967001

Australian Zircon Pty. Ltd.

E.L. 6/92 Ocean Beach

~~Year 1/Final Report~~

93-3509.

K.C. Morrison
October 1993

LIST OF CONTENTS

TENEMENT INFORMATION

Exploration Licence 6/92 is a 133 km^2 tenement at Ocean Beach, Western Tasmania.(Fig. 1).

The licence was granted from 23 October, 1992 and this report deals with all exploration conducted in licence Year 1 (23/10/92 - 23/10/93).

Australian Zircon Pty. Ltd. holds 100% equity in the tenement.

EXPLORATION AIMS

Heavy mineral accumulations have been observed on the active beach face at Ocean Beach for over 100 years and exploration programmes by CRA Exploration Ltd. in 1981, Newmont Holdings Pty. Ltd. in 1985 and Aztec Mining Company Pty. Ltd. in 1989, all reported drill-defined resources of the order of 2 million tonnes grading 9% total heavy mineral.

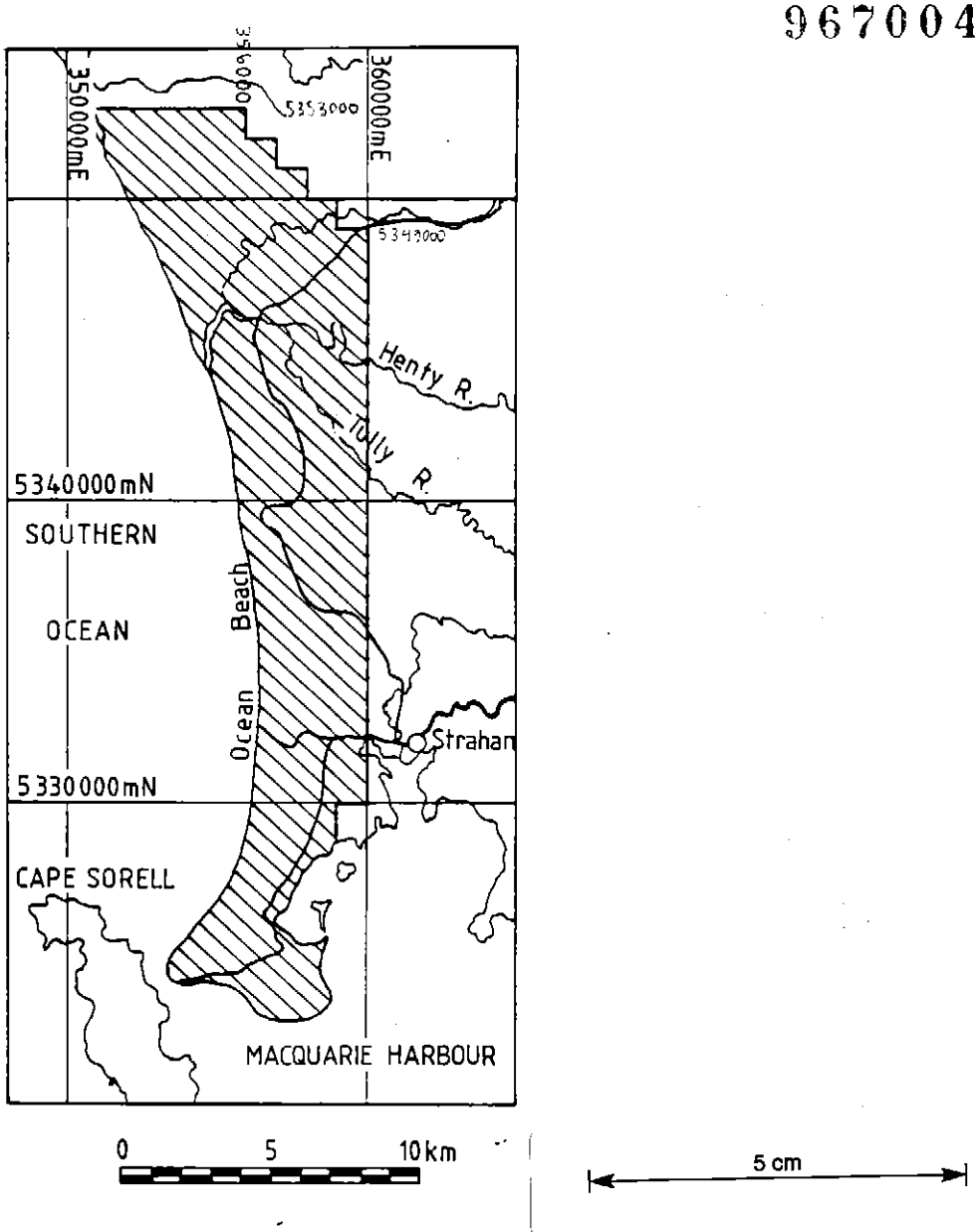
The mineralogy and metallurgy of the concentrate was not adequately dealt with, especially in relation to the separation properties of the chromite and ilmenite, which constitute a majority fraction of the potentially valuable minerals.

The main Year 1 aim of Australian Zircon was to test the laboratory scale mineralogy and separation performance of, and circuitry options for, Ocean Beach concentrate. If a low cost, high quality mix of ore minerals is feasible, then the resource would be re-evaluated as a small beach skimming operation.

RESULTS

1 MINERALOGY

Six, 5kg samples of heavy mineral concentrate, enriched by wave action winnowing, were collected from Ocean Beach in November, 1992 (Plan 1, Table 1) and a composite composed of 10% splits from each of the six samples (combined), was submitted to Amdel Limited, Adelaide, for quantitative mineralogy.



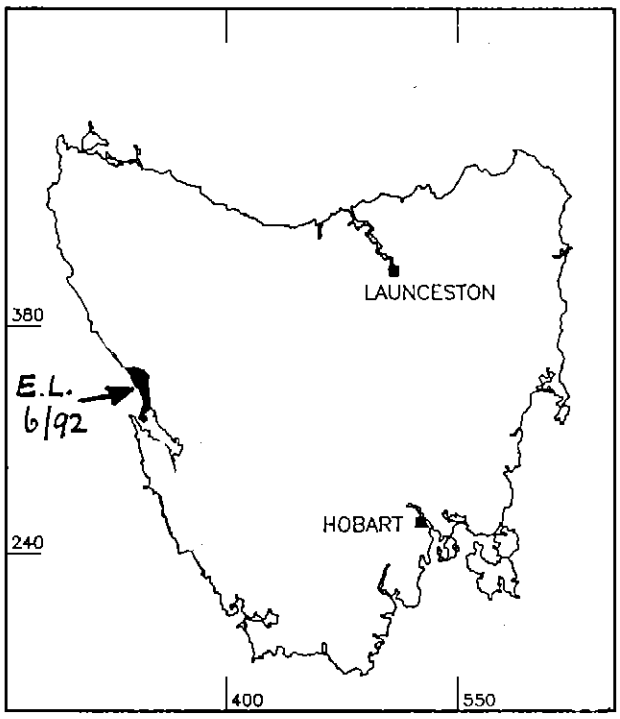


Fig. 1 E.L. 6/92 LOCATION MAP

TABLE 1

SAMPLE LOCATIONS, OCEAN BEACH, 1992

Sample	Easting*	Northing*
x1	355970	5329150
x2	355730	5328320
x3	354640	5326320
x4	355900	5328790
x5	356420	5333380
x6	356300	5331750

*Approximate - Estimated from 1:25000 AMG

The results (Appendix 1) show that although 54.5% of the sample has SG +2.96, within that fraction only 16.1% comprised rutile + zircon, and 18.7% ilmenite + leucoxene. Using the Newmont and Aztec resource estimates of approximately 2 million tonnes at 9 % heavy mineral, the results indicate contained ore mineral quantities of approximately; ilmenite (29,000 t), zircon (22,000 t), rutile (6,500 t) and leucoxene (5,000 t). In addition, some 23,000 t of chromite and minor amounts of monazite/xenotime and cassiterite (and probably gold) occur in the concentrate.

