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AN EVALUATION OF THE KIBUKA MINES PTY LTD PROPERTIES - KING ISLAND, TASMANIA

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Australia

7th May, 1975

Mr I. Shulman
Chairman,
Buka Minerals N'L.
119 York Street,
Sydney N S W 2000

Dear Mr Shulman

Evaluation of Kibuka Mines Pty Limited.

The attached is a copy of a report on a valuation study which has been finalised during the month of April, 1975.

The value of Kibuka Mines Pty Ltd., has been related to ore reserves and capital requirements as they were at April, 1975.

If you have any queries on the contents of the report, I will be pleased to discuss them with you.

Yours sincerely,

Ian J. Salway

AN EVALUATION OF THE KIBUKA MINES PTY LTD

PROPERTIES - KING ISLAND, TASMANIA

Trevor I. Neale B. App. Sc.

Ian J. U. Salway B. Sc. C. Eng.

King Island,
April, 1975

LIST OF CONTENTS

SUMMARY and CONCLUSION

Production and grade problems existing at the Naracoopa mine of Kibuka Mines Pty. Ltd. resulted in a poor performance over the years 1972-1973. These problems in the main have been solved during 1974. Further reserves of rutile and zircon have been proven and indicated on Kibuka leases, world markets for rutile and ziroon have strengthened and the future for these minerals looks strong. Because of the above events the value of the mining properties of Kibuka has been enhanced. In this report the Kibuka operations and the expansion programme which is proceeding are described, and the mine is evaluated in the light of the changed circumstances.

The properties over which Kibuka hold their mining lease and four exploration licences amount to 114.6 square kilometers in area. These are listed in Table 1 and indicated on a location plan, Figure 1.

The Kibuka properties are located on King Island which is at the eastern entrance to Bass Strait, about 88 kilometers from North West Tasmania, see Figure 2. The Island is 64 kilometers long on a north-south axis and is 26 kilometers wide. The main Island port is Grassy. This port is served by Tasmanian Transport Commission roll/roll ships with up to 2000 tonnes capacity. The Island airport is at Currie and is served daily by scheduled Ansett Fokker Friendship flights and by freight and passenger charter planes.

The Island annual rainfall is 905 mm ($35\frac{1}{2}$") with winter rainf all pattern. The average monthly wind velocity is 7 knots and gales are not unusual. The coastal areas of the Island are vegetated with grass and low coastal shrub and the inland areas with blackwood, gums, and tee-trees where they have not been cleared for farming. Other industries include a scheelite mine, farming, with abattoirs and butter factory, fishing, and all necessary supporting services. The Island population is approximately 2,800.

The history of mining in the Naracoopa area goes back to 1905 when the mineral of interest was tin, $5\frac{1}{2}$ tons of which were mined by the British Flag Prospecting & Mining Syndicate. The mining leases were held by various syndicates and individuals between 1905 and 1965 but very little mineral was produced during that time. In 1965 a Canadian company, Mt. Costigan Mines took over

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the leases and evaluated them. In 1968 a Mt. Costigan subsidiary, called Naracoopa Rutile, was formed to mine the property. This company successfully mined deposits located on the Sea Beach but went into receivership shortly after commencing mining the raised beach deposits. The assets of Naracoopa Rutile were bought by Buka Minerals in May 1972 after which a reconstruction and mining programme was commenced and is still proceeding.

The basement rocks of King Island consists of Pre-Cambrian Metamorphics and Palaeozoic sediments and volcanics. There are also granitic intrusions. Most of the rocks are covered by Pliestocene and Recent superficial deposits so that the King Island solid geology is not well known.

The heavy mineral deposits are found in free sand and in loosley cemented claybound sands. The mineral content of the sand diminishes northwards from the mouth of the Frazer River, see Figure 3. The heavy mineral bearing sands continue at least to the Sea Elephant River. The magnetic mineral (ilmenite, hornblende, garnet and staurolite), makesup 60-70% of the heavy mineral deposits, and the ore minerals, i.e., rutile and zircon which average .45% and .6% respectively of the sand vary in size and distribution in the heavy mineral. The majority of rutile is held on 120 mesh screen with very little greater than 72 mesh. Most of the zircon is less than 100 mesh with significant amounts greater than 72 mesh.

The proven ore reserves used in evaluation are based on results of drilling carried out by Kibuka since May 1972. Probable reserves are based on the work done by McMahon & Partners in 1967. Drilling and sampling methods and the exploration grids used in the reserve calculations are in accordance with accepted beach sand practice and are described in detail in this report. Analysis of samples was carried out at the Mine and check analysis was done by independent assayers. Assay results are compared in Table 2. The method of calculation of reserves was by the cross section method and the influence/area depth method. The cut-off grade used in ore reserves calculations was 2.5% heavy mineral and a tonnage factor of 1.6 tonnes per cubic meter was employed. The total reserves at April 1975 are as follows:-

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	Tonnes Sand	Tonnes Rutile	Tonnes Zircon
Proven	5,312,869	35,068	59,921
Probable	8,925,000	29,444	25,925
Total:	14,237,869	64,512	85,846

Proven reserves have been drilled on 50m x 25m grid or less. Probable reserves have been drilled on 300m x 30m grid.

Kibuka has exploration licences over interesting exploration areas to the north of the Sea Elephant River on the east coast of the Island. Here scout drilling has indicated heavy mineral deposits.

The planned full production for the mine is 20,800 tonnes per year of rutile and zircon combined. The average ratio of rutile to zircon production being 1:1.35. An expansion programme is being implemented and it is anticipated that full production will be achieved in July 1975 and production will continue at this rate through to May 1981. Production has been based on overall recoveries of 75% for rutile and 76% for zircon. In addition to rutile and zircon production, about 500 tonnes per year of reject zircon will be produced for sale as foundry sand. It is also anticipated that some tin will be produced but no consideration has been given to this in the evaluation since no accurate recovery information is presently available. The reserves to be mined are Lanherne Beach, Sea Beach, Milford Beach, Back Beach and High Dune. The latter area is lower grade than the others.

The existing two types of feed unit in use at the mine, i.e., "buried loader" and "potholer" are considered suitable for mining the whole of the reserves. The mining equipment is being upgraded to handle the increased production as is the primary separation plant. Alterations are also being made to secondary separation and dry plant processes to give the required increase in production. When mining of the lower grade areas, scheduled for 1979, is to take place, the mining and primary separation plants will be upgraded further.

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The requirement of new capital to complete the production expansion programme and to develop and mine the other known ore bodies is $1,279,000. In addition, $730,000 will be required to replace existing capital equipment. The capital phasing will be as follows :-

$ x 1,000

Year	New	Replacement	Total
74/75	174		174
75/76	100	105	205
76/77		125	125
77/78	255	150	405
78/79	750	150	900
79/80		200	200
	1,279	730	2,009

The expansion programme underway requires an expenditure of $175,000 which has already been committed. A zircon milling project in the planning stage requires $100,000 to be expended in 1975/76. A further $255,000 will be required when mining moves to the Back Beach deposit which is situated 10 kilometers from the present mining area and a further $750,000 when the lower grade deposits at Cowper Point, about 12 kilometers away, are mined.

Kibuka has forward sold two-thirds of the 1975 mine production. Negotiations are proceeding with the intention of selling 75% of the next three years production. Mineral prices used in the mine evaluation vary from $321 per tonne F.O.B. to $250 per tonne, F.O.B. for rutile and $321 per tonne F.O.B. to $175 per tonne F.O.B. for zircon. These prices are based on existing contracts and market forecasts.

Production costs are known accurately for the Lanherne deposit. The production costs for the other deposits have been arrived at

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by transposing the Lanherne costs and making allowance for local conditions in the new areas. The production costs arrived at for the different areas at the new rate of production are given below for each tonne of rutile or zircon F. O. B. Melbourne.

Lanherne Beach	$103 per tonne
Back Beach	$104. 44 per tonne
High Dune	$120 per tonne

The cost of producing zircon flour from zircon sand has been estimated at $10 per tonne.

The estimates of production, revenue, capital and operating costs were used to project a cash flow extending over the life of the proven and probable reserves. This cash flow was discounted to give a net present value for the property. Three different discount figures were used and the respective N. P. V. at April 1975 are :-

15% Return on Capital	$5, 770, 849
20% Return on Capital	$5, 388, 432
25% Return on Capital	$5, 058, 035

In addition to the mining property Kibuka have saleable real estate valued at $157, 427 and mineral stocks on hand at April 1st, 1975 valued at $341, 568.

The conclusion to be drawn from this is that the present value of the Kibuka properties on King Island is of the order of $6, 000, 000.

1. INTRODUCTION

1.1 Scope

Since February 1974 the problems which were the cause of low production of saleable rutile and zircon from the Naracoopa Mine of Kibuka Mines Pty. Ltd (Kibuka King Island) and which were also causing financial losses to the company have been in the main isolated and overcome. As a result of these improvements in the operations, production of saleable product has been increased to 300 tonnes per week and reasonable profits are now being achieved. It is confidentally anticipated that further plant modifications which are presently underway will be successful and that a production of at least 400 tonnes per week of finished product will be achieved in the near future.

Recent drilling results from the Back Beach deposit in the Cowper Point area which is situated about 10 km north of the present Mine site, have indicated a higher grade and larger tonnage than was thought from the results of previous drilling programs.

A strengthening of rutile and zircon prices on the world markets, the good prices obtained for forward sales of rutile and zircon production which have been made by Kibuka, and the good prospects in the long term future for rutile and zircon, have made the lower grade heavy mineral deposits of the Cowper Point area a more attractive exploitation possibility.

