MINEMAKERS LIMITED

# MINEMAKERS LTD

## ANCHOR TIN PROJECT

## CONCEPTUAL STUDY

**1406-STY-002**

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## DISCLAIMER

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# SECTION 1.0

# INTRODUCTION AND SCOPE

# 1.0 INTRODUCTION AND SCOPE

## 1.1 Introduction

Minemakers Ltd (Minemakers) is undertaking a preliminary evaluation of a number of tin deposits in north eastern Tasmania. This report provides indicative (-20/+50%) capital and operating costs for the development of the Anchor deposit.

Development of the Anchor deposit is based on two throughput options:

- 500,000 tpa throughput.
- 1,000,000 tpa throughput.

In each case, the project will include a greenfield treatment plant utilising two stage crushing and a single stage ball mill followed by flotation of sulphides and separate treatment of coarse and fine products using spirals and shaking tables to recover tin and other heavy minerals in concentrates. An additional stage of tin / wolfram separation has also been included. Lycopodium Engineering Pty Ltd (Lycopodium) has been commissioned to prepare a conceptual study comprising capital and operating cost estimates for development of the treatment plant.

Metallurgical data was derived from various reports provided by Minemakers, in particular “The Metallurgical Treatment of Blue Tier Mineralisation” by Cross and Selby (February 1983), as well as from Lycopodium’s database and knowledge of Tasmanian tin operations. The data used as the basis of this report does not represent information based on a known resource or mineable reserve but can be considered as typical or indicative of an orebody of this type.

This report, together with the attached appendices, presents the results of the study.

## 1.2 Study Scope

The scope of the facilities covered by this study includes the following:

- Primary crushing and closed circuit secondary crushing to a fine ore bin.
- Single stage ball milling and classification by screening.
- Removal of sulphide minerals in the ore by flotation.
- Cyclone classification into coarse and fine streams.
- Separate treatment of the coarse and fine streams through banks of rougher, scavenger and cleaner spirals.
- Separate upgrading of the coarse and fine cleaner spiral concentrates using shaking tables.

- Separation of wolfram from cassiterite in the gravity concentrates by magnetic separation.
- Final tailings thickening and disposal to tailings storage facility.
- Reticulation of process and raw water within the process plant.
- Make-up water supply from bores adjacent to local rivers.
- Potable water provided by treating a portion of the bore water supply.
- Power supply from the 11 kV grid 0.5 km from the plant.
- Site office, crib / ablution and workshop / warehouse buildings.
- Minimal on-site graded roads.
- Unlined, valley type tailings storage facility.

It should be noted that no site visit was conducted, nor was site specific information such as topographical data nor selected sites for facilities available. The scope of all infrastructure should therefore be considered conceptual and not site specific.

Deliverables for the study include:

- Indicative process flowsheets and mass balance.
- Indicative major equipment list.
- Capital cost estimate (-20%/+50%, 3Q07).
- Operating cost estimate (-20%/+50%, 3Q07).
- Basic cash flow model, incorporating mining costs by others, to estimate project cash flow excluding financing costs, royalties, taxes and other government imposts.

Battery limits for the study are:

- Mining by others. Minemakers has advised that they will use contract mining and has supplied a unit mining cost of $3.75/tonne of material moved for both ore and waste.
- Ore introduced by others into the ROM bin. ROM pad preparation and FEL supply excluded.
- Tin concentrate and wolfram concentrate drummed and ready for dispatch.
- Sulphide concentrate stored in a plastic lined dam for subsequent processing.
- Final tailings deposited into a valley style TSF.

- Power supply from the local grid at 11 kV, no standby power.
- Water supply from bores adjacent to nearby rivers.
- Access to site is by existing bitumen and formed gravel roads.

It should also be noted that both flowsheets were based on those developed for the earlier Great Pyramid study (1406-STY-001) with the addition of a sulphide flotation step and tin / wolfram separation. Should the 1 Mtpa option be developed further it would be prudent to consider a number of possible process alternatives that may be appropriate at the higher throughput, particularly in relation to the requirement for a third stage of crushing and a higher level of automation for concentrate handling. It should also be noted that the tin / wolfram separation process is untested and may require additional steps to improve separation.

Although a sulphide flotation step has been incorporated into the flowsheet no value has been assigned to the sulphide concentrate produced.

# SECTION 2.0

# FACILITIES DESCRIPTION AND LAYOUT

# 2.0 FACILITIES DESCRIPTION AND LAYOUT

## 2.1 Study Basis

The following basis has been assumed for the study.

| | | | | |
|---|---|---|---|---|
| Ore feed rate | 1,000,000 | 500,000 | tpa | Client |
| | 125 | 62.5 | tph | Calculated |
| Operating hours per annum | | | | |
| - crushing | 6,570 | 6,570 | hrs | Industry standard |
| - milling and tin recovery | 8,000 | 8,000 | hrs | Industry standard |
| Primary ore source | Anchor | Anchor | | Client |
| Head grade | 0.30 | 0.40 | % Sn | Client |
| Overall tin recovery | 80 | 80 | % | Assumed |
| Tin in concentrates produced (base case) | 2,400 | 1,600 | tpa | Calculated |
| Wolfram concentrate | 600 | 300 | tpa | Client |
| Sulphide concentrate | 2300 | 1150 | tpa | Client |
| Grind size, $P_{80}$ | 350 | 350 | microns | Typical |

## 2.2 Process Flowsheet

The starting place for the concentrator flowsheet has been the same crush/grind/gravity recovery flowsheet employed on Great Pyramid. However, the Anchor deposit contains sulphide minerals in sufficient quantities to necessitate a flotation stage. This can be completed in two ways:

- Flotation of sulphides can be on the whole ore after grinding. This requires full scale equipment but minimises contamination of the downstream gravity circuit. It also permits storage of all the sulphides in a plastic lined dam.

- Flotation of sulphides can be on the concentrate alone, which reduces the scale of equipment but may lead to higher losses of tin and results in some sulphides reporting to gravity circuit tail, thus ending up in the main unlined TSF.

For the purpose of this study the first option, a crush / mill / flotation / gravity recovery flowsheet, is proposed for the Anchor Project.

Minemakers has advised that the tin concentrate contains wolfram (tungsten) in sufficient quantities to warrant separation from the cassiterite. In the absence of any testwork a simple magnetic separation flowsheet has been adopted. It should be noted that the difference in magnetic susceptibility between cassiterite and wolframite is small and it may be necessary to use high intensity magnetic separators to produce a saleable grade of wolframite. For the purpose of this study, a rougher / scavenger / cleaner flowsheet is proposed for the magnetic separation using medium intensity magnetic separators.

## 2.3 Process Description

In keeping with a plant of this size and limited complexity, instrumentation and control will be kept to a minimum and will be provided by a number of PLC based controllers and an operator interface panel. P&IDs are not required for a study of this level of detail. The following description relates to the 500,000tpa throughput flowsheet. The flowsheet for 1,000,000 tpa does not differ materially except that the size and/or number of individual items of process equipment has changed.

### 2.3.1 Crushing

Refer flowsheet 000-F-101.

ROM ore will be fed into the ROM bin by FEL. A static grizzly will be provided to prevent oversize ore reporting to the crusher. No fixed rock breaker is provided, oversize will be returned to the mine for breakage.

A vibrating feeder will draw ore from the ROM bin and discharge into a jaw crusher. Jaw crusher product will be conveyed to a double deck sizing screen.

Screen oversize will be conveyed to a secondary cone crusher. The crusher product will be combined with the jaw crusher product for screening.

Final crushed ore (screen undersize) at minus 15 mm will report to a crushed product bin with limited surge capacity. The excess will overflow to a dead stockpile. During periods when the crushing circuit is off line the FEL normally used to feed the primary crusher will reclaim the dead stockpile to the crushed product bin.

### 2.3.2 Milling and Primary Classification

Refer flowsheet 000-F-101.

Crushed ore will be drawn via conveyor from the crushed product bin at a controlled rate and fed to a single stage ball mill. The ball mill will operate in closed circuit with a classification screen, to minimise over grinding of the cassiterite, to produce an 80% passing 350 micron product.

### 2.3.3 Sulphide Flotation

Refer flowsheet 000-F-102

Feed to the flotation plant will be conditioned with xanthate and copper sulphate reagents before being treated in a rougher / scavenger flotation circuit to float off the sulphide minerals. Concentrate will be pumped to a storage pond while tails will report to the gravity circuit.

### 2.3.4 Gravity Concentration

Refer flowsheets 000-F-103 and 000-F-104.

The flotation rougher tail will be cycloned to achieve a nominal separation at 106 microns to provide coarse and fine streams for separate gravity treatment in spiral circuits.

The coarse and fine cyclone products will be treated separately in banks of rougher, scavenger and cleaner spirals. Concentrates from the coarse and fine cleaner spirals will be treated separately on coarse and fine cleaner and retreat tables.

Concentrate from the cleaner tables will report to the wolfram separation circuit.

### 2.3.5 Wolfram Separation

Refer flowsheet 000-F-107

Concentrates from the fine and coarse cleaner tables will be pumped to the wolfram separation circuit and combined in a pump hopper. From here, the combined concentrate will be pumped to three medium intensity magnetic separators arranged in a rougher / scavenger / cleaner configuration. Magnetics from the rougher and scavenger machines will be cleaned to produce a weakly magnetic wolfram stream while the cassiterite will report to the non-magnetics.

Each of the two concentrate streams will gravitate to a surge tank where solids will settle out and excess water will overflow and be recycled back into the process plant. After settling, the concentrates will be discharged into drums.

### 2.3.6 Tailings Disposal

Refer flowsheet 000-F-105

Coarse and fine scavenger spiral tails will report to the tailings thickener feed box to be recombined and dewatered prior to pumping to the tailings storage facility. It has been assumed that a tailings storage site will be identified within 1 km of the plant site and that the nature of the tailings is such that lining of the tailings storage facility is not required.

### 2.3.7 Reagents

Refer flowsheets 000-F-105 and 000-F-106.

The following reagents will be used at the Anchor Project:

- Flocculant for the tails thickener will be purchased ready prepared in a bulk box and metered into the thickener feed well using a dosing pump as required.

- Sodium Ethyl Xanthate will be used as a collector in the flotation circuit. It will be received as a powder in 200 kg drums and will be mixed to a 20% w/w solution in a purpose built mixing tank before being dosed to the flotation circuit.

- Copper Sulphate will be used as an activator in the flotation circuit. It will be received as a crystalline powder in 200 kg drums and will be mixed to a 15% w/w solution in a purpose built mixing tank before being dosed to the flotation circuit.

- Frother for the flotation circuit will be purchased ready prepared in a bulk box and metered into the flotation circuit using dosing pumps as required.

It has been assumed that no pH modification is required for flotation.

### 2.3.8 Services

- Power will be provided via a tie-in to the 11 kV grid which passes within 0.5 km of the treatment plant site. Step-down transformers will enable reticulation at 3.3 kV and 415 V within the treatment plant.

- Raw water will be obtained from bores in sand beds adjacent to nearby rivers. 200 NB cased bores will be drilled within 1 km of the plant site and water delivered via a 200 NB pipeline.

- Potable water will be provided by filtering and sterilizing a portion of the raw water.

- Process and raw water storage will be provided at the treatment plant. Pumps will reticulate water within the plant.

- A compressor will be provided for instrument and plant air. A suitable filter, drier and air receiver will be provided prior to reticulation within the plant.

- A low pressure blower will be provided to provide air for the flotation plant.

## 2.4 Project Infrastructure

- No allowance has been made for buildings to enclose the process facilities other than as noted below.

- A 400 $m^2$ demountable style administration building will be provided to accommodate up to 20 personnel.

- A 700 $m^2$ metal clad workshop / warehouse will be provided for the treatment plant.

- A 30 $m^2$ demountable style crib / ablution building will be provided inside the treatment plant.

- Allowance has been made for a sewage treatment facility at the site.

- A small sample preparation area comprising pressure filters and work bench will be provided. All exploration, grade control and plant samples will be sent off-site for analysis.

- A 2 m high cyclone fence will be provided around the treatment plant facilities. Double gates and boom gates will be provided at two locations.
- 500 m of graded site roads has been allowed in addition to the upgrading or extending of existing tracks to the TSF and borefield.
- An allowance has been made for the purchase of five houses in nearby communities to house key personnel. All other personnel will be responsible for their own accommodation in local towns.
- Mobile equipment for the treatment plant will comprise a 3 tonne all terrain boom forklift, 2 x 4WD station wagons, 3 x 4WD utilities, portable welder, 20 t yard crane and a Hiab truck with tray.

## 2.5 Major Equipment Items

For the purposes of comparison, major equipment items for the two throughput options have been presented below. The detailed design criteria, mass balances and equipment lists are presented in Appendix 1 and 3.

| | | |
|---|---|---|
| Ore feed rate: tpa | 1,000,000 | 500,000 |
| : tph | 125 | 62.5 |
| Primary crusher | 1000 x 750 jaw | 900 x 600 jaw |
| Secondary crusher | 4 ¼ ft cone | 4 ¼ ft cone |
| Mill feed bin | 240 t | 120 t |
| Primary ball mill | 4.3 m 5.5 m | 3.6 m x 5.0 m |
| Ball mill power | 1,650 kW | 1,250 kW |
| Rougher / scavenger flotation cells | 6 x 16 $m^3$ cells | 6 x 8 $m^3$ cells |
| Cleaner flotation cells | 4 x 3 $m^3$ cells | 3 x 3 $m^3$ cells |
| Coarse spirals | 36 x triple start | 18 x triple start |
| Fine spirals | 60 x triple start | 30 x triple start |
| Coarse tables | 8 x Holman 8000 | 4 x Holman 8000 |
| Fine tables | 14 x Holman 8000 | 7 x Holman 8000 |
| Magnetic separators | 3 x MIMS | 3 x MIMS |
| Tails thickener | 13 m diameter | 9 m diameter |

The ball mill selected for the 500,000 tpa case was determined by a requirement for a diameter adequate to provide impact breakage for the 15 mm mill feed, and an aspect ratio appropriate for the duty. This has resulted in the selected mill drive (at 1250 kW) being somewhat oversized for the duty. The selection is appropriate given the level of process definition available at the scoping study level.

# SECTION 3.0

# CAPITAL COST ESTIMATE

# 3.0 CAPITAL COST ESTIMATE

## 3.1 Capital Cost Estimate

The capital cost estimate has been prepared based on budget pricing of major equipment only and has been factored from that basis using rates typical for projects of this type. An overall contingency of 20% has been allowed. The cost estimate is believed to have an accuracy of -20% / +50% at this time. However, it should be noted that the construction market at present is volatile and any cost estimates should be treated with caution as the current rate of escalation in construction costs is significant.

Both estimates are based on pricing obtained in 1Q07 for the first draft of the 500,000 tpa Great Pyramid report. A 5% escalation allowance has been included to bring the pricing in line with 3Q07 when the final draft of the report was prepared. No future escalation to cover the period of project implementation has been allowed.

**Table 3.1 Capital Cost Estimate (-20% / +50%, 3Q07)**

| Area | Cost Estimate A$000 | |
|---|---|---|
| **Throughput** | **1,000,000 tpa** | **500,000 tpa** |
| **Direct Costs** | | |
| Mining (allowance) | 3,000 | 2,000 |
| Const. Site Establish. and Indirects | 1,904 | 1,474 |
| Treatment Plant | 36,761 | 25,626 |
| Infrastructure and Services | 4,722 | 4,082 |
| **Subtotal Directs Costs** | **46,387** | **33,182** |
| **Indirect Costs** | | |
| EPCM, Consultants, Vendors | 8,014 | 5,834 |
| Owners Costs | 1,535 | 1,380 |
| Allowance for Spare Parts | 758 | 500 |
| Plant Pre-Production Costs | 677 | 625 |
| **Subtotal Indirect Costs** | **10,984** | **8,339** |
| Contingency at 20% | 11,474 | 8,304 |
| Escalation 1Q07 to 3Q07 5% | 3,442 | 2,491 |
| **Project Total** | **72,287** | **52,316** |
| Future Escalation | Excluded | Excluded |

## 3.2 Capital Estimate Exclusions

Capital cost estimate qualifications / exclusions include:

- The allowance for mining capital costs assume contract mining will be employed. The allowance covers contractor mobilisation, haul road construction, mine pre-stripping and development, provision of fuel storage, explosives magazines and maintenance workshop with contractor facilities, and ROM pad preparation.

- No abnormal site founding conditions are assumed to be present.
- Costs associated with environmental impact assessments, and government permitting are excluded.
- Owner's costs are an allowance to cover the owners project management team, project insurances, specialist consultants and the recruitment of operating staff.
- Pre-production costs have been included to cover labour costs prior to commissioning and first fill reagents and consumables. No allowance has been made for working capital.
- Sunk costs, including future testwork and studies prior to commencement of project execution, are excluded.
- Contingency has been globally applied at 20% to the estimate.
- Escalation has been excluded from the estimate.
- EPCM has been factored based on Lycopodium experience of projects of this size and complexity.

## 3.3 Capital Estimate Basis

The estimate has been prepared on the following basis:

- Budget prices were obtained from vendors for major items of equipment including the crushing plant, mill, flotation and gravity concentration equipment.
- Some items of equipment were factored for the 1,000,000 tpa case (crushing plant and mill).
- Other equipment pricing was extracted from Lycopodiums database.
- Installed costs were factored using known costs from previous projects.
- Architectural and infrastructure costs were based on Lycopodiums experience with similar facilities on other projects.
- Costs were escalated by 5% to move the basis of the estimates from 1Q07 to 3Q07.

# SECTION 4.0

# OPERATING COST ESTIMATE

# 4.0 OPERATING COST ESTIMATE

## 4.1 Mine Operating Cost Estimate

Mine operating costs were provided by Minemakers and are based on contract mining.

The basis of the costs is an all-in allowance of $3.75 per tonne of material moved, and strip ratios of 2:1 and 3:1, waste to ore, for the 1,000,000 tpa and 500,000 tpa cases respectively.

**Table 4.1 Mine Operating Cost Estimate (-20% / +50%, 3Q07)**

| | 1,000,000 tpa | | 500,000 tpa | |
|---|---|---|---|---|
| | **Annual A$000** | **A$/t Ore** | **Annual A$000** | **A$/t Ore** |
| **Total** | **11,250** | **11.25** | **7,500** | **15.00** |

The cost includes:

- Geology, exploration and mining related costs including haul road maintenance.
- ROM stockpile rehandling costs including rehandling of mill feed when the crushing circuit is not operating.

## 4.2 Plant and Administration Operating Cost Estimate

The operating cost estimate has been prepared based on available typical costs from similar mining projects. The cost estimate has an accuracy of -20 / +50% and is summarised below.

**Table 4.2 Plant and Admin. Operating Cost Estimate (-20% / +50%, 3Q07)**

| Cost Area | 1,000,000tpa | | 500,000 tpa | |
|---|---|---|---|---|
| | **Annual A$000** | **A$/t Ore** | **Annual A$000** | **A$/t Ore** |
| Labour | 5,688 | 5.69 | 5,571 | 11.14 |
| Consumables | 2,618 | 2.62 | 1,309 | 2.62 |
| Power | 2,382 | 2.38 | 1,531 | 3.06 |
| Maintenance | 1,286 | 1.28 | 857 | 1.71 |
| General and Administration | 987 | 0.99 | 847 | 1.69 |
| Tailings Disposal | 1,000 | 1.00 | 500 | 1.00 |
| **Total** | **13,960** | **13.96** | **10,614** | **21.23** |

## 4.3 Operating Cost Estimate Exclusions

Operating cost estimate exclusions include:

- Tin and wolfram concentrate transport and downstream treatment charges.
- All head office costs and corporate overheads.
- Sustaining capital, other than an allowance of $1/tonne for tailings disposal.
- Ongoing rehabilitation or closure costs.
- Licence fees, royalties, GST and Government monitoring / compliance costs.
- Project financing costs and interest payments.
- Escalation.
- Power costs of $0.10/kWh have been assumed.
- Costs associated with areas beyond the battery limits of the study.

No contingency has been applied to the operating cost estimate.

## 4.4 Labour Costs

Labour costs have been based on Lycopodiums data base for similar operations in relation to the manning requirements. An approach of “Multi Skilling” have been applied in the manning structure to allow operating personnel to be used for basic maintenance duties on processing equipment. Specialised or legislative duties i.e. electrical maintenance etc. has been separately allowed for in the manning structure.

Unit rates for labour have been based on similar projects from Lycopodium’s database.

The labour cost for all mining related personnel is assumed to be included in the allowance in 4.1.

No laboratory or personnel has been allowed for.

## 4.5 Consumables

Crusher and mill liners and grinding media consumption are based on data from similar ore types.

Reagent requirements are typical values not supported by testwork data. Reagent pricing is from recent studies.

The diesel requirements for the front end loader feeding the plant are excluded from the consumable as it is assumed part of the mining contract.

## 4.6 Power

Power costs are based on a supply rate of $0.10/kWh. Power draw is based on the installed drives taken from the equipment lists with appropriate utilisation factors applied.

## 4.7 Maintenance Materials Costs

Maintenance materials costs for the operation have been estimated as a percentage of installed capital cost based on historical in-house data and covers mechanical spares, wear parts and general consumables. The maintenance costs exclude all payroll maintenance labour (covered in plant labour) and crusher and mill liners (covered in consumables).

## 4.8 General and Administration Costs

Administration costs have been based on historical in-house data.

## 4.9 Tailings Disposal

An allowance of $1.00/t has been allowed for ongoing works, such as raising the dam wall, to provide storage capacity in the tailings storage facility. This is the only allowance for sustaining capital in the operating cost estimate.

## SECTION 5.0

## PROJECT CASH FLOW

# 5.0 PROJECT CASH FLOW

Simple cash flow spreadsheets were developed for the two throughput scenarios. In addition, spreadsheets were prepared with and without revenue from the wolfram concentrate. No value was allowed for the sulphide concentrate recovered by flotation. The spreadsheets were developed to provide an indication of potential project cash flow and provide an indication of the sensitivity of the project to cost and revenue variation. The spreadsheets are not fully inclusive financial models and as such should not be interpreted to be a statement of the economic viability or otherwise of the project. Any use of the results of these spreadsheets is undertaken at the users risk.

## 5.1 Spreadsheet Basis

The basis of the spreadsheets is as shown below:

| | | |
|---|---|---|
| Ore feed rate: tpa | 1,000,000 | 500,000 |
| : tph | 125 | 62.5 |
| Ore available: | 6,000,000 t | 3,000,000 t |
| Grade: | 0.30%Sn | 0.40%Sn |
| Tin recovery: | 80% | 80% |
| Tin price (AUD): | $17,457 | $17,457 |
| Concentrate grade: | 50%Sn | 50%Sn |
| Payable metal in concentrate: | 85% contained Sn | 85% contained Sn |
| Concentrate treatment charge: | $350/t | $350/t |
| Concentrate shipping costs: | $100/t | $100/t |
| With payable wolfram concentrate: | | |
| WO3 concentrate grade: | 70% WO3 | 70% WO3 |
| WO3 concentrate tonnage: | 600 tpa | 300 tpa |
| WO3 value: | $183/mtu | $183/mtu |

Site operating costs used in the cash flow spreadsheets were as outlined in Section 4 of this study report.