2 METALLURGY

Readings Metallurgical Services Pty. Ltd. conducted preliminary testwork on the Ocean Beach parent samples to determine the plant circuitry needed to produce clean sales product concentrates and therefore enable estimates of operating costs (Appendix 2).

Several conclusions resulted from this work:

1. A premium grade zircon product is expected.

2. Additional plant would be required to remove cassiterite and leucoxene from the rutile concentrate and to separate rutile from ilmenite and chromite contaminants.

3. The chromite is of metallurgical grade but it is unlikely that a saleable ilmenite product could be achieved at reasonable cost, due to chromite contamination.

CONCLUSIONS AND RECOMMENDATIONS

The Ocean Beach resource is small and potential to substantially increase its size through exploration would involve the environmental and overburden difficulties of working in the back dune areas.

Work done in Year 1 confirms that the heavy mineralogy is complex, with the major species being either of low value and/or intercontaminated and the main ore minerals (rutile and zircon) occurring in low concentration.

When the above factors are considered, together with the current weak demand for titanium oxide and zirconium, the company concludes that no further work is justified on the project.

TRIAL HARBOUR

LITTLE HENTY RIVER

ZEEHAN

HENTY RIVER

BEACH

OCEAN

5

6

1

4

2

3

PROBABLE STRAND LINES.

AIRSTRIP

STRAHAN

QUEENSTOWN

MT. LYELL TAILINGS DELTA

KING RIVER

HELLS GATES.

MACQUARIE HARBOUR.

LEGEND

QUATERNARY

ACTIVE BEACH SAND.

UNVEGETATED, MOBILE DUNE SAND.

UNDERWATER SANDBAR / DELTA SEDIMENTS

VEGETATED BEACH, MARSH, DUNE SEDIMENTS.

TERTIARY

SAND. GRAVEL. CLAY. LIGNITE.

DEVONIAN

GRANITE

PRECAMBRIAN - JURASSIC

BASEMENT ROCKS (UNDIFFERENTIATED)

GEOLOGY FROM STRAHAN 1:50.000, ZEEHAN 1" TO 1 MILE MAP SHEETS.

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AUSTRALIAN ZIRCON PTY. LTD. PLAN 1.

AIRPHOTO INTERPRETATION AND GEOLOGY - OCEAN BEACH AREA, TASMANIA

SCALE 1 : 42.000

5 cm

M. N.

K.C. MORRISON NOVEMBER, 1992.

0 km. 1

X3 = AUSTRALIAN ZIRCON PTY. LTD. 1992 SAMPLE SITE

APPENDIX 1

QUANTITATIVE MINERALOGY OF CONCENTRATE

1. INTRODUCTION

One sample was received from Mr. K. Morrison of K.C. Morrison Pty Ltd on behalf of Australian Zircon Pty Ltd with a request for quantitative mineralogy.

2. PROCEDURE

a) a riffled ≈ 90 g was separated centrifugally at 2.96 sp.gr. and 3.32 sp.gr.

b) a riffled portion of the >3.32 sp.gr. product was separated on an isodynamic separator at settings of 0.6A and 1.2A.

c) riffled portions of the magnetic fractions were analysed by XRF for Sn, Ce, Y, Zr, U and Th.

d) the magnetic fractions were examined microscopically in polished section (PS 51822-24) and grain mount and the mineral proportions estimated.

e) the proportions of the selected minerals were calculated using the chemical data viz:

zircon = 2.06 x Zr assay, monazite = 3.97 x Ce assay, cassiterite = 1.27 x Sn assay, and xenotime = 3.02 x Y assay of 0.6A magnetic fraction.

f) the overall mineralogical composition was calculated.

3. RESULTS

The XRF results are given overleaf.

The results of the separations are as follows:

Sp.Gr.	Magnetic Susceptibility	Wt %
<2.96		36.0
2.96-3.32		9.5
>3.32	0.6A mags	39.6
	0.6-1.2A	1.7
	1.2A non-mags	13.2
TOTAL		100.0

The mineralogy of the >3.32 sp.gr. product is as follows:

Mineral	Wt %	Magnetic Susceptibility Fraction
Altered ilmenite	18.5	0.6A mags
	0.2	0.6-1.2A
	18.7	
Zircon	13.7	1.2A non-mags
	0.4	0.6-1.2A
	0.6	0.6A mags
	14.7	
Rutile	4.2	1.2A non-mags
Leucoxene	2.7	1.2A non-mags
	0.6	0.6-1.2A mags
	3.3	
Cassiterite	0.02	1.2A non-mags
Monazite	0.26	0.6-1.2A
Xenotime	0.09	0.6A mags
Chrome spinel	15.2	0.6A mags
	0.2	0.6-1.2A
	15.4	
Others	38.3	0.6A mags (garnet, pyroxene, staurolite)
	1.8	0.6-1.2A (garnet pyroxene)
	2.2	1.2A non-mags (topaz, kyanite)
	~~37.3~~	
	42.3 K.M.	

The mineralogical data are required to one decimal place for convenience, but this does not imply such a high degree of accuracy. The accuracy of the zircon, monazite, xenotime and cassiterite proportions is approximately ± 5-10% relative whereas the accuracy of the other valuable minerals is approximately ± 10-30% relative.

967012

CLASSIC LABORATORIES

Job: 2AD1282
O/N: G6581/13845

ANALYTICAL REPORT

	Sample	Dt Lim	Sample	Dt Lim	Sample	Dt Lim	
	0.6A Mags		0.6-1.2A		1.2A Non Mags		
Sn %	<0.004	0.004	0.041	0.02	0.086	0.012	XRF6
Ce %	<0.02	0.02	2.08	0.10	<0.06	0.060	XRF6
Y %	0.04	0.004	0.21	0.02	0.07	0.012	XRF6
Zr %	0.33	0.004	5.70	0.02	27.7	0.012	XRF6
U ppm	<40	40	<200	200	<120	120	XRF6
Th ppm	<40	40	<200	200	<120	120	XRF6

APPENDIX 2

RMS
Readings
A.C.N. 003 655 534
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Australia 2480
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Fax: (066) 21 9384
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1 INTRODUCTION

Readings Metallurgical Services was commissioned by Mr Clive Foyster to conduct preliminary testwork in several samples[1] of beach sand concentrates from Strahan, Tasmania.

The purpose of this report is to present a summary of the testwork performed and to also make recommendations based on:

- observations made during the testwork, and
- the results of the analysis undertaken on some of the products of testwork.