Scout drilling has indicated further possible ore reserves to the north of the Sea Elephant River and some interesting assays have been obtained from scout drilling samples taken in the north of King Island in the vicinity of Disappointment Bay. Both these areas which are being scout drilled are on Exploration Licences held by Kibuka.

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The above events have enhanced the value of the mining properties of Kibuka on King Island The scope of this study is to determine the present value of the property and to examine what further effect that the mining of lower grade Cowper Point deposits will have on the profitability on the King Island operation. In addition this study also considers the effect that an increase in annual production to 20,000 tonnes will have on the overall economics of the operation.

1.2 Investigations and Procedure

In order to determine the effect of the above circumstances, the following investigations and procedures were adopted.

Ore reserves were checked and re-assessed.

Check assays were obtained from independent Analysts and a complete examination of all geological data relating to the King Island ore reserves were examined.

Mining sites were examined and an exploitation concept for the King Island environment was selected.

Capital costs and operating costs were estimated, based on the selected concept and upon present operating requirements.

Existing sales agreements were examined and some investigations were made into future mineral prices.

The estimates of ore reserves, operating and capital costs and revenue were used to project a cash flow which covered the life of the operation.

This cash flow was then used as a basis for the evaluation of the property.

Findings of the above investigations are contained in this report.

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2. PROPERTIES

Kibuka holds a total of one consolidated mining lease, one water lease and four exploration licences over an area of 114.6 square kilometres of King Island.

Figure 1 indicates the location of properties on the Island.

Table 1 gives the descriptions of the properties held.

The mining lease was consolidated from 29 contiguous mineral leases on the 28th February, 1974.

The least rental on existing mining and water leases is 50¢/acre.

For exploration licences the rental payable is 40¢/km^2.

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TABLE 1

PROPERTY SCHEDULE - KING ISLAND

1. EXISTING LEASES

Description	Number	Location	Area (Km^2)	Term	Date of Commencement
Mining Lease (Consolidated)	5M/73	Sea Elephant Bay	7.4	21 years	28th February, 1974
Water Lease	4W/68	Frazer River	3 sluice heads	21 years	1st November, 1968

2. EXISTING LICENCES

Description	Number	Location	Area (Km^2)	Term	Date of Renewal
Exploration Licence	9/69	Sea Elephant Bay	38.8	6 months	21st May, 1975
Exploration Licence	14/72	Sea Elephant Bay	11.3	6 "	14th May, 1975
Exploration Licence	21/73	Sea Elephant Bay	31.1	6 "	1st June, 1975
Exploration Licence	23/74	Sea Elephant Bay	26.0	6 "	24th September, 1975

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3. LOCATION AND ACCESS

King Island is situated midway between Tasmania and the mainland of Australia at the western entrance to the Bass Straits being approximately 88 km north-west of Tasmania, see Figure 2. The centre of the Island lies on longitude 144°E and latitude 40°S. The Island's greatest length is 64 km in a meridional direction and its breadth at the widest part is 26 km.

The main port on the Island is at Grassy (see Figure 1), and is capable of handling ships up to about 2000 tonnes. The limiting factors are as follows: 6 m draft along the wharf; 11 m approach draft and a 140 m harbour entrance. The harbour has a turning circle of 183 m in diameter with a minimum draft of 6 m within the circle. The wharf is 67 m long, and because of the currents, boats longer than this cannot be secured during rough weather. Facilities at Grassy include a 20-tonne stationery crane, with a 90° turning radius, a roll-on/roll-off ramp, and a Marine Board storage shed (30m x 23m). A 20-tonne forklift is operated by the Transport Commission at Grassy, and bottom lift overseas containers can be handled. There is another harbour at Currie which cannot take ships greater than 300 tonnes. There is a jetty at Naracoopa which is capable of taking larger ships but it is unsheltered, and is subjected to frequent rough weather and storms. The jetty is used for unloading oil supplies for the Island. A 20,000 tonne tanker anchors about 100 m off the end of the jetty and pumps the Island's oil supplies to storage tanks. The main supply ports at present are Melbourne and Stanley, however, any of the Northern Tasmanian ports (Burnie and Devonport) are equally as suitable as Stanley.

The Island is presently serviced by two boats, the "Rah", which is a 2000 tonne roll-on/roll-off ship, and the "Joseph Banks", which is a conventional ship with a carrying capacity of approximately 900 tonnes. Both of these ships are run by the Tasmanian Transport Commission. The "Straitsman" (roll-on/roll-off), which is a 1000 tonne capacity ship is currently undergoing repairs in Tasmania. This ship will be coming back onto the Island run to replace the "Rah" which was purchased overseas by the Tasmanian Transport Commission, for use on the Tasmania/Melbourne run. At the present time the "Rah" is being used to transport general cargo and mineral on and off the Island, and the "Joseph Banks" is being used exclusively for stock

...../6.

and superphosphate and an occasional mineral sands cargo. Occasionally suitable ships are chartered to move mineral sand stocks to the mainland.

The Island airport is 6.4 km north of Currie. There is a daily service by Ansett Fokker Friendship to and from Melbourne. Several other companies operate small twin-engined aircraft services from Melbourne and Tasmania, with several flights daily. A Bristol Freighter plane also makes about three trips a week from Melbourne with general cargo. DC3's are used for flying out cargoes of meat from the King Island Abattoirs to Melbourne and these planes also backload general cargo to the Island.

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4. CLIMATE and LOCAL RESOURCES

4.1 Precipitation

The average annual rainfall on the Island is 905 MM ($35\frac{1}{2}$ inches), distributed in a normal winter rainfall pattern.

Average Monthly Rainfall (mm)

Jan	Feb	Mar	April	May	June
35.56	46.99	42.93	71.63	98.30	102.87
July	Aug	Sept	Oct	Nov	Dec
126.49	115.06	81.28	72.90	61.21	50.03

4.2 Winds

The prevailing winds in the area are predominantly south-westerlies, with south-easterlies occurring during November to January.

Average Monthly Wind Velocity (knots)

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
7	5	6	6	6	7	7	8	7	8	7	8

4.3 Vegetation

Coastal Belt. The coastal dunes are covered mainly with marram grass. Spinifex and low coastal scrub, with ferns and low scrub in the lower lying areas.

Inland Area. A high proportion of this area has been cleared for farming purposes but the remaining natural areas are predominantly covered by tea-tree, blackwood and gums.

4.4 Animal Life

The Island is noted for its wildlife both native and introduced.

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Interesting animal species include - Wallabies, Possums, Platypus, Echidnas, and Seals. Fish are numerous in the waters around the Island and bird life is abundant, with pheasants, mutton birds, and Cape Barren Geese being of particular interest.

4.5 Local Industry, etc.

There is one other mine on the Island which is operated by King Island Scheelite, a wholly owned subsidiary of Peko-Wallsend. This mine is located at Grassy and employs and houses approximately 300 workforce and staff.

Other local industries are farming and associated abattoirs and butter factory, fishing and seaweed harvesting. There is also a forest and sawmill controlled by the Tasmanian Forest Commission.

The main centres of population are Currie and Grassy and the total Island population is 2,800. The main roads on the Island are paved and all unpaved roads are well graded and maintained. Sporting facilities include two golf courses, various tennis courts, bowling greens, cricket and football facilities, etc. A complete sporting complex is planned for Currie.

...../9

5. HISTORY OF BEACH SAND EXPLORATION & MINING IN THE NARACOOPA AREA.

Since the early 1900's there has been interest in heavy mineral deposits on King Island, however, this interest was intially restricted to the high grade deposits of the Milford Beach which is near the mouth of the Frazer River on the east coast of the Island - see Figure 3.

In 1905 the British Flag Prospecting and Mining Syndicate No Liability applied for and were granted six reward claims for tin over an area of 125 acres of Milford Beach. The leases were situated north of and adjacent to the mouth of the Frazer River. The syndicate started mining operations on the south eastern section with an experimental plant in 1906 but suspended work after six months owing to the unsuitability of the concentrating machines and lack of funds. During the period that the company was in operation. 1584 cubic yards of material were excavated of which 866 cubic yards were passed over tables and 5 tons 11 cwts of tin and 1 oz. 11 dwts. of gold with a net value of £250. were recovered. The original lease expired in 1911.

In the period between 1911 and 1926 the ground was held by numerous people at different times but very little actual mining was done.

In 1926 Mr. J McK. Bowling was granted a 76 acre lease covering the old workings of the British Flag Co. and at the southern end of Milford Beach constructed fluming to the old workings where a trial was made with a special type of sluice-box to recover the tin. The experiment evidently proved a failure as very little work was done.

Prior to 1928 much shaft and hole digging was done in an attempt to prove the deposit. This method proved unsuccessful owing mainly to the fine nature of the sand which fell into the excavations and prevented accurate sampling at depth. A number of drill holes were also put down.

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Up until 1928 interest was centred on the tin contained in the mineral sands. Drilling by the Department of Mines in 1928 (Blake 1929) showed that the heavy mineral content of Milford Beach decreased northward from the Frazer River and also that the sands contained substantial amounts of rutile. 24 scout holes were put down by hand in an attempt to evaluate the deposit. The depth of mineralised sand averaged about 10 feet. The average grade of 3.5 lbs. per cu. yd. of SnO_2 and 1514 lbs. per cu. yd. of TiO_2 obtained by Blake (1929) was considered by Solomon (1964) to be lower than the actual values in the ground because of the crude boring and sampling methods used. An analysis done by the Department of Mines in 1964 during studies on the treatment of terrace sands (Milford Beach) gave 0.13% Sn. Two samples from the modern beach (Sea Beach) taken in 1964 gave 0.20% Sn and 0.28% Sn. These figures represent 3, $4\frac{1}{2}$, and 6 lbs. of cassiterite per cu. yd. respectively (Solomon 1964).