Unless listed above as the basis for the spreadsheet calculations, all exclusions listed in Section 4 of this report apply equally to the calculated cash flows. In addition / particular it should be noted that the cash flow spreadsheet excludes all consideration of:

- Financing charges.
- Royalties, taxes and government charges.
- Sustaining capital.
- Head office costs.
- Rehabilitation or closure costs.

It should be noted that the 'ore available' tonnages quoted above are not based on, and do not constitute, a JORC compliant ore resource or reserve.

## 5.2 Project Cash Flow

The simple cash flow spreadsheets developed indicate positive annual cash flows, excluding capital repayment and/or payment of financing charges and interest, of:

$4.19 million for the 500,000 tpa case excluding WO3 values,

$8.00 million for the 500,000 tpa case including WO3 values,

$8.24 million for the 1,000,000 tpa case excluding WO3 values and,

$15.86 million for the 1,000,000 tpa case including WO3 values.

The spreadsheets are included at the end of this section.

## 5.3 Sensitivities

The simple cash flow spreadsheet was used to examine the sensitivity of the annual cash flow to changes in various inputs. This is shown in Table 5.1 below.

**Table 5.1 Cash Flow Sensitivity Analysis Summary**

| | Annual Cash Flow A$000 | | | |
|---|---|---|---|---|
| **Throughput** | **500,000 tpa** | | **1,000,000 tpa** | |
| | **No WO3** | **With WO3** | **No WO3** | **With WO3** |
| Base Case | 4,187 | 7,997 | 8,243 | 15,863 |
| Tin Head Grade +10% | 6,417 | 10,227 | 11,588 | 19,208 |
| Tin Head Grade -10% | 1,957 | 5,767 | 4,897 | 12,517 |
| Process Operating Cost +10% | 3,212 | 7,022 | 6,943 | 14,563 |
| Process Operating Cost -10% | 5,162 | 8,972 | 9,543 | 17,163 |
| Tin Recovery +5% | 5,302 | 9,112 | 9,915 | 17,535 |
| Tin Recovery -5% | 3,072 | 6,882 | 6,570 | 14,190 |

The annual cash flows quoted in the above table exclude capital repayment and financing charges and are subject to the same exclusions on input data as are listed earlier in this report.

The sale of wolfram concentrates in the quantity and under the terms provided by Minemakers significantly improves project cash flow.

**1406 Anchor 500,000tpa**
**Tin Concentrate Only**

**Anchor Ore Body**

**Basis:** **Australian dollars, 3Q2007**
**Operating cost exclusions as noted in the study document**

| | | | | | |
|---|---|---|---|---|---|
| Ore available | **3,000,000** | tonnes | Client | | |
| Grade | **0.40%** | Sn | Client | LME 21 Sept 07 | Exchange Rate |
| Throughput | **500,000** | tpa | Design Basis | Cash, US$/t | AUD:US$ |
| Tin price | **17,457** | AUD$/t | | 15,275 | 0.875 |
| Conc grade | **50%** | Sn | Assumed | | |
| Conc treatment charge | **350** | $/t | Assumed | | |
| Transport | **100** | $/t conc | Assumed | | |
| Payable metal in conc | **85%** | Contained Sn | Assumed | | |
| Strip ratio | **3** | Waste:ore | Client | | |
| Recovery | **80%** | | Assumed | | |
| Mining cost/t (O/pit) | **3.75** | $/t moved | Client | | |
| Process cost | **19.54** | $/t | Lyco Estimate | | |
| G&A | **1.69** | $/t | Lyco Estimate | | |

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|
| Ore mined, tpa | | 500,000 | 500,000 | 500,000 | 500,000 | 500,000 | 500,000 | 3,000,000 |
| Waste mined, tpa | | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 | 9,000,000 |
| Total moved, tpa | | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 12,000,000 |
| Contained metal value, $ | | 34,914,286 | 34,914,286 | 34,914,286 | 34,914,286 | 34,914,286 | 34,914,286 | 209,485,714 |
| **Onsite costs** | | | | | | | | |
| Annual mining cost, $ | | 7,500,000 | 7,500,000 | 7,500,000 | 7,500,000 | 7,500,000 | 7,500,000 | 45,000,000 |
| Processing cost, $ | | 9,770,000 | 9,770,000 | 9,770,000 | 9,770,000 | 9,770,000 | 9,770,000 | 58,620,000 |
| G&A cost, $ | | 845,000 | 845,000 | 845,000 | 845,000 | 845,000 | 845,000 | 5,070,000 |
| Total onsite cost, $ | | 18,115,000 | 18,115,000 | 18,115,000 | 18,115,000 | 18,115,000 | 18,115,000 | 108,690,000 |
| Concentrate produced, tpa | | 3,200 | 3,200 | 3,200 | 3,200 | 3,200 | 3,200 | 19,200 |
| **Offsite costs** | | | | | | | | |
| Concentrate transport, $ | | 320,000 | 320,000 | 320,000 | 320,000 | 320,000 | 320,000 | 1,920,000 |
| Concentrate treatment charges, $ | | 1,120,000 | 1,120,000 | 1,120,000 | 1,120,000 | 1,120,000 | 1,120,000 | 6,720,000 |
| Total offsite, $ | | 1,440,000 | 1,440,000 | 1,440,000 | 1,440,000 | 1,440,000 | 1,440,000 | 8,640,000 |
| Total costs, $ | | 19,555,000 | 19,555,000 | 19,555,000 | 19,555,000 | 19,555,000 | 19,555,000 | 117,330,000 |
| **Net revenue tin** | | | | | | | | |
| Metal in concentrate, t | | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | 9,600 |
| Payable metal in concentrate, t | | 1,360 | 1,360 | 1,360 | 1,360 | 1,360 | 1,360 | 8,160 |
| Revenue, $ | | 23,741,714 | 23,741,714 | 23,741,714 | 23,741,714 | 23,741,714 | 23,741,714 | 142,450,286 |
| Revenue after costs, $ | | 4,186,714 | 4,186,714 | 4,186,714 | 4,186,714 | 4,186,714 | 4,186,714 | 25,120,286 |

**1406 Anchor 1,000,000tpa**
**Tin Concentrate Only**

**Anchor Ore Body**

**Basis:** **Australian dollars, 3Q2007**
**Operating cost exclusions as noted in the study document**

| | | | | | |
|---|---|---|---|---|---|
| Ore available | 6,000,000 | tonnes | Client | | |
| Grade | 0.30% | Sn | Client | LME 21 Sept 07 | Exchange Rate |
| Throughput | 1,000,000 | tpa | Design Basis | Cash, US$/t | AUD:US$ |
| Tin price | 17,457 | AUD$/t | | 15,275 | 0.875 |
| Conc grade | 50% | Sn | Assumed | | |
| Conc treat | 350 | $/t | Assumed | | |
| Transport | 100 | $/t conc | Assumed | | |
| Payable metal in conc | 85% | Contained Sn | Assumed | | |
| Strip ratio | 2 | Waste:ore | Client | | |
| Recovery | 80% | | Assumed | | |
| Mining cost/t (O/pit) | 3.75 | $/t moved | Client | | |
| Process cost | 12.97 | $/t | Lyco Estimate | | |
| G&A | 0.99 | $/t | Lyco Estimate | | |

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|
| Ore mined, tpa | | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 6,000,000 |
| Waste mined, tpa | | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 12,000,000 |
| Total moved, tpa | | 3,000,000 | 3,000,000 | 3,000,000 | 3,000,000 | 3,000,000 | 3,000,000 | 18,000,000 |
| Contained metal value, $ | | 52,371,429 | 52,371,429 | 52,371,429 | 52,371,429 | 52,371,429 | 52,371,429 | 314,228,571 |
| | | | | | | | | |
| **Onsite costs** | | | | | | | | |
| Annual mining cost, $ | | 11,250,000 | 11,250,000 | 11,250,000 | 11,250,000 | 11,250,000 | 11,250,000 | 67,500,000 |
| Processing cost, $ | | 12,970,000 | 12,970,000 | 12,970,000 | 12,970,000 | 12,970,000 | 12,970,000 | 77,820,000 |
| G&A cost, $ | | 990,000 | 990,000 | 990,000 | 990,000 | 990,000 | 990,000 | 5,940,000 |
| Total onsite cost, $ | | 25,210,000 | 25,210,000 | 25,210,000 | 25,210,000 | 25,210,000 | 25,210,000 | 151,260,000 |
| | | | | | | | | |
| Concentrate produced, tpa | | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 28,800 |
| | | | | | | | | |
| | | | | | | | | - |
| **Offsite costs** | | | | | | | | - |
| Concentrate transport, $ | | 480,000 | 480,000 | 480,000 | 480,000 | 480,000 | 480,000 | 2,880,000 |
| Concentrate treatment charges, $ | | 1,680,000 | 1,680,000 | 1,680,000 | 1,680,000 | 1,680,000 | 1,680,000 | 10,080,000 |
| Total offsite, $ | | 2,160,000 | 2,160,000 | 2,160,000 | 2,160,000 | 2,160,000 | 2,160,000 | 12,960,000 |
| | | | | | | | | |
| Total costs, $ | | 27,370,000 | 27,370,000 | 27,370,000 | 27,370,000 | 27,370,000 | 27,370,000 | 164,220,000 |
| | | | | | | | | |
| **Net revenue tin** | | | | | | | | |
| Metal in concentrate, t | | 2,400 | 2,400 | 2,400 | 2,400 | 2,400 | 2,400 | 14,400 |
| Payable metal in concentrate, t | | 2,040 | 2,040 | 2,040 | 2,040 | 2,040 | 2,040 | 12,240 |
| Revenue, $ | | 35,612,571 | 35,612,571 | 35,612,571 | 35,612,571 | 35,612,571 | 35,612,571 | 213,675,429 |
| | | | | | | | | - |
| Revenue after costs, $ | | 8,242,571 | 8,242,571 | 8,242,571 | 8,242,571 | 8,242,571 | 8,242,571 | 49,455,429 |

**1406 Anchor 500,000tpa**
**Tin and Tungsten Concentrates**

**Anchor Ore Body**

**Basis:** **Australian dollars, 3Q2007**
**Operating cost exclusions as noted in the study document**

| | | | | | |
|---|---|---|---|---|---|
| Ore available | 3,000,000 | tonnes | Client | | |
| Grade | 0.40% | Sn | Client | LME 21 Sept 07 | Exchange Rate |
| Throughput | 500,000 | tpa | Design Basis | Cash, US$/t | AUD:US$ |
| Tin price | 17,457 | AUD$/t | | 15,275 | 0.875 |
| Tin conc grade | 50% | Sn | Assumed | | |
| Tin conc treatment charge | 350 | $/t | Assumed | | |
| Transport | 100 | $/t conc | Assumed | | |
| Payable metal in tin conc | 85% | Contained Sn | Assumed | | |
| Strip ratio | 3 | Waste:ore | Client | | |
| Recovery | 80% | | Assumed | | |
| Mining cost/t (O/pit) | 3.75 | $/t moved | Client | | |
| Process cost | 19.54 | $/t | Lyco Estimate | | |
| G&A | 1.69 | $/t | Lyco Estimate | | |
| WO3 concentrate grade | 70% | WO3 | Client | | |
| WO3 concentrate tonnage | 300 | tpa | Client | | |
| WO3 value | 183 | AUD$/MTU | Client | | |

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|
| Ore mined, tpa | | 500,000 | 500,000 | 500,000 | 500,000 | 500,000 | 500,000 | 3,000,000 |
| Waste mined, tpa | | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 | 1,500,000 | 9,000,000 |
| Total moved, tpa | | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 12,000,000 |
| Contained metal value, $ | | 34,914,286 | 34,914,286 | 34,914,286 | 34,914,286 | 34,914,286 | 34,914,286 | 209,485,714 |
| **Onsite costs** | | | | | | | | |
| Annual mining cost, $ | | 7,500,000 | 7,500,000 | 7,500,000 | 7,500,000 | 7,500,000 | 7,500,000 | 45,000,000 |
| Processing cost, $ | | 9,770,000 | 9,770,000 | 9,770,000 | 9,770,000 | 9,770,000 | 9,770,000 | 58,620,000 |
| G&A cost, $ | | 845,000 | 845,000 | 845,000 | 845,000 | 845,000 | 845,000 | 5,070,000 |
| Total onsite cost, $ | | 18,115,000 | 18,115,000 | 18,115,000 | 18,115,000 | 18,115,000 | 18,115,000 | 108,690,000 |
| Concentrate produced, tpa | | 3,200 | 3,200 | 3,200 | 3,200 | 3,200 | 3,200 | 19,200 |
| **Offsite costs** | | | | | | | | |
| Concentrate transport, $ | | 350,000 | 350,000 | 350,000 | 350,000 | 350,000 | 350,000 | 2,100,000 |
| Tin concentrate treatment charges, $ | | 1,120,000 | 1,120,000 | 1,120,000 | 1,120,000 | 1,120,000 | 1,120,000 | 6,720,000 |
| Total offsite, $ | | 1,470,000 | 1,470,000 | 1,470,000 | 1,470,000 | 1,470,000 | 1,470,000 | 8,820,000 |
| Total costs, $ | | 19,585,000 | 19,585,000 | 19,585,000 | 19,585,000 | 19,585,000 | 19,585,000 | 117,510,000 |
| **Net revenue tin** | | | | | | | | |
| Metal in concentrate, t | | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | 1,600 | 9,600 |
| Payable metal in concentrate, t | | 1,360 | 1,360 | 1,360 | 1,360 | 1,360 | 1,360 | 8,160 |
| Tin revenue, $ | | 23,741,714 | 23,741,714 | 23,741,714 | 23,741,714 | 23,741,714 | 23,741,714 | 142,450,286 |
| **Net revenue tungsten** | | | | | | | | |
| Payable WO3 in concentrate, t | | 210 | 210 | 210 | 210 | 210 | 210 | 1,260 |
| WO3 revenue, $ | | 3,840,000 | 3,840,000 | 3,840,000 | 3,840,000 | 3,840,000 | 3,840,000 | 23,040,000 |
| Revenue after costs, $ | | 7,996,714 | 7,996,714 | 7,996,714 | 7,996,714 | 7,996,714 | 7,996,714 | 47,980,286 |

**1406 Anchor 1,000,000tpa**
**Tin and Tungsten Concentrates**

**Anchor Ore Body**
**Basis:** **Australian dollars, 3Q2007**
**Operating cost exclusions as noted in the study document**

| | | | | | |
|---|---|---|---|---|---|
| Ore available | **6,000,000** | tonnes | Client | | |
| Grade | **0.30%** | Sn | Client | LME 21 Sept 07 | Exchange Rate |
| Throughput | **1,000,000** | tpa | Design Basis | Cash, US$/t | AUD:US$ |
| Tin price | **17,457** | AUD$/t | | 15,275 | 0.875 |
| Conc grade | **50%** | Sn | Assumed | | |
| Conc treat | **350** | $/t | Assumed | | |
| Transport | **100** | $/t conc | Assumed | | |
| Payable metal in conc | **85%** | Contained Sn | Assumed | | |
| Strip ratio | **2** | Waste:ore | Client | | |
| Recovery | **80%** | | Assumed | | |
| Mining cost/t (O/pit) | **3.75** | $/t moved | Client | | |
| Process cost | **12.97** | $/t | Lyco Estimate | | |
| G&A | **0.99** | $/t | Lyco Estimate | | |
| WO3 concentrate grade | **70%** | WO3 | Client | | |
| WO3 concentrate tonna | **600** | tpa | Client | | |
| WO3 value | **183** | AUD$/MTU | Client | | |

| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|
| Ore mined, tpa | | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 1,000,000 | 6,000,000 |
| Waste mined, tpa | | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 2,000,000 | 12,000,000 |
| Total moved, tpa | | 3,000,000 | 3,000,000 | 3,000,000 | 3,000,000 | 3,000,000 | 3,000,000 | 18,000,000 |
| Contained metal value, $ | | 52,371,429 | 52,371,429 | 52,371,429 | 52,371,429 | 52,371,429 | 52,371,429 | 314,228,571 |
| **Onsite costs** | | | | | | | | |
| Annual mining cost, $ | | 11,250,000 | 11,250,000 | 11,250,000 | 11,250,000 | 11,250,000 | 11,250,000 | 67,500,000 |
| Processing cost, $ | | 12,970,000 | 12,970,000 | 12,970,000 | 12,970,000 | 12,970,000 | 12,970,000 | 77,820,000 |
| G&A cost, $ | | 990,000 | 990,000 | 990,000 | 990,000 | 990,000 | 990,000 | 5,940,000 |
| Total onsite cost, $ | | 25,210,000 | 25,210,000 | 25,210,000 | 25,210,000 | 25,210,000 | 25,210,000 | 151,260,000 |
| Concentrate produced, tpa | | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 4,800 | 28,800 |
| | | | | | | | | - |
| **Offsite costs** | | | | | | | | - |
| Concentrate transport, $ | | 540,000 | 540,000 | 540,000 | 540,000 | 540,000 | 540,000 | 3,240,000 |
| Concentrate treatment charges, $ | | 1,680,000 | 1,680,000 | 1,680,000 | 1,680,000 | 1,680,000 | 1,680,000 | 10,080,000 |
| Total offsite, $ | | 2,220,000 | 2,220,000 | 2,220,000 | 2,220,000 | 2,220,000 | 2,220,000 | 13,320,000 |
| Total costs, $ | | 27,430,000 | 27,430,000 | 27,430,000 | 27,430,000 | 27,430,000 | 27,430,000 | 164,580,000 |
| **Net revenue tin** | | | | | | | | |
| Metal in concentrate, t | | 2,400 | 2,400 | 2,400 | 2,400 | 2,400 | 2,400 | 14,400 |
| Payable metal in concentrate, t | | 2,040 | 2,040 | 2,040 | 2,040 | 2,040 | 2,040 | 12,240 |
| Tin revenue, $ | | 35,612,571 | 35,612,571 | 35,612,571 | 35,612,571 | 35,612,571 | 35,612,571 | 213,675,429 |
| **Net revenue tungsten** | | | | | | | | |
| Payable WO3 in concentrate, t | | 420 | 420 | 420 | 420 | 420 | 420 | 2,520 |
| WO3 revenue, $ | | 7,680,000 | 7,680,000 | 7,680,000 | 7,680,000 | 7,680,000 | 7,680,000 | 46,080,000 |
| | | | | | | | | - |
| Revenue after costs, $ | | 15,862,571 | 15,862,571 | 15,862,571 | 15,862,571 | 15,862,571 | 15,862,571 | 95,175,429 |

# SECTION 6.0

# RISKS AND OPPORTUNITIES

# 6.0 RISKS AND OPPORTUNITIES

During the course of completing the study the following risks and opportunities have been identified:

**Crushing and Milling**

- The crushing and milling circuit has been conservatively sized on the basis of typical granite properties and assumes that a feed size of 15 mm to the mill can be ground without undue scatting of the mill. The ore is altered but its properties should be determined and the circuit modelled to confirm this.

- Surge capacity in the crushing circuit is based on an open air stockpile. Given this operation is in Tasmania, it may be necessary to review this assumption and provide storage with a level of weather protection.

- The estimate is based on a packaged crushing plant and assumes that for the 1 Mtpa case a 15 mm product size can still be achieved by 2-stage crushing. This will require validation.

- The grinding circuit has maintained a grind product $P_{80}$ of 350 microns. In order to liberate sulphides it may be necessary to reduce the grind size to 250 microns or finer with consequent impact on mill size and operating cost.

**Sulphide Flotation Circuit**

- No testwork has been undertaken on the sulphide flotation circuit and residence times have been assumed from typical practice.

- It may be possible to float sulphides off at the concentrate stage rather than the mill product stage. However this has some environmental concerns with sulphides reporting to the TSF.

- A plastic lined earthen dam has been assumed for storage of the sulphide concentrate. This has been assumed to be cleaned out once per year. No long term storage or dewatering of concentrate has been allowed.

**Gravity Spiral Circuit**

- The spiral circuit design is based on splitting coarse and fine feeds which is generally good practice for gravity separation. This was not done for the original Selby / Cross study and may warrant further testing.

- Spiral capacity has been based on typical industry averages and should be confirmed.

**Gravity Tabling Circuit**

- The table circuit design is based on splitting coarse and fine feeds which is generally good practice for gravity separation. This was not done for the original Selby / Cross study and may warrant further testing.

- Table capacity has been based on typical industry averages and should be confirmed.

- An additional step of kieving or high frequency vibration of the concentrates may offer some opportunity for upgrading the shipped concentrates.

- Other process routes have been developed for fine tin concentrates since the original work by Selby and this should be investigated as it may offer both capital and operating cost savings.

- Given the requirement for significant manual handling of concentrate at the 1 Mtpa throughput rate, there should be some consideration given to a filtration facility so this part of the operation can be automated.

**Wolfram Separation Circuit**

- No testwork has been undertaken on the wolfram separation circuit and equipment sizes and flux intensity have been assumed.

- Feedback from some vendors suggests it may be more effective to dry the concentrate prior to separation. This will need further study.

**Tailings Disposal Facility**

- A simple unlined starter dam has been assumed for the facility. Should there be sulphides present in the tailings the dam may require lining to prevent the release of acid mine drainage.

- It has been assumed that a suitable site for the facility will be available in close proximity to the plant site. Should this not be the case both capital and operating costs for the facility could be significantly higher than those allowed.

**Reagents and Services**

- Power and water are assumed to be within close proximity of the site. Any requirements for either other than as described in this study could significantly affect capital cost.