2 FORMAT OF REPORT

Because the client has already received the majority of the testwork results, the format of this report is summary based with detailed information appendisized in the rear.

This approach was taken to assist the client in the pre-feasibility study by collating all the relevant data into the one report.

3 SUMMARY OF TESTWORK PERFORMED

3.1 WHIMS Option

Samples 1, 1B, 4 and 4B were separately processed through a simple Wet Mill Circuit which included a two stage WHIMS treatment. The resulting magnetic and non-magnetic products from the Wet Mill processing of Sample 1 were subsequently treated through pathfinding Chromite and R.L.Z. Circuits to produce Chromite, Zircon and Rutile Products respectively.

Contained in Appendix I is the simplified treatment flowsheet which describes this processing. Appendix IV contains the machine operating parameters that were applied during processing.

The Wet Mill concentrates from samples 1B and 4 were not processed further. Attempts were made to process the Wet Mill concentrates from sample 4B. However, it soon became evident during processing that the Wet Mill non-magnetics product from sample 4B contained significant levels of Aluminium Silicates[2] resulting in the production of a poor quality Zircon Product.

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[1] samples : the details of these samples are contained in Appendix VIII.

[2] Silicates : the results of the grain count undertaken on the bromoform sink product of the WHIMS non-magnetics concentrate produced from sample 4B (Test 405 Sink) are contained in Appendix III. This sample weighed as 41.20% of the Wet Mill concentrate and contained 43.0% Kyanite. Therefore the Kyanite in this sample weighs as 17.72% of the Wet Mill concentrate (41.20% x 0.43 = 17.72%).

3.2 High Tension Option

Following wet gravity processing samples:

- 2, 3, 5 and 6,
- 2B, 3B and 5B, and
- the combined concentrates from the Elutriator/Wet Table comparative testwork

were separately processed through a Rougher High Tension Circuit to eventually produce Garnet, Zircon, Chromite and Rutile Products.

Contained in Appendix II is the simplified treatment flowsheet for the processing of sample 2B, 3B and 5B. The machine operating conditions that were applied during this processing are contained in Appendix VI.

3.3 Overall Testwork Summary

The weight percentages[3] of the final products produced during testwork are as follows:

Sample	Treatment Option	Final Product Wt %			
		Chromite	Zircon	Rutile	Garnet
1	WHIMS	30.46	15.79	5.36	-
4B	WHIMS	11.99	3.27	-	-
2,3,5 and 6	H.T.	22.67	13.36	7.93	15.74
2B,3B and 5B	H.T.	28.28	11.43	6.20	7.17
Elutriator/Wet Table Concentrates	H.T.	33.30	12.34	6.56	15.99

4 RESULTS OF ANALYSIS ON TESTWORK PRODUCTS

Mineralogical and/or chemical analysis has been undertaken on:

- the Chromite Product (Test 112 Non-mag), Zircon Product (Test 123 B/R Non-mag), Rutile Product (Test 125 Non-mag), Ilmenite Concentrate (Test 112 - Mag 1) and the Ilmenite/Chromite Concentrate (Test 112 Mag 2 + Mid) from the processing of sample 1 through the WHIMS option,
- the Chromite Product (Test 410 Non-mag), Ilmenite Concentrate (Test 410 Mag 1) and the Ilmenite/Chromite Concentrate (Test 410 Mag 2 + Mid) from the processing of sample 4B through the WHIMS option, and
- the Zircon Product (Test 520 B/R Non-mags) from the processing of sample 2, 3, 5 and 6 through the High Tension Option.

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[3] percentages : In each case the Wet Mill concentrates are taken as 100.00%.

Contained in Appendix III are copies of the assay certificates for these analyses.

A.F.S. sizing determinations were also conducted on a number of final products. A summary of these determinations is as follows:

Sample	A.F.S.		
	Chromite	Zircon	Garnet
1	127	129	-
4B	121	-	-
2,3,5 and 6	137	143	117
2B,3B and 5B	114	144	119
Elutriator/Wet Table Concentrates	131	160	115

5 DISCUSSION AND RECOMMENDATIONS

The writer would draw the reader's attention to the fact that the testwork undertaken to date was of a preliminary nature conducted to assist the client.

Because of this and the fact that relatively small plant tonnages were involved, the treatment flowsheets utilized during the testwork were relatively simple.

5.1 Discussion of Final Products

The results of the analyses undertaken on some of the final products are contained in Appendix III. A brief discussion of the products produced is as follows:

1 Chromite

The Chromite Products produced contain significant levels of TiO_2 (the Chromite product produced from sample 1 Test 112 Non-mag contained 4.54% TiO_2). The mineralogist later confirmed that the TiO_2 was present in the form of Ilmenite. He also stated that there was no evidence of the presence of troublesome Chrome-Titania hybrid grains.

We are confident that these levels of TiO_2 can be reduced by:

- the inclusion of a roll magnet before the crossbelt, or by
- roasting followed by low intensity magnets to remove the roasted 'magnetized' Ilmenite.

When the Ilmenite is mathematically removed from the Chromite Product contains:

- 58% Cr_2O_3, and has a
- Cr:Fe ratio of 3.48:1

This Chromite is a metallurgical grade Chromite commonly used in the production of Ferro-Chromium (and ultimately stainless steel).

2 Zircon

Assay results from the chemical analysis of the Zircon Product produced from sample 2, 3, 5 and 6 (Test 520 B/R Non-mag) show that it should be possible to produce a premium grade Zircon Product from Strahan. It will be necessary however to reduce the level of Al_2O_3 (0.94%) to around 0.50%.

3 Rutile

The Rutile product which was analysed (Test 125 non-magnetics) contains predominantly black Rutile grains.

The presence of Cassiterite (4.58%) and Leucoxene (25.5%) has significantly depressed the level of TiO_2 down to 88.3% (when Cassiterite is mathematically removed, the level of TiO_2 is still only 92.5%). The Leucoxene has also caused an increase in SiO_2 (2.62%).
Additional circuitry will be required to:

- recover the Cassiterite, and
- assist in the production of a suitable final product grade.

Test 125 non-magnetics product also contained a low level of Gold (2.3p.p.m.)

4 Garnet

None of the Garnet Products have been chemically assayed. However the material is very fine with an average A.F.S. of 117. Because of this fineness it appears the Garnet will have only limited market appeal.

5 Ilmenite

The Ilmenite concentrates that were analysed (Test 112 Mag 1 and Test 410 Mag 1) contained significant Chromite and it is unlikely that will be possible produce an acceptable Ilmenite Product.

5.2 General Discussion and Recommendations

It became apparent that the material responded well to wet gravity[4] processing. The effective reduction in the levels of Pyroxene and Aluminium Silicates by wet gravity treatment assisted the subsequent separation in the High Tension Rougher section of the High Tension Option.