A few tonnes of tin were removed during the second world war by Mr. Max Gatenby.

In 1952, Dr. M. D. Garretty drilled three lines of holes at Cowper Point on behalf of Mount Isa Mines. The drilling indicated some concentration of H. M. in the area. Interest was centred on R & Z although some assays were done for tin.

King Island Scheelite Company held the leases from the late 1950's to 1963 and when they relinquished their mining leases over the Naracoopa area, they had drilled 24 east west lines of bore holes. This drilling showed that the main concentrations of H. M. occurred in Milford Beach and inland near the Frazer River (Lanherne Beach Deposit). As far as is known, no assays were done for tin, interest centred only on the rutile and zircon content of the sand.

In the period to 1965, three Tasmanians, W. C. Burrows, M. Gatenby and J. H. Curtain carried out further investigations of heavy mineral deposits in the Naracoopa area. On the 14th April, 1965, a Canadian company, Mount Costigan Mines, signed an agreement with the three man syndicate to take over the leases at Naracoopa.

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During 1965-66, Mount Costigan Mines carried out an evaluation of the heavy mineral deposits at Naracoopa and in 1968 this company formed a subsidiary company, Naracoopa Rutile, to mine their proven heavy mineral deposits on King Island. Actual mining was commenced in February, 1969. On April 9th of the same year, operations were officially opened by The Hon. E. E. Reece, M. H. A., Premier, Treasurer, Minister of Mines for the State of Tasmania.

In 1966 Kenneth McMahon & Partners (McMahon), consulting geologists conducted a hand drilling program to check the reserves of beach sand obtained by Mount Costigan. Results confirmed the volume of sand in the reserves but owing to the adoption of different conversion factors, the tonnage of rutile and zircon was slightly lower.

On Sea and Milford Beaches the tonnage of rutile was estimated at 19904 long tons as against 24531 long tons previously calculated. For zircon the corresponding figures were 20687 and 25964 long tons. Systematic check drilling of Lanherne Beach was not carried out owing to indurated layers impeding progress of hand augering. Selected drill holes to the same depth showed that the Gemco results were in all cases lower than the hand drilling results.

Also, during 1966, work was carried out by C. Byrne for Mount Costigan in the Surprise Bay and Yellow Rock areas but revealed only low concentrations of heavy minerals.

From 1967 to 1970 further test drilling and check drilling was conducted by McMahon over an area from Naracoopa in the south to Cowper Point in the north. The major part of this program was concentrated at Naracoopa where an area of approximately 4,000 feet N-S by 2,000 feet E-W was covered. The holes were drilled at 100 feet intervals along lines 400 feet apart and running at right angles to the beach line. Ore reserves and the feasibility of mining Lanherne Beach were based on the results obtained from this drilling program.

At the northern end of the Sea Elephant Bay where good values had been found behind Cowper Point, test drilling was conducted on widely spaced grid with lines at 1,000 feet intervals and holes drilled at 100 feet to 200 feet along them. This grid also ran at

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right angles to the beach line. Drilling results indicated a low grade dune deposit and a higher grade strand line deposit.

The line spacing in the area between Naracoopa and Cowper Point was increased to 1,600 feet with holes at 100 feet intervals along them. The results were not encouraging and no significant heavy mineral deposits were indicated in the area.

By late 1970 the reserves of Sea and Milford Beaches were almost exhausted and mining of Lanherne Beach was commenced. In February 1972 Naracoopa Rutile Ltd. went into receivership and in May 1972 the operations were taken over by Buka Minerals N. L. and a subsidiary company, Kibuka Mines Pty. Ltd. (Kibuka) was formed to manage the operations at Naracoopa.

In the period to mid-1973, McSweeney & Partners were consulting managers to Kibuka. During this time little exploratory drilling was done as nearly all the drilling was for mining control purposes.

The work carried out by Kibuka since mid-1973 has been directed towards establishing tonnages and grades of areas indicated by previous exploration and towards continuing exploration in other areas. The Lanherne Beach and Back Beach deposits were completely outlined using a 50 x 25 meter grid and the ore reserves calculated. The results of check drilling carried out in the dune system at Cowper Point compared favourably with those obtained by McMahon. Scout drilling in the intermediate area between Naracoopa and Cowper Point did not indicate any significant mineralisation. Scout drilling at the north of the Island in the Disappointment Bay area has revealed some promising results.

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6. GEOLOGY OF KING ISLAND AND ITS HEAVY MINERAL DEPOSITS

6.1 GENERAL GEOLOGY:

Since most of the Island is covered by Pliestocene and Recent superficial deposits, the solid geology of King Island is not well-known.

Basement rocks of King Island consist of Pre-Cambrian Metamorphics, and Palaeozoic sediments and volcanics. Granitic rocks of two ages have intruded the above sequences - Devonian potassic granites confined to the west coast of the Island and Carboniferous granodiorites and adamellite confined mainly to the east coast of the Island.

Pre-Cambrian Rocks:

Lithologically the Pre-Cambrian rocks of King Island are best classified as belonging to the Davey Group of the Pre-Cambrian (Callow 1972).

They consist of regionally metamorphosed sediments in the form of various mica schists, muscovite quartzite, quartzite and slate. Generally, dips are high and strike is north-south. The rocks are well exposed along the west coast of the Island and on the east coast from Seal Bay to Stokes' Point and at the southern end of Sea Elephant Bay.

Palaeozoic Rocks:

The palaeozoic rocks are confined to the eastern half of the Island between Naracoopa and Grassy and have a known thickness of about 1,500 meters made up of a lower series consisting of approximately 750 meters of interbedded whitish to gray coloured shales blue gray shales and fine grained micacious sandstone followed conformably by an upper series of at least 750 meters of volcanics with interbedded shales, tillites, limestone and dolomite beds mainly near the base of the sequence. The rocks dip easterly at approximately 40 degrees.

At Grassy and Bold Head these limestone and dolomite beds have been contact metamorphosed and metasomatised by intrusive granodiorite and adamellite to form garnet-scheelite, skarn ore bodies.

.. /14

The Intrusive Rocks

These consist of amphibolites, various types of granitic rocks, quartz veins and later dolerite and lamprophyric dykes.

Granitic rocks - Two different ages of granite appear to be present on King Island. Potassic granite of possible Devonian age occurs as a narrow belt down the west coast of the Island, whilst individual granodiorite and adamellite masses of Lower Carboniferous age (determined isotopically by McDougall and Leggo (1965)) occur at three localities down the east coast of the Island. The best exposure of these is the granodiorite mass extending from 400 meters south of the open-cut at Grassy for a distance of 6.4 milometers down the coast, and for a distance of 4 kilometers inland, to form a semicircular stock.

The adamellite associated with the Bold Head scheelite orebody about 3.2 kilometers north of the Grassy open-cut is poorly exposed over an area measuring a few hundred feet across. The mass has possible dimensions of 2,000 meters by 900 meters and could well be a faulted portion of the granoriodite mass south of Grassy.

The other granodiorite mass is poorly exposed in the bed of the Sea Elephant River about 5.2 kilometers from its mouth. It is not possible to determine the size of this mass as only a few isolated outcrops have been observed, but it is very likely that the northern portion of Exploration Licence 9/66 is underlain by granodiorite.

Quartz veins - Narrow quartz veins and areas of quartz float occur at Reekara and the Hawkes alluvial tin workings. Waterhouse (1915) reported that an auriferous quartz vein occurs in the bed of the Sea Elephant River about 2.4 kilometers north of the Pegarah road and that another vein about 5.6 kilometers due north of City of Melbourne Bay carries a little galena and sphalerite.

Cainozoic Rocks - Restricted occurrences of Tertiary limestone occurs on the Island. The chief outcrop known is at the Blow Hole, 6.4 kilometers north of Naracoopa where

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horizontal bryozonal limestone occurs as a shore platform. Superficial deposits obscure its inland extent.

6.2 GEOLOGY OF HEAVY MINERAL DEPOSITS

Ore types vary from free sand in Sea and Milford Beaches and Cowper Point dunes to loosely cemented clay bound sand in the Lanherne Beach and Back Beach deposits.

The mineral content of Lanherne, Milford and Sea Beaches clearly diminishes northwards and 2,000 meters north of the mouth of the Frazer River, the heavy mineral concentration is low and generally less than one percent. These more or less barren sands continue northwards along Sea Elephant Bay to Blowhole Creek where heavy minerals are once again encountered in dunes and old strand lines (see Figure 3).

The heavy mineral bearing sands continue at least to the Sea Elephant River, but are in nearly all cases of lower grade than the Naracoopa sands.

Minerology:

The typical minerology of the heavy mineral deposits is listed below, in order of abundance :

Quartz
Ilmenite *
Zircon
Tourmaline
Leucoxene
Hornblende *
Garnet *
Rutile
Staurolite *
Chromite
Kyanite
Monazite
Varying amounts of cassiterite also occur.

The magnetic minerals * which make up about 60-70% of the heavy mineral consists mainly of ilmenite and in the main are coarser than the non-magnetic minerals.