# APPENDIX 1

# PROCESS DESIGN BASIS AND MASS BALANCE

# MINEMAKERS LTD

## ANCHOR TIN PROJECT

### PROCESS DESIGN BASIS

**Scoping Study**

**Oct-07**

**Prepared By:**

Lycopodium ENGINEERING PTY LTD
ABN 34 055 880 109

Job No: 1406

| REV NO. | DATE | DESCRIPTION OF REVISION | BY | DESIGN APPROVAL | PROJECT APPROVAL |
|---|---|---|---|---|---|
| B | 18/10/2007 | Client Comments Incorporated | CW | | CW |
| A | 09/10/2007 | Issued for Internal Review | AR | | CW |

| Client | **Minemakers Limited** | Revision | **B** | Date | | | **18-Oct-07** |
|---|---|---|---|---|---|---|---|
| Project | **Anchor** | Prepared | **AR** | Checked | **CW** | | |
| Title | **Design Basis** | Job No. | **1406** | | | | |

**Note** All metallurgical balance assumptions are derived from the report by Selby and Cross (1983)

| | | | | | | Rev | **Source** |
|---|---|---|---|---|---|---|---|
| **SITE CHARACTERISTICS** | | | | | | | |
| Location | | | | North East Tasmania | | A | Owner |
| | | | | **500,000 tpa** | **1,000,000 tpa** | | |
| **ORE CHARACTERISTICS** | | | | | | | |
| Ore Type | | | | **Altered Granite** | | A | Owner |
| Annual throughput | Operating Capacity | dry t/a | | **500,000** | **1,000,000** | A | Owner |
| Ore grade Design | Sn % | | | **0.40** | **0.30** | A | Owner |
| Overall Tin Recovery | % | | | **80.0** | **80.0** | A | Assumed |
| Bulk density | | $t/m^3$ | | **1.62** | **1.62** | A | Assumed |
| Specific gravity | Ore | t/m3 | | **2.70** | **2.70** | A | Assumed |
| | Spiral Concentrate | | | **3.20** | **3.20** | A | Assumed |
| | Table Concentrate | | | **3.50** | **3.50** | A | Assumed |
| | Water | | | **1.00** | **1.00** | A | Assumed |
| Ore Moisture content | Design | % | | **5.00** | **5.00** | A | Assumed |
| Crushing work index | Primary Ore - Design | kWh/t | | **15.0** | **15.0** | A | Assumed |
| Bond Rod Mill work index | Design | kWh/t | | **18.0** | **18.0** | A | Assumed |
| Bond Ball Mill work index | Design | kWh/t | | **16.0** | **16.0** | A | Assumed |
| Abrasion index | Design | | | **0.40** | **0.40** | A | Assumed |
| **OPERATING SCHEDULE** | | | | | | | |
| **CRUSHING PLANT OPERATION** | | | | | | | |
| Operating hours per day | | h | | **24** | **24** | A | Assumed |
| Operating days per year | | d | | **365** | **365** | A | Assumed |
| Utilisation | | % | | **80.0** | **80.0** | A | Assumed |
| Operating hours per year | | h | | **7008** | **7008** | A | Calc |
| Feed rate | Nominal | dry t/h | | **71** | **143** | A | Calc |
| **MILLING AND GRAVITY PLANT OPERATION** | | | | | | | |
| Operating hours per day | | h | | **24** | **24** | A | Assumed |
| Operating days per year | | d | | **365** | **365** | A | Assumed |
| Utilisation | | % | | **91.3** | **91.3** | A | Assumed |
| Operating hours per year | | h | | **8000** | **8000** | A | Calc |
| Feed rate | | dry t/h | | **63** | **125** | A | Calc |
| **CRUSHING PLANT** | | | | | | | |
| **R.O.M. Ore** | | | | | | | |
| 100% passing | | mm | | **500** | **500** | A | Assumed |
| **ROM Bin** | | | | | | | |
| Capacity | | tonnes | | **25** | **25** | A | Vendor |
| **Primary Feeder** | | | | | | | |
| Type | | | | | **Vibrating, Horizontal** | A | Vendor |
| **Primary Crusher** | | | | | | | |
| Type | | | | **Jaw** | **Jaw** | A | Vendor |
| Size, | | mm | | **900 x 600** | **1000 x 750** | A | Vendor |
| Crusher CSS | Nominal | mm | | **80** | **80** | A | Vendor |
| Crusher Product size | Nominal $P_{80}$ | mm | | **75** | **90** | A | Vendor |
| **Product Screen** | | | | | | | |
| Circulating load | | % | | **100** | **100** | A | Assumed |
| Type | | | | | **Double Deck Vibrating** | A | Vendor/Assume |
| Size | | m x m | | **1.80 x 6.10** | **1.80 x 6.10** | A | Vendor/Assume |
| Number of screens | | | | **1** | **2** | A | Assume |
| Bottom Deck Aperture | | mm | | **15** | **15** | A | Vendor/Assume |
| Product P80 | | mm | | **12** | **12** | A | Vendor/Assume |
| **Secondary Crusher** | | | | | | | |
| Type | | | | **Cone** | **Cone** | A | Vendor/Assume |
| Size | | mm | | **41/4ft** | **41/4ft** | A | Vendor/Assume |
| Throughput | Nominal | dry t/h | | **71** | **143** | A | Vendor/Assume |
| Crusher CSS | Nominal | mm | | **20** | **20** | A | Vendor/Assume |
| **Crushed Product Feed Bin** | | | | | | | |
| Capacity | | tonnes | | **20** | **40** | A | Lyco |
| **Fine Ore Stockpile (dead)** | | | | | | | |
| Capacity | | tonnes | | **120** | **240** | A | Assumed |

| Client | **Minemakers Limited** | | Revision | **B** | Date | | | **18-Oct-07** |
|---|---|---|---|---|---|---|---|---|
| Project | **Anchor** | | Prepared | **AR** | Checked | **CW** | | |
| Title | **Design Basis** | | Job No. | **1406** | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **GRINDING** | | | | | | | |
| **Primary Mill** | | | | **500,000 tpa** | **1,000,000 tpa** | A | |
| New Feed Rate | | | dry t/h | **63** | **125** | A | Calc |
| Mill Feed | | F80 | mm | **12** | **12** | A | Calc |
| Mill Product | | P80 | micron | **350** | **350** | A | Selby |
| Type | | | | **Ball Mill** | **Ball Mill** | A | Lyco |
| Size | | Diameter (inside shell) | m (ft) | **3.6** | **4.3** | A | Calc |
| | | EGL | m (ft) | **5.0** | **5.5** | A | Calc |
| Power | | Installed | kW | **1250** | **1650** | A | Calc |
| Ball Charge | | Nominal | % volume | **35** | **30** | A | Calc |
| | | Critical Speed | %Nc | **75** | **75** | A | Calc |
| **Classifying Screen** | | | | | | | |
| Circulating Load | | | % | **150** | **150** | A | Selby |
| Aperture | | | micron | **500** | **500** | A | Calc |
| Nominal cut size $P_{80}$ | | | micron | **350** | **350** | A | Calc |
| **SULPHIDE FLOTATION CIRCUIT** | | | | | | | |
| **Conditioning Tank** | | | | | | | |
| | | Residence time | mins | **5** | **5** | A | Assume |
| | | Freeboard | m | **0.5** | **0.5** | A | Lyco |
| | | Tank dimensions | m x m | **2.5 x 3** | **3 x 3.5** | A | Calc |
| **Rougher Flotation** | | | | | | | |
| | | Residence time | mins | **20** | **20** | A | Assume |
| | | Air holdup | % | **15** | **15** | A | Assume |
| | | Calculated volume | m3 | **48** | **96** | A | Calc |
| | | Number of cells | | **6 x 8m3** | **6 x 16m3** | A | Lyco |
| | | Configuration | | **F-3-J-3-D** | **F-3-J-3-D** | A | Lyco |
| | | Airflow | Am3/h | **1440** | **2880** | A | Vendor |
| **Cleaner Flotation** | | | | | | | |
| | | Residence time | mins | **20** | **20** | A | Assume |
| | | Air holdup | % | **15** | **15** | A | Assume |
| | | Calculated volume | m3 | **6** | **12** | A | Calc |
| | | Number of cells | | **3 x 3m3** | **4 x 3m3** | A | Lyco |
| | | Configuration | | **F-3-D** | **F-2-J-2-D** | A | Lyco |
| | | Airflow | Am3/h | **540** | **720** | A | Vendor |
| | | Cleaner concentrate | tpa | **1150** | **2300** | A | Client |
| **Concentrate Storage** | | | | | | | |
| | | Type | | | **Plastic lined earthen dam** | A | Lyco |
| | | Capacity | t | **1500** | **3000** | A | Calc |
| | | Bulk density | | **2.5** | **2.5** | A | Assume |
| | | Live Volume | m3 | **600** | **1200** | A | Calc |
| | | Solution pump capacity | m3/h | **15** | **30** | A | Lyco |
| **Reagents** | | | | | | | |
| Sodium Ethyl Xanthate | | Addition rate | g/t | **120** | **120** | | Assume |
| | | Concentration | %w/v | **20** | **20** | | Assume |
| | | Flowrate | L/hr | **32.6** | **65.2** | | Calc |
| | | Mix tank storage | hrs | **24** | **24** | | Assume |
| | | | m3 | **1.0** | **2.0** | | Calc |
| Copper Sulphate | | Addition rate | g/t | **50** | **50** | | Assume |
| | | Concentration | %w/v | **15** | **15** | | Assume |
| | | Flowrate | L/hr | **18.9** | **37.9** | | Calc |
| | | Mix tank storage | hrs | **24** | **24** | | Assume |
| | | | m3 | **1.0** | **1.0** | | Calc |
| Frother | | Addition rate | g/t | **15** | **15** | | Assume |
| | | Concentration | %w/v | **100** | **100** | | Assume |
| | | Flowrate | L/hr | **1.1** | **2.2** | | Calc |
| | | Storage system | | **IBC** | **IBC** | | Assume |

| Client | **Minemakers Limited** | Revision | **B** | Date | | | **18-Oct-07** |
|---|---|---|---|---|---|---|---|
| Project | **Anchor** | Prepared | **AR** | Checked | **CW** | | |
| Title | **Design Basis** | Job No. | **1406** | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **GRAVITY CIRCUIT** | | | | | | |
| **Classifying Cyclones** | | | | | | |
| Diameter | mm | **250** | **250** | A | Lyco | |
| Cut size | micron | **106** | **106** | A | Lyco | |
| Number of cyclones | | **2** | **4** | A | Lyco | |
| Mass to underflow | % | **50** | **50** | A | Assumed | |
| Pressure | kPa | **75** | **75** | A | Lyco | |
| **Spiral Circuit** | | | | | | |
| **Coarse rougher spirals** | | | | | | |
| Feed density | % solids | **40** | **40** | A | Lyco | |
| Stage Mass rec to conc | % | **25** | **25** | A | Assumed/Selby | |
| Stage Sn rec to conc | % | **90** | **88** | A | Assumed/Selby | |
| Stage Water rec to conc | % | **20** | **20** | A | Assumed/Selby | |
| Spirals selected | | | **6 turn, triple start** | A | Vendor | |
| Number of spirals | | **6** | **12** | A | Vendor | |
| **Coarse scavenger spirals** | | | | | | |
| Feed density | % solids | **38** | **38** | A | Calc | |
| Stage Mass rec to conc | % | **10** | **10** | A | Assumed/Selby | |
| Stage Sn rec to conc | % | **60** | **60** | A | Assumed/Selby | |
| Stage Water rec to conc | % | **8** | **8** | A | Assumed/Selby | |
| Spirals selected | | | **6 turn, triple start** | A | Vendor | |
| Number of spirals | | **6** | **12** | A | Vendor | |
| **Coarse cleaner spirals** | | | | | | |
| Feed density | % solids | **40** | **40** | A | Lyco | |
| Stage Mass rec to conc | % | **20** | **20** | A | Assumed/Selby | |
| Stage Sn rec to conc | % | **90** | **88** | A | Assumed/Selby | |
| Stage Water rec to conc | % | **15** | **15** | A | Assumed/Selby | |
| Spirals selected | | | **6 turn, triple start** | A | Vendor | |
| Number of spirals | | **6** | **12** | A | Vendor | |
| **Fine rougher spirals** | | | | | | |
| Feed density | % solids | **34** | **34** | A | Calc | |
| Stage Mass rec to conc | % | **25** | **25** | A | Assumed/Selby | |
| Stage Sn rec to conc | % | **90** | **88** | A | Assumed/Selby | |
| Stage Water rec to conc | % | **16** | **16** | A | Assumed/Selby | |
| Spirals selected | | | **8.5 turn, triple start** | A | Vendor | |
| Number of spirals | | **10** | **20** | A | Vendor | |
| **Fine scavenger spirals** | | | | | | |
| Feed density | % solids | **33** | **33** | A | Calc | |
| Stage Mass rec to conc | % | **10** | **10** | A | Assumed/Selby | |
| Stage Sn rec to conc | % | **60** | **60** | A | Assumed/Selby | |
| Stage Water rec to conc | % | **8** | **8** | A | Assumed/Selby | |
| Spirals selected | | | **8.5 turn, triple start** | A | Vendor | |
| Number of spirals | | **10** | **20** | A | Vendor | |
| **Fine cleaner spirals** | | | | | | |
| Feed density | % solids | **40** | **40** | A | Calc | |
| Stage Mass rec to conc | % | **20** | **20** | A | Assumed/Selby | |
| Stage Sn rec to conc | % | **90** | **88** | A | Assumed/Selby | |
| Stage Water rec to conc | % | **15** | **15** | A | Assumed/Selby | |
| Spirals selected | | | **8.5 turn, triple start** | A | Vendor | |
| Number of spirals | | **10** | **20** | A | Vendor | |
| **Tabling Circuit** | | | | | | |
| **Coarse cleaner tables** | | **500,000 tpa** | **1,000,000 tpa** | A | | |
| Feed density | % solids | **40** | **40** | A | Lyco | |
| Stage Mass rec to conc | % | **4** | **3.3** | A | Assumed/Selby | |
| Stage Sn rec to conc | % | **80** | **75** | A | Assumed/Selby | |
| Stage Water rec to conc | % | **5** | **5** | A | Assumed/Selby | |
| Stage Mass rec to mids | % | **20** | **20** | A | Assumed/Selby | |
| Stage Sn rec to mids | % | **10** | **10** | A | Assumed/Selby | |
| Stage Water rec to mids | % | **17** | **17** | A | Assumed/Selby | |
| Tables selected | | | **Holman 8000 table** | A | Vendor | |
| Number of tables | | **3** | **6** | A | Vendor | |
| **Coarse retreat table** | | | | | | |
| Feed density | % solids | **43** | **43** | A | Calc | |
| Stage Mass rec to conc | % | **6** | **5.5** | A | Assumed/Selby | |
| Stage Sn rec to conc | % | **50** | **45** | A | Assumed/Selby | |
| Stage Water rec to conc | % | **15** | **15** | A | Assumed/Selby | |
| Tables selected | | | **Holman 8000 table** | A | Vendor | |
| Number of tables | | **1** | **2** | A | Vendor | |
| **Fine cleaner tables** | | | | | | |
| Feed density | % solids | **40** | **40** | A | Lyco | |
| Stage Mass rec to conc | % | **4** | **3.3** | A | Assumed/Selby | |
| Stage Sn rec to conc | % | **80** | **80** | A | Assumed/Selby | |
| Stage Water rec to conc | % | **5** | **5** | A | Assumed/Selby | |
| Stage Mass rec to mids | % | **20** | **20** | A | Assumed/Selby | |
| Stage Sn rec to mids | % | **10** | **10** | A | Assumed/Selby | |
| Stage Water rec to mids | % | **17** | **17** | A | Assumed/Selby | |
| Tables selected | | | **Holman 8000 table** | A | Vendor | |
| Number of tables | | **6** | **12** | A | Vendor | |

| Client | **Minemakers Limited** | | Revision | **B** | Date | | | **18-Oct-07** |
|---|---|---|---|---|---|---|---|---|
| Project | **Anchor** | | Prepared | **AR** | Checked | **CW** | | |
| Title | **Design Basis** | | Job No. | **1406** | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Fine retreat table** | | | | | | | | |
| Feed density | | | % solids | | **43** | **43** | A | Calc |
| Stage Mass rec to conc | | | % | | **6** | **5.5** | A | Assumed/Selby |
| Stage Sn rec to conc | | | % | | **50** | **50** | A | Assumed/Selby |
| Stage Water rec to conc | | | % | | **15** | **15** | A | Assumed/Selby |
| Tables selected | | | | | | **Holman 8000 table** | A | Vendor |
| Number of tables | | | | | **1** | **2** | A | Vendor |
| **WOLFRAM SEPARATION** | | | | | | | | |
| **Rougher Magnetic separation** | | | | | | | | |
| Stage Mass rec to mags | | | % | | **12** | **12** | A | Assume |
| Stage Sn rec to mags | | | % | | **3** | **3** | A | Assume |
| Separator type | | | | | **LIMS** | **LIMS** | A | Lyco |
| **Scavenger Magnetic separation** | | | | | | | | |
| Stage Mass rec to mags | | | % | | **5** | **5** | A | Assume |
| Stage Sn rec to mags | | | % | | **3** | **3** | A | Assume |
| Separator type | | | | | **LIMS** | **LIMS** | A | Lyco |
| **Cleaner Magnetic separation** | | | | | | | | |
| Stage Mass rec to mags | | | % | | **75** | **75** | A | Assume |
| Stage Sn rec to mags | | | % | | **20** | **20** | A | Assume |
| Separator type | | | | | **LIMS** | **LIMS** | A | Lyco |
| Wolfram Concentrate | | | tpa | | **300** | **600** | A | Client |
| **Concentrate dewatering** | | | | | | | | |
| Nominal rise rate | | | m/h | | **1** | **1** | A | Assume |
| Settled density | | | % solids | | **70** | **70** | A | Assume |
| Storage residence time | | | hrs | | **8** | **8** | A | Assume |
| Nominal diameter - tin | | | m | | **1.5** | **2** | A | Calc |
| Nominal diameter - wolfram | | | m | | **1.5** | **2** | A | Calc |
| **FINAL TAILS** | | | | | | | | |
| **Tailings thickener** | | | | | | | | |
| Type | | | | | **High Rate** | **High Rate** | A | Lyco |
| Solids loading | | Flux Rate | $t/h.m^2$ | | **1.00** | **1.00** | A | Assumed |
| Diameter | | calculated | m | | **9** | **13** | A | Calc |
| Flocculant addition | | | g/t | | **15** | **15** | A | Assumed |
| Feed | | solids | t/h | | **62** | **124** | A | Calc |
| **WATER SYSTEMS - USAGE** | | | | | | | | |
| **Water Usage** | | | | | | | | |
| Process | | | | | | **Milling, Dilution, Hoseup, Spray water** | A | Lyco |
| Raw Water | | | | | | **Tables, Gland Water** | A | Lyco |
| Bore Water | | | | | | **Raw water supply, Potable water supply** | A | Lyco |
| **WATER SYSTEM** | | | | | | | A | |
| **Potable Water - pumping** | | | m3/h | | **5** | **5** | A | Assumed |
| **Total Process Water Demand** | | Average | $m^3/h$ | | **120** | **235** | A | Calc |
| **Raw Water Demand** | | Average | $m^3/h$ | | **45** | **71** | A | Calc |
| Process Water Pond Capacity | | | $m^3$ | | **120** | **240** | A | Lyco |
| Raw Water Pond capacity | | | $m^3$ | | **50** | **80** | A | Lyco |

# APPENDIX 2

# PROCESS FLOW DIAGRAMS

PROCESS WATER
F-105

DUST
SUPPRESSION

FRONT END
LOADER

STATIC GRIZZLY

ROM BIN

VSD

PRIMARY FEEDER

JAW
CRUSHER

CONE
CRUSHER

CV01

CV02

METAL
DETECTOR

PRODUCT
SIZING
SCREEN

CV03

CV04

CV05

DEAD
STOCKPILE

CRUSHED
PRODUCT
FEED
BIN

VSD

CV06

WEIGHTOMETER

PROCESS WATER
F-105

CLASSIFICATION
SCREEN

SULPHIDE FLOTATION
F-102

PRIMARY BALL MILL

SCATS

MILL
DISCHARGE
HOPPER

MILL
DISCHARGE
PUMP

MILL SUMP PUMP

TAILS THICKENER
F-105

HIGH PRESSURE AIR
F-105

AIR
RECEIVER

MILL ANCILLARIES
-

LEGEND
FUTURE
INTERMITTENT

| DRAWN | CHECKED | DESIGN | SENIOR ENG | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|
| | AK | AR | | | | |

| DRG No | REFERENCE DRAWINGS | No | DATE | REVISIONS | DRN | CHK'D | APP'D | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|---|---|---|---|
| XXX | XXX | | | | | | | | | |

| No | DATE | REVISIONS | DRN | CHK'D | DESIGN | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|---|---|
| A | 10OCT07 | ISSUED FOR CLIENT REVIEW | VEC | AR | AR | CW | CW | |

CLIENT: MINEMAKERS LTD

PROJECT: ANCHOR TIN STUDY

DRAWING TITLE: CRUSHING & MILLING FLOWSHEET

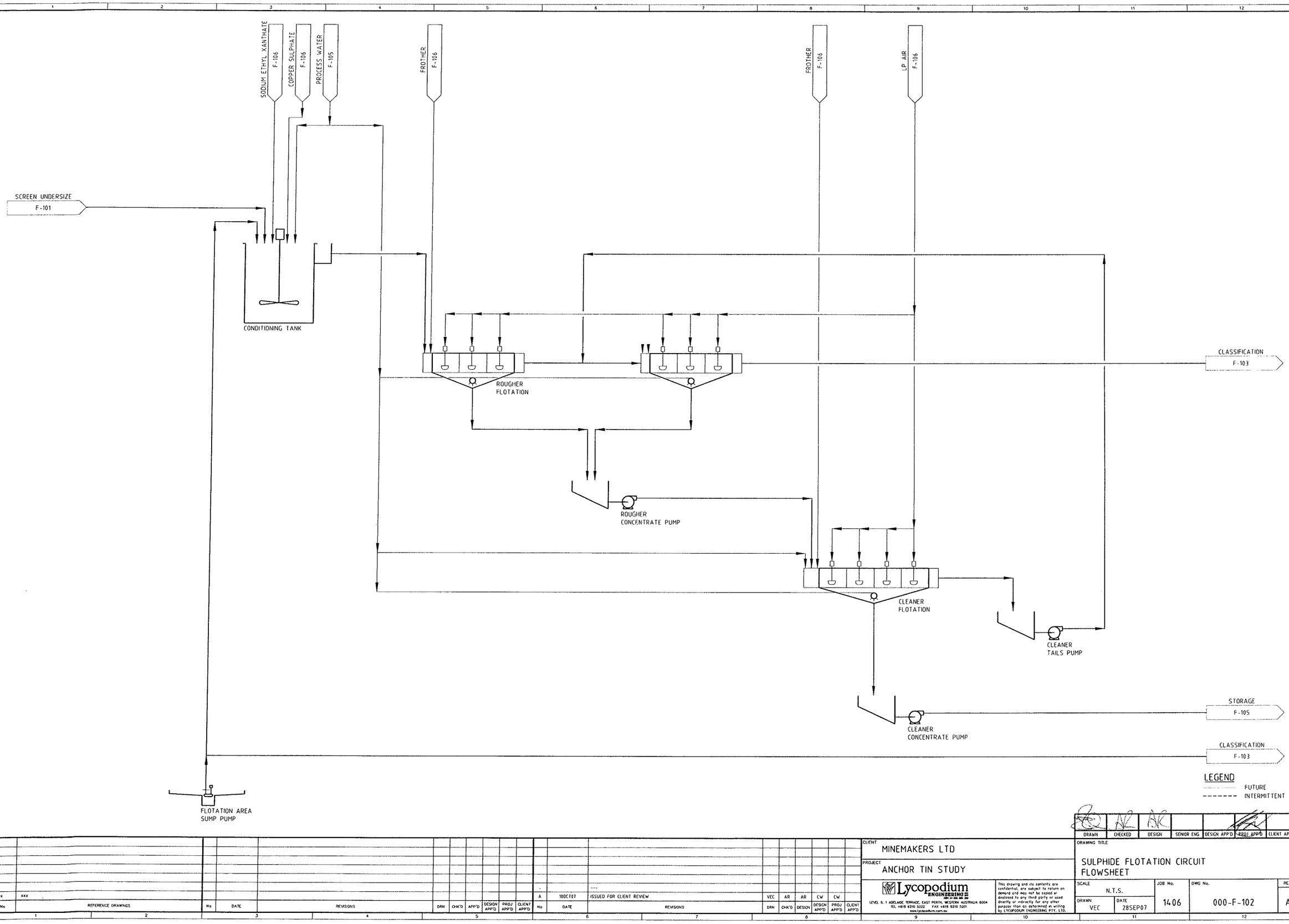
Lycopodium ENGINEERING
LEVEL 5, 1 ADELAIDE TERRACE, EAST PERTH, WESTERN AUSTRALIA 6004
TEL +618 6210 5222 FAX +618 6210 5201
www.lycopodium.com.au



| SCALE | JOB No. | DWG No. | REV. |
|---|---|---|---|
| N.T.S. | 1406 | 000-F-101 | A |

| DRAWN | DATE |
|---|---|
| VEC | 28SEP07 |

B1




| DRAWN | CHECKED | DESIGN | SENIOR ENG | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|
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| DRG No | REFERENCE DRAWINGS |
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DRAWING TITLE: SULPHIDE FLOTATION CIRCUIT FLOWSHEET