It was observed however that the presence of Ilmenite and Chromite tended to suppress the recovery of Rutile into the conductor fraction during high tensioning - with significant amounts of Rutile reporting to middlings. This fact combined with:

- the necessity to produce a 'clean' conductor product from the High Tension Rougher Circuit,
- the colour similarities (from an operator's standpoint) between Ilmenite, Chromite and black Rutile, and
- the subsequent danger inherent in attempting to produce a black mineral product (Chromite) from black contaminate minerals (Ilmenite and Rutile)

leads us to recommend that a large Rutile rich middling fraction should be produced in the High Tension Rougher Circuit. This middlings fraction can then be processed over an expanded Middlings Circuit which utilizes an induced roll magnet.

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[4] gravity : contained in Appendix IX are the results of the comparative Elutriator/Wet Table Testwork.

The Rutile concentrate produced in the Middlings Circuit could then be sent directly to the head of an expanded Rutile Circuit. In this way, a significant portion of the Rutile could not interfere with the production of Chromite Product.

It is also recommended that a reject stockpile be produced in this proposed 'expanded' Middling Circuit. This reject flow would be rich in Pyroxene, Tourmaline, Kyanite and other 'troublesome' minerals.

As previously mentioned (in section 4:1 - ***1 Chromite***) Readings we would incorporate an additional induced roll magnet before the crossbelt magnet in the Chromite Circuit. This roll magnet would remove the majority of Ilmenite from the Chromite thereby assisting in the subsequent production of a low TiO_2 Chromite Product.

Mention has been made previously that the testwork undertaken to date has been of a preliminary nature and because of this it is important to note that there are no quoted mineral recoveries.

It is strongly recommended that a testwork programme be initiated on a representative bulk sample. When this bulk testwork is concluded, Readings will be in a position to:

- determine the mineralogy of the ore body,
- establish recovery and product grade data,
- produce sales samples, and
- finalize the treatment flowsheet.

FLOWSHEET 1 - WHIMS OPTION

SIMPLIFIED TREATMENT FLOWSHEET FOR THE PROCESSING OF SAMPLE 1 FROM STRAHAN, TASMANIA

RMS JOB NO 3636

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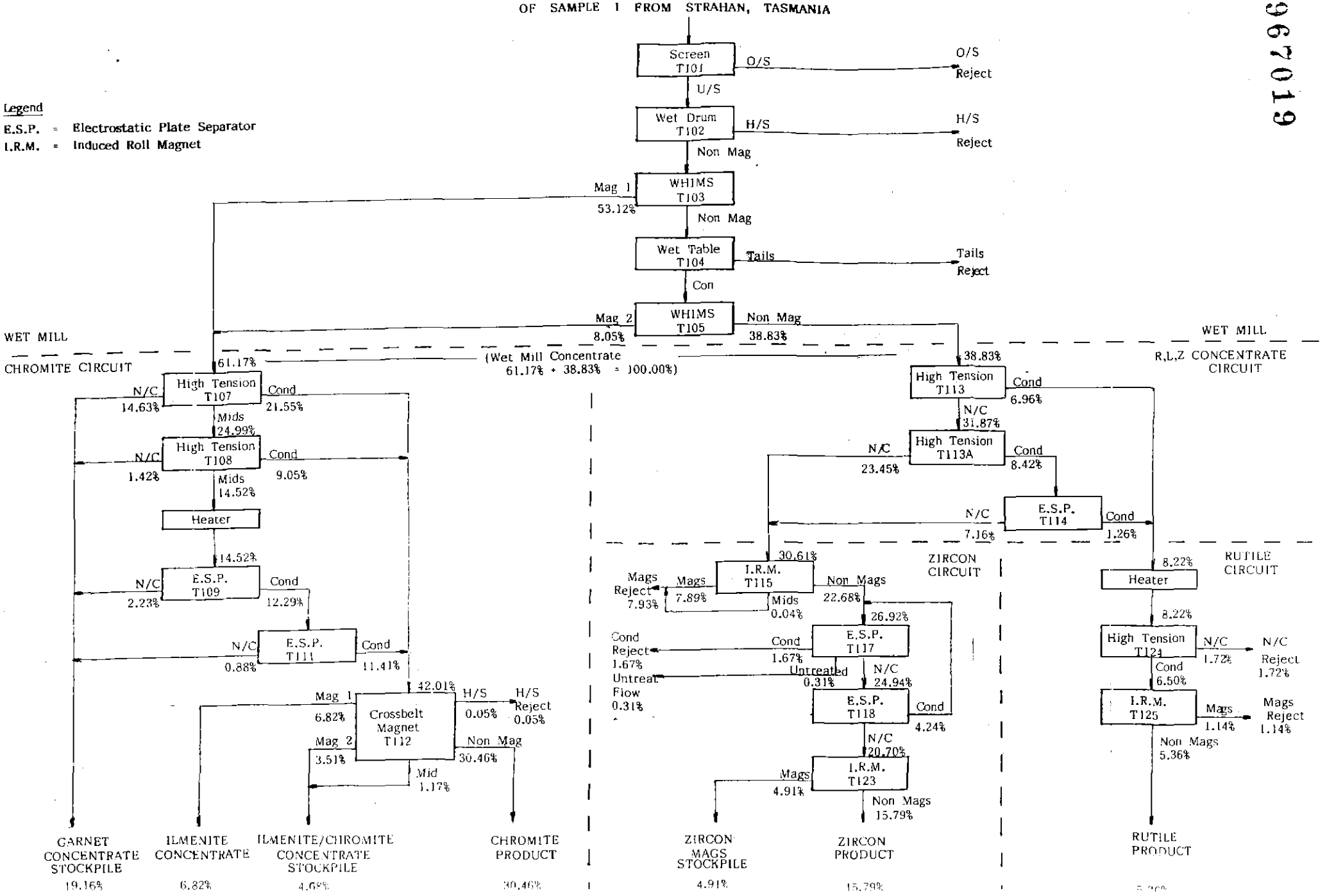