..../16

The ore minerals - rutile and zircon - vary in their size distribution in the heavy mineral.

The zircon is spread over a broad range of grain sizes whereas rutile has a more restricted distribution.

The majority of rutile is held on 120 mesh (125 micron) and 150 mesh (105 micron) screens with very little greater than 72 mesh (210 micron).

Most of the zircon is less than 100 mesh (150 micron) with significant amounts greater than 72 mesh (210 micron) screen.

Origin of Minerology

It has been suggested that the sands at Naracoopa were derived from the Sea Elephant River. If this is so then heavy minerals should be spread all along Sea Elephant Bay and be included in dune and beach sands from Sea Elephant River to Frazer River.

However, the intermediate area between the Blowhole and Naracoopa contains very little heavy mineral which suggests the Naracoopa minerals have a separate origin from those at Cowper Point.

The Naracoopa minerals and the Cowper Point minerals are presumably derived from the catchment area of the Frazer and Sea Elephant Rivers respectively.

All the heavy minerals found in these deposits with the exception of chromite and cassiterite can be found associated with metamorphic rocks (Dana 1966). This indicates that the original source of this heavy mineral was probably the Pre-Cambrian metamorphics and the igneous intrusives which are the basement rocks for the majority of the area drained by the Frazer and Sea Elephant Rivers.

A gabbro which outcrops south west of Naracoopa is probably the major contributor of ilmenite as well as a source of chromite as the ilmenite content of metamorphic rocks is generally very low.

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The occurrence of mineralized quartz veins has been noted in the catchment areas and is the most likely source of the cassiterite. Hawkes alluvial tin deposit which is located on a tributary of the Sea Elephant River and which is associated with a granodiorite in the area probably contributed most of the cassiterite to the Cowper Point mineralization.

Formation of Deposits

The deposits located at Naracoopa can be attributed to three different sea levels - Lanherne Beach (11m), Milford Beach (2 m) and the present sea Beach (0m). The heavy minerals were distributed and deposited by means of ocean tides and currents after being carried in suspension by the rivers to the sea from a point or points inland. At Naracoopa, water worn pebbles on basement encountered in drill holes indicate that the course of the Frazer River has varied considerably.

After the deposition of Lanherne Beach and subsequent lowerings of sea level, the resulting downcutting of the Frazer River reworked some of the initial deposit to produce the high grade Milford Beach and then Sea Beach deposits.

The deposits at Cowper Point are of two types - those in the strandlines associated with past wandering of the Sea Elephant River and contemporaneous with deposition of Lanherne Beach and those in dunes which have been reconstituted by wind action from earlier strandlines and of similar age to Milford Beach. The dunes appear to have blocked the mouth of the Sea Elephant River and gradually diverted it northwards.

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7. ORE RESERVES

7.1 General

All the proven ore reserves in this report are based on results of drilling that has been carried out by Kibuka since March, 1972. The probable reserves are based on work carried out previously by McMahon in 1967.

Approximately 33,102 meters (108,575 feet) of exploratory drilling has been completed by Kibuka. The majority of this drilling was done during the last 14 months. The targets drilled had been indicated by drilling carried out by the companies who had previously explored the leases, i.e., Mount Costigan Mines and Naracoopa Rutile.

The drilling was undertaken on a close spaced grid of 25 meter intervals along lines 50 meters apart and scout drilling was at 50 meter intervals along lines 500 meters apart. The orientation of the grid lines are at right angles to the trend of the deposit. Scout drilling lines are generally sighted at right angles to any geomorphological feature which might contain heavy minerals.

7.2 Drilling and Sampling Methods

Drilling of the Lanherne Beach Deposit at Naracoopa and the Back Beach Deposit at Cowper Point was carried out with a Gemco 210B drill using $2\frac{1}{2}$" solid augers. The drilling string consisted of a tungsten tipped, steel cutting head and a stem so formed that the drill cuttings travel up the auger along flites arranged in a helical path around it. Boring was by rotation and pressure, extra flite sections, in lengths of six feet, being added as the hole deepens. Sampling was done by withdrawal of the auger without rotation and collection of the cuttings from the flites before advancing another flite section. The first sample taken from each hole represented the top four feet. Successive samples represented six foot increments. Samples were successfully obtained from above and below the water table and from indurated layers.

The risk of contamination from mineral seams higher up in the hole is high by the Gemco method unless special sampling precautions are taken and allowances are made for 'spin-up'. Samples were collected from the inner parts of the auger flites after the contaminated outside layer of sand was removed. Material from each sample interval was collected and mixed thoroughly. Several random grab samples of this mixture were taken as being representative of the sample interval. The samples were bagged, tagged and sealed to avoid contamination between field and laboratory.

The sampling of Sea Beach was carried out by hand boring and sludging. The samples above the water table were obtained using a three inch auger. Taking care to keep the auger vertical, it was rotated by hand five or six times and then withdrawn from the hole. The sample cuttings were then shaken out on to a sampling mat. The process was repeated and the cuttings were allowed to accumulate until the desired interval of the hole was sampled. The sample interval used on Sea Beach was two feet.

For scout drilling a five foot sample interval was used.

Below the water table, hand sludging was used to obtain the samples.

7.3 Analysis of Samples

Kibuka's laboratory uses a standard procedure for the analysis of drill hole samples. The basic procedure used has been to first dry the sample then pass it through a coarse screen to remove all shell material, vegetation and pebbles. Some samples require crushing prior to screening because of their high clay content. The samples are then split to a 40-60g fraction; (approximately 10g/foot of drill sample). These fractions are washed to provide a clean sample for separation and then dried so that the clay content can be determined.

The samples are then subjected to sink-float separation using bromoform (S.G. 2.8) and the heavy minerals collected. The

heavy mineral fractions are dried, weighed and those containing over an arbitrary cut-off grade of 2.5% heavy mineral or contained within a particular pit outline on a section are bulked together according to the line or the hole from which they were taken. The H.M. composite is then split into two fractions; one for assaying by Kibuka, the other for check assaying by an independent laboratory.

In Kibuka's laboratory the magnetic minerals, mainly ilmenite, magnetite, staurolite and garnet are removed, using a Carpco electromagnetic separator and the non-magnetic fraction which contains primarily rutile, zircon leucoxene and tourmaline is subjected to grain counting to determine the percentage of the two ore minerals considered in this report, viz. rutile and zircon. Grain counting is considered to be sufficiently accurate for estimating grades during prospecting and for preliminary ore reserves.

Errors in grain counting techniques are introduced when the operating personnel do not correctly recognise the various minerals under the microscope. Another common error is that insufficient grains are counted for the final analysis to be statistically correct.

Check assaying of the heavy mineral composites was initially done by Dr. R. Townend of Mineral Investigators, Perth, and later by R. K. Newmans of Sydney. The reason for employing both Newman and Townend was because Townend left Australia prior to the completion of the Lanherne Beach drilling program. Some of Townend's work was checked by Newman.

The results as given in Table 2 generally show poor correlation between Kibuka results and check assay results, although the grain counts of Townend's compare very well with the Newman assays. The grain counts of Lanherne Beach and Back Beach samples, carried out by Kibuka, were not done on screened fractions as Townend's were; this may account for the significant variations between the results. Recent grain counting of Sea Beach samples was done on screened fractions. Newman's assays for this deposit were not available at the time of writing this report.

The final ore reserves calculations for areas have been based on assay results from an independent laboratory.

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TABLE 2

CHECK ASSAYING

Lanherne Beach		Kibuka (Grain Count)	Townend (Grain Count)	Newman (Chemical)
Line 200	% Rutile	5.12	8.6	8.74
	% Zircon	11.88	13.3	12.65
Line 300	% Rutile	3.60	7.9	7.57
	% Zircon	10.15	9.0	9.90
Line 400	% Rutile	3.58	6.8	7.04
	% Zircon	12.98	11.0	11.69

Back Beach		Kibuka (Grain Count)	Newman (Chemical)
200N - 150W	% Rutile	10.68	7.15
	% Zircon	15.15	10.00
100S - 125W	% Rutile	7.08	8.87
	% Zircon	20.69	13.26
400S - 125W	% Rutile	7.20	10.72
	% Zircon	13.72	16.58
1000S - 75W	% Rutile	12.74	9.88
	% Zircon	19.50	12.47

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7.4 Method of Calculation of Ore Reserves

Two basic methods of calculation have been used for the evaluation of ore reserves; the cross-section method and the influence area-depth method.

The evaluation of the Lanherne Beach ore body at Naracoopa was initially done using the influence area-depth method but was recalculated at a later date using the cross-section method. A preliminary evaluation of the Back Beach Deposit was made using the influence area-depth method. The final evaluation of this deposit will be carried out using the cross-section method when topographic maps become available. The influence area-depth method was used to evaluate the reserves of Sea Beach.

Each method is described separately below :

Cross-Section Method:

The heavy mineral values using two decimal places are plotted on to sections (scale: hor. & Vert. 1:250). The ore zone for a particular cut-off (2.5% H.M.) is outlined on the section using heavy mineral values and drilling logs. When sub-ore (material below cut-off grade) is present above the ore zone, the sub-ore and ore are averaged and if the average is above cut-off, the material is considered mineable.

The pit outline is drawn on the cross-sections using a batter angle of 30 degrees. The outline is drawn as simply as possible to facilitate the mining and, where possible, pit outlines on adjoining sections are correlated.

The actual grade of each ore zone is a weighted average of each heavy mineral value in that zone. The average so calculated is the grade for that particular cut-off and pit outline.

