



AMDEX MINING LIMITED

TRIAKO MINES N.L., BUKA MINERALS N.L.,

GIPPSLAND MINERALS N.L., KIBUKA MINES PTY. LTD.

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TECHNICAL REPORT

SUMMARY ON PIONEER MINING OPERATIONS,

NORTH EAST TASMANIA

1977 - 1981

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PREPARED FOR THE DEPARTMENT OF

INDUSTRIAL DEVELOPMENT

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1. INTRODUCTION

This report briefly summarises the change in operating conditions at the Pioneer alluvial tin mine since April 1977.

In early 1980, the Department of Planning and Development made additional finance available for extra capital works needed to expand the Pioneer operation into a profitable and more stable venture. This also provided for the employment of an extra thirteen people.

By the end of February 1981, this expansion programme was 90% complete and all new methods have been tested successfully.

Unfortunately, now that the new plant is operating, the price of tin metal has decreased drastically and the mine has a severe water shortage due to the driest summer period in twelve years. This has caused additional problems although we are still confident of success.

↓

₹ || Tin Price March 1980 → \$152 p.u.
Tin Price March 1981 → \$107 p.u.
ie reduction of 30%

2. INITIAL STAGES 1977 - 1979

2.1 The Company

Amdex Mining Limited took over the mining operations of the Pioneer Mine in April 1977, from the previous owner Mr. V. Wood. Since that time, Amdex have increased production rates and recoveries and experimented with various mining and treatment plant methods in attempting to improve the efficiency of the operation.

Since the commencement at Pioneer, Amdex have become further involved in alluvial tin deposits in North East Tasmania. They have been granted several large exploration leases to enable the further discovery and appraisal of deposits in the area. In March 1978, Amdex took over the B.M.I. owned South Mount Cameron operations in which there are several operating mines and two larger deposits that have potential for re-opening (the Monarch and the Endurance deposits).

By the end of 1978, Amdex employed 57 people in their operations in North East Tasmania. This number can be broken down as follows:-

| | |
|------------------------------------------|-------|
| Employees - Pioneer Mine | 27 |
| Employees - South Mount Cameron Mines | 16 |
| Employees - Exploration Drilling | 8 |
| Staff and Administration | 6 |
| | <hr/> |
| | 57 |
| | <hr/> |

2.2 The Pioneer Deposit

The Pioneer Mine is a "deep lead" cassiterite bearing deposit in which mining first commenced in the late 1890's.

The overall depth of the deposit is 40-45 metres from the natural surface to the weathered granite bedrock. The cassiterite is primarily contained in the lower third of a sequence of unconsolidated Tertiary sediments. The upper two-thirds of the sequence is classified as overburden.

The deposit is roughly linear, taking the form of an elongated basin. Economic constraints rather than physical constraints determine the margins of the workings. Mineralization concentration is inconsistent and is very difficult to relate to the geology. The cassiterite bearing sediments and those that lie above are a complex association of conglomerates, clayey sands, quartz gravels with coarse sands, lignite lenses and bedded clay lenses. Devonian granite is the main source of the cassiterite.

The sedimentology of the deposit is difficult to interpret. The lower more stanniferous strata exhibits large scale cross bedding, rapid lensing of lithological units and much reworking as shown by frequent scours affecting all sediment types. A fluvial system with some lacustrine stages is a possible model to explain the lower strata. Source material may in part be outwash deposits, much of which has been transported from the east down an ancient drainage system. The upper sequences are possibly either estuarine or lower energy fluvial deposits.

The Company, since commencement of operations, has drilled approximately 4,000 metres of percussion drilling ahead of the working face. At the end of May 1979, proven ground consisted of 3.95 million cubic metres at an average grade of $0.22\text{kg/SnO}_2/\text{m}^3$.

$$(0.373 \text{ lbs/SnO}_2/\text{yd}^3)$$

This is equivalent to 870 tonnes of contained cassiterite. All of this cassiterite is contained in the lower 15 metres of the deposit. The deposit is still open in extent.

By the end of 1980 additional reserves have been outlined inferring a further 800-1000 tonnes of cassiterite at a reduced grade of 190 grms/m³ (0.32 lbs/yd³)

2.3 Pioneer Mining Operation - End 1978

This operation consisted of mining with high pressure water monitors to transport the ore to a 12/10 Warman gravel pump (400 Hp electric motor). The gravel pump transports the material to the Primary Concentration Plant at the rate of approximately 40m³/hour.

This plant consists of:-

- a) Trommel for elimination of oversize (+10mm);
- b) Dewatering tank;
- c) Primary concentration by jigs;
- d) Secondary concentration by jigs and spirals.

The plant is operated to obtain high recovery and low grade product. This low grade product is then transported to our Tin Dressing Shed for upgrading to 70-75% Sn.

The traditional and present method of mining involves the mining of overburden and tin bearing wash at the same time. This causes several major problems.

- 1) Low average head grade of feed to the treatment plant limiting production of cassiterite.
- 2) Constant changing of head feed grade due to slumping of overburden which is detrimental to tuning of treatment plant for high recovery.