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| SCALE | JOB No. | DWG No. | REV. |
|---|---|---|---|
| N.T.S. | 1406 | 000-F-102 | A |

| DRAWN | DATE |
|---|---|
| VEC | 28SEP07 |

B1

PROCESS WATER
F-105

SUMP PUMP
F-102

SULPHIDE FLOTATION
F-102

CLASSIFICATION FEED PUMP

CLASSIFICATION CYCLONES

FEED DILUTION BOX

COARSE ROUGHER SPIRALS

COARSE SCAVENGER SPIRALS

COARSE CLEANER SPIRALS

T C

SPIRALS SUMP PUMP

COARSE SCAVENGER FEED PUMP

COARSE CLEANER FEED PUMP

COARSE TABLE TAIL
F-104

FINE TABLE TAIL
F-104

FINE ROUGHER SPIRALS

FINE SCAVENGER SPIRALS

FINE CLEANER SPIRALS

FINE CONCENTRATE TABLES
F-104

FINE SCAVENGER FEED PUMP

FINE CLEANER FEED PUMP

COARSE CONCENTRATE TABLES
F-104

COMBINED SPIRAL TAILS PUMP

TAILS HOPPER
F-105

LEGEND

FUTURE

INTERMITTENT

| DRAWN | CHECKED | DESIGN | SENIOR ENG | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|
| | | | | | | |

| DRG No | REFERENCE DRAWINGS |
|---|---|
| xxx | xxx |

| No | DATE | REVISIONS | DRN | CHK'D | APP'D | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
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DRAWING TITLE: PRIMARY SPIRAL CIRCUIT FLOWSHEET

| SCALE | JOB No. | DWG No. | REV. |
|---|---|---|---|
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| DRAWN | DATE |
|---|---|
| VEC | 28SEP07 |

B1

PROCESS WATER F-105

RAW WATER F-105

PROCESS WATER F-105

FINE SPIRAL CONCENTRATE F-103

COARSE SPIRAL CONCENTRATE F-103

DILUTION BOX

DILUTION BOX

C

COARSE CLEANER TABLES

M

T

C

FINE CLEANER TABLES

T

M

FINE RETREAT FEED PUMP

FINE CLEANER SPIRALS F-103

FINE TABLE TAILS PUMP

COARSE RETREAT FEED PUMP

C

FINE RETREAT TABLE

T

C

COARSE RETREAT TABLE

T

COARSE TABLE TAILS PUMP

COARSE CLEANER SPIRALS F-103

WOLFRAM SEPARATION F-107

WOLFRAM SEPARATION F-107

FLOCCULANT BY HAND

FLOCCULANT BY HAND

COARSE CONCENTRATE PUMP

FINE CONCENTRATE PUMP

COARSE CONCENTRATE SETTLING DRUMS

KIEVING TABLE (FUTURE)

FINE CONCENTRATE SETTLING DRUMS

LEGEND

FUTURE

INTERMITTENT

| | DRAWN | CHECKED | DESIGN | SENIOR ENG | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

| DWG No | REFERENCE DRAWINGS |
|---|---|
| xxx | xxx |

| No | DATE | REVISIONS | DRN | CHK'D | APP'D | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|---|---|
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| No | DATE | REVISIONS | DRN | CHK'D | DESIGN | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
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CLIENT: MINEMAKERS LTD

PROJECT: ANCHOR TIN STUDY

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DRAWING TITLE: CONCENTRATE CLEANING FLOWSHEET

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|---|---|---|---|
| N.T.S. | 1406 | 000-F-104 | A |

| DRAWN | DATE |
|---|---|
| VEC | 28SEP07 |

B1

SPILLAGE PUMPS
F-101/103

COARSE SPIRAL TAIL
F-103

FINE SPIRAL TAIL
F-103

FLOCCULANT
(BULK BOX)

TAILS THICKENER

SULPHIDE CONCENTRATE
F-102

TAILS HOPPER

TAILS PUMP

PROCESS WATER TANK

PROCESS WATER
PUMPS

SULPHIDE FLOTATION
F-102

CRUSHING
F-101

MILLING
F-101

SPIRALS
F-103

TABLES
F-104

WOLFRAM SEPARATION
F-107

PORTABLE
PUMP

SULPHIDE CONCENTRATE STORAGE

DECANT
PUMP

TAILINGS IMPOUNDMENT

RAW WATER BORES

RAW WATER
TANK

RAW WATER
PUMPS

GLAND WATER
PUMP

ADMIN/WORKSHOP
-

SPIRALS/TABLES
-

REAGENTS
F-106

GLAND WATER

FILTER

UV STERILISER

SAFETY SHOWERS
-

ABLUTIONS
-

POTABLE
WATER PUMPS

COMPRESSOR

FILTER

DRYER

AIR RECEIVER

MILLING
F-101

OTHER INSTRUMENTS
-

COMPRESSED AIR

LEGEND
FUTURE
INTERMITTENT

| | DRAWN | CHECKED | DESIGN | SENIOR ENG | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|---|
| | VEC | AR | AR | CW | CW | | |

| DRG No | REFERENCE DRAWINGS |
|---|---|
| xxx | xxx |

| No | DATE | REVISIONS | DRN | CHK'D | APP'D | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|---|---|
| | | --- | | | | | | |
| A | 18OCT07 | ISSUED FOR CLIENT REVIEW | VEC | AR | AR | CW | CW | |

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DRAWING TITLE
REAGENTS AND SERVICES
FLOWSHEET

| SCALE | JOB No. | DWG No. | REV. |
|---|---|---|---|
| N.T.S. | 1406 | 000-F-105 | A |

DRAWN VEC
DATE 28SEP07

B1

RAW WATER
F-105

BY MONORAIL

EXTRACTION FAN

DRUMS

SODIUM ETHYL XANTHATE MIX TANK

BUFFER TANK

DOSING PUMP

SODIUM ETHYL XANTHATE

FROTHER IBC

FROTHER

DOSING PUMPS

ROUGHER FLOTATION
F-102

CLEANER FLOTATION
F-102

SULPHIDE FLOTATION
F-102

BY MONORAIL

EXTRACTION FAN

DRUMS

COPPER SULPHATE MIX TANK

BUFFER TANK

DOSING PUMP

COPPER SULPHATE

SULPHIDE FLOTATION
F-102

LP BLOWER AIR

LP AIR

SULPHIDE FLOTATION
F-102

LEGEND

FUTURE

INTERMITTENT

| ORG No | REFERENCE DRAWINGS |
|---|---|
| XXX | XXX |

| No | DATE | REVISIONS | DRN | CHK'D | APP'D | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|---|---|
| . | | --- | | | | | | |
| A | 10OCT07 | ISSUED FOR CLIENT REVIEW | VEC | AR | AR | CW | CW | |

| No | DATE | REVISIONS | DRN | CHK'D | DESIGN | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|---|---|

| DRAWN | CHECKED | DESIGN | SENIOR ENG | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|
| VEC | AR | AR | | | CW | |

CLIENT: MINEMAKERS LTD

PROJECT: ANCHOR TIN STUDY

DRAWING TITLE: REAGENTS AND SERVICES #2 FLOWSHEET

Lycopodium ENGINEERING
LEVEL 5, 1 ADELAIDE TERRACE, EAST PERTH, WESTERN AUSTRALIA 6004
TEL +618 6210 5222 FAX +618 6210 5201
www.lycopodium.com.au



| SCALE | JOB No. | DWG No. | REV. |
|---|---|---|---|
| N.T.S. | 1406 | 000-F-106 | A |

DRAWN: VEC DATE: 28SEP07

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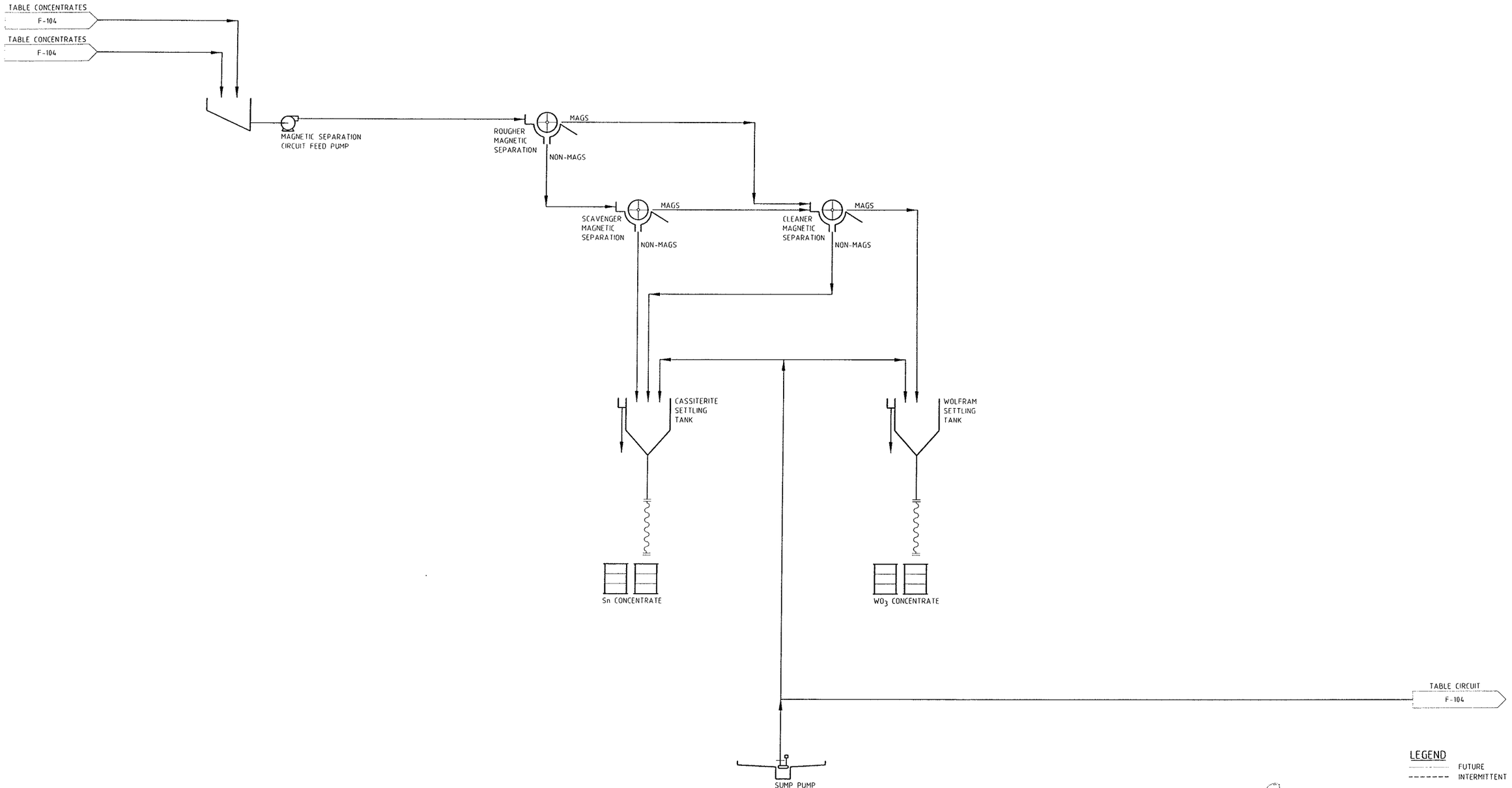


| DRG No | REFERENCE DRAWINGS |
|---|---|
| xxx | xxx |

| No | DATE | REVISIONS | DRN | CHK'D | APP'D | DESIGN APP'D | PROJ APP'D | CLIENT APP'D |
|---|---|---|---|---|---|---|---|---|
| A | 190C107 | ISSUED FOR CLIENT REVIEW | VEC | AR | AR | CW | CW | |

DRAWN | CHECKED | DESIGN | SENIOR ENG | DESIGN APP'D | PROJ APP'D | CLIENT APP'D

CLIENT: MINEMAKERS LTD

PROJECT: ANCHOR TIN STUDY

DRAWING TITLE: WOLFRAM RECOVERY FLOWSHEET

Lycopodium ENGINEERING
LEVEL 5, 1 ADELAIDE TERRACE, EAST PERTH, WESTERN AUSTRALIA 6004
TEL +618 6210 5222 FAX +618 6210 5201
www.lycopodium.com.au