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The area of the pit outlined on the section is determined twice using a planimeter and if the difference between the two readings is more than ten units, a third reading is taken. The area of the section is multiplied by the width, and the volume obtained by a factor of 1.60 tonnes per cubic meter to obtain tonnes of sand.

The width is given by the addition of half the distances to adjacent sections. For a grid with a line spacing of 50 meters and holes drilled at 25 meters along each line the width would be 50 meters. This is the width used in the calculation of Lanherne Beach reserves.

The tonnes of heavy mineral are calculated using the average heavy mineral content of the section and the tonnage of sand represented by that section. The tonnes of rutile and zircon contained is then calculated using the percentage of rutile and the percentage of zircon obtained by chemical assaying or by grain counting a heavy mineral composite of the section.

Percentages of rutile and zircon used in the calculation of the Lanherne Beach Reserves were determined chemically by R. K. Newman of Sydney. Grain counting by Kibuka's laboratory was used to determine the percentages of rutile and zircon for the preliminary ore reserves of the Back Beach deposit.

Influence Area-Depth Method:

The volume of mineable material for a particular cut-off grade (2.5% H.M.) is calculated by multiplying the depth of material above cut-off in a drill hole by its area of influence.

The depth of mineable material is determined in accordance with the nominated cut-off grade (2.5% H.M.). The depth assessment is examined on an increment by increment basis using weighted average values of heavy mineral, to an increment which results in above cut-off values from the surface.

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The area of influence is the area over which the results of the drill hole are calculated to be representative. The influence area extends halfway to adjacent drill holes and halfway to adjacent lines. For a grid with a line spacing of 50 meters and holes drilled at 25 meter intervals along each line, the area of influence of each hole is 50m by 25m (= 1250m^2). This is the area of influence used for the majority of drill holes in the preliminary ore reserve evaluation of the Back Beach deposit.

The values obtained are converted to tonnes of mineable sand using a tonnage factor of 1.60 tonnes per cubic meter and the tonnes of rutile and zircon are calculated as they were for the cross-section method.

7.5 Cut-Off Grade

The cut-off grade used in all ore reserve calculations has been arrived at arbitrarily and is 2.5% heavy mineral.

Along the east coast of Australia, the cut-off grades vary between 1% heavy mineral and 2.5% heavy mineral, the controlling factors being the percentage of rutile and zircon in the heavy mineral and production costs. Generally speaking, the percentage of ore minerals (rutile and zircon) in the heavy mineral on King Island is lower, and transport and freight costs higher, than most other east coast deposits, hence the higher heavy mineral cut-off grade.

7.6 Tonnage Factor

In converting the volume of sand into tonnes, a factor of 1.60 tonnes per cubic meter (1.2 long tons per cubic yard) has been used in the reserve calculations.

This figure is acceptable and is based on a test carried out at the Department of Mines, Launceston, to determine the density of sand containing Heavy Minerals. The conversion factors in the table, giving long tons per cubic yard and tonnes per cubic meter, refer to sand with a moisture content not exceeding 2%.

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% H. M.	Long Tons	Tonnes
0	1.20	1.60
10	1.20	1.60
20	1.20	1.60
30	1.25	1.67
40	1.31	1.75
50	1.37	1.83
60	1.44	1.92
70	1.53	2.04
80	1.63	2.17

The constant tonnage factor of 1.60 tonnes per cubic meter has been adopted for all ore reserve calculations as the average grade of sections rarely exceeds 30% heavy mineral.

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7.7 Classification Reserves

In order to define a degree of reliability of reserves for various deposits, a system of classification is used. Although several such systems are in use by other companies for defining the reliability of various mineral sand reserves, the classifications adopted for use in this report are :-

Proven

Reserves which have been calculated from results of a systematic drilling program on a closely spaced grid (50m x 25m or less).

Probable

Reserves which are indicated from the results of drilling on a widely spaced grid where the line spacing is 305 m and the holes are 30.5 m apart.

Subsequent close spaced drilling of the area may prove the reserves.

Possible

A further category of possible reserves is not used in this report as none of our reserves fall into this category at the moment.

Possible reserves would be based on a more widely spaced drilling grid than we use at present.

7.8 Reserves Summary

The proven and probable reserves considered in this study total 14, 237, 869 tonnes of sand with an average grade of 0.45% rutile and 0.60% zircon.

The reserves according to the classification previously defined are :-

	Tonnes Sand	Tonnes Rutile	Tonnes Zircon
Proven	5, 312, 869	35, 068	59, 921
Probable	8, 925, 000	29, 444	25, 925
Total:	14, 237, 869	64, 512	85, 846

A summary of the reserves by areas is given in Table 3.

Details of the reserve estimates are contained in Appendix 1 of this report.

7.9 Exploration Potential

All known heavy mineral deposits on King Island are associated with quartz rich sands and an analysis of the New Dunes (Jennings 1959) which form an almost continuous rim around the Island should given an indication of where this type of sand occurs.

The west coast New Dunes are predominantly calcareous, and exploration licences held in the area by Naracoopa Rutile showed the dunes contained very little heavy mineral. From Cape Wickham to Lavinia Point (see figure No. 1), the calcareous content remains high most of the way but declines near Lavinia Point. Calcareous dunes persist from Stokes' Point nearly to Grassy, but eastwards the shell content falls off rapidly. The east coast New Dunes are predominantly quartz sand.

Along the east coast, the area between Grassy and Naracoopa is rocky, so that the superficial deposits for the remainder of the east coast from Naracoopa to Lavinia Point would possibly contain all major heavy mineral deposits on the Island.

Exploration between Naracoopa and Cowper Point has located all significant heavy mineral deposits.

The drilling carried out by McMahon in 1967 which indicated the High Dune and Back Beach deposits at Cowper Point did not continue much north of the mouth of the Sea Elephant River.

If similar conditions existed and the same processes operated near the mouth of the Sea Elephant River as those which existed and operated at the mouth of the Frazer River when Lanherne Beach was deposited, then the area north of Sea Elephant River would hold the most potential for locating deposits similar to those at Naracoopa.

This area is contained in a new Exploration Licence (E. L. 23/74) which has been recently granted. The strandlines and dunes which occur in this area continue almost to Lavinia Point.

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In the Disappointment Bay area of E. L. 21/73, scout drilling of the dunes has encountered heavy mineral values up to 5. 0%. Further investigation is to be carried out in the area to delineate the extent of the mineralization.

Strandlines between the Back Beach and High Dunes and to the west of the Back Beach are known to contain lenses of heavy mineral. Drilling carried out to date indicates these are not extensive and the grade is low. Further drilling in this area will outline these lenses.

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TABLE 3

SUMMARY OF ORE RESERVES

PROVEN RESERVES

Deposit	Tonnes of Sand	Tonnes of H. M.	Average % H. M.	Tonne Rutil	% R in Sand	Tonnes Zircon	% Z in Sand
Lanherne Beach	3,725,400	402,717	10.81	25,4 1	0.68	39,725	1.07
Sea Beach	392,-029	50,894	12.98	3,0 7	0.79	6,145	1.57
Back Beach	1,195,440	89,460	7.48	6,5 0	0.55	14,051	1.18
Total:	5,312,869	543,071	10.22	35,0 8	0.66	59,921	1.13

POSSIBLE RESERVES

Deposit	Tonnes of Sand	Tonnes of H. M.	Average % H. M.	Tonne Rutile	% R in Sand	Tonnes Zircon	% Z in Sand
High Dunes	8,925,000	--	--	29,4 4	0.33	25,925	0.29
Total:	14,237,869			64,5 2	0.45	85,846	0.60

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8. PRODUCTION PROGRAMME

8.1 Introduction

The production programme used as a basis for this exercise is based on a current production rate of 300 tonnes per week of saleable rutile and zircon from the dry mill, and a final production rate of 400 tonnes per week. It is anticipated that this final production level will be achieved by July 1975. The main controlling factor on this date is the delivery of the necessary equipment which has already been ordered.

The expansion programme from 300 to 400 tonnes of saleable product per week is under way, and this will achieve a production of 400 tonnes/week of product from the Lanherne and Sea Beach deposits. Further investment will be required to achieve this same production from the Back Beach deposit and if the Cowper Point deposits are mined, additional capital investment will be required prior to commencement of mining in that area. The production programme has consequently been planned in three stages with a mining sequence of Lanherne and Sea Beach followed by Back Beach followed by Cowper Point.

8.2 Parameters used in Production Estimate

The parameters used in the production estimates are :-

Average weekly production	300 tonnes now,	400 tonnes July, 1975
Operating Time	52 weeks per year	

Recoveries of :-

Dry Plant	95% of the Rutile	94% of the Zircon
Secondary	94% "	95% "
Primary	84% "	85% "
Overall	75% "	76% "

These recoveries are lower than would normally be expected in sand mining operations but are based on present performance. Recoveries should improve with the addition of new equipment to

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all sections of the plant which is part of the production expansion programme, however, for the purposes of this study, the present lower recoveries have been used.

It has been assumed in this production programme that there will be no loss of production from the dry mill whilst mining plant is transferred from one reserve area to another. This is reasonable since it will be possible to stock sufficient dry plant feed to cover the loss in primary feed during transfer operations.

8.3 Tin Production

In addition to production of rutile and zircon the mine will also produce some tin in the form of cassiterite. The amount of tin that will be produced is not yet known, since the final circuit has not yet been completed. At the moment a tin/zircon concentrate is being produced which indicates that a weekly production of 100 kgs. of tin can be expected, with the upgrading of the plant by 33%, a production of at least 300 kgs. per week of tin should be anticipated. The improvements in the primary separation plant to be carried out could result in higher tin recoveries and consequent production.