FLOWSHEET 2
HIGH TENSION OPTION

SIMPLIFIED TREATMENT FLOWSHEET FOR THE PROCESSING OF SAMPLE 2B, 3B and 5B

RMS JOB NO 3636

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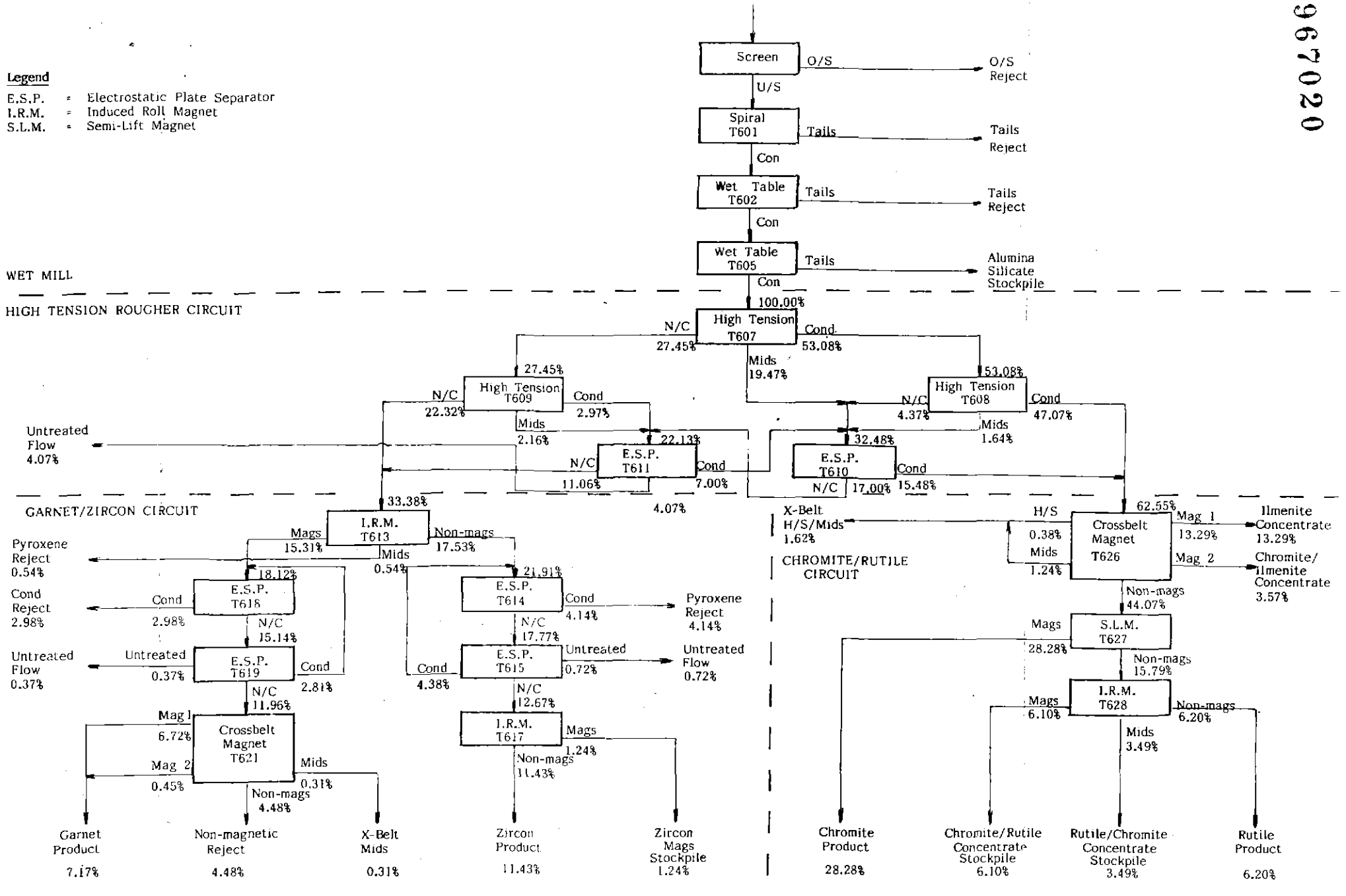
Legend

E.S.P. = Electrostatic Plate Separator
I.R.M. = Induced Roll Magnet
S.L.M. = Semi-Lift Magnet



CONTENTS

1 INTRODUCTION

This report outlines indicative flowsheets and equipment requirements for a dry mill with the capacity to produce 9000-10000 tpa of Chromite product using the High Tension option.

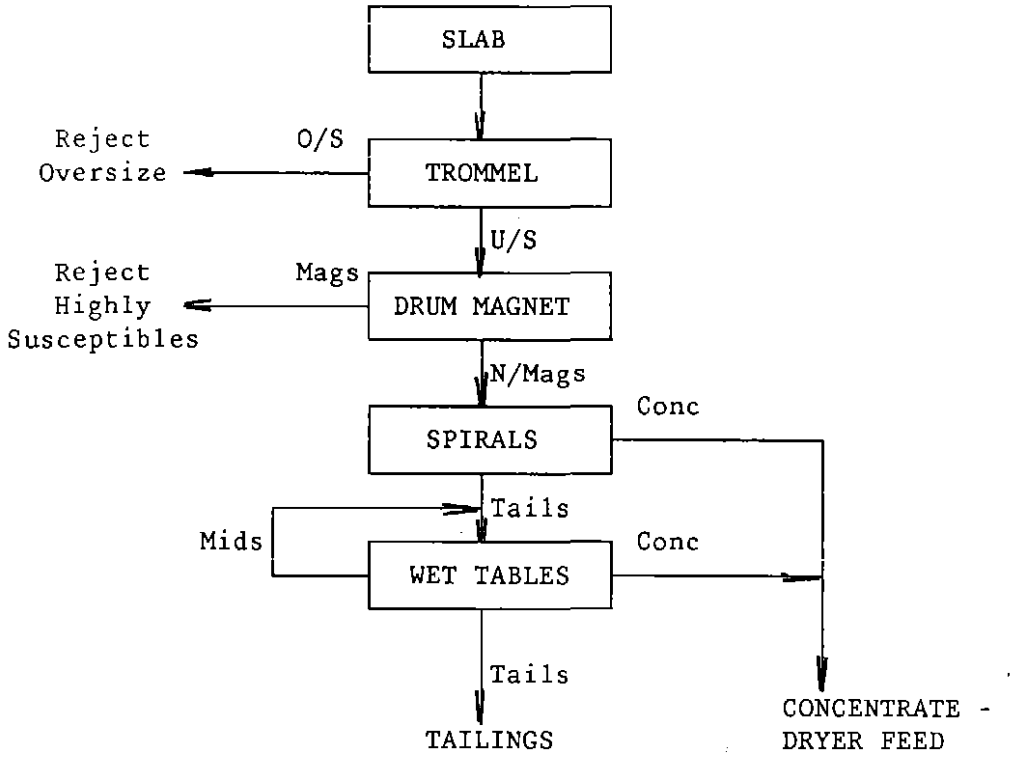
It should be stressed that the flowsheets and equipment numbers have been determined using incomplete data - with observation rather than metallurgical balances - being used as guides to decision making. Thus the numbers and flowsheets are indicative only. They are given with the aim to assisting the client with pre-feasibility assessment.

Intermediate and final product flows have been deduced both in terms of assay and rate by applying mineral distributions about a stage to calculate out the quantities of each mineral in all the products from that stage. The quantities are then added together to generate flowrates and assays of each of the products of that stage.

2 CONCENTRATE UPGRADING PLANT

(a) Flowsheet

WET PLANT CONCENTRATE - 8TPH



(b) Head Feed

TPH	MINERAL	%
1.92	CHROMITE	24.0
0.64	ILMENITE	8.0
0.80	QUARTZ	10.0
0.96	ZIRCON	12.0
0.48	RUTILE	6.0
2.40	PYROXENE	30.0
0.80	GARNET	10.0
8.00		100.0

(c) Concentrate Upgrading Plant Products

CONCENTRATE		
TPH	MINERAL	%
1.82	CHROMITE	36.4
0.61	ILMENITE	12.2
0.09	QUARTZ	1.8
0.87	ZIRCON	17.4
0.41	RUTILE	8.2
0.56	PYROXENE	11.2
0.64	GARNET	12.8
5.00		100.0

TAILINGS		
TPH	MINERAL	%
0.10	CHROMITE	3.3
0.03	ILMENITE	1.0
0.71	QUARTZ	23.7
0.09	ZIRCON	3.0
0.07	RUTILE	2.3
1.84	PYROXENE	61.3
0.16	GARNET	5.4
3.00		100.0

BASES:

It has been assumed in the preparation of the figures in these two tables that the same quantities of non-magnetic minerals were lost during the wet gravity treatment of the feed as were lost during the same treatment of the WHIMS non-magnetics in the WHIMS option (see Section 3C in Report No 3636A). Given that the magnetic minerals are present in the feed (since WHIMS has not been used) it has also been assumed that the following mineral recoveries were obtained:

Chromite - 95%
Ilmenite - 95%
Garnet - 80%

The effect of this is to increase the quantity of Tailings produced over and above the amount produced in the WHIMS option.