| SCALE | JOB No. | DWG No. | REV. |
|---|---|---|---|
| N.T.S. | 1406 | 000-F-107 | A |

DRAWN VEC | DATE 28SEP07

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# APPENDIX 3

# MAJOR EQUIPMENT LIST

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**500 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 101 Crushing and Milling** | | | | | | | | |
| A | 1 | | ROM Bin | 25tonne capacity | 3500 w 10m3 bin | | - | - |
| A | 1 | | Primary Vibrating Feeder | 71tph @ minus 500mm | 1200 x 4000mm vibrating feeder | V | 22 | 22 |
| A | 1 | | Primary Jaw Crusher | 71tph @ minus 500mm, CSS of 100mm | 36" x 24" single toggle jaw | F | 75 | 75 |
| A | 1 | | Crusher Discharge Conveyor | 71tph @ minus 100mm | 750 w stringer conveyor | F | 7.5 | 7.5 |
| A | 1 | | Product Sizing Screen | 143tph @ minus 100mm | 1800 x 6100 2 deck screen, 40mm top, 15mm bottom deck | F | 15 | 15 |
| A | 1 | | Screen oversize conveyor | 71tph @ minus 100mm | 600 w conveyor | F | 5.5 | 5.5 |
| A | 1 | | Metal Detector | | | | - | - |
| A | 1 | | Secondary Crusher | 71tph @ minus 100mm, CSS of 15mm | 4ft cone crusher, medium liners | F | 150 | 150 |
| A | 1 | | Product screen undersize conveyor | 71tph @ minus 15mm | 600 w conveyor | F | 2.2 | 2.2 |
| A | 1 | | Crushed product conveyor | 71tph @ minus 15mm | 600 w conveyor | F | 5.5 | 5.5 |
| A | 1 | | Crushed product bin | 16tonne capacity | 3500 w 10m3 bin | | - | - |
| A | 1 | | Stockpile feed conveyor | 71tph @ minus 15mm | 600 w conveyor | F | 11 | 11 |
| A | 1 | | Mill belt feeder | 63tph @ minus 15mm | 600w x 2500L | V | 7.5 | 7.5 |
| A | 1 | | Mill feed conveyor | 63tph @ minus 15mm | 600 w conveyor | F | 11 | 11 |
| A | 1 | | Mill feed weightometer | 0-100tph +/-1% | | | - | - |
| A | 1 | | Primary ball mill | 63tph grind to P80 of 350 microns | 3.66 x 5.00 EGL grate discharge mill c/w 1250kW drive | F | 1250 | 1250 |
| A | 1 | | Mill discharge hopper | 163m3/h @59% solids, 1minute | 3m3 | F | - | - |
| A | 1 | | Mill discharge pump | 163m3/h @59% solids and 35m TDH | 6/4 AH VSD | F | 75 | 75 |
| A | 2 | | DSM Screen | 163m3/h @59% solids | 1.6 m wide x 2.036 m radius, 45 degree arc DSM screen | | - | - |
| A | 1 | | Milling sump pump | 15 m3/hr capacity, 10 m TDH, 1.57 SG, 350 micron P80 | 50mm | F | 15 | 15 |
| A | 1 | | Milling area air receiver | 750kPa | 0.5m3 capacity | | - | - |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**500 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 102 Sulphide Flotation** | | | | | | | | |
| A | 1 | | Conditioning Tank | 10m3 capacity, 3 x 120 degree baffles | 2.5m dia x 3m hi rubber lined steel | F | - | - |
| A | 1 | | Conditioning Tank Agitator | 40% solids, 10m3 tank | three blade aerofoil, s/steel | F | 2.2 | 2.2 |
| A | 1 | | Rougher Flotation Cell # 1 | 8m3 capacity, 6 cells in F-3-J-3-D | OK8, epoxy lined | F | 22 | 22 |
| A | 1 | | Rougher Flotation Cell # 2 | configuration with pinch valve | OK8, epoxy lined | F | 22 | 22 |
| A | 1 | | Rougher Flotation Cell # 3 | level control, epoxy lined | OK8, epoxy lined | F | 22 | 22 |
| A | 1 | | Rougher Flotation Cell # 4 | | OK8, epoxy lined | F | 22 | 22 |
| A | 1 | | Rougher Flotation Cell # 5 | | OK8, epoxy lined | F | 22 | 22 |
| A | 1 | | Rougher Flotation Cell # 6 | | OK8, epoxy lined | F | 22 | 22 |
| A | 1 | | Rougher concentrate pump | 10m3/h @ 21m TDH | 2/1.5 AH | F | 5.5 | 5.5 |
| A | 1 | | Cleaner Flotation Cell # 1 | 3m3 capacity, 6 cells in F-3-D | OK3, epoxy lined | F | 11 | 11 |
| A | 1 | | Cleaner Flotation Cell # 2 | configuration with pinch valve | OK3, epoxy lined | F | 11 | 11 |
| A | 1 | | Cleaner Flotation Cell # 3 | level control, epoxy lined | OK3, epoxy lined | F | 11 | 11 |
| A | 1 | | Cleaner Concentrate pump | 2m3/h @ 30m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 1 | | Cleaner tails pump | 15m3/h @ 25m TDH | 2/1.5 AH | F | 5.5 | 5.5 |
| A | 1 | | Flotation area sump pump | 15 m3/hr capacity, 10 m TDH, 1.57 SG, 350 micron P80 | 50mm | F | 15 | 15 |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**500 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 103 Coarse and Fine Spirals** | | | | | | | | |
| A | 1 | | Classification cyclone feed hopper | 99m3/h @ 1 minute | 2m3 capacity | | - | - |
| A | 1 | | Classification cyclone feed pump | 99m3/h @ 45m TDH | 4/3 AH | V | 45 | 45 |
| A | 2 | | Classification cyclones | 99m3/h feed, 90 mic P80 in overflow | 250CVX | | - | - |
| A | 1 | | Coarse spirals dilution box | 58m3/h, 30secs | 0.5m3 capacity | | - | - |
| A | 6 | | Coarse rougher spirals | 31tph, 40% solids, 1.8tph/start | 6 x triple start, 6 turns | | - | - |
| A | 1 | | Coarse scavenger spiral feed hopper | 68m3/h @ 30 secs | 0.5m3 capacity | | - | - |
| A | 1 | | Coarse scavenger spiral feed pump | 68m3/h @ 32m TDH | 4/3 AH | F | 22 | 22 |
| A | 6 | | Coarse scavenger spirals | 35tph, 30% solids, 1.8tph/start | 6 x triple start, 6 turns | | - | - |
| A | 1 | | Combined Scavenger spiral tails hopper | 137m3/h @ 30 secs | 1m3 capacity | | - | - |
| A | 1 | | Combined Scavenger spiral tails pump | 137m3/h @ 21m TDH | 6/4 AH | F | 37 | 37 |
| A | 1 | | Coarse cleaner spiral feed hopper | 22m3/h @ 1 minute | 0.5m3 capacity | | - | - |
| A | 1 | | Coarse cleaner spiral feed pump | 22m3/h @ 46m TDH | 3/2 AH | F | 22 | 22 |
| A | 6 | | Coarse cleaner spirals | 14tph, 30% solids, 1.0tph/start | 6 x triple start, 6 turns | | - | - |
| A | 10 | | Fine rougher spirals | 31tph, 34% solids, 1tph/start | 10 x triple start, 8.5 turns | | - | - |
| A | 1 | | Fine scavenger spiral feed hopper | 82m3/h @ 30 secs | 1m3 capacity | | - | - |
| A | 1 | | Fine scavenger spiral feed pump | 82m3/h @ 23m TDH | 4/3 AH | F | 22 | 22 |
| A | 10 | | Fine scavenger spirals | 35tph, 33% solids, 1tph/start | 10 x triple start, 8.5 turns | | - | - |
| A | 1 | | Fine cleaner spiral feed hopper | 24m3/h @ 30 secs | 0.5m3 capacity | | - | - |
| A | 1 | | Fine cleaner spiral feed pump | 24m3/h @ 24m TDH | 3/2 AH | F | 11 | 11 |
| A | 10 | | Fine cleaner spirals | 14tph, 30% solids, 0.5tph/start | 10 x triple start, 8.5 turns | | - | - |
| A | 1 | | Spirals area sump pump | 15 m3/hr capacity, 10 m TDH, 1.57 SG, 350 micron P80 | 50mm | F | 11 | 11 |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**500 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 104 Coarse and Fine Tables** | | | | | | | | |
| A | 3 | | Coarse cleaner tables | 2.8tph @ -350 + 90 micron | 3 x Holman 8000 shaking tables | | 1.5 | 4.5 |
| A | 1 | | Coarse retreat table feed hopper | 1m3/h @ 30 secs | 0.3m3 capacity | | - | - |
| A | 1 | | Coarse retreat table feed pump | 1m3/h @ 24m TDH | 1.5/1 AH | F | 1.1 | 1.1 |
| A | 1 | | Coarse retreat tables | 0.6tph @ -350 + 90 micron | 1 x Holman 8000 shaking tables | | 1.5 | 1.5 |
| A | 1 | | Coarse concentrate hopper | 0.5m3/h @ 30 secs | 0.3m3 capacity | | - | - |
| A | 1 | | Coarse concentrate pump | 0.5m3/h @ 11m TDH | 1.5/1 AH | F | 1.1 | 1.1 |
| A | 1 | | Coarse table tails hopper | 5m3/h @ 30 secs | 0.3m3 capacity | | - | - |
| A | 1 | | Coarse table tails pump | 5m3/h @ 40m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 6 | | Fine cleaner tables | 2.8tph @ -350 + 90 micron | 6 x Holman 8000 shaking tables | | 1.5 | 9 |
| A | 1 | | Fine retreat table feed hopper | 1m3/h @ 30 secs | 0.3m3 capacity | | - | - |
| A | 1 | | Fine retreat table feed pump | 1m3/h @ 15m TDH | 1.5/1 AH | F | 1.1 | 1.1 |
| A | 1 | | Fine retreat tables | 0.6tph @ -350 + 90 micron | 1 x Holman 8000 shaking tables | | 1.5 | 1.5 |
| A | 1 | | Fine concentrate hopper | 0.5m3/h @ 30 secs | 0.3m3 capacity | | - | - |
| A | 1 | | Fine concentrate pump | 0.5m3/h @ 10m TDH | 1.5/1 AH | F | 1.1 | 1.1 |
| A | 1 | | Fine table tails hopper | 5m3/h @ 30 secs | 0.3m3 capacity | | - | - |
| A | 1 | | Fine table tails pump | 5m3/h @ 26m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 1 | | Table area sump pump | 5.5 m3/hr capacity, 17.5 m TDH, 1.57 SG, 350 micron P80 | 25mm | F | 7.5 | 7.5 |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**500 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 105 Tailings and services** | | | | | | | | |
| A | 1 | | Final Tails thickener | 62tph, 1t/m2/h | 10m diam hi rate thickener | F | 11 | 11 |
| A | 1 | | Final Tails hopper | 84m3/h @ 60 secs | 2m3 capacity | | - | - |
| A | 1 | | Final Tails pump | 84m3/h @ 77m TDH | 4/3 AH, 15m static, 1000m line | F | 75 | 75 |
| A | 1 | | Sulphide Concentrate Impoundment | 1500 t capacity, 1.5mm plastic lined | 20m x 15m x 3m deep, 2:1 batters | | | |
| A | 1 | | Submersible pump | 15m3/hr, 15m TDH | | F | 7.5 | 7.5 |
| A | 1 | | Tailings impoundment | 1 million tonne starter dam | Unlined | | - | - |
| A | 1 | | Decant return pump | 31m3/h @ 45m TDH | 3/2 AH | F | 15 | 15 |
| A | 1 | | Process water tank | 120m3/hr demand | 120 m3 capacity, 9m dia x 2.4 hi | | - | - |
| A | 2 | | Process water pumps | 120m3/hr, 65m TDH | 6/4 AH | F | 75 | 150 |
| A | 1 | | Raw water tank | 45m3/hr demand | 50 m3 capacity, 6m dia x 2.4 hi | | - | - |
| A | 2 | | Raw water pump | 45m3/hr, 55m TDH | Southern Cross Water pumps | F | 22 | 44 |
| A | 2 | | Gland water pump | 5m3/hr, 31m TDH | Southern Cross Water pumps | F | 3 | 6 |
| A | 2 | | Raw water bore pumps | 30m3/hr, 45m | Southern Cross Water pumps | F | 15 | 30 |
| A | 1 | | Potable water treatment facility | 5m3/hr, filter and UV steriliser | | | 1 | 1 |
| A | 2 | | Potable water pump | 5m3/hr, 30m | Southern Cross Water pumps | F | 5.5 | 11 |
| A | 1 | | Plant air compressor | 700kPa | 300 Nm3/hr @ 700 kPa(g) | F | 45 | 45 |
| A | 1 | | Plant air receiver | 700kPa | 2m3 capacity | F | - | - |
| A | 1 | | Flocculant pump | 30g/t as 20% pre-mix solution | 0-20L/hr, 20m | F | 0.5 | 0.5 |
| A | 1 | | Tails area sump pump | 15 m3/hr capacity, 10 m TDH, 1.57 SG, 350 micron P80 | 50mm | F | 7.5 | 7.5 |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**500 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 106 Reagents** | | | | | | | | |
| A | 1 | | Sodium Ethyl Xanthate mixing/storage tank | 1m3 storage tank | 1.2m dia x 1.5m hi, s/steel | | - | - |
| A | 1 | | Sodium Ethyl Xanthate agitator | 1.15 SG, 1m3 tank | three blade s/steel | F | 0.5 | 0.5 |
| A | 1 | | Sodium Ethyl Xanthate drum chute | 200kg drums | m/steel | | - | - |
| A | 1 | | Sodium Ethyl Xanthate monorail hoist | 200kg drums | 1.5t SWL, electric hoist | F | 0.5 | 0.5 |
| A | 1 | | Sodium Ethyl Xanthate ventilation fan | | | F | 1.1 | 1.1 |
| A | 1 | | Sodium Ethyl Xanthate buffer tank | | 300 dia x 1.5m pipe | | | |
| A | 1 | | Sodium Ethyl Xanthate dosing pump | | 0-50L/hr | V | 0.2 | 0.2 |
| A | 1 | | Copper Sulphate mixing/storage tank | 1m3 storage tank | 1.2m dia x 1.5m hi, s/steel | | - | - |
| A | 1 | | Copper Sulphate agitator | 1.15 SG, 1m3 tank | three blade s/steel | F | 0.5 | 0.5 |
| A | 1 | | Copper Sulphate drum chute | 200kg drums | m/steel | | - | - |
| A | 1 | | Copper Sulphate monorail hoist | 200kg drums | 1.5t SWL, electric hoist | F | 0.5 | 0.5 |
| A | 1 | | Copper Sulphate buffer tank | | 300 dia x 1.5m pipe | | | |
| A | 1 | | Copper Sulphate dosing pump | | 0-50L/hr | V | 0.2 | 0.2 |
| A | 1 | | Frother dosing pump # 1 | | 0-10L/hr | V | 0.2 | 0.2 |
| A | 1 | | Frother dosing pump # 2 | | 0-10L/hr | V | 0.2 | 0.2 |
| A | 1 | | Low Pressure blower | 3000Am3/hr at 20kPa | | F | 75 | 75 |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**500 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 107 Wolfram Separation** | | | | | | | | |
| A | 1 | | Magnetic Separation Circuit feed pump | 2m3/h @ 60m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 1 | | Rougher Magnetic Separator | Medium Intensity Mag Separator | 305 dia x 305 long | F | 0.55 | 0.55 |
| A | 1 | | Scavenger Magnetic Separator | Medium Intensity Mag Separator | 305 dia x 305 long | F | 0.55 | 0.55 |
| A | 1 | | Cleaner Magnetic Separator | Medium Intensity Mag Separator | 305 dia x 305 long | F | 0.55 | 0.55 |
| A | 1 | | Cassiterite settling tank | 8 hrs storage | 1.5m dia x 3.1m hi, s/steel | - | - | - |
| A | 1 | | Wolfram Settling Tank | 8 hrs storage | 1.5m dia x 3.1m hi, s/steel | - | - | - |
| A | 1 | | Mag Separation Sump pump | 5.5 m3/hr capacity, 17.5 m TDH, 1.57 SG, 350 micron P80 | 25mm | F | 7.5 | 7.5 |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**1,000 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 101 Crushing and Milling** | | | | | | | | |
| A | 1 | | ROM Bin | 25tonne capacity | 3500 w 15m3 bin | | - | - |
| A | 1 | | Primary Vibrating Feeder | 143tph @ minus 500mm | 1200 x 4000mm vibrating feeder | V | 30 | 30 |
| A | 1 | | Primary Jaw Crusher | 143tph @ minus 500mm, CSS of 100mm | 40" x 30" single toggle jaw | F | 110 | 110 |
| A | 1 | | Crusher Discharge Conveyor | 143tph @ minus 100mm | 750 w stringer conveyor | F | 15 | 15 |
| A | 2 | | Product Sizing Screen | 285tph @ minus 100mm | 1800 x 6100 2 deck screen, 40mm top, 15mm bottom deck | F | 15 | 30 |
| A | 1 | | Screen oversize conveyor | 143tph @ minus 100mm | 750 w conveyor | F | 11 | 11 |
| A | 1 | | Metal Detector | | | | - | - |
| A | 1 | | Secondary Crusher | 143tph @ minus 100mm, CSS of 15mm | 4ft cone crusher, medium liners | F | 150 | 150 |
| A | 1 | | Product screen undersize conveyor | 143tph @ minus 15mm | 750 w conveyor | F | 5.5 | 5.5 |
| A | 1 | | Crushed product conveyor | 143tph @ minus 15mm | 750 w conveyor | F | 11 | 11 |
| A | 1 | | Crushed product bin | 40tonne capacity | 3500 w 25m3 bin | | - | - |
| A | 1 | | Stockpile feed conveyor | 143tph @ minus 15mm | 750 w conveyor | F | 11 | 11 |
| A | 1 | | Mill belt feeder | 125tph @ minus 15mm | 750w x 2500 | V | 15 | 15 |
| A | 1 | | Mill feed conveyor | 125tph @ minus 15mm | 750 w conveyor | F | 15 | 15 |
| A | 1 | | Mill feed weightometer | 0-150tph +/-1% | | | - | - |
| A | 1 | | Primary ball mill | 125tph grind to P80 of 350 microns | 4.27 x 5.50 EGL overflow discharge mill c/w 1650kW drive | F | 1650 | 1650 |
| A | 1 | | Mill discharge hopper | 327m3/h @59% solids, 1minute | 6m3 | F | - | - |
| A | 1 | | Mill discharge pump | 327m3/h @59% solids and 39m TDH | 8/6 AH, VSD | F | 150 | 150 |
| A | 4 | | DSM Screen | 327m3/h @59% solids | 1.6 m wide x 2.036 m radius, 45 degree arc DSM screen | | - | - |
| A | 1 | | Milling sump pump | 25 m3/hr capacity, 10 m TDH, 1.57 SG, 350 micron P80 | 65mm | F | 15 | 15 |
| A | 1 | | Milling area air receiver | 750kPa | 1m3 capacity | | - | - |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**1,000 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 102 Sulphide Flotation** | | | | | | | | |
| A | 1 | | Conditioning Tank | 20m3 capacity, 3 x 120 degree baffles | 3.0m dia x 3.5m hi rubber lined steel | F | - | - |
| A | 1 | | Conditioning Tank Agitator | 40% solids, 20m3 tank | three blade aerofoil, s/steel | F | 3 | 3 |
| A | 1 | | Rougher Flotation Cell # 1 | 16m3 capacity, 6 cells in F-3-J-3-D | OK16, epoxy lined | F | 37 | 37 |
| A | 1 | | Rougher Flotation Cell # 2 | configuration with pinch valve | OK16, epoxy lined | F | 37 | 37 |
| A | 1 | | Rougher Flotation Cell # 3 | level control, epoxy lined | OK16, epoxy lined | F | 37 | 37 |
| A | 1 | | Rougher Flotation Cell # 4 | | OK16, epoxy lined | F | 37 | 37 |
| A | 1 | | Rougher Flotation Cell # 5 | | OK16, epoxy lined | F | 37 | 37 |
| A | 1 | | Rougher Flotation Cell # 6 | | OK16, epoxy lined | F | 37 | 37 |
| A | 1 | | Rougher concentrate pump | 20m3/h @ 25m TDH | 2/1.5 AH | F | 7.5 | 7.5 |
| A | 1 | | Cleaner Flotation Cell # 1 | 3m3 capacity, 6 cells in F-3-D | OK3, epoxy lined | F | 11 | 11 |
| A | 1 | | Cleaner Flotation Cell # 2 | configuration with pinch valve | OK3, epoxy lined | F | 11 | 11 |
| A | 1 | | Cleaner Flotation Cell # 3 | level control, epoxy lined | OK3, epoxy lined | F | 11 | 11 |
| A | 1 | | Cleaner Flotation Cell # 4 | | OK3, epoxy lined | F | 11 | 11 |
| A | 1 | | Cleaner Concentrate pump | 3m3/h @ 25m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 1 | | Cleaner tails pump | 40m3/h @ 22m TDH | 3/2 AH | F | 7.5 | 7.5 |
| A | 1 | | Flotation area sump pump | 15 m3/hr capacity, 10 m TDH, 1.57 SG, 350 micron P80 | 50mm | F | 15 | 15 |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**1,000 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 103 Coarse and Fine Spirals** | | | | | | | | |
| A | 1 | | Classification cyclone feed hopper | 198m3/h @ 1 minute | 4m3 capacity | | - | - |
| A | 1 | | Classification cyclone feed pump | 198m3/h @ 40m | 6/4 AH | V | 75 | 75 |
| A | 4 | | Classification cyclones | 198m3/h feed, 90 mic P80 in overflow | 250CVX | | - | - |
| A | 1 | | Coarse spirals dilution box | 116m3/h, 30secs | 1m3 capacity | | - | - |
| A | 12 | | Coarse rougher spirals | 63tph, 40% solids, 1.8tph/start | 12 x triple start, 6 turns | | - | - |
| A | 1 | | Coarse scavenger spiral feed hopper | 136m3/h @ 30 secs | 1m3 capacity | | - | - |
| A | 1 | | Coarse scavenger spiral feed pump | 136m3/h @ 28m TDH | 6/4 AH | F | 30 | 30 |
| A | 12 | | Coarse scavenger spirals | 69tph, 38% solids, 1.8tph/start | 12 x triple start, 6 turns | | - | - |
| A | 1 | | Combined Scavenger spiral tails hopper | 275m3/h @ 30 secs | 3m3 capacity | | - | - |
| A | 1 | | Combined Scavenger spiral tails pump | 275m3/h @ 21m TDH | 8/6 AH | F | 45 | 45 |
| A | 1 | | Coarse cleaner spiral feed hopper | 51m3/h @ 1 minute | 1m3 capacity | | - | - |
| A | 1 | | Coarse cleaner spiral feed pump | 51m3/h @ 30m TDH | 4/3 AH | F | 22 | 22 |
| A | 10 | | Coarse cleaner spirals | 28tph, 45% solids, 1.0tph/start | 10 x triple start, 6 turns | | - | - |
| A | 20 | | Fine rougher spirals | 63tph, 34% solids, 1tph/start | 20 x triple start, 8.5 turns | | - | - |
| A | 1 | | Fine scavenger spiral feed hopper | 164m3/h @ 30 secs | 1.5m3 capacity | | - | - |
| A | 1 | | Fine scavenger spiral feed pump | 164m3/h @ 23m TDH | 6/4 AH | F | 30 | 30 |
| A | 20 | | Fine scavenger spirals | 69tph, 33% solids, 1tph/start | 20 x triple start, 8.5 turns | | - | - |
| A | 1 | | Fine cleaner spiral feed hopper | 46m3/h @ 30 secs | 0.5m3 capacity | | - | - |
| A | 1 | | Fine cleaner spiral feed pump | 46m3/h @ 24m TDH | 4/3 AH | F | 15 | 15 |
| A | 20 | | Fine cleaner spirals | 28tph, 30% solids, 0.5tph/start | 20 x triple start, 8.5 turns | | - | - |
| A | 1 | | Spirals area sump pump | 25 m3/hr capacity, 10 m TDH, 1.57 SG, 350 micron P80 | 65mm | F | 22 | 22 |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**1,000 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 104 Coarse and Fine Tables** | | | | | | | | |
| A | 6 | | Coarse cleaner tables | 5.6tph @ -350 + 90 micron | 6 x Holman 8000 shaking tables | | 1.5 | 9 |
| A | 1 | | Coarse retreat table feed hopper | 2m3/h @ 30 secs | 0.5m3 capacity | | - | - |
| A | 1 | | Coarse retreat table feed pump | 2m3/h @ 24m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 2 | | Coarse retreat tables | 1.1tph @ -350 + 90 micron | 2 x Holman 8000 shaking tables | | 1.5 | 3 |
| A | 1 | | Coarse concentrate hopper | 1.8m3/h @ 30 secs | 0.5m3 capacity | | - | - |
| A | 1 | | Coarse concentrate pump | 1.8m3/h @ 20m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 1 | | Coarse table tails hopper | 9m3/h @ 30 secs | 0.5m3 capacity | | - | - |
| A | 1 | | Coarse table tails pump | 9m3/h @ 40m TDH | 1.5/1 AH | F | 7.5 | 7.5 |
| A | 12 | | Fine cleaner tables | 5.6tph @ - 90 micron | 12 x Holman 8000 shaking tables | | 1.5 | 18 |
| A | 1 | | Fine retreat table feed hopper | 2m3/h @ 30 secs | 0.5m3 capacity | | - | - |
| A | 1 | | Fine retreat table feed pump | 2m3/h @ 15m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 2 | | Fine retreat tables | 1.1tph @ - 90 micron | 2 x Holman 8000 shaking tables | | 1.5 | 3 |
| A | 1 | | Fine concentrate hopper | 1.8m3/h @ 30 secs | 0.5m3 capacity | | - | - |
| A | 1 | | Fine concentrate pump | 1.8m3/h @ 10m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 1 | | Fine table tails hopper | 9m3/h @ 30 secs | 0.5m3 capacity | | - | - |
| A | 1 | | Fine table tails pump | 9m3/h @ 26m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 1 | | Table area sump pump | 5.5 m3/hr capacity, 17.5 m TDH, 1.57 SG, 350 micron P80 | 25mm | F | 7.5 | 7.5 |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**1,000 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 105 Tailings and services** | | | | | | | | |
| A | 1 | | Final Tails thickener | 125tph, 1t/m2/h | 13m diam hi rate thickener | F | 15 | 15 |
| A | 1 | | Final Tails hopper | 169m3/h @ 60 secs | 4m3 capacity | | - | - |
| A | 1 | | Final Tails pump | 169m3/h @61m TDH | 6/4 AH, VSD 15m static, 1000m line | F | 110 | 110 |
| A | 1 | | Sulphide Concentrate Impoundment | 3000 t capacity, 1.5mm plastic lined | 25m x 16m x 4m deep, 2:1 batters | | | |
| A | 1 | | Submersible pump | 30m3/hr, 15m TDH | | F | 11 | 11 |
| A | 1 | | Tailings impoundment | 2 million tonne starter dam | Unlined | | - | - |
| A | 1 | | Decant return pump | 63m3/h @ 45m TDH | 4/3 AH | F | 30 | 30 |
| A | 2 | | Process water tank | 240m3/hr demand | 120 m3 each, 9m dia x 2.4 hi | | - | - |
| A | 2 | | Process water pumps | 300m3/hr, 70m TDH | 8/6 AH | F | 132 | 264 |
| A | 1 | | Raw water tank | 71m3/hr demand | 80 m3 capacity, 7m dia x 2.4 hi | | - | - |
| A | 2 | | Raw water pump | 80m3/hr, 80m TDH | Southern Cross Water pumps | F | 55 | 110 |
| A | 2 | | Gland water pump | 5m3/hr, 31m TDH | Southern Cross Water pumps | F | 7.5 | 15 |
| A | 3 | | Raw water bore pumps | 30m3/hr, 45m | Southern Cross Water pumps | F | 22 | 66 |
| A | 1 | | Potable water treatment facility | 5m3/hr, filter and UV steriliser | | | 1 | 1 |
| A | 2 | | Potable water pump | 5m3/hr, 30m | Southern Cross Water pumps | F | 5.5 | 11 |
| A | 1 | | Plant air compressor | 700kPa | 500 Nm3/hr @ 700 kPa(g) | F | 55 | 55 |
| A | 1 | | Plant air receiver | 700kPa | 2m3 capacity | F | - | - |
| A | 1 | | Flocculant pump | 30g/t as 20% pre-mix solution | 0-40L/hr, 20m | F | 0.5 | 0.5 |
| A | 1 | | Tails area sump pump | 15 m3/hr capacity, 10 m TDH, 1.57 SG, 350 micron P80 | 50mm | F | 7.5 | 7.5 |
| A | 3 | | Safety showers | | | | | |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**1,000 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 106 Reagents** | | | | | | | | |
| A | 1 | | Sodium Ethyl Xanthate mixing/storage tank | 2m3 storage tank | 1.5m dia x 1.8m hi, s/steel | | - | - |
| A | 1 | | Sodium Ethyl Xanthate agitator | 1.15 SG, 1m3 tank | three blade s/steel | F | 0.5 | 0.5 |
| A | 1 | | Sodium Ethyl Xanthate drum chute | 200kg drums | m/steel | | - | - |
| A | 1 | | Sodium Ethyl Xanthate monorail hoist | 200kg drums | 1.5t SWL, electric hoist | F | 0.5 | 0.5 |
| A | 1 | | Sodium Ethyl Xanthate ventilation fan | | | F | 1.1 | 1.1 |
| A | 1 | | Sodium Ethyl Xanthate buffer tank | | 300 dia x 1.5m pipe | | | |
| A | 1 | | Sodium Ethyl Xanthate dosing pump | | 0-100L/hr | V | 0.2 | 0.2 |
| A | 1 | | Copper Sulphate mixing/storage tank | 1m3 storage tank | 1.2m dia x 1.5m hi, s/steel | | - | - |
| A | 1 | | Copper Sulphate agitator | 1.15 SG, 1m3 tank | three blade s/steel | F | 0.5 | 0.5 |
| A | 1 | | Copper Sulphate drum chute | 200kg drums | m/steel | | - | - |
| A | 1 | | Copper Sulphate monorail hoist | 200kg drums | 1.5t SWL, electric hoist | F | 0.5 | 0.5 |
| A | 1 | | Copper Sulphate buffer tank | | 300 dia x 1.5m pipe | | | |
| A | 1 | | Copper Sulphate dosing pump | | 0-50L/hr | V | 0.2 | 0.2 |
| A | 1 | | Frother dosing pump # 1 | | 0-10L/hr | V | 0.2 | 0.2 |
| A | 1 | | Frother dosing pump # 2 | | 0-10L/hr | V | 0.2 | 0.2 |
| A | 1 | | Low Pressure blower | 6000Am3/hr at 20kPa | | F | 132 | 132 |

**1406 ANCHOR TIN PROJECT**
**EQUIPMENT LIST**
**1,000 ktpa**

| Rev | Tot Qty | S/By Qty | Equipment Name | Process Duty Point | Size | Fixed/ Variable Speed | kW each | kW Inst. |
|---|---|---|---|---|---|---|---|---|
| **F 107 Wolfram Separation** | | | | | | | | |
| A | 1 | | Magnetic Separation Circuit feed pump | 4m3/h @ 40m TDH | 1.5/1 AH | F | 5.5 | 5.5 |
| A | 1 | | Rougher Magnetic Separator | Medium Intensity Mag Separator | 305 dia x 305 long | F | 5.5 | 5.5 |
| A | 1 | | Scavenger Magnetic Separator | Medium Intensity Mag Separator | 305 dia x 305 long | F | 5.5 | 5.5 |
| A | 1 | | Cleaner Magnetic Separator | Medium Intensity Mag Separator | 305 dia x 305 long | F | 5.5 | 5.5 |
| A | 1 | | Cassiterite settling tank | 8 hrs storage | 1.5m dia x 3.1m hi, s/steel | - | - | - |
| A | 1 | | Wolfram Settling Tank | 8 hrs storage | 1.5m dia x 3.1m hi, s/steel | - | - | - |
| A | 1 | | Mag Separation Sump pump | 5.5 m3/hr capacity, 17.5 m TDH, 1.57 SG, 350 micron P80 | 25mm | F | 7.5 | 7.5 |