8.4 Foundry Sand

The oversize reject product from the final zircon screen contains principally zircon, kyanite, and some silica. Tests have been carried out with this material and it has been found suitable for steel foundry moulding applications. The weekly production estimate for this material is ten tonnes. Local requirements are in excess of this and a recent market survey has indicated that all of this material produced can be sold locally.

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TABLE 4

PRODUCTION PROGRAM

Year	Deposit	Reserve Type	Tonnes of Sand Mined	Average Grade H.M.	Average Grade R	Average Grade Z %	Reserve Tonnes H.M.	Reserve Tonnes R	Reserve Tonnes Z	Recovered Tonnes R	Recovered Tonnes Z	Mining Time	Yearly Tonnes R	Yearly Tonnes Z	Total R + Z
1/7/75	Lanherne	Proven	211,972	10.81	0.68	1.07	22,914	1,451	2,253	1,088	1,712	10 wks	1,088	1,712	2,800
75 - 76	Lanherne	Proven	1,574,316	10.81	0.68	1.07	169,858	10,776	16,734	8,082	12,718	52 wks	8,082	12,718	20,800
76 - 77	Lanherne	Proven	1,574,316	10.81	0.68	1.07	169,858	10,776	16,734	8.082	12,718	52 wks	8,082	12,718	20,800
	Lanherne	Proven	364,796	10.81	0.68	1.07	40,087	2,418	4,004	1,814	3,043	12 wks			
			3,725,400	10.81	0.68	1.07	402,717	25,421	39,725	19,066	30,191				
77 - 78	Sea Beach	Proven	392,029	12.98	0.79	1.57	50,894	3,097	6,145	2,323	4,670	17 wks			
			4,117,429				453,611	28,518	45,870	21,389	34,861				
	Back Beach	Proven	685,381	7.48	0.55	1.18	51,266	3,795	8,033	2,845	6,105	23 wks	6.982	13,818	20,800
	Back Beach	Proven	510,059	7.48	0.55	1.18	38,194	2,755	6,018	2,066	4,574	16 wks			
78 - 79			5,312,869				543,071	35,068	59,921	26,300	45,540				
	High Dunes	Probable	3,024,990		0.33	0.29		10,049	8,714	7.537	6,623	36 wks	9,603	11,197	20,800
79 - 80	High Dunes	Probable	4,443,584		0.33	0.29		14,761	12,801	11,071	9,729	52 wks	11,071	9,729	20,800
80 - 81	High Dunes	Probable	1,456,426		0.33	0.29		4,634	4,410	3,476	3,352	16 wks	3,476	3,352	6,828
Total			14,237,869					64,512	85,846	48,384	65,244		48,384	65,244	113,628

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9. EXPLOITATION CONCEPT

The following concept is considered best suited for mining the remaining ore reserves of the Naracoopa/Cowper Point area. Estimates of capital requirement and operating costs have been based on this concept.

9.1 Mining Method and Primary Separation

Two mining methods are used at the moment to mine the Lanherne Beach deposit. Both these methods are suitable for application in the other reserve areas and no basic changes need be made to them. Both methods are dry mining methods employing tracked bulldozers for feeding sand to slurrying and pumping units which transfer feed from the mining area to the wet separation plant. Methods differ in that the feed units themselves differ.

One feed unit is called a buried loader and employs a hopper into which the bulldozers push sand and from which the sand is transported by conveyor belts to a trommel. Oversize material and old tree roots, etc. are removed by the trommel, the undersize material goes through the trommel and into a bin where water is added and the resultant slurry is pumped to the primary plant.

The second unit is called a pot-holer and employs a cutter-suction head similar to that used on a sand dredge. This suction head is lowered into a pre-excavated sump hole into which the sand is pushed by bulldozer. The sand is mixed at the pump suction with water entering from behind the cutter head and also from a high pressure monitor directed into the stockpile. The sand slurry is them pumped by standard slurry pump to the wet mill. The cutter suction head, slurry pump and diesel motor, monitor, are all mounted on a pontoon type skid base which can be moved from mining site to mining site by bulldozers. In locations remote from the present plant area a diesel driven electricity generator would also be mounted on the pontoon.

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The capacity of the buried loader can be increased by increasing feed belt speed and pump motor and pipeline capacities. Likewise pot-holer capacity can be increased by improving the capacity of pump, motor and pipeline. An increase feed rate to buried loader or pot-holer can be achieved by adding more bulldozer capacity.

In the case of 400 tonnes per week of product from the Lanherne Beach, Sea Beach, Milford Beach and Back Beach deposits, no changes in existing mining or feed transfer equipment, other than those already underway, are required. However, if and when mining of the High Dune deposits commences, tonnage of sand mined will be increased and more mining feed transfer equipment will be required.

The Primary plant capacity is 175 tonnes per hour of sand. In order to fulfill the production programme requirement from the dry plant, the capacity of the mining equipment and primary plant will have to be upgraded. When mining the Lanherne Beach, Sea Beach and Milford Beach and Back Beach deposits, capacity will have to be 300 tonnes of sand per hour. For the High Dune deposit a throughput of 550 tonnes of sand per hour will be required.

Separation in the primary plant is by pinched sluiced trays. Expansion of capacity of this plant to 300 tonnes per hour will be carried out using similar equipment except that the new trays will have variable throats to allow improved recovery from varying grades of sand mined. In addition, the new section of the plant will contain spiral separators from which a higher concentration of primary plant product will be obtained than is the current practice. This will have the effect of lowering transport cost per tonne of saleable product when mining is in areas remote from the dry plant. Consideration will be given to the use of separation cones if and when the Cowper Point area is mined.

9.2 Primary Concentrate Transport and Handling

The present site of the primary plant is adjacent to the secondary and dry plants and the feed for the secondary plant is transported

by front end loader from the primary plant product stockpile. When mining moves to the northern extension of the Lanherne Beach, the concentrate from the primary plant will be pumped to the secondary plant.

The southern end of the Back Beach deposit is 8 kilometers from the secondary and dry plants and is 1 kilometer from an existing made road. In order to have access to the Back Beach deposit, 1 kilometer of road and one small bridge will have to be constructed. The road will be constructed of sand and trommel trash, both materials being readily available and suitable for the job. The existing made road will also have to be widened in parts. (see Figure 3).

The northern end of the High Dune deposit at Cowper Point is 12 kilometers from the plant and is adjacent to the road at that point. Alternatively, if a road 2 kilometers in length is constructed from the Back Beach deposit to the southern end of the High Dune deposit, the haulage distance from the High Dune deposit to the dry plant is reduced to 10 kilometers. Further study is required when contour maps are available before final plans are prepared. For the purposes of this report, it will be assumed that if the High Dune deposit is mined it will be mined from the southern end.

9.3 Secondary and Dry Separation

The present secondary and dry separation plants consist of spirals, wet magnets, wet tables, caustic soda attritioner, vacuum filter, kiln drier, electrostatic separators, dry magnets, screens, plate cleaners and air tables. Equipment is ordered and being manufactured to upgrade the throughput and efficiency of these plants from 300 tonnes to 400 tonnes per week of rutile and zircon, and also to produce a saleable tin product. Additions will be made to the spirals, wet magnets, wet tables, drying facilities, electrostatic separators, dry magnets, and air tables. Experience over the last year with the existing plant has indicated that the above modifications will result in the desired production.

Because of the short life of the outlying deposits, it is not feasible to move the dry plant and powerhouse nearer to the points of mining.

9.4 Zircon Milling

Investigation of the zircon flour market has indicated that the viability of the Naracoopa operation would be improved if part of the zircon production is milled to flour. With this objective in mind, a mill has been purchased and other necessary ancillary equipment ordered. It is expected that zircon flour will be available for sale during the last quarter of 1975.

The zircon product from the dry plant will pass either into a zircon sand bin for bagging, or into a bin which will feed the zircon mill. The mill will be built adjacent to the dry plant and no extra labour will be required for its operation. The mill will produce 3,000 tonnes per year of zircon flour of 200 mesh specification.

9.5 Water Supply

The present summer water supply is only just adequate for present production. Increases in production will require increases in summer water supply.

For the Lanherne Beach area, water requirement will be augmented during the summer months by pumping fresh water from a swamp which lies to the north of the Lanherne deposit.

When the Milford and Sea Beaches are mined, the pot-holer will be used and water required for mining and primary separation will come from the sea adjacent to the pot-holer.

When the Back Beach deposit is mined, a sea pump will be installed in the Blowhole area and will pump a distance of 750 meters to the mining plant. The sea line will be bolted to the sea bed which at this point is limestone. (See Figure 3).

If the Cowper Point reserves are mined then brackish water will be obtained from the Sea Elephant River adjacent to the northern end of the deposit, and sea water from the Blowhole area at the southern end of the deposit. Pumping distances would be a maximum of 2 kilometers.

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9.6 Power Supply

Power supply for mining the Lanherne, Sea, and Milford Beaches at the increased rate of production will come from the existing power plant. When mining operations move north, power supply for mining and primary separation will be supplied by portable diesel driven generators. These generators are available at the mine site, only for the Back Beach deposit.

9.7 Product Transportation

There have been many problems over the life of the mine due to the inadequacy of the shipping off the Island.