3) Mining of excessively high faces which necessitates for safety reasons a considerable distance between the face and monitor/gravel pump. These long distances cause decreased tonnage rates.

4) The presence of clay balls from the overburden "picks up" cassiterite in the race and increases losses.

For these reasons, it became important to the economic success of the Pioneer Operation to prestrip the overburden ahead of the mining face.

Since 1977, Amdex had been attempting to solve the overburden removal problem.

1) First attempt was using a Buried Loader fed by two D8 bulldozers. This equipment was transferred to Pioneer from the Kibuka Beach Sand Mining Operations on King Island. This equipment, although successful with the relatively dry, free-flowing beach sand was not adaptable to the saturated clay bearing ground conditions at Pioneer.

2) The second attempt was employing a local earthmoving contractor who used open bowl scrapers and dozers.

3) The third attempt was employing an interstate earthmoving contractor using new Caterpillar elevating scrapers.

These two contractors failed mainly due to underestimation of the wet and boggy conditions that occur at Pioneer in wet weather. We have since talked to many earth moving contractors in regard to using scrapers, loaders, draglines, trucks etc. It has become obvious that the overburden cannot be stripped efficiently and reliably by conventional earth moving equipment for less than 70-80 cents per cubic metre.

The economics of the Pioneer operation could not support this sort of stripping cost.

We felt there was only one economic method left to strip the overburden and be able to maintain a profitable operation. That was the hydraulic method using high pressure water and gravel pumps ahead of the mining face. This necessitated a company controlled operation and investment rather than the use of a contractor.

In addition to the prestripping of the overburden it had also become necessary to rebuild and relocate the treatment plant for the following reasons:-

- a) To incorporate the changes found necessary from experimental testwork to improve recoveries.
- b) Replace old and worn out equipment.
- c) Position in a semi-permanent site with concrete base to recover spillages of cassiterite due to "sand-ups", pipe failures etc.
- d) Eliminate production lost time that occurred when the present portable plant had to be moved when the main gravel pump was relocated.

3. FURTHER DEVELOPMENT WORK 1979 - 1981

In early 1979 after the failure of the second earth moving contractor, the need for further investment became more apparent. A submission was placed before the Department of Planning and Development in August 1979 requesting assistance in financing the capital work necessary to make the Pioneer mine an economic and stable operation.

This capital need was made up as follows:-

| | |
|-------------------------------------------------|-----------|
| - Establishment of Overburden Removal Programme | \$210,000 |
| - Construction of New Treatment Plant | \$100,000 |

Tentative approval for this financing was made on the 17th December 1979 but unfortunately the capital was not made available until May 1980. This meant that most of the construction work was carried out during the winter months which of course caused serious delays.

The decision was made to supplement production with a temporary plant whilst the new treatment plant was being constructed. This was done at a lower production rate, mining lower grade ore on the southern face of the deposit.

1) Overburden Stripping

The first testing of the new overburden stripping method occurred in July 1980. This was performed using a smaller than required gravel pump that was already on site. As the recirculating water supply couldn't be completed until the new treatment plant was finished, fresh water was used when available from our main dam supply.

Although full regular production has not yet been attained, we are satisfied that the method works well and that prestripping can be accomplished economically.

We will not be sure of a unit cost (cents/m³) until three months of stripping has been performed using the return water system.

The main system change from the original proposal was the decision to alter from two diesel powered pumps to one large electric pump. This was due to two reasons:-

- a) The sudden escalation of the price of diesel since the original proposal was made.
- b) The need to standardise pumps and try and reduce necessity to carry extra spare parts. The new stripping pump is a 12/10 Warman Gravel pump which is identical to our main mining pumps.

2) Treatment Plant

The new plant was completed in early December and commissioning took place immediately. There were some teething problems as there are with all new plants.

Although some problems are still being eliminated the overall results are very satisfying.

- a) The production tonnage rate has been increased by a factor of 2.
- b) The recoveries have improved to 85-90%.

4. PRESENT SITUATION

The completion of the treatment plant enabled the recirculating water supply to be finished. This has now been commissioned and tested.

Unfortunately due to the shortage of water, the recirculating water pumps are being used for the mining operation and as a result, the overburden stripping has been ceased until rain eventuates.

All major capital expenditure has been made and the only item remaining to be installed is the new overburden stripping pump which only arrived on site on the 23rd January 1981. The capital requirements were greater than anticipated and this was mainly due to an underestimation of the labour costs involved in construction and erection of all equipment.

Although the price of tin metal has reduced drastically over the past few months we are still confident that an economic operation can be maintained.

The drop in tin price has obviously increased the minimum tonnage required for profitable operation.

PIONEER PRODUCTION AND EMPLOYMENT

| YEAR TO | PRODUCTION TONNES SNO2 | NO. EMPLOYEES |
|---------------|---------------------------|---------------|
| DECEMBER 1978 | 70 | 30 |
| DECEMBER 1979 | 123 | 36 |
| DECEMBER 1980 | 83 | 46 |

Does not include exploration or South Mount Cameron

PRODUCTION - JANUARY 1981 - 16.65 TONNES