# APPENDIX 4

# CAPITAL COST ESTIMATE DETAIL

# Capital Cost Estimate
# Summary 500 ktpa

**ANCHOR TIN PROJECT CONCEPTUAL STUDY**
**CAPITAL COST ESTIMATE**
**ACCURACY +50%, -20%, 1Q2007**
**CURRENCY AUSTRALIAN DOLLARS**

| Area Description | Total Cost (excluding Contingency) | Contingency | Total Cost |
|---|---|---|---|
| 001 Site Estab.-General Total | 745,000 | 149,000 | 894,000 |
| 010 Site Constr. Facilities Total | 190,000 | 38,000 | 228,000 |
| 020 Constr. Equip. & Operations Total | 539,000 | 107,800 | 646,800 |
| **000 Site Estab. & Constr. Total** | **1,474,000** | **294,800** | **1,768,800** |
| 101 Treatment Plant-General Total | 238,000 | 95,200 | 333,200 |
| 101 Treatment Plant-Total | 25,243,015 | 5,048,603 | 30,291,618 |
| 180 Plant Services Total | 145,000 | 29,000 | 174,000 |
| **100 Treatment Plant Total** | **25,626,015** | **5,172,803** | **30,798,818** |
| 201 Infrastructure-General Total | 220,000 | 44,000 | 264,000 |
| 210 Utilities Total | 325,000 | 90,500 | 415,500 |
| 230 Tailings Dam Total | 500,000 | 200,000 | 700,000 |
| 240 Plant Buildings Total | 1,107,000 | 221,400 | 1,328,400 |
| 251 Site Sewage Plant and Management Housing | 1,040,000 | 208,000 | 1,248,000 |
| 250 Other Permanent Accommodation | N/A | | |
| 260 Construction Accommodation Total | Not required | | |
| 270 Mobile Plant & General Equip/Furniture Total | 546,000 | 109,200 | 655,200 |
| 280 Overland Pipelines Total | 344,000 | 68,800 | 412,800 |
| **200 Infrastructure Total** | **4,082,000** | **941,900** | **5,023,900** |
| **300 Mining Total** | **Excluded** | **Excluded** | **Excluded** |
| 410 EPCM Total | 5,384,347 | 1,076,869 | 6,461,217 |
| 420 Specialist Consultants Total | 400,000 | 80,000 | 480,000 |
| 430 Vendor Representatives Total | 50,000 | 10,000 | 60,000 |
| **400 Management Costs Total** | **5,834,347** | **1,166,869** | **7,001,217** |
| 501 Owners Costs-General Total | 1,380,000 | 276,000 | 1,656,000 |
| 530 Spare Parts Total | 500,000 | 100,000 | 600,000 |
| 540 Fees/Taxes/Duties Total | Excluded | Excluded | Excluded |
| 590 Other Owners Costs Total | Excluded | Excluded | Excluded |
| 510 Pre-production Total | 625,000 | 125,000 | 750,000 |
| **500 Owners Costs Total** | **2,505,000** | **501,000** | **3,006,000** |
| **600 Working Capital Total** | **Excluded** | **Excluded** | **Excluded** |
| **Grand Total** | **39,521,362** | **8,077,372** | **47,598,735** |

**Capital Cost Estimate**
**Equipment by Area**
**500 ktpa**

**ANCHOR TIN PROJECT CONCEPTUAL STUDY**
**CAPITAL COST ESTIMATE**
**ACCURACY +50%, -20%, 1Q2007**
**CURRENCY AUSTRALIAN DOLLARS**

| | | | Percentage | 40 | 13 | 8 | 7 | 13 | 19 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Area** | **Ex Works** | **Freight** | **Install** | **Equip** | **Concrete** | **Steelwork** | **Platework** | **Piping** | **E&I** | **Total** |
| Crushing | 1,500,000 | 135,000 | 450,000 | 2,085,000 | 677,625 | 417,000 | 364,875 | 677,625 | 990,375 | 5,212,500 |
| Milling | 2,663,500 | 239,715 | 799,050 | 3,702,265 | 1,203,236 | 740,453 | 647,896 | 1,203,236 | 1,758,576 | 9,255,663 |
| Sulphide Flotation | 700,000 | 63,000 | 210,000 | 973,000 | 316,225 | 194,600 | 170,275 | 316,225 | 462,175 | 2,432,500 |
| Spirals | 592,500 | 53,325 | 177,750 | 823,575 | 267,662 | 164,715 | 144,126 | 267,662 | 391,198 | 2,058,938 |
| Tables | 554,900 | 49,941 | 166,470 | 771,311 | 250,676 | 154,262 | 134,979 | 250,676 | 366,373 | 1,928,278 |
| Tailings & Services | 815,000 | 73,350 | 244,500 | 1,132,850 | 368,176 | 226,570 | 198,249 | 368,176 | 538,104 | 2,832,125 |
| Reagents | 129,500 | 11,655 | 38,850 | 180,005 | 58,502 | 36,001 | 31,501 | 58,502 | 85,502 | 450,013 |
| Wolfram Seperation | 280,000 | 25,200 | 84,000 | 389,200 | 126,490 | 77,840 | 68,110 | 126,490 | 184,870 | 973,000 |
| **Grand Total** | **7,235,400** | **651,186** | **2,170,620** | **10,057,206** | **3,268,592** | **2,011,441** | **1,760,011** | **3,268,592** | **4,777,173** | **25,143,015** |

**ANCHOR TIN PROJECT CONCEPTUAL STUDY**
**CAPITAL COST ESTIMATE**
**ACCURACY +50%, -20%, 1Q2007**
**CURRENCY AUSTRALIAN DOLLARS**

| Plant Area | Facility | PDisc. | Ex-Works Cost | Freight Cost | Install Cost | Total Cost (excl Cont) | % Cont | Cont | Grand Total |
|---|---|---|---|---|---|---|---|---|---|
| 001 Site Estab.-General | 002 Mob/Demob contractors labour | 0 General | 200,000 | 10,000 | | 210,000 | 20% | 42,000 | 252,000 |
| | 003 Mob/Demob constr. plant & equip. | 0 General | 300,000 | 50,000 | | 350,000 | 20% | 70,000 | 420,000 |
| | 004 Site Surveying | 0 General | 20,000 | 5,000 | | 25,000 | 20% | 5,000 | 30,000 |
| | 005 General Freight & Transport | 0 General | | 125,000 | | 125,000 | 20% | 25,000 | 150,000 |
| | 007 Testing and Inspection | 0 General | | | 25,000 | 25,000 | 20% | 5,000 | 30,000 |
| | 008 Barricades/Safety Signs | 0 General | 5,000 | 1,000 | 4,000 | 10,000 | 20% | 2,000 | 12,000 |
| **001 Site Estab.-General Total** | | | **525,000** | **191,000** | **29,000** | **745,000** | **20%** | **149,000** | **894,000** |
| 010 Site Constr. Facilities | 012 Construction Roads & Drainage | 1 Earthworks | 15,000 | | 15,000 | 30,000 | 20% | 6,000 | 36,000 |
| | 013 Laydown Areas (hardstand) | 1 Earthworks | 15,000 | | 15,000 | 30,000 | 20% | 6,000 | 36,000 |
| | 014 Construction Buildings/Facilities | 0 General | 5,000 | | 5,000 | 10,000 | 20% | 2,000 | 12,000 |
| | | 8 Arch/ Bldgs | 25,000 | | 25,000 | 50,000 | 20% | 10,000 | 60,000 |
| | 015 Construction Site Services | 0 General | 15,000 | | 15,000 | 30,000 | 20% | 6,000 | 36,000 |
| | 018 Constr Security Fencing | 0 General | 5,000 | | 5,000 | 10,000 | 20% | 2,000 | 12,000 |
| | 019 Weather Protection | 0 General | 20,000 | | 10,000 | 30,000 | 20% | 6,000 | 36,000 |
| **010 Site Constr. Facilities Total** | | | **100,000** | **0** | **90,000** | **190,000** | **20%** | **38,000** | **228,000** |
| 020 Constr. Equip. & Operations | 023 Heavy lift cranage | 0 General | | 20,000 | 80,000 | 100,000 | 20% | 20,000 | 120,000 |
| | 024 Misc. Equipment hire | 0 General | | 2,000 | 20,000 | 22,000 | 20% | 4,400 | 26,400 |
| | 025 Handling & access equipment | 0 General | | 2,000 | 10,000 | 12,000 | 20% | 2,400 | 14,400 |
| | 026 Security during construction | 0 General | | | 10,000 | 10,000 | 20% | 2,000 | 12,000 |
| | 027 Fuel & consumables | 0 General | | | 20,000 | 20,000 | 20% | 4,000 | 24,000 |
| | 028 Medical & First Aid | 0 General | 5,000 | 1,000 | 4,000 | 10,000 | 20% | 2,000 | 12,000 |
| | 029 Construction Services | 0 General | 25,000 | 1,000 | 14,000 | 40,000 | 20% | 8,000 | 48,000 |
| | xxx Accommodation and meals | 0 General | | | 325,000 | 325,000 | 20% | 65,000 | 390,000 |
| **020 Constr. Equip. & Operations Total** | | | **30,000** | **26,000** | **483,000** | **539,000** | **20%** | **107,800** | **646,800** |
| **Total** | | | **655,000** | **217,000** | **602,000** | **1,474,000** | **20%** | **294,800** | **1,768,800** |
| 101 Treatment Plant-General | 102 Bulk site earthworks | 1 Earthworks | 20,000 | | 20,000 | 40,000 | 40% | 16,000 | 56,000 |
| | 103 Detailed site earthworks | 1 Earthworks | 20,000 | | 20,000 | 40,000 | 40% | 16,000 | 56,000 |
| | 104 Site drainage & culverts | 1 Earthworks | 20,000 | | 20,000 | 40,000 | 40% | 16,000 | 56,000 |
| | 105 Inplant Tracks | 1 Earthworks | 20,000 | | 80,000 | 100,000 | 40% | 40,000 | 140,000 |
| | 107 Site Security Fencing | 0 General | 0 | | 0 | 0 | 40% | 0 | 0 |
| | 108 Packers/shims/bolts | 5 Equipment | 4,000 | | 4,000 | 8,000 | 40% | 3,200 | 11,200 |
| | 109 Non Shrink Grout | 5 Equipment | 5,000 | | 5,000 | 10,000 | 40% | 4,000 | 14,000 |
| **101 Treatment Plant-General Total** | | | **89,000** | **0** | **149,000** | **238,000** | **40%** | **95,200** | **333,200** |
| 100 Treatment Plant | Crushing | | 2,866,875 | 260,625 | 2,085,000 | 5,212,500 | 20% | 1,042,500 | 6,255,000 |
| | Milling | | 5,090,614 | 462,783 | 3,702,265 | 9,255,663 | 20% | 1,851,133 | 11,106,795 |
| | Sulphide Flotation | | 1,337,875 | 121,625 | 973,000 | 2,432,500 | 20% | 486,500 | 2,919,000 |
| | Spirals | | 1,132,416 | 102,947 | 823,575 | 2,058,938 | 20% | 411,788 | 2,470,725 |
| | Tables | | 1,060,553 | 96,414 | 771,311 | 1,928,278 | 20% | 385,656 | 2,313,933 |
| | Tailings & Services | | 1,557,669 | 141,606 | 1,132,850 | 2,832,125 | 20% | 566,425 | 3,398,550 |
| | Reagents | | 247,507 | 22,501 | 180,005 | 450,013 | 20% | 90,003 | 540,015 |
| | Wolfram Seperation | | 535,150 | 48,650 | 389,200 | 973,000 | 20% | 194,600 | 1,167,600 |
| | Conc Storage Dam | | 50,000 | 5,000 | 45,000 | 100,000 | 20% | 20,000 | 120,000 |
| **101 Treatment Plant-Total** | | | **13,878,658** | **1,262,151** | **10,102,206** | **25,243,015** | **20%** | **5,048,603** | **30,291,618** |
| 180 Plant Services | 183 Other Plant Services (Gases, Fuel) | | 15,000 | 3,000 | 12,000 | 30,000 | 20% | 6,000 | 36,000 |
| | 184 Fire Protection | | 9,000 | 1,000 | 5,000 | 15,000 | 20% | 3,000 | 18,000 |
| | 185 Plant Control System - PLC | | 85,000 | | 15,000 | 100,000 | 20% | 20,000 | 120,000 |
| | 186 Common Services & Piperacks | | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 187 CCTV System | | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 188 Instrument and Controls | | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| **180 Plant Services Total** | | | **109,000** | **4,000** | **32,000** | **145,000** | **20%** | **29,000** | **174,000** |
| **al** | | | **14,076,658** | **1,266,151** | **10,283,206** | **25,626,015** | **20%** | **5,172,803** | **30,798,818** |
| 201 Infrastructure-General | 202 Main Access Road | 1 Earthworks | | | 0 | 0 | 20% | 0 | 0 |
| | 203 Misc. Track | 1 Earthworks | | | 25,000 | 25,000 | 20% | 5,000 | 30,000 |
| | 204 Misc Bulk Earthworks | 1 Earthworks | | | 50,000 | 50,000 | 20% | 10,000 | 60,000 |
| | 205 Environmental Control Pond | 1 Earthworks | | | 100,000 | 100,000 | 20% | 20,000 | 120,000 |
| | 206 Misc Culverts & Drainage | 1 Earthworks | | | 15,000 | 15,000 | 20% | 3,000 | 18,000 |
| | 207 Security Fencing | 0 General | | | 30,000 | 30,000 | 20% | 6,000 | 36,000 |
| **201 Infrastructure-General Total** | | | **0** | **0** | **220,000** | **220,000** | **20%** | **44,000** | **264,000** |
| 210 Utilities | 211 HV Switchyard | 7 Elect & Instr | 125,000 | 5,000 | 45,000 | 175,000 | 30% | 52,500 | 227,500 |
| | 212 Powerlines | 7 Elect & Instr | 50,000 | 2,000 | 28,000 | 80,000 | 30% | 24,000 | 104,000 |
| | 213 Emergency Power | 7 Elect & Instr | 30,000 | 2,000 | 8,000 | 40,000 | 20% | 8,000 | 48,000 |
| | 214 Communications | 7 Elect & Instr | 15,000 | 2,000 | 13,000 | 30,000 | 20% | 6,000 | 36,000 |
| **210 Utilities Total** | | | **220,000** | **11,000** | **94,000** | **325,000** | **28%** | **90,500** | **415,500** |
| 230 Tailings Dam | 231 Tailings Dam Stage | 1 Earthworks | 250,000 | 0 | 250,000 | 500,000 | 40% | 200,000 | 700,000 |
| **230 Tailings Dam Total** | | | **250,000** | **0** | **250,000** | **500,000** | **40%** | **200,000** | **700,000** |
| 240 Plant Buildings | 241 Administration Office | 8 Arch/ Bldgs | 300,000 | 10,000 | 90,000 | 400,000 | 20% | 80,000 | 480,000 |
| | 242 Process Office | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 243 Workshop/Warehouse | 8 Arch/ Bldgs | 270,000 | 30,000 | 120,000 | 420,000 | 20% | 84,000 | 504,000 |
| | 244 Laboratory | 8 Arch/ Bldgs | 25,000 | 1,000 | 14,000 | 40,000 | 20% | 8,000 | 48,000 |
| | 245 Weighbridge station | 8 Arch/ Bldgs | 15,000 | 2,000 | 13,000 | 30,000 | 20% | 6,000 | 36,000 |
| | 246 Conc Storage Shed | 8 Arch/ Bldgs | 50,000 | 2,000 | 23,000 | 75,000 | 20% | 15,000 | 90,000 |
| | 247 Plant Site Ablutions | 8 Arch/ Bldgs | 25,000 | 5,000 | 10,000 | 40,000 | 20% | 8,000 | 48,000 |
| | 248 MCC's and Switchroom | 8 Arch/ Bldgs | 50,000 | 5,000 | 25,000 | 80,000 | 20% | 16,000 | 96,000 |
| | 249 Remote Pumphouse | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 249b Control room | 8 Arch/ Bldgs | 15,000 | 2,000 | 5,000 | 22,000 | 20% | 4,400 | 26,400 |
| **240 Plant Buildings Total** | | | **750,000** | **57,000** | **300,000** | **1,107,000** | **20%** | **221,400** | **1,328,400** |

**Capital Cost Estimate**
**Estimate Details**
**RoM Estimate Details 500 ktpa**

| Plant Area | Facility | PDisc. | Ex-Works Cost | Freight Cost | Install Cost | Total Cost (excl Cont) | % Cont | Cont | Grand Total |
|---|---|---|---|---|---|---|---|---|---|
| 250 Permanent Accommodation | 251 Sewerage Treatment Plant | 8 Arch/ Bldgs | 25,000 | 2,000 | 13,000 | 40,000 | 20% | 8,000 | 48,000 |
| | 252 Water Treatment Plant | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 253 Misc Facilities (Pool, Tennis Court, Oval, Club House) | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 254 Accommodation Units | 8 Arch/ Bldgs | 1,000,000 | 0 | 0 | 1,000,000 | 20% | 200,000 | 1,200,000 |
| | 254b Laundry | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 255 Kitchen/Diner | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 256 Toilets | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 257 Rec Room | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 258 Office | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 258b Stores | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 259 Services | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| **250 Permanent Accommodation Total** | | | **1,025,000** | **2,000** | **13,000** | **1,040,000** | **20%** | **208,000** | **1,248,000** |
| 260 Construction Accommodation | 261 Sewerage Treatment Plant | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 262 Water Treatment Plant | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 263 Misc Facilities (Pool, Multi Use Courts) | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 264 Accommodation Units | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 264b Laundry | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 265 Kitchen/Diner | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 266 Toilets | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 267 Rec Room | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 268 Office | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 259 Services | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| **250 Construction Accommodation Total** | | | **0** | **0** | **0** | **0** | **20%** | **0** | **0** |
| 260 Mobile Plant & General Equip/Furniture | 261 Mobile Plant | 5 Equipment | 380,000 | 20,000 | 0 | 400,000 | 20% | 80,000 | 480,000 |
| | 262 Maint. Tools and Equip. | 5 Equipment | 45,000 | 5,000 | 0 | 50,000 | 20% | 10,000 | 60,000 |
| | 263 Warehouse Shelving/Fitout | 8 Arch/ Bldgs | 15,000 | 2,000 | 4,000 | 21,000 | 20% | 4,200 | 25,200 |
| | 264 Office Equip. and Furniture | 8 Arch/ Bldgs | 25,000 | 3,000 | 7,000 | 35,000 | 20% | 7,000 | 42,000 |
| | 266 Laboratory Equipment | 5 Equipment | 30,000 | 5,000 | 5,000 | 40,000 | 20% | 8,000 | 48,000 |
| **260 Mobile Plant & General Equip/Furniture Total** | | | **495,000** | **35,000** | **16,000** | **546,000** | **20%** | **109,200** | **655,200** |
| 280 Overland Pipelines | 281 Water Supply | 6 Piping | 50,000 | 54,000 | 50,000 | 154,000 | 20% | 30,800 | 184,800 |
| | 282 Tailings Pipeline | 6 Piping | 50,000 | 5,000 | 50,000 | 105,000 | 20% | 21,000 | 126,000 |
| | 283 Decant Return Pipeline | 6 Piping | 48,000 | 2,000 | 25,000 | 75,000 | 20% | 15,000 | 90,000 |
| | 284 Dump Run-Off Collection | 6 Piping | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | 285 TSF Toe Drain/Run-Off Collection | 6 Piping | 5,000 | 0 | 5,000 | 10,000 | 20% | 2,000 | 12,000 |
| | 286 Pit Dewatering | 6 Piping | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| **270 Overland Pipelines Total** | | | **153,000** | **61,000** | **130,000** | **344,000** | **20%** | **68,800** | **412,800** |
| | | | **2,893,000** | **166,000** | **1,023,000** | **4,082,000** | **23%** | **941,900** | **5,023,900** |
| | | | **0** | **0** | **0** | **0** | | **0** | **0** |
| 410 EPCM | 411 EPCM - Home Office | 9 EPCM | 1,762,466 | 164,915 | 1,190,821 | 3,118,202 | 20% | 623,640 | 3,741,842 |
| | 412 EPCM - Site Construction | 9 EPCM | | 164,915 | 1,786,231 | 1,951,146 | 20% | 390,229 | 2,341,375 |
| | 414 EPCM - Commissioning | 9 EPCM | | 15,000 | 150,000 | 165,000 | 20% | 33,000 | 198,000 |
| | 415 EPCM - Expenses | 9 EPCM | 75,000 | | 75,000 | 150,000 | 20% | 30,000 | 180,000 |
| **410 EPCM Total** | | | **1,837,466** | **344,830** | **3,202,052** | **5,384,347** | **20%** | **1,076,869** | **6,461,217** |
| 420 Specialist Consultants | 425 Other Specialist Consultants | 0 General | 100,000 | | 50,000 | 150,000 | 20% | 30,000 | 180,000 |
| | xxx TSF Consultants | 0 General | 200,000 | | 50,000 | 250,000 | 20% | 50,000 | 300,000 |
| **420 Specialist Consultants Total** | | | **300,000** | **0** | **100,000** | **400,000** | **20%** | **80,000** | **480,000** |
| 430 Vendor Representatives | 431 Vendor Representatives - General | 0 General | 50,000 | | | 50,000 | 20% | 10,000 | 60,000 |
| **430 Vendor Representatives Total** | | | **50,000** | **0** | **0** | **50,000** | **20%** | **10,000** | **60,000** |
| **Total** | | | **2,187,466** | **344,830** | **3,302,052** | **5,834,347** | **20%** | **1,166,869** | **7,001,217** |
| 501 Owners Costs-General | 502 Owners Project Mng't Team | 0 General | 500,000 | | | 500,000 | 20% | 100,000 | 600,000 |
| | 503 Legal Services | 0 General | 25,000 | | | 25,000 | 20% | 5,000 | 30,000 |
| | 504 Computing Systems | 5 Equipment | 50,000 | 5,000 | | 55,000 | 20% | 11,000 | 66,000 |
| | 505 Construction Insurances | 0 General | 300,000 | | | 300,000 | 20% | 60,000 | 360,000 |
| | 506 Specialised Insurance Cover | 0 General | 0 | | | 0 | 20% | 0 | 0 |
| | 507 Specialist Consultants | 0 General | 250,000 | | | 250,000 | 20% | 50,000 | 300,000 |
| | 508 Recruiting | 0 General | 250,000 | | | 250,000 | 20% | 50,000 | 300,000 |
| **501 Owners Costs-General Total** | | | **1,375,000** | **5,000** | **0** | **1,380,000** | **20%** | **276,000** | **1,656,000** |
| 530 Spare Parts | 531 Commissioning & Consumables Spares | 0 General | 50,000 | | | 50,000 | 20% | 10,000 | 60,000 |
| | 532 Consumable Spares | 0 General | 150,000 | 15,000 | | 165,000 | 20% | 33,000 | 198,000 |
| | 533 Insurance Spares | 0 General | 265,000 | 20,000 | | 285,000 | 20% | 57,000 | 342,000 |
| **530 Spare Parts Total** | | | **465,000** | **35,000** | **0** | **500,000** | **20%** | **100,000** | **600,000** |
| 540 Fees/Taxes/Duties | 541 Fees/Taxes/Duties | 0 General | 0 | | | 0 | 20% | 0 | 0 |
| **540 Fees/Taxes/Duties Total** | | | **0** | **0** | **0** | **0** | | **0** | **0** |
| 590 Other Owners Costs | 591 Community Relations | 0 General | 0 | | 0 | 0 | 20% | 0 | 0 |
| **590 Other Owners Costs Total** | | | **0** | **0** | **0** | **0** | | **0** | **0** |
| 510 Pre-production | 511 Plant Pre-production Labour | 0 General | | | 250,000 | 250,000 | 20% | 50,000 | 300,000 |
| | 512 Plant Pre-production Expenses | 5 Equipment | | | 25,000 | 25,000 | 20% | 5,000 | 30,000 |
| | 515 Opening Stocks | 0 General | 0 | 0 | | 0 | 20% | 0 | 0 |
| | 516 First Fill Reagents & Consumables | 0 General | 95,000 | 5,000 | | 100,000 | 20% | 20,000 | 120,000 |
| | 519 Training | 0 General | | | 250,000 | 250,000 | 20% | 50,000 | 300,000 |
| **510 Pre-production Total** | | | **95,000** | **5,000** | **525,000** | **625,000** | | **125,000** | **750,000** |
| | | | **1,935,000** | **45,000** | **525,000** | **2,505,000** | **20%** | **501,000** | **3,006,000** |
| 601 Working Capital-General | 602 Plant | 0 General | | | | 0 | | | 0 |
| **601 Working Capital-General Total** | | | **0** | **0** | **0** | **0** | | **0** | **0** |
| **l** | | | **0** | **0** | **0** | **0** | | **0** | **0** |
| | | | **21,747,124** | **2,038,981** | **15,735,258** | **39,521,362** | **20%** | **8,077,372** | **47,598,735** |