Naracoopa Rutile Ltd. shipped all their product in bulker bags from the Naracoopa jetty, originally to Stanley, then finally both north coast Tasmanian ports. This material was stockpiled in Tasmania and when sufficient quantities were available, was shipped overseas in bulk. Serious problems were encountered due to contamination in transit and rough weather conditions off the Naracoopa jetty.

Kibuka product is all bagged and stacked on to pallets, each pallet holding two tonnes of product. These pallets are plastic-covered and strapped. The pallets are either loaded on to container flats at the mine and transported by road to Grassy, or transported on the 2-tonne pallets without containers.

Grassy is the port for King Island and is situated a distance of 32 kilometers from the mine. Local haulage contractors are employed to transport the mineral from mine to port.

At Grassy the mineral is stored in a King Island Marine Board Store or is stacked on the wharf ready for shipping. Kibuka is in the process of moving a storage shed from Naracoopa jetty to Grassy port. This building will be used for mineral storage and cargo consolidation.

Generally speaking, shipping to and from the Island comes under the control of the Tasmanian Transport Commission (T.T.C.) and over the past few years the shipping services to and from the Island

has been inadequate. During the past year, Kibuka chartered a ship in order to move product stocks to Melbourne, which is now the regular transhipment port for overseas.

The present shipping service is supplied by the "Rah" which is a T. T. C. roll/toll ship with a capacity of 2,000 tonnes. This ship is more than adequate for the service. The "Straitsman", which is also a T. T. C. ship, is undergoing repairs, and will be re-commissioned in August 1975 solely for the King Island trade. This ship has 1,000 tonnes capacity and can handle the plant production from the mine as well as all other Island cargoes. In the event of the failure of either of these ships, there are, from time to time, charter ships available. No serious shipping problems are envisaged for the future.

9.8 RESTORATION

Due to the high average thickness of the ore body and the high heavy mineral content, the average acreage of ground mined per year at Naracoopa is low compared with other beach sand operations. Because of this and also because of the wet winter climate, restoration of mined areas does not present such problems as are encountered on the east coast of New South Wales. The total mining area of the Lanherne Beach deposit is 37.5 hectares. With the production planned, the average restoration rate is only 12.5 hectares per year. This is an extremely low rate.

The area of the mining leases is made up entirely of coastal scrub which is easily restored to its natural condition after mining. The method employed in restoration is to bulldoze away and stockpile all topsoil prior to mining. On completion of mining and levelling of tailings areas, the topsoil is replaced and seeded. Seeding takes place in April at the beginning of the wet season with pasture grasses and cover crop. The crop is heavily fertilised during the first year. The objective of planting the grasses is to stabilise the sand so that natural vegetation can re-establish itself. If fertiliser is added after the first year, the grass growth is encouraged to the detriment of the natural vegetation.

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The above method has been utilised very successfully on parts of the lease. The results have been examined by the local Field Naturalists Society, who have noted that none of the natural vegetation has been destroyed; the Society have expressed their opinion that the area would revert to its natural state within about two years.

..../41

10. CAPITAL REQUIREMENTS

10.1 Summary

Capital requirements have been based on the production programme and exploitation concept previously described in this report. At the present time some of the mining equipment employed is on a lease/rental basis, i. e., two bulldozers and one front end loader. The present company policy is to purchase equipment rather than to lease, and all future capital requirements have been estimated on this basis.

Capital is already committed for an expansion programme which is underway and which should be completed in two months time. Approval in principle has already been given for the installation of a zircon milling plant which will be built during the next three months. After the above two capital projects are completed the only capital required, other than replacement capital, will be an amount prior to commencement of the Back Beach deposit, and a further amount prior to the mining of the High Dune deposit atCowper Point.

A summary of capital requirements including replacement capital is given below. The details of these capital estimates can be found in Appendix 2 of this report.

Production Expansion	174;000	(committed)	1974/75
Zircon Milling	100,000	(committed)	1975/76
Back Beach	255,000		1977/78
High Dune	750,000		1978/79
	1,279,000		

10.2 Production Expansion

The amount of capital remaining to be spent on the production expansion programme is $174,000. This is all committed. On completion of this expenditure the plant should be capable of producing 400 tonnes per week of rutile plus zircon.

10.3 Zircon Milling

A secondhand zircon mill has been purchased and the necessary ancillary equipment has been ordered. Details of the capital estimate are given in Appendix 2. Delivery time on some of the quipment is three months. Consequently, it will be at least August 1975 before the plant is operational. Expenditure will be in the 1975/76 year. The capital requirement for this project is $100,000 and the pay back time will be a maximum of $1\frac{1}{2}$ years.

10.4 Back Beach Deposit

Capital requirements for mining this area are estimated to be $255,000. Details of this estimate are given in Appendix 2. The capital expenditure is incurred due to change of mining site only, no plant alterations are envisaged. The main items of expenditure are water supply and access road ($62,000), front end loader ($54,000), workshop and employee facilities ($26,000), additional housing ($30,000). This capital will be expended in the first half of the year 1977/78.

10.5 High Dune Deposit

If this deposit is mined capital requirement for upgrading the mining and primary separation rate to 550 tonnes of sand per hour, is $750,000. The majority of this capital would be expended on bulldozers ($220,000), primary separator expansion ($308,000). Capital expenditure would be in the year 1978/79.

10.6 Replacement Capital

In addition to capital required for production expansion and changing mine sites, it is necessary from time to time to replace capital equipment such as bulldozers, loaders, vehicles, etc. A summary of the capital requirement for this purpose is as follows :

1975/76	$105,000
1976/77	125,000
1977/78	150,000
1978/79	150,000
1979/80	200,000
	$730,000

Details of this estimate are given in Appendix 2.

10.7 Capital Phasing

The phasing of capital expenditure over the rest of the mine life, based on the production programme and mining concept, is as follows :

1974/75	$174,000
1975/76	205,000
1976/77	125,000
1977/78	405,000
1978/79	900,000
1979/80	200,000
	$2,009,000

..../44

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11. PERSONNEL AND HOUSING

The present personnel and future personnel requirements are given below. These estimates for future requirements are based on the exploitation concept outlined in Section 8 of this report.

11.1 Staff Personnel

Administration:	Manager	*
	Asst. to Manager	*
	Manager's Secy.	(O)
	Accountant	*
	Bookeeper	(O)
	Stenographer/Time Clerk	(O)
	Storekeeper	(O)
	Laboratory Supervisor	*
Production & Maintenance:	Production Manager	*
	Dry Plant Superintendent	*
	Wet Plant Superintendent	*
	Plant Maintenance F'man	*
	Diesel & Powerhouse "	(O)
	Electrical Foreman	(L)

* These people live in company owned houses.
(O) These people live in their own houses.
(L) These people live in company leased houses.

In addition to the above staff the Company Secretary/Treasurer in Sydney performs some financial duties to do with collecting sales revenue and arranging operating finance. All other work concerned with the running of the company is done by the Island staff.

A geologist is seconded from Sydney office to carry out work on exploration.

The expansion programme, including zircon milling and mining of Beach Beach and High Dune deposits, will not require any further permanent staff, but it will be necessary when designing the Cowper Point plant to engage a contract draftsman for a short period.

11.2 Workforce Personnel

The present workforce personnel and future requirement is given below.

	Now	Back Beach	High Dune
Shift Chargeman	2	2	2
Bulldozer Drivers	3	3	5
Buried Loader Operators	4	4	4
Primary Plant Operators	2	2	2
Secondary Plant Operators	3	3	3
Dry Plant Operators	3	3	3
Powerhouse Attendants	4	4	4
Trainee Operators	3	3	3
Front End Loader Driver	1	2	2
Boilermakers	3	3	3
Diesel Fitters	3	3	3
Greasers	1	1	1
Carpenters	2	1	1
Motor Mechanic	1	1	1
General Labour	-	2	2
Laboratory	3	3	3
Single Quarters	3	3	3
Drilling	2	2	2
	43	45	47

In addition to the above manpower, bagging, palletising and trucking of mineral, is done by contractors. It is proposed to continue this practice and also in future to use contractors for trucking the heavy mineral concentrate from the northern deposits to the dry plant.

11.3 Housing

The company owns 14 houses and is leasing on a long term basis a further 10. Single accommodation is available for 17 people, of which 3 are contractors. The total available company accommodation is therefore 38 out of a total personnel of 56. The remaining 18 people are local residents and do not require company housing. It is expected to retain this percentage of local employees in the future.

11.4 Conditions of Employment - Industrial Employees

The minimum requirements are those set down in the Federal Gold and Metalliferous Mining Award 1968, as amended from time to time by the Commonwealth Conciliation and Arbitration Commission.

However, because of the location of the company's operations, it has been decided to adopt the provisions, as near as practicable, of the King Island Scheelite Industrial Agreement, which has resulted from negotiations between King Island Scheelite and the appropriate Unions.

The current King Island Scheelite Industrial Agreement became operative 21st May 1974 and remains in force until 20th May 1976 with provisions to re-negotiate wage rates and single accommodation and messing charges 21st May, 1975.

The major provisionsof the Industrial Agreement are as follows :-

Annual Leave

Four weeks per annum, plus 17½% loading together with return air fares to Melbourne or Launceston for employee and his family once per year.

Sick Pay:

Sixty-four hours per annum, accumulating.