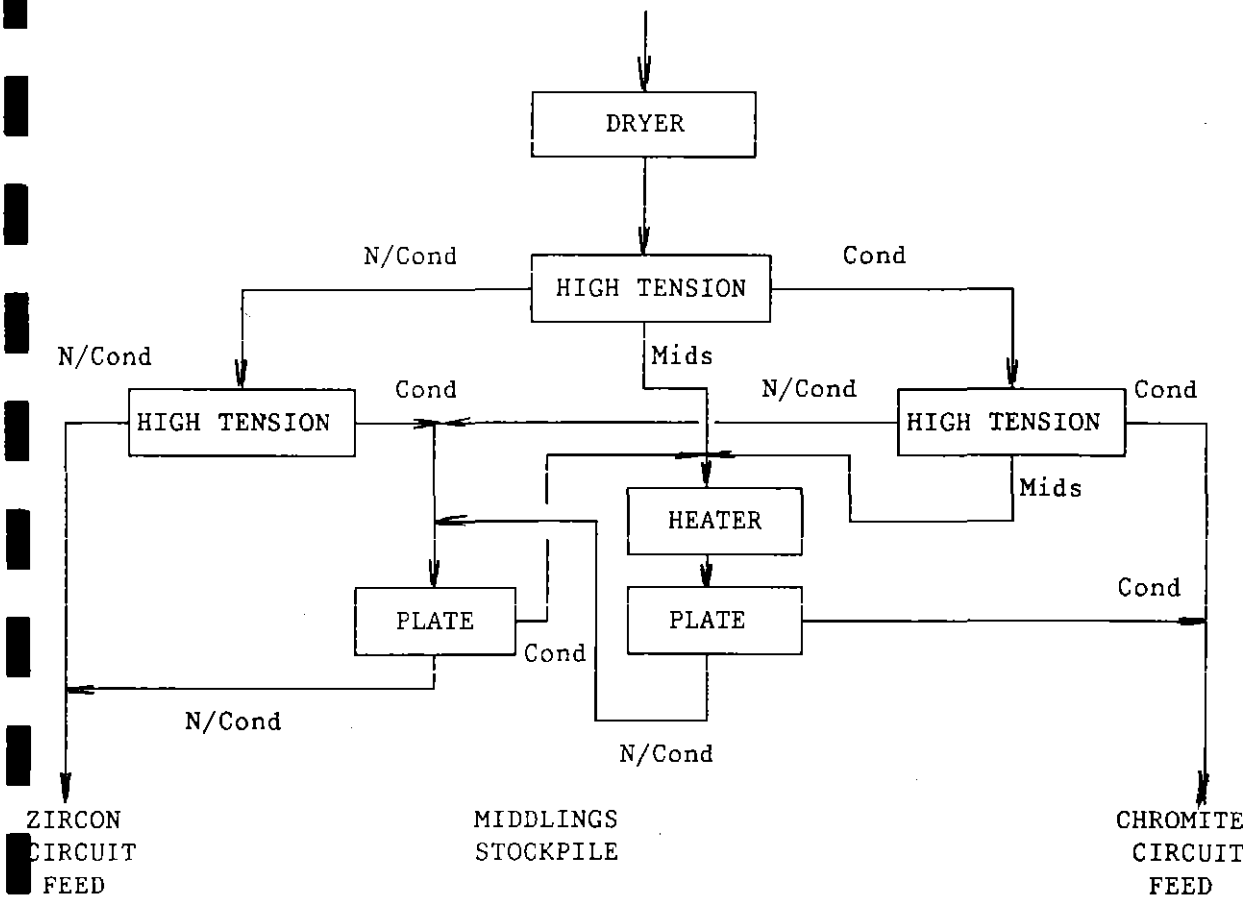
(d) Concentrate Upgrading Plant Equipment

(i) Trommel 850μ
(ii) Double pass drum magnet
(iii) 10 off HG8 MDL Spirals
(iv) 6 off full size Wet Tables

3 HIGH TENSION CIRCUIT

(a) Flowsheet

CONCENTRATE UPGRADING PLANT CONCENTRATE - 5TPH



(b) Head Feed

TPH	MINERAL	%
1.82	CHROMITE	36.4
0.61	ILMENITE	12.2
0.09	QUARTZ	1.8
0.87	ZIRCON	17.4
0.41	RUTILE	8.2
0.56	PYROXENE	11.2
0.64	GARNET	12.8
5.00		100.0

(c) **High Tension Circuit Products**

ZIRCON CIRCUIT FEED		
TPH	MINERAL	%
0.01	CHROMITE	0.5
0.01	ILMENITE	0.5
0.09	QUARTZ	4.2
0.84	ZIRCON	39.2
0.03	RUTILE	1.4
0.54	PYROXENE	25.2
0.62	GARNET	29.0
2.14		100.0

CHROMITE CIRCUIT FEED		
TPH	MINERAL	%
1.77	CHROMITE	64.1
0.59	ILMENITE	21.3
-	QUARTZ	-
0.01	ZIRCON	0.4
0.37	RUTILE	13.4
0.01	PYROXENE	0.4
0.01	GARNET	0.4
2.76		100.0

MIDDLINGS STOCKPILE		
TPH	MINERAL	%
0.04	CHROMITE	40.0
0.01	ILMENITE	10.0
-	QUARTZ	-
0.02	ZIRCON	20.0
0.01	RUTILE	10.0
0.01	PYROXENE	10.0
0.01	GARNET	10.0
0.10		100.0

BASES:

(1) A Stockpile Product of 0.1TPH is produced as a mids from the plates

(2) Recovery of Chromite and Ilmenite into Chromite Circuit Feed is 97%

(3) Recovery of Rutile into Chromite Circuit Feed is 90%

(4) Recovery of Quartz, Zircon, Pyroxene, and Garnet into Zircon Circuit Feed is 97%