# Capital Cost Estimate
# Summary 1000 ktpa

**ANCHOR TIN PROJECT CONCEPTUAL STUDY**
**CAPITAL COST ESTIMATE**
**ACCURACY +50%, -20%, 1Q2007**
**CURRENCY AUSTRALIAN DOLLARS**

| | 1 000 000 TPA | | |
|---|---|---|---|
| **Area Description** | **Total Cost (excluding Contingency)** | **Contingency** | **Total Cost** |
| 001 Site Estab.-General Total | 990,000 | 198,000 | 1,188,000 |
| 010 Site Constr. Facilities Total | 190,000 | 38,000 | 228,000 |
| 020 Constr. Equip. & Operations Total | 723,608 | 144,722 | 868,329 |
| **000 Site Estab. & Constr. Total** | **1,903,608** | **380,722** | **2,284,329** |
| 101 Treatment Plant-General Total | 238,000 | 95,200 | 333,200 |
| 101 Treatment Plant-Total | 36,377,801 | 7,275,560 | 43,653,361 |
| 180 Plant Services Total | 145,000 | 29,000 | 174,000 |
| **100 Treatment Plant Total** | **36,760,801** | **7,399,760** | **44,160,561** |
| 201 Infrastructure-General Total | 220,000 | 44,000 | 264,000 |
| 210 Utilities Total | 452,500 | 126,250 | 578,750 |
| 230 Tailings Dam Total | 757,858 | 303,143 | 1,061,002 |
| 240 Plant Buildings Total | 1,207,565 | 241,513 | 1,449,078 |
| 251 Site Sewage Plant and Management Housing | 1,040,000 | 208,000 | 1,248,000 |
| 250 Other Permanent Accommodation | N/A | | |
| 260 Construction Accommodation Total | Not required | | |
| 270 Mobile Plant & General Equip/Furniture Total | 566,629 | 113,326 | 679,954 |
| 280 Overland Pipelines Total | 477,571 | 95,514 | 573,085 |
| **200 Infrastructure Total** | **4,722,122** | **1,131,746** | **5,853,868** |
| **300 Mining Total** | **Excluded** | **Excluded** | **Excluded** |
| 410 EPCM Total | 7,564,361 | 1,512,872 | 9,077,233 |
| 420 Specialist Consultants Total | 400,000 | 80,000 | 480,000 |
| 430 Vendor Representatives Total | 50,000 | 10,000 | 60,000 |
| **400 Management Costs Total** | **8,014,361** | **1,602,872** | **9,617,233** |
| 501 Owners Costs-General Total | 1,534,715 | 306,943 | 1,841,658 |
| 530 Spare Parts Total | 757,858 | 151,572 | 909,430 |
| 540 Fees/Taxes/Duties Total | Excluded | Excluded | Excluded |
| 590 Other Owners Costs Total | Excluded | Excluded | Excluded |
| 510 Pre-production Total | 676,572 | 135,314 | 811,886 |
| **500 Owners Costs Total** | **2,969,145** | **593,829** | **3,562,974** |
| **600 Working Capital Total** | **Excluded** | **Excluded** | **Excluded** |
| **Grand Total** | **54,370,037** | **11,108,929** | **65,478,966** |

**Capital Cost Estimate**
**Equipment by Area**
**1,000 ktpa**

**ANCHOR TIN PROJECT CONCEPTUAL STUDY**
**CAPITAL COST ESTIMATE**
**ACCURACY +50%, -20%, 1Q2007**
**CURRENCY AUSTRALIAN DOLLARS**

| | | | Percentage | 40 | 13 | 8 | 7 | 13 | 19 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Area** | **Ex Works** | **Freight** | **Install** | **Equip** | **Concrete** | **Steelwork** | **Platework** | **Piping** | **E&I** | **Total** |
| Crushing | 2,273,575 | 204,622 | 682,072 | 3,160,269 | 1,027,087 | 632,054 | 553,047 | 1,027,087 | 1,501,128 | 7,900,673 |
| Milling | 3,243,730 | 291,936 | 973,119 | 4,508,785 | 1,465,355 | 901,757 | 789,037 | 1,465,355 | 2,141,673 | 11,271,963 |
| Suplhide Flotation | 968,000 | 87,120 | 290,400 | 1,345,520 | 437,294 | 269,104 | 235,466 | 437,294 | 639,122 | 3,363,800 |
| Spirals | 1,089,984 | 98,099 | 326,995 | 1,515,078 | 492,400 | 303,016 | 265,139 | 492,400 | 719,662 | 3,787,694 |
| Tables | 1,025,500 | 92,295 | 307,650 | 1,425,445 | 463,270 | 285,089 | 249,453 | 463,270 | 677,086 | 3,563,613 |
| Tailings & Services | 1,368,758 | 123,188 | 410,627 | 1,902,574 | 618,336 | 380,515 | 332,950 | 618,336 | 903,722 | 4,756,434 |
| Reagents | 172,000 | 15,480 | 51,600 | 239,080 | 77,701 | 47,816 | 41,839 | 77,701 | 113,563 | 597,700 |
| Wolfram Seperation | 283,000 | 25,470 | 84,900 | 393,370 | 127,845 | 78,674 | 68,840 | 127,845 | 186,851 | 983,425 |
| **Grand Total** | **10,424,547** | **938,209** | **3,127,364** | **14,490,120** | **4,709,289** | **2,898,024** | **2,535,771** | **4,709,289** | **6,882,807** | **36,225,301** |

**Capital Cost Estimate**
**Estimate Details**
**1,000 ktpa**

| Main Area | Plant Area | Facility | PDisc. | Ex-Works Cost | Freight Cost | Install Cost | Total Cost (excl Cont) | % Cont | Cont | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 000 Site Estab. & Constr. | 001 Site Estab.-General | 002 Mob/Demob contractors labour | 0 General | 300,000 | 15,000 | | 315,000 | 20% | 63,000 | 378,000 |
| | | 003 Mob/Demob constr. plant & equip. | 0 General | 400,000 | 65,000 | | 465,000 | 20% | 93,000 | 558,000 |
| | | 004 Site Surveying | 0 General | 20,000 | 5,000 | | 25,000 | 20% | 5,000 | 30,000 |
| | | 005 General Freight & Transport | 0 General | | 150,000 | | 150,000 | 20% | 30,000 | 180,000 |
| | | 007 Testing and Inspection | 0 General | | | 25,000 | 25,000 | 20% | 5,000 | 30,000 |
| | | 008 Barricades/Safety Signs | 0 General | 5,000 | 1,000 | 4,000 | 10,000 | 20% | 2,000 | 12,000 |
| | **001 Site Estab.-General Total** | | | **725,000** | **236,000** | **29,000** | **990,000** | **20%** | **198,000** | **1,188,000** |
| | 010 Site Constr. Facilities | 012 Construction Roads & Drainage | 1 Earthworks | 15,000 | | 15,000 | 30,000 | 20% | 6,000 | 36,000 |
| | | 013 Laydown Areas (hardstand) | 1 Earthworks | 15,000 | | 15,000 | 30,000 | 20% | 6,000 | 36,000 |
| | | 014 Construction Buildings/Facilities | 0 General | 5,000 | | 5,000 | 10,000 | 20% | 2,000 | 12,000 |
| | | | 8 Arch/ Bldgs | 25,000 | | 25,000 | 50,000 | 20% | 10,000 | 60,000 |
| | | 015 Construction Site Services | 0 General | 15,000 | | 15,000 | 30,000 | 20% | 6,000 | 36,000 |
| | | 018 Constr Security Fencing | 0 General | 5,000 | | 5,000 | 10,000 | 20% | 2,000 | 12,000 |
| | | 019 Weather Protection | 0 General | 20,000 | | 10,000 | 30,000 | 20% | 6,000 | 36,000 |
| | **010 Site Constr. Facilities Total** | | | **100,000** | **0** | **90,000** | **190,000** | **20%** | **38,000** | **228,000** |
| | 020 Constr. Equip. & Operations | 023 Heavy lift cranage | 0 General | | 20,000 | 80,000 | 100,000 | 20% | 20,000 | 120,000 |
| | | 024 Misc. Equipment hire | 0 General | | 3,000 | 25,000 | 28,000 | 20% | 5,600 | 33,600 |
| | | 025 Handling & access equipment | 0 General | | 3,000 | 15,000 | 18,000 | 20% | 3,600 | 21,600 |
| | | 026 Security during construction | 0 General | | | 10,000 | 10,000 | 20% | 2,000 | 12,000 |
| | | 027 Fuel & consumables | 0 General | | | 25,000 | 25,000 | 20% | 5,000 | 30,000 |
| | | 028 Medical & First Aid | 0 General | 5,000 | 1,000 | 4,000 | 10,000 | 20% | 2,000 | 12,000 |
| | | 029 Construction Services | 0 General | 25,000 | 1,000 | 14,000 | 40,000 | 20% | 8,000 | 48,000 |
| | | xxx Accommodation and meals | 0 General | | | 492,608 | 492,608 | 20% | 98,522 | 591,129 |
| | **020 Constr. Equip. & Operations Total** | | | **30,000** | **28,000** | **665,608** | **723,608** | **20%** | **144,722** | **868,329** |
| **000 Site Estab. & Constr. Total** | | | | **855,000** | **264,000** | **784,608** | **1,903,608** | **20%** | **380,722** | **2,284,329** |
| 100 Treatment Plant | 101 Treatment Plant-General | 102 Bulk site earthworks | 1 Earthworks | 20,000 | | 20,000 | 40,000 | 40% | 16,000 | 56,000 |
| | | 103 Detailed site earthworks | 1 Earthworks | 20,000 | | 20,000 | 40,000 | 40% | 16,000 | 56,000 |
| | | 104 Site drainage & culverts | 1 Earthworks | 20,000 | | 20,000 | 40,000 | 40% | 16,000 | 56,000 |
| | | 105 Inplant Tracks | 1 Earthworks | 20,000 | | 80,000 | 100,000 | 40% | 40,000 | 140,000 |
| | | 107 Site Security Fencing | 0 General | 0 | | 0 | 0 | 40% | 0 | 0 |
| | | 108 Packers/shims/bolts | 5 Equipment | 4,000 | | 4,000 | 8,000 | 40% | 3,200 | 11,200 |
| | | 109 Non Shrink Grout | 5 Equipment | 5,000 | | 5,000 | 10,000 | 40% | 4,000 | 14,000 |
| | **101 Treatment Plant-General Total** | | | **89,000** | **0** | **149,000** | **238,000** | **40%** | **95,200** | **333,200** |
| | 100 Treatment Plant | Crushing | | 4,345,370 | 395,034 | 3,160,269 | 7,900,673 | 20% | 1,580,135 | 9,480,807 |
| | | Milling | | 6,199,579 | 563,598 | 4,508,785 | 11,271,963 | 20% | 2,254,393 | 13,526,355 |
| | | Suplhide Flotation | | 1,850,090 | 168,190 | 1,345,520 | 3,363,800 | 20% | 672,760 | 4,036,560 |
| | | Spirals | | 2,083,232 | 189,385 | 1,515,078 | 3,787,694 | 20% | 757,539 | 4,545,233 |
| | | Tables | | 1,959,987 | 178,181 | 1,425,445 | 3,563,613 | 20% | 712,723 | 4,276,335 |
| | | Tailings & Services | | 2,616,039 | 237,822 | 1,902,574 | 4,756,434 | 20% | 951,287 | 5,707,721 |
| | | Reagents | | 328,735 | 29,885 | 239,080 | 597,700 | 20% | 119,540 | 717,240 |
| | | Wolfram Seperation | | 540,884 | 49,171 | 393,370 | 983,425 | 20% | 196,685 | 1,180,110 |
| | | Conc Storage Dam | | 75,000 | 7,500 | 70,000 | 152,500 | 20% | 30,500 | 183,000 |
| | **101 Treatment Plant-Total** | | | **19,998,916** | **1,818,765** | **14,560,120** | **36,377,801** | **20%** | **7,275,560** | **43,653,361** |
| | 180 Plant Services | 183 Other Plant Services (Gases, Fuel) | | 15,000 | 3,000 | 12,000 | 30,000 | 20% | 6,000 | 36,000 |
| | | 184 Fire Protection | | 9,000 | 1,000 | 5,000 | 15,000 | 20% | 3,000 | 18,000 |
| | | 185 Plant Control System - PLC | | 85,000 | | 15,000 | 100,000 | 20% | 20,000 | 120,000 |
| | | 186 Common Services & Piperacks | | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 187 CCTV System | | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 188 Instrument and Controls | | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | **180 Plant Services Total** | | | **109,000** | **4,000** | **32,000** | **145,000** | **20%** | **29,000** | **174,000** |
| **100 Treatment Plant Total** | | | | **20,196,916** | **1,822,765** | **14,741,120** | **36,760,801** | **20%** | **7,399,760** | **44,160,561** |
| 200 Infrastructure | 201 Infrastructure-General | 202 Main Access Road | 1 Earthworks | | | 0 | 0 | 20% | 0 | 0 |
| | | 203 Misc. Track | 1 Earthworks | | | 25,000 | 25,000 | 20% | 5,000 | 30,000 |
| | | 204 Misc Bulk Earthworks | 1 Earthworks | | | 50,000 | 50,000 | 20% | 10,000 | 60,000 |
| | | 205 Environmental Control Pond | 1 Earthworks | | | 100,000 | 100,000 | 20% | 20,000 | 120,000 |
| | | 206 Misc Culverts & Drainage | 1 Earthworks | | | 15,000 | 15,000 | 20% | 3,000 | 18,000 |
| | | 207 Security Fencing | 0 General | | | 30,000 | 30,000 | 20% | 6,000 | 36,000 |
| | **201 Infrastructure-General Total** | | | **0** | **0** | **220,000** | **220,000** | **20%** | **44,000** | **264,000** |
| | 210 Utilities | 211 HV Switchyard | 7 Elect & Instr | 200,000 | 7,500 | 70,000 | 277,500 | 30% | 83,250 | 360,750 |
| | | 212 Powerlines | 7 Elect & Instr | 50,000 | 2,000 | 28,000 | 80,000 | 30% | 24,000 | 104,000 |
| | | 213 Emergency Power | 7 Elect & Instr | 50,000 | 3,000 | 12,000 | 65,000 | 20% | 13,000 | 78,000 |
| | | 214 Communications | 7 Elect & Instr | 15,000 | 2,000 | 13,000 | 30,000 | 20% | 6,000 | 36,000 |
| | **210 Utilities Total** | | | **315,000** | **14,500** | **123,000** | **452,500** | **28%** | **126,250** | **578,750** |
| | 230 Tailings Dam | 231 Tailings Dam Stage | 1 Earthworks | 378,929 | 0 | 378,929 | 757,858 | 40% | 303,143 | 1,061,002 |
| | **230 Tailings Dam Total** | | | **378,929** | **0** | **378,929** | **757,858** | **40%** | **303,143** | **1,061,002** |
| | 240 Plant Buildings | 241 Administration Office | 8 Arch/ Bldgs | 300,000 | 10,000 | 90,000 | 400,000 | 20% | 80,000 | 480,000 |
| | | 242 Process Office | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 243 Workshop/Warehouse | 8 Arch/ Bldgs | 270,000 | 30,000 | 120,000 | 420,000 | 20% | 84,000 | 504,000 |
| | | 244 Laboratory | 8 Arch/ Bldgs | 37,893 | 1,516 | 21,220 | 60,629 | 20% | 12,126 | 72,754 |
| | | 245 Weighbridge station | 8 Arch/ Bldgs | 15,000 | 2,000 | 13,000 | 30,000 | 20% | 6,000 | 36,000 |
| | | 246 Conc Storage Shed | 8 Arch/ Bldgs | 75,786 | 3,031 | 34,861 | 113,679 | 20% | 22,736 | 136,414 |
| | | 247 Plant Site Ablutions | 8 Arch/ Bldgs | 25,000 | 5,000 | 10,000 | 40,000 | 20% | 8,000 | 48,000 |
| | | 248 MCC's and Switchroom | 8 Arch/ Bldgs | 75,786 | 7,579 | 37,893 | 121,257 | 20% | 24,251 | 145,509 |
| | | 249 Remote Pumphouse | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 249b Control room | 8 Arch/ Bldgs | 15,000 | 2,000 | 5,000 | 22,000 | 20% | 4,400 | 26,400 |
| | **240 Plant Buildings Total** | | | **814,465** | **61,126** | **331,974** | **1,207,565** | **20%** | **241,513** | **1,449,078** |
| | 250 Permanent Accommodation | 251 Sewerage Treatment Plant | 8 Arch/ Bldgs | 25,000 | 2,000 | 13,000 | 40,000 | 20% | 8,000 | 48,000 |
| | | 252 Water Treatment Plant | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |

