystals are lamellae, rather than fibres.

The calcite forms complex intergrowths with these wollastonite lamellae. Liberation of each is not likely above 0.1mm. The cpyroxene tends to be present as fine inclusions in the wollastonite calcite etc.These inclusions are usually 50 microns or less and their distribution is erratic. The ores like the pyroxene are fines as inclusions in the wollastonite etc.

HEAD -500 +38 MICRONS 39%

CALCITE	70%
WOLLASTONITE	14%
WOLLASTONITE./CPYR./ORES	3%
WOLLASTONITE/CALCITE	2%
CPYROXENE	7%
CALCITE/CPYR.	2%
OTHERS	2%

The sample contains largely liberated crystals , essentially calcite and wollastonite.The wollastonite are single lamellae. The composite woll.examples consist of either single crystals or groups of sub 0.1mm lamellae.

HEAD -38 MICRONS 9%

A visual estimate found that the sample was CALCITE > WOLLASTONITE >> OTHERS(PYROXENE, ORES ETC).

The wollastonite was totally liberated .

214036

APPENDIX 2

MAGNETIC SEPARATION PRODUCTS MINERALOGICAL REPORT

Mn Fe

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214037

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Mineralogical examination of mag. and non mag. wollastonite samples.

R Townend

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INTRODUCTION

Two samples were submitted, which were wollastonite mags. (LB 462) and a non mags (LB 462). They were examined by optical microscopy. The non mags. was also analysed by XRD. Photomicrographs were taken of typical fields by PLM.

RESULTS

LB 462 MAGS.

The small mags sample is highly attracted to a hand magnet.

It consist of angular metallic pieces attached to wollastonite , etc. The metallic pieces are probably tramp iron, from the comminution process.

LB 462 NON MAGS.

The fraction consists dominantly of WOLLASTONITE and CALCITE .

The two minerals appear largely liberated, with the wollastonite habit varying from coarser lamellae down to fine fibres.

The wollastonite is estimated to form not more than 30% of the fraction.

214039

APPENDIX 3

FLOTATION PRODUCTS MINERALOGICAL REPORT

Mn Fe

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Mineralogical examination of four wollastonite floats and tails.(LB 498/9.)

R Townend

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RESULTS.

LB 498 RO CON. 1

CARBONATE >90%
WOLLASTONITE/ORES ETC <10%

LB 498 RO TAIL.

WOLLASTONITE 80-90%
CARBONATE]
QUARTZ]
CLINOPYROXENE ETC 10-20%

LB 499 RC1

WOLLASTONITE >95%
CLINOPYROXENE /CARBONATE/OPAQUES/QUARTZ <5%.

Note. this result applies to the optically identifiable material.There is a dust population that may be of different composition.

LB 499 RO TAIL

CARBONATE >95%
WOLLASTONITE/OPAQUES ETC <5%

214042

APPENDIX 4

FLOTATION PRODUCTS SIZE AND SHAPE ASSESSMENT

214043

Mn Fe

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20 MAR 1997

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Size assessment of wollastonite and calcite in two samples (LB 499 RC1 , LB 499 ROTAIL).

R Townend

103 - 105 Dowd Street, Welshpool, Western Australia 6106
Correspondence to Box 120 Bentley W.A. 6102

INTRODUCTION

A wollastonite and a calcite conc. were submitted for examination with relation to size and shape of particles of these two minerals. The samples were examined by transmission polarising microscope, and some counts were made.

RESULTS.

LB 499 RC 1

The wollastonite was divided into six categories based on length width ratios.

About 200 particles were counted.

>0.1<0.2MM	W	0.5%
>0.1<0.2MM	N	1%
>0.05<0.1MM	N	·5%
>0.05<0.1MM	W	7%
<0.05MM	W	26%
<0.05MM	N	60%

These figures represent the number of particles percentaged, but a second set of counts suggest that they bear some resemblance to the wt%.

The parameters represent the lengths. W = wide and N = narrow, the former being lamellae with aspect ratios of less than 3:1, and the latter as fibres with aspect ratios of greater than 3:1.

Calcite present was very dominantly less than 0.05mm , as cleavage rhombs, with rare examples in the 0.05-0.1mm range.

LB 499 ROTAIL

The calcite was present as follows

15% as rhombs around 0.1mm diameter.
25% as rhombs in the range 30 -70 microns diameter.
60% as rhombs of less than 30 microns diameter.

Some of the smaller cleavage rhombs were more rectilinear than equant.