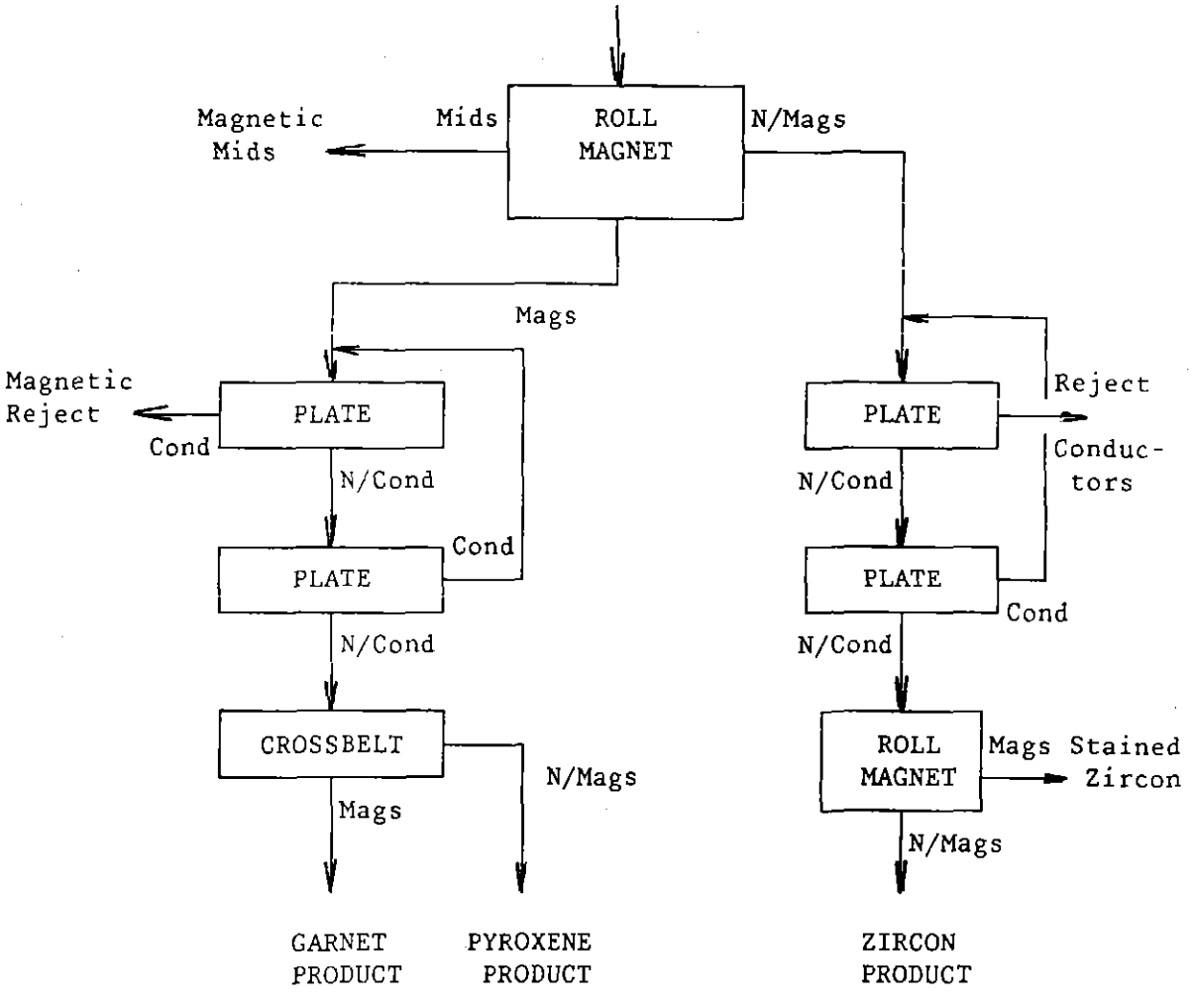
(d) High Tension Circuit Equipment

(i) Dryer 6-7TPH capacity
(ii) 1 off *Reading* 2x2x1524x270mm dia High Tension Roll Separator (CC)
(iii) 1 off *Reading* 1x2x1524x270mm dia High Tension Roll Separator (CC)
(iv) 1 off *Reading* 1x2x1524x270mm dia High Tension Roll Separator (NCC)
(v) 1 off Heater (3TPH, 50°C → 90°C)
(vi) 2 off *Reading* 2x5x1800mm Plate Separators

4 ZIRCON CIRCUIT

(a) Flowsheet

HIGH TENSION CIRCUIT NON-CONDUCTORS - 2.14TPH



(b) Head Feed

TPH	MINERAL	%
0.01	CHROMITE	0.5
0.01	ILMENITE	0.5
0.09	QUARTZ	4.2
0.84	ZIRCON	39.2
0.03	RUTILE	1.4
0.54	PYROXENE	25.2
0.62	GARNET	29.0
2.14		100.0

(c) Zircon Circuit Products

MAGNETIC REJECT		
TPH	MINERAL	%
0.01	CHROMITE	9.1
0.01	ILMENITE	9.1
0.02	QUARTZ	18.1
-	ZIRCON	-
0.01	RUTILE	9.1
0.03	PYROXENE	27.3
0.03	GARNET	27.3
0.11		100.0

STAINED ZIRCON		
TPH	MINERAL	%
-	CHROMITE	-
-	ILMENITE	-
-	QUARTZ	-
0.02	ZIRCON	100.0
-	RUTILE	-
-	PYROXENE	-
-	GARNET	-
0.02		100.0

GARNET PRODUCT		
TPH	MINERAL	%
-	CHROMITE	-
-	ILMENITE	-
-	QUARTZ	-
-	ZIRCON	-
-	RUTILE	-
-	PYROXENE	-
0.56	GARNET	100.0
0.56		100.0

PYROXENE REJECT		
TPH	MINERAL	%
-	CHROMITE	-
-	ILMENITE	-
-	QUARTZ	-
-	ZIRCON	-
-	RUTILE	-
0.48	PYROXENE	94.1
0.03	GARNET	5.9
0.51		100.0

(c) Zircon Circuit Products contd/..

ZIRCON PRODUCT		
TPH	MINERAL	%
-	CHROMITE	-
-	ILMENITE	-
-	QUARTZ	-
0.78	ZIRCON	100.0
-	RUTILE	-
-	PYROXENE	-
-	GARNET	-
0.78		100.0

MAGNETIC MIDS		
TPH	MINERAL	%
-	CHROMITE	-
-	ILMENITE	-
-	QUARTZ	-
0.02	ZIRCON	40.0
-	RUTILE	-
0.03	PYROXENE	60.0
-	GARNET	-
0.05		100.0

REJECT CONDUCTORS		
TPH	MINERAL	%
-	CHROMITE	-
-	ILMENITE	-
0.07	QUARTZ	63.6
0.02	ZIRCON	18.2
0.02	RUTILE	18.2
-	PYROXENE	-
-	GARNET	-
0.11		100.0

BASES:

(1) 94% Recovery of Zircon into Zircon Product - 2% into Reject Conductors - 2% into Magnetic Mids - 2% into Stained Zircon

(2) 90% Recovery of Garnet to Garnet Product - 5% to Magnetic Reject - 5% to Pyroxene Reject

(3) 90% Recovery of Pyroxene to Pyroxene Reject - 5% into Magnetic Mids - 5% into Magnetic Reject