**Capital Cost Estimate**
**Estimate Details**
**1,000 ktpa**

| Main Area | Plant Area | Facility | PDisc. | Ex-Works Cost | Freight Cost | Install Cost | Total Cost (excl Cont) | % Cont | Cont | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 253 Misc Facilities (Pool, Tennis Court, Oval, Club House) | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 254 Accommodation Units | 8 Arch/ Bldgs | 1,000,000 | 0 | 0 | 1,000,000 | 20% | 200,000 | 1,200,000 |
| | | 254b Laundry | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 255 Kitchen/Diner | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 256 Toilets | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 257 Rec Room | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 258 Office | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 258b Stores | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 259 Services | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | **250 Permanent Accommodation Total** | | | **1,025,000** | **2,000** | **13,000** | **1,040,000** | **20%** | **208,000** | **1,248,000** |
| | 260 Construction Accommodation | 261 Sewerage Treatment Plant | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 262 Water Treatment Plant | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 263 Misc Facilities (Pool, Multi Use Courts) | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 264 Accommodation Units | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 264b Laundry | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 265 Kitchen/Diner | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 266 Toilets | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 267 Rec Room | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 268 Office | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 259 Services | 8 Arch/ Bldgs | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | **250 Construction Accommodation Total** | | | **0** | **0** | **0** | **0** | **20%** | **0** | **0** |
| | 260 Mobile Plant & General Equip/Furniture | 261 Mobile Plant | 5 Equipment | 380,000 | 20,000 | 0 | 400,000 | 20% | 80,000 | 480,000 |
| | | 262 Maint. Tools and Equip. | 5 Equipment | 45,000 | 5,000 | 0 | 50,000 | 20% | 10,000 | 60,000 |
| | | 263 Warehouse Shelving/Fitout | 8 Arch/ Bldgs | 15,000 | 2,000 | 4,000 | 21,000 | 20% | 4,200 | 25,200 |
| | | 264 Office Equip. and Furniture | 8 Arch/ Bldgs | 25,000 | 3,000 | 7,000 | 35,000 | 20% | 7,000 | 42,000 |
| | | 266 Laboratory Equipment | 5 Equipment | 45,471 | 7,579 | 7,579 | 60,629 | 20% | 12,126 | 72,754 |
| | **260 Mobile Plant & General Equip/Furniture Total** | | | **510,471** | **37,579** | **18,579** | **566,629** | **20%** | **113,326** | **679,954** |
| | 280 Overland Pipelines | 281 Water Supply | 6 Piping | 75,786 | 81,849 | 75,786 | 233,420 | 20% | 46,684 | 280,104 |
| | | 282 Tailings Pipeline | 6 Piping | 75,786 | 7,579 | 75,786 | 159,150 | 20% | 31,830 | 190,980 |
| | | 283 Decant Return Pipeline | 6 Piping | 48,000 | 2,000 | 25,000 | 75,000 | 20% | 15,000 | 90,000 |
| | | 284 Dump Run-Off Collection | 6 Piping | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | | 285 TSF Toe Drain/Run-Off Collection | 6 Piping | 5,000 | 0 | 5,000 | 10,000 | 20% | 2,000 | 12,000 |
| | | 286 Pit Dewatering | 6 Piping | 0 | 0 | 0 | 0 | 20% | 0 | 0 |
| | **270 Overland Pipelines Total** | | | **204,572** | **91,427** | **181,572** | **477,571** | **20%** | **95,514** | **573,085** |
| **200 Infrastructure Total** | | | | **3,248,437** | **206,632** | **1,267,054** | **4,722,122** | **24%** | **1,131,746** | **5,853,868** |
| **300 Mining Total** | | | | **0** | **0** | **0** | **0** | | **0** | **0** |
| 400 Management Costs | 410 EPCM | 411 EPCM - Home Office | 9 EPCM | 2,430,035 | 229,340 | 1,679,278 | 4,338,653 | 20% | 867,731 | 5,206,384 |
| | | 412 EPCM - Site Construction | 9 EPCM | | 229,340 | 2,518,917 | 2,748,257 | 20% | 549,651 | 3,297,908 |
| | | 414 EPCM - Commissioning | 9 EPCM | | 22,736 | 227,357 | 250,093 | 20% | 50,019 | 300,112 |
| | | 415 EPCM - Expenses | 9 EPCM | 113,679 | | 113,679 | 227,357 | 20% | 45,471 | 272,829 |
| | **410 EPCM Total** | | | **2,543,714** | **481,415** | **4,539,232** | **7,564,361** | **20%** | **1,512,872** | **9,077,233** |
| | 420 Specialist Consultants | 425 Other Specialist Consultants | 0 General | 100,000 | | 50,000 | 150,000 | 20% | 30,000 | 180,000 |
| | | xxx TSF Consultants | 0 General | 200,000 | | 50,000 | 250,000 | 20% | 50,000 | 300,000 |
| | **420 Specialist Consultants Total** | | | **300,000** | **0** | **100,000** | **400,000** | **20%** | **80,000** | **480,000** |
| | 430 Vendor Representatives | 431 Vendor Representatives - General | 0 General | 50,000 | | | 50,000 | 20% | 10,000 | 60,000 |
| | **430 Vendor Representatives Total** | | | **50,000** | **0** | **0** | **50,000** | **20%** | **10,000** | **60,000** |
| **400 Management Costs Total** | | | | **2,893,714** | **481,415** | **4,639,232** | **8,014,361** | **20%** | **1,602,872** | **9,617,233** |
| 500 Owners Costs | 501 Owners Costs-General | 502 Owners Project Mng't Team | 0 General | 500,000 | | | 500,000 | 20% | 100,000 | 600,000 |
| | | 503 Legal Services | 0 General | 25,000 | | | 25,000 | 20% | 5,000 | 30,000 |
| | | 504 Computing Systems | 5 Equipment | 50,000 | 5,000 | | 55,000 | 20% | 11,000 | 66,000 |
| | | 505 Construction Insurances | 0 General | 454,715 | | | 454,715 | 20% | 90,943 | 545,658 |
| | | 506 Specialised Insurance Cover | 0 General | 0 | | | 0 | 20% | 0 | 0 |
| | | 507 Specialist Consultants | 0 General | 250,000 | | | 250,000 | 20% | 50,000 | 300,000 |
| | | 508 Recruiting | 0 General | 250,000 | | | 250,000 | 20% | 50,000 | 300,000 |
| | **501 Owners Costs-General Total** | | | **1,529,715** | **5,000** | **0** | **1,534,715** | **20%** | **306,943** | **1,841,658** |
| | 530 Spare Parts | 531 Commissioning & Consumables Spares | 0 General | 75,786 | | | 75,786 | 20% | 15,157 | 90,943 |
| | | 532 Consumable Spares | 0 General | 227,357 | 22,736 | | 250,093 | 20% | 50,019 | 300,112 |
| | | 533 Insurance Spares | 0 General | 401,665 | 30,314 | | 431,979 | 20% | 86,396 | 518,375 |
| | **530 Spare Parts Total** | | | **704,808** | **53,050** | **0** | **757,858** | **20%** | **151,572** | **909,430** |
| | 540 Fees/Taxes/Duties | 541 Fees/Taxes/Duties | 0 General | 0 | | | 0 | 20% | 0 | 0 |
| | **540 Fees/Taxes/Duties Total** | | | **0** | **0** | **0** | **0** | | **0** | **0** |
| | 590 Other Owners Costs | 591 Community Relations | 0 General | 0 | | 0 | 0 | 20% | 0 | 0 |
| | **590 Other Owners Costs Total** | | | **0** | **0** | **0** | **0** | | **0** | **0** |
| | 510 Pre-production | 511 Plant Pre-production Labour | 0 General | | | 250,000 | 250,000 | 20% | 50,000 | 300,000 |
| | | 512 Plant Pre-production Expenses | 5 Equipment | | | 25,000 | 25,000 | 20% | 5,000 | 30,000 |
| | | 515 Opening Stocks | 0 General | 0 | 0 | | 0 | 20% | 0 | 0 |
| | | 516 First Fill Reagents & Consumables | 0 General | 143,993 | 7,579 | | 151,572 | 20% | 30,314 | 181,886 |
| | | 519 Training | 0 General | | | 250,000 | 250,000 | 20% | 50,000 | 300,000 |
| | **510 Pre-production Total** | | | **143,993** | **7,579** | **525,000** | **676,572** | | **135,314** | **811,886** |
| **500 Owners Costs Total** | | | | **2,378,516** | **65,629** | **525,000** | **2,969,145** | **20%** | **593,829** | **3,562,974** |
| 600 Working Capital | 601 Working Capital-General | 602 Plant | 0 General | | | | 0 | | | 0 |
| | **601 Working Capital-General Total** | | | **0** | **0** | **0** | **0** | | **0** | **0** |
| **600 Working Capital Total** | | | | **0** | **0** | **0** | **0** | | **0** | **0** |
| **Grand Total** | | | | **29,572,583** | **2,840,440** | **21,957,014** | **54,370,037** | **20%** | **11,108,929** | **65,478,966** |

# APPENDIX 5

# OPERATING COST ESTIMATE DETAIL

**Operating Cost Estimate**
**Summary**
**500 ktpa**

**MINEMAKERS LIMITED**
**ANCHOR TIN PROJECT**
**OPERATING COST ESTIMATE**
**ACCURACY -20/+50%, 3Q07**
**JOB NO: 1406**

**SUMMARY**

| | | |
|---|---|---|
| Annual throughput | **500,000** | tpa |
| Ore Processing Rate | **63** | tph |
| Plant Availability | **91.3%** | |
| Operating Hours | **8000** | h/annum |

| **SUMMARY** | **Annual Cost A$000** | **A$/t ore** |
|---|---|---|
| Labour | 5,570,500 | **11.14** |
| Consumables | 1,308,750 | **2.62** |
| Power | 1,530,928 | **3.06** |
| Maintenance | 857,143 | **1.71** |
| General and Administration | 847,125 | **1.69** |
| Tailings Disposal | 500,000 | **1.00** |
| **TOTAL** | **10,614,446** | **21.23** |

**Operating Cost Estimate**
**Labour Costs**
**500 ktpa**

## Summary of Labour Costs

| | Number of Employees | Classification | Roster | Base Annual Salary/Wage AUD$ | Overhead Costs % | Overhead Costs AUD$ | Annual Labour Costs AUD$ | Annual Salary/Wage Total AUD$ | Overhead Costs Total AUD$ | Annual Labour Costs Total AUD$ |
|---|---|---|---|---|---|---|---|---|---|---|
| **Process Department** | | | | | | | | | | |
| Plant Superintendent | **1** | **M** | **4** | $150,000 | 30% | $45,000 | $195,000 | $150,000 | $45,000 | $195,000 |
| Plant Metallurgist | **1** | **SD** | **6** | $95,000 | 30% | $28,500 | $123,500 | $95,000 | $28,500 | $123,500 |
| Mill Supervisor | **1** | **SD** | **6** | $95,000 | 30% | $28,500 | $123,500 | $95,000 | $28,500 | $123,500 |
| Shift Foreman | **3** | **SS** | **5** | $90,000 | 30% | $27,000 | $117,000 | $270,000 | $81,000 | $351,000 |
| Crushing Operators | **4** | **SS** | **5** | $90,000 | 30% | $27,000 | $117,000 | $360,000 | $108,000 | $468,000 |
| Milling/Flotation Operators | **4** | **SS** | **5** | $90,000 | 30% | $27,000 | $117,000 | $360,000 | $108,000 | $468,000 |
| Gravity Operators | **4** | **SS** | **5** | $90,000 | 30% | $27,000 | $117,000 | $360,000 | $108,000 | $468,000 |
| Tails/Water Operators | **2** | **SD** | **4** | $80,000 | 30% | $24,000 | $104,000 | $160,000 | $48,000 | $208,000 |
| Relief/Conc Handling | **4** | **SD** | **4** | $80,000 | 30% | $24,000 | $104,000 | $320,000 | $96,000 | $416,000 |
| Lab supervisor | **1** | **SD** | **4** | $80,000 | 30% | $24,000 | $104,000 | $80,000 | $24,000 | $104,000 |
| Lab Technicians | **2** | **SD** | **2** | $65,000 | 30% | $19,500 | $84,500 | $130,000 | $39,000 | $169,000 |
| Maintenance Supervisor | **1** | **M** | **3** | $120,000 | 30% | $36,000 | $156,000 | $120,000 | $36,000 | $156,000 |
| MaintenancePlanner | **1** | **SD** | **7** | $100,000 | 30% | $30,000 | $130,000 | $100,000 | $30,000 | $130,000 |
| Maintenance L/Hand | **1** | **SD** | **7** | $100,000 | 30% | $30,000 | $130,000 | $100,000 | $30,000 | $130,000 |
| Boilermakers | **2** | **SD** | **5** | $90,000 | 30% | $27,000 | $117,000 | $180,000 | $54,000 | $234,000 |
| Fitters | **6** | **SD** | **5** | $90,000 | 30% | $27,000 | $117,000 | $540,000 | $162,000 | $702,000 |
| Electricians | **2** | **SD** | **5** | $90,000 | 30% | $27,000 | $117,000 | $180,000 | $54,000 | $234,000 |
| | **40** | | | $1,595,000 | | $478,500 | $2,073,500 | $3,600,000 | $1,080,000 | $4,680,000 |
| **Administration** | | | | | | | | | | |
| Site Manager | **1** | **M** | **5** | $180,000 | 30% | $54,000 | $234,000 | $180,000 | $54,000 | $234,000 |
| Accountant | **1** | **SD** | **4** | $80,000 | 30% | $24,000 | $104,000 | $80,000 | $24,000 | $104,000 |
| HR Officer | **1** | **SD** | **2** | $65,000 | 30% | $19,500 | $84,500 | $65,000 | $19,500 | $84,500 |
| HSE Nurse | **1** | **SD** | **2** | $65,000 | 30% | $19,500 | $84,500 | $65,000 | $19,500 | $84,500 |
| Safety Officer | **1** | **SD** | **2** | $65,000 | 30% | $19,500 | $84,500 | $65,000 | $19,500 | $84,500 |
| Logistics/Environmental Officer | **1** | **SD** | **2** | $65,000 | 30% | $19,500 | $84,500 | $65,000 | $19,500 | $84,500 |
| Warehouse | **2** | **SD** | **1** | $55,000 | 30% | $16,500 | $71,500 | $110,000 | $33,000 | $143,000 |
| Reception/Payroll | **1** | **SD** | **1** | $55,000 | 30% | $16,500 | $71,500 | $55,000 | $16,500 | $71,500 |
| | **8** | | | $630,000 | | $189,000 | $819,000 | $685,000 | $205,500 | $890,500 |
| **Total (excl Mining)** | **48** | | | **$2,225,000** | | **$667,500** | **$2,892,500** | **$4,285,000** | **$1,285,500** | **$5,570,500** |

**Operating Cost Estimate**
**Consumables**
**500 ktpa**

**CONSUMABLES**

| Consumable | Cost A$ / unit | Consumption | Consumption | A$/annum | A$/t |
|---|---|---|---|---|---|
| Crusher liners | | | | 150,000 | 0.30 |
| Mill liners | 1500 /t | 0.14 kg/t | 0.009 tph | 105,000 | 0.21 |
| Grinding Media | 1350 /t | 1.2 kg/t | 0.075 tph | 810,000 | 1.62 |
| Sodium Ethyl Xanthate | 2000 /t | 120 g/t | 7.500 kgph | 120,000 | 0.24 |
| Copper Sulphate | 2700 /t | 50 g/t | 3.125 kgph | 67,500 | 0.14 |
| Frother | 4000 /t | 15 g/t | 0.938 kgph | 30,000 | 0.06 |
| Flocculant | 3500 /t | 15 g/t | 0.938 kgph | 26,250 | 0.05 |
| **Total Cost per annum** | | | | 1,308,750 | |
| **Total Cost per tonne processed** | | | | | **2.62** |

**Operating Cost Estimate**
**Power**
**500 ktpa**

**POWER**

| | | |
|---|---|---|
| Power Cost | 0.1000 | $/kWh |
| Drawn Power | 1914 | kW |
| Power used | 15,309,280 | kWh/year |
| | 30.6 | kWh/t |
| **Annual Cost** | **$1,530,928** | **/year** |
| **Cost per tonne processed** | **$3.06** | **/t ore** |

**Operating Cost Estimate**
**Maintenance**
**500 ktpa**

**MAINTENANCE**

| | | |
|---|---|---|
| Cost of Equipment | A$ | 6,000,000 |
| Estimated installed cost (at 35% for eqt) | A$ | 17,142,857 |
| Maintenance factor | 5% | |
| Maintenance Cost per annum | A$ | 857,143 |
| **Total Cost per tonne processed** | **A$/t** | **1.71** |

**Operating Cost Estimate**
**General and Administration**
**500 ktpa**

**GENERAL AND ADMINISTRATION**

| Item | A$/year |
|---|---|
| G& A Allowance | 847,125 |
| **TOTAL** | **847,125** |

**G&A Allowance**

| Item | A$/year |
|---|---|
| Telecommunications | 20,000 |
| Insurances | 210,000 |
| Stationery | 10,000 |
| Office Cleaning | 36,000 |
| Postage, Courier and Light Freight | 15,000 |
| Computer Supplies and Support | 10,000 |
| First Aid Costs | 5,000 |
| Entertainment | 3,000 |
| Metallurgical Testing - External Met labs | 70,000 |
| Environmental Testing | 70,000 |
| Consultants and Vendors | 50,000 |
| Banking Fees | 6,000 |
| Safety, Clothing | 25,000 |
| Training budget | 10,000 |
| Travel & Accommodation | 40,000 |
| Recruiting/Relocation | 50,000 |
| Licenses | 10,000 |
| Rent assistance | 25,000 |
| Assaying - external laboratory | 82,125 |
| Miscellaneous | 100,000 |
| **TOTAL** | **847,125** |

**Operating Cost estimate**
**Tailings Disposal**
**500 ktpa**

**Tailings Disposal**

Allowance of $1.00/tonne for ongoing lifts to dam wall and general works and progressive rehabilitation.

**Operating Cost Estimate**
**Summary**
**1,000 ktpa**

**MINEMAKERS LIMITED**
**ANCHOR TIN PROJECT**
**OPERATING COST ESTIMATE**
**ACCURACY -20/+50%, 3Q07**
**JOB NO: 1406**

**SUMMARY**

| | | |
|---|---|---|
| Annual throughput | **1,000,000** | tpa |
| Ore Processing Rate | **125** | tph |
| Plant Availability | **91.3%** | |
| Operating Hours | **8000** | h/annum |

| **SUMMARY** | **Annual Cost A$000** | **A$/t ore** |
|---|---|---|
| Labour | 5,687,500 | **5.69** |
| Consumables | 2,617,500 | **2.62** |
| Power | 2,382,176 | **2.38** |
| Maintenance | 1,285,714 | **1.29** |
| General and Administration | 987,125 | **0.99** |
| Tailings Disposal | 1,000,000 | **1.00** |
| **TOTAL** | **13,960,015** | **13.96** |

**Operating Cost Estimate**
**Labour Costs**
**1,000 ktpa**

## Summary of Labour Costs

| | Number of Employees | Classification | Roster | Base Annual Salary/Wage AUD$ | Overhead Costs % | Overhead Costs AUD$ | Annual Labour Costs AUD$ | Annual Salary/Wage Total AUD$ | Overhead Costs Total AUD$ | Annual Labour Costs Total AUD$ |
|---|---|---|---|---|---|---|---|---|---|---|
| **Process Department** | | | | | | | | | | |
| Plant Superintendent | **1** | **M** | **4** | $150,000 | 30% | $45,000 | $195,000 | $150,000 | $45,000 | $195,000 |
| Plant Metallurgist | **1** | **SD** | **6** | $95,000 | 30% | $28,500 | $123,500 | $95,000 | $28,500 | $123,500 |
| Mill Supervisor | **1** | **SD** | **6** | $95,000 | 30% | $28,500 | $123,500 | $95,000 | $28,500 | $123,500 |
| Shift Foreman | **3** | **SS** | **5** | $90,000 | 30% | $27,000 | $117,000 | $270,000 | $81,000 | $351,000 |
| Crushing Operators | **4** | **SS** | **5** | $90,000 | 30% | $27,000 | $117,000 | $360,000 | $108,000 | $468,000 |
| Milling/Flotation Operators | **4** | **SS** | **5** | $90,000 | 30% | $27,000 | $117,000 | $360,000 | $108,000 | $468,000 |
| Gravity Operators | **4** | **SS** | **5** | $90,000 | 30% | $27,000 | $117,000 | $360,000 | $108,000 | $468,000 |
| Tails/Water Operators | **2** | **SD** | **4** | $80,000 | 30% | $24,000 | $104,000 | $160,000 | $48,000 | $208,000 |
| Relief/Conc Handling | **4** | **SD** | **4** | $80,000 | 30% | $24,000 | $104,000 | $320,000 | $96,000 | $416,000 |
| Lab supervisor | **1** | **SD** | **4** | $80,000 | 30% | $24,000 | $104,000 | $80,000 | $24,000 | $104,000 |
| Lab Technicians | **2** | **SD** | **2** | $65,000 | 30% | $19,500 | $84,500 | $130,000 | $39,000 | $169,000 |
| Maintenance Supervisor | **1** | **M** | **3** | $120,000 | 30% | $36,000 | $156,000 | $120,000 | $36,000 | $156,000 |
| MaintenancePlanner | **1** | **SD** | **7** | $100,000 | 30% | $30,000 | $130,000 | $100,000 | $30,000 | $130,000 |
| Maintenance L/Hand | **1** | **SD** | **7** | $100,000 | 30% | $30,000 | $130,000 | $100,000 | $30,000 | $130,000 |
| Boilermakers | **3** | **SD** | **5** | $90,000 | 30% | $27,000 | $117,000 | $270,000 | $81,000 | $351,000 |
| Fitters | **6** | **SD** | **5** | $90,000 | 30% | $27,000 | $117,000 | $540,000 | $162,000 | $702,000 |
| Electricians | **2** | **SD** | **5** | $90,000 | 30% | $27,000 | $117,000 | $180,000 | $54,000 | $234,000 |
| | **41** | | | $1,595,000 | | $478,500 | $2,073,500 | $3,690,000 | $1,107,000 | $4,797,000 |
| **Administration** | | | | | | | | | | |
| Site Manager | **1** | **M** | **5** | $180,000 | 30% | $54,000 | $234,000 | $180,000 | $54,000 | $234,000 |
| Accountant | **1** | **SD** | **4** | $80,000 | 30% | $24,000 | $104,000 | $80,000 | $24,000 | $104,000 |
| HR Officer | **1** | **SD** | **2** | $65,000 | 30% | $19,500 | $84,500 | $65,000 | $19,500 | $84,500 |
| HSE Nurse | **1** | **SD** | **2** | $65,000 | 30% | $19,500 | $84,500 | $65,000 | $19,500 | $84,500 |
| Safety Officer | **1** | **SD** | **2** | $65,000 | 30% | $19,500 | $84,500 | $65,000 | $19,500 | $84,500 |
| Logistics/Environmental Officer | **1** | **SD** | **2** | $65,000 | 30% | $19,500 | $84,500 | $65,000 | $19,500 | $84,500 |
| Warehouse | **2** | **SD** | **1** | $55,000 | 30% | $16,500 | $71,500 | $110,000 | $33,000 | $143,000 |
| Reception/Payroll | **1** | **SD** | **1** | $55,000 | 30% | $16,500 | $71,500 | $55,000 | $16,500 | $71,500 |
| | **8** | | | $630,000 | | $189,000 | $819,000 | $685,000 | $205,500 | $890,500 |
| **Total (excl Mining)** | **49** | | | **$2,225,000** | | **$667,500** | **$2,892,500** | **$4,375,000** | **$1,312,500** | **$5,687,500** |

**Operating Cost Estimate**
**Consumables**
**1,000 ktpa**

**CONSUMABLES**

| Consumable | Cost A$ / unit | Consumption | Consumption | A$/annum | A$/t |
|---|---|---|---|---|---|
| Crusher liners | | | | 300,000 | **0.30** |
| Mill liners | 1500 /t | 0.14 kg/t | 0.018 tph | 210,000 | **0.21** |
| Grinding Media | 1350 /t | 1.2 kg/t | 0.150 tph | 1,620,000 | **1.62** |
| Sodium Ethyl Xanthate | 2000 /t | 120 g/t | 15.000 kgph | 240,000 | **0.24** |
| Copper Sulphate | 2700 /t | 50 g/t | 6.250 kgph | 135,000 | **0.14** |
| Frother | 4000 /t | 15 g/t | 1.875 kgph | 60,000 | **0.06** |
| Flocculant | 3500 /t | 15 g/t | 1.875 kgph | 52,500 | **0.05** |
| **Total Cost per annum** | | | | 2,617,500 | |
| **Total Cost per tonne processed** | | | | | **2.62** |

**Operating Cost Estimate**
**Power**
**1,000 ktpa**

**POWER**

| | | |
|---|---|---|
| Power Cost | 0.1000 | $/kWh |
| Drawn Power | 2978 | kW |
| Power used | 23,821,760 | kWh/year |
| | 23.8 | kWh/t |
| **Annual Cost** | **$2,382,176** | **/year** |
| **Cost per tonne processed** | **$2.38** | **/t ore** |

**Operating Cost Estimate**
**Maintenance**
**1,000 ktpa**

**MAINTENANCE**

| | | |
|---|---|---|
| Cost of Equipment | A$ | 9,000,000 |
| Estimated installed cost (at 35% for eqt) | A$ | 25,714,286 |
| Maintenance factor | 5% | |
| Maintenance Cost per annum | A$ | 1,285,714 |
| | | |
| **Total Cost per tonne processed** | **A$/t** | **1.29** |

**Operating Cost Estimate**
**General and Administration**
**1,000 ktpa**

**GENERAL AND ADMINISTRATION**

| Item | A$/year |
|---|---|
| G& A Allowance | 987,125 |
| **TOTAL** | **987,125** |

**G&A Allowance**

| Item | A$/year |
|---|---|
| Telecommunications | 20,000 |
| Insurances | 300,000 |
| Stationery | 10,000 |
| Office Cleaning | 36,000 |
| Postage, Courier and Light Freight | 20,000 |
| Computer Supplies and Support | 10,000 |
| First Aid Costs | 5,000 |
| Entertainment | 3,000 |
| Metallurgical Testing - External Met labs | 70,000 |
| Environmental Testing | 100,000 |
| Consultants and Vendors | 50,000 |
| Banking Fees | 6,000 |
| Safety, Clothing | 25,000 |
| Training budget | 10,000 |
| Travel & Accommodation | 50,000 |
| Recruiting/Relocation | 50,000 |
| Licenses | 15,000 |
| Rent assistance | 25,000 |
| Assaying - external laboratory | 82,125 |
| Miscellaneous | 100,000 |
| **TOTAL** | **987,125** |

**Operating Cost Estimate**
**Tailings Disposal**
**1,000 ktpa**

**Tailings Disposal**

Allowance of $1.00/tonne for ongoing lifts to dam wall and general works and progressive rehabilitation.