(4) 60% Recovery of Rutile into Reject Conductors - 40% into Magnetic Reject

(5) 80% Recovery of Quartz into Reject Conductors - 20% into Magnetic Reject

(6) 100% Recovery of Chromite and Ilmenite into Magnetic Reject

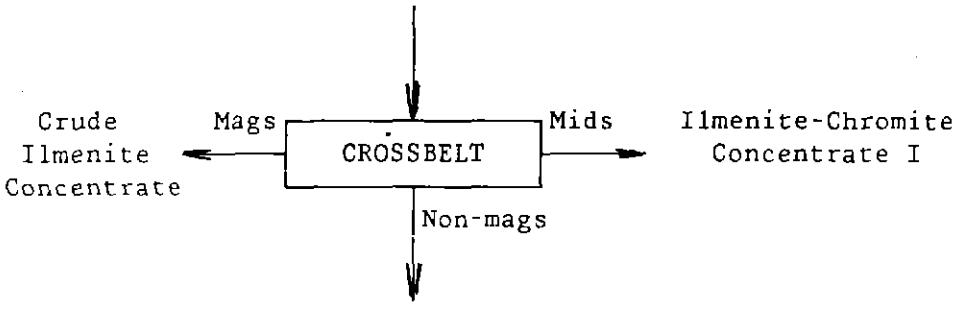
(d) Zircon Circuit Equipment

(i) 1 off *Reading* 2x2x760mm Induced Roll Magnetic Separator
(ii) 2 off *Reading* 2x5x1800mm Plate Separators
(iii) 1 off *Reading* 2x2x380mm Induced Roll Magnetic Separator
(iv) 2 off *Reading* 2x5x1800 Plate Separators
(v) 1 off *Reading* 6,8,8 Mark 6 Crossbelt Magnetic Separator

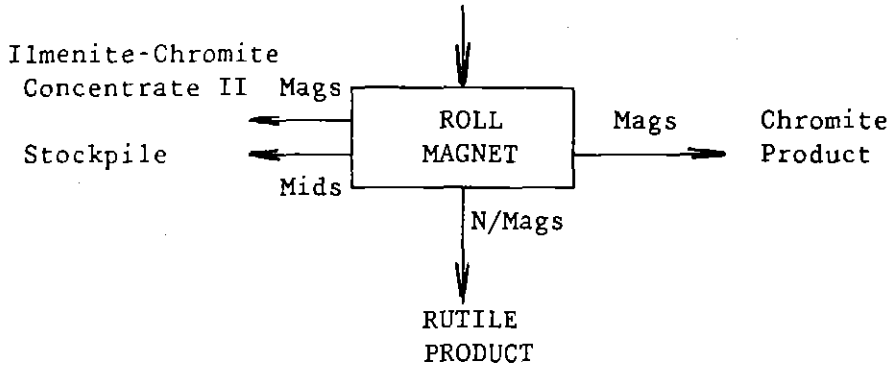
5 CHROMITE CIRCUIT

(a) Flowsheet

HIGH TENSION CIRCUIT CONDUCTORS - 2.76TPH



TPH	MINERAL	%
1.59	CHROMITE	78.3
0.05	ILMENITE	2.5
-	QUARTZ	-
0.01	ZIRCON	0.5
0.37	RUTILE	18.2
0.01	PYROXENE	0.5
-	GARNET	-
2.03		100.0



(b) Head Feed

TPH	MINERAL	%
1.77	CHROMITE	64.1
0.59	ILMENITE	21.3
-	QUARTZ	-
0.01	ZIRCON	0.4
0.37	RUTILE	13.4
0.01	PYROXENE	0.4
0.01	GARNET	0.4
2.76		100.0

(c) Chromite Circuit Products

CRUDE ILMENITE CONCENTRATE		
TPH	MINERAL	%
0.07	CHROMITE	16.3
0.35	ILMENITE	81.4
-	QUARTZ	-
-	ZIRCON	-
-	RUTILE	-
-	PYROXENE	-
0.01	GARNET	2.3
0.43		100.0

ILMENITE-CHROMITE CONCENTRATE I		
TPH	MINERAL	%
0.11	CHROMITE	36.7
0.19	ILMENITE	63.3
-	QUARTZ	-
-	ZIRCON	-
-	RUTILE	-
-	PYROXENE	-
-	GARNET	-
0.30		100.0

ILMENITE - CHROMITE CONCENTRATE II		
TPH	MINERAL	%
0.02	CHROMITE	33.3
0.04	ILMENITE	66.7
-	QUARTZ	-
-	ZIRCON	-
-	RUTILE	-
-	PYROXENE	-
-	GARNET	-
0.06		100.0

CHROMITE PRODUCT		
TPH	MINERAL	%
1.50	CHROMITE	100.0
-	ILMENITE	-
-	QUARTZ	-
-	ZIRCON	-
-	RUTILE	-
-	PYROXENE	-
-	GARNET	-
1.50		100.0

RUTILE PRODUCT		
TPH	MINERAL	%
0.02	CHROMITE	5.3
-	ILMENITE	-
-	QUARTZ	-
0.01	ZIRCON	2.6
0.35	RUTILE	92.1
-	PYROXENE	-
-	GARNET	-
0.38		100.0

STOCKPILE		
TPH	MINERAL	%
0.05	CHROMITE	55.6
0.01	ILMENITE	11.1
-	QUARTZ	-
-	ZIRCON	-
0.02	RUTILE	22.2
0.01	PYROXENE	11.1
-	GARNET	-
0.09		100.0

BASES:

(1) 4% Recovery of Chromite to Crude Ilmenite Concentrate - 6% recovery to Ilmenite-Chromite Concentrate I

(2) 60% Recovery of Ilmenite to Crude Ilmenite Concentrate - 32% Recovery to Ilmenite-Chromite Concentrate I - 6% to Ilmenite-Chromite Concentrate II - 2% to Stockpile

(3) 85% Recovery of Chromite to final Product - 1% to Rutile Product - 1% to Ilmenite-Chromite Concentrate II - 3% to Stockpile

(4) 95% Recovery of Rutile to Rutile Product, 5% to Stockpile

(d) Chromite Circuit Equipment

(i) 1 off *Reading* 6,8,8 Mark 6 Crossbelt Magnetic Separator
(ii) 1 off *Reading* 2x2x760mm Induced Roll Magnetic Separator

The allocation of one Crossbelt to treat the conductors is a little optimistic - perhaps the Garnet Crossbelt could be used in a parallel manner for part of the time.

6 OVERALL EQUIPMENT REQUIREMENTS

The following Table outlines the overall equipment requirements for the High Tension option plant. The table is an accumulation of the items already listed in Sections 2-5.

Equipment	Budget Unit Price[1] $ (FOT Lismore)	PLANT			
		Conc. Upgrading Plant	High Tension Circuit	Zircon Circuit	Chromite Circuit
Trommel Screen	-	1	-	-	-
Double Pass Drum Magnetic Separator	-	1	-	-	-
HG8 Spirals	-	10	-	-	-
Full Size Conventional Wet Tables	-	6	-	-	-
Dryer	-	-	1 (6-7TPH)	-	-
2x2x1524x270mm dia Reading High Tension Roll Separator	39,000		1 (CC)	-	-
1x2x1524x270mm dia Reading High Tension Roll Separator	29,000		1 (CC)	-	-
1x2x1524x270mm dia Reading High Tension Roll Separator	29,000		1 (NCC)	-	-
Heater			1 (3TPH 50°C-90°C)	-	-
2x5x1800mm Reading Plate Separators	28,000		2	4	-
2x2x760mm Reading Induced Roll Magnetic Separators	75,000			1	1
2x2x380mm Reading Induced Roll Magnetic Separator	53,000			1	-
Reading Mark 6 6,8,8 Crossbelt Magnets	106,000			1	1

[1] Price : Prices include dust extraction chambers on all *Reading* equipment where applicable.