Service Pay:

During 1st year of service - $15.00 per week.
During 2nd year of service - $16.00 per week
During 3rd year of service - $18.00 per week
During 4th year of service and thereafter - $20.00 per week

Hours of Work:

Forty hours per week

Single Accommodation:

$13.00 per week (full board)

056

In addition to the provisions of the King Island Scheelite Industrial Agreement, Kibuka Mines Pty. Ltd provides housing of such married employees as is practicable at a rental of $10.00 per week with free electricity.

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057

12. SALES AND REVENUE

12.1 Current Sales Commitments

Sales commitments for 1975 total 5,000 tonnes rutile and 5,000 tonnes zircon to Derby & Company Ltd. of London, England. This material is to be supplied at the rate of 1,250 tonnes of each per quarter.

The gross sales price of this contract is $338.00 per tonne for both rutile and zircon. Net proceeds to Kibuka after deduction of Derby & Company (Australia) Pty. Ltd. 5% commission, is $321.1 per tonne of product. The respective sales specifications are :-

Rutile	TiO_2	95% minimum
	Fe_2O_3	1% maximum
	ZrO_2	1% maximum
Ziroon	ZrO_2	65% minimum
	TiO_2	.3% maximum
	Fe_2O_3	.15% maximum

These are the only sales commitments that Kibuka have.

12.2 Further Sales, 1975

Estimated excess of production over sales commitments to the end of 1975 is 1,500 tonnes rutile and 4,000 tonnes zircon. It is planned to mill 1,500 tonnes of this excess zircon and sell as zircon flour. Unless long term contracts are signed in the meantime this excess production will be sold on a spot-sale basis. Anticipated prices are between $290 and $330 per tonne for both rutile and zircon. For the purposes of the evaluation, a price of $310 has been assumed for the further sales of rutile and $280 for zircon during 1975.

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12.3 Product Prices - Long Term

The new minesin Western Australia are at least six months behind schedule and can not fill their present sales contracts. The Jennings operation at Eneabba/Geraldton is having problems in producing zircon up to sales specification. The Dillingham/Murphyores Frazer Island project is going ahead against strong conservationist opposition but is also behind schedule. Production from the older east coast New South Wales producers is down.

It is considered advisable to sign up 75% of the mine production on contract and to retain 25% for short forward sales. It is planned to negotiate forward sales contracts for the next three years for rutile, zircon sand and zircon flour during the latter half of 1975. These contracts will have escalation clauses to cover increasing production costs due to inflation. Depending on the situation at the time, these contracts will be negotiated directly with the users or through Derby & Company (Australia) Pty. Ltd.

Beneficiated ilmenite (B.I.) could be a serious competitor to natural rutile by 1977. When Western Titanium have their process in full production, they will be marketing approximately 45,000 tonnes per annum of B.I., with a Ti02 content of about 94%, but production costs will be in excess of Kibuka production costs. It is also doubtful whether the B.I., which is fine-grained, will be suitable for use in welding manufacture. If it is not suitable, a high and increasing level of demand will continue for the natural rutile available from Kibuka, over and above the pigment consumption requirement.

The zircon market is not so influenced by problems of substitution, except perhaps in the foundry sand area where because of recent high prices, foundry users have turned to some extent to using chromite sands. The development of zircon brick usage in steel ladels has only recently started. Demand for zircon in this field will increase at a high rate. By milling part of Kibuka's production and producing zircon flour suitable for ceramic uses, it will be possible to take advantage of the ceramic field which should continue to expand.

Base prices for rutile and zircon should not be less than $200 and $150 per tonne respectively for the life of the mine and a differential of at least $30 per tonne for zircon flour can be reasonably expected since custom milling costs are of that order.

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12.4 Foundry Sand

A reject product from the zircon circuit which is +72 mesh in size, contains most of the kyanite (Al_2SiO_5) found in the deposit together with the zircon of +72 mesh size. A typical chemical analysis of this product is :

ZrO2	45.7%
Al2O3	18.9%
SiO2	1.52%
TiO2	.24%
Fe2O3	.22%

This material has been proved to be ideal for steel moulding and can be sold locally in competition with zircon sand and chromite sand. A price of $200 per tonne will be possible during 1975. The product is under trial by Melbourne users and quantities are being shipped to Melbourne store for sale.

Annual sales of 500 tonnes of this material at a value of two-thirds that of zircon sand has been used in the final evaluation.

12.5 Tin

There is insufficient knowledge available at the moment concerning tin recovery to estimate reliably revenue from this source. It has not therefore been used in the evaluation.

12.6 Sales Agreement

Currently all sales are made through Derby & Company (Australia) Pty. Ltd. who have a sales agreement with Kibuka to sell all production. This agreement terminates in November, 1975 and is up for re-negotiation six months prior to that date, i.e., May, 1975. At this stage it is not known whether Kibuka will continue to use Derbys as their sole agents or whether Kibuka will take over its own sales or use some other agent.

060

13 PRODUCTION COSTS

13.1 Summary

The total production costs related to Free In Store Melbourne (F.I.S.), less any depreciation costs, for the three mining areas would be as follows for a production rate of 400 tonnes per week of rutile plus zircon.

Lanherne Beach	Rutile and zircon	$ 93.69 per tonne
	Zircon Flour	$103.69 "
Back Beach	Rutile and zircon	$104.44 "
	Zircon Flour	$114.44 "
High Dune	Rutile and zircon	$120.00 "
	Zircon Flour	$130.00 "

13.2 Lanherne Beach

The production costs for mining the Lanherne Beach area are known accurately and details are given in Appendix 3.

The total cost of production for the year to date, i.e., 1974/75 is $900,072.00. This covers all costs other than bagging, palletising, road and sea transport, which amount to $36.00 per tonne of product. These latter costs are related directly to tonnage handled and are a function of the amount of saleable mineral produced.

The planned increase in production will require no additional personnel and the production costs will remain the same. The production costs in the case of the Lanherne Beach area therefore can be taken as $1,200,000.00 per year or $23,076.00 per week, with an additional $36.00 per tonne to cover handling. With the planned annual production of 20,800 tonnes, the cost per tonne of finished product, F.I.S. Melbourne, would be $57.69 plus $36.00 equals $93.69 per tonne, say $94.00 per tonne.

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13.3 Back Beach Area

Costs of production in the Back Beach area would be greater than in the Lanherne Beach area because of the trucking costs incurred in transporting the heavy mineral concentrate from the primary concentrator to the dry plant. There will also be increases in pumping, power and maintenance costs, due to the location of the mining area. Approximately 2,800 tonnes of concentrate will be produced by the primary concentrator per week for trucking to the dry plant. The average trucking distance is 10 kilometers and Island trucking costs are of the order of 10¢ per tonne/kilometer. The additional costs incurred in trucking therefore would be $145,600.00 per year or $2,800.00 per week.

The estimated additional cost due to pumping, power, and front end loader operation, would amount to a further $78,000.00 per year or $1,500.00 per week.

The cost differential between Lanherne Beach deposit and Back Beach deposit would therefore be $223,600.00 per year or $4,300.00 per week. The total annual cost for Back Beach production would be $1,423,600.00 per year. This represents a mine production cost of $68.44 per tonne and an F.I.S. cost of $104.44 per tonne.

13.4 High Dune Deposit

The cost of mining the High Dune deposit would be higher than the Back Beach deposit and Lanherne Beach deposit. The main areas of increase of costs would be in mining and primary concentration trucking and restoration.

Mining and primary separation costs would be increased by $288,000.00 per year. This cost increase is incurred mainly in increased bulldozer hours, power costs, labour costs and maintenance costs, due to larger plant size. Additional trucking costs would amount to $29,000.00 over Back Beach trucking costs and restoration costs would require a further $26,000.00 per year.

This gives a total yearly estimate of production costs of $1,766,600.00. The cost at the mine would be $84.00 per tonne and the F.I.S. cost, $120.00 per tonne.

13.5 Ziroon Flour

The cost of producing zircon flour from zircon product has been estimated at $9.31 per tonne. This cost is made up of power cost, grinding media, maintenance labour and materials. The cost of producing zircon flour from the various mining areas would therefore be :

Lanherne Beach	$103.00 per tonne
Back Beach	$113.75 "
High Dune	$129.31 "

14. ECONOMIC EVALUATION

14.1 General

This economic evaluation of the mining operation at Naracoopa is calculated as of April 1975. Bases for the evaluation are the production programme, mining concept, market prices production costs, and capital requirements outlined in the previous sections of this report. The evaluation has been arrived at by projecting a cash flow for the life of the mine and from that cash flow arriving at a present value for the property by discounting at 15%, 20% and 25%. Details of the figures used in the cash flow are indicated below. The projected cash flow is given in Table 5.

14.2 Revenue

Revenue is obtained by selling rutile and zircon sand and in future revenue will also be obtained by selling zircon flour and foundry sand. Revenue is given in todays dollars and has been arrived at by multiplying the forecast production of each product by the estimated sales price. The sales prices used in the calculation are given below.

Current Sales to mid-1975/76:	Rutile $321/tonne Zircon$ 321/tonne
1976-76 (2nd half of year):	Rutile $310/tonne Zircon $280/per tonne Zircon flour differential $30/tonne Foundry sand $200/per tonne
1976 onwards:	Rutile $250/tonne Zircon $175/tonne Zircon flour differential $35/tonne Foundry sand $125/tonne

All these prices represent net revenue to Kibuka after sales commission has been deducted.

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The revenue by year is as follows :-

Revenue from Rutile and Zircon Sand

Year	Tonnes	Rutile Value $/tonne	Value of Sales $	Tonnes	Zircon Value $/tonne	Value of Sales $	Total
74-75	1088	$321	349248	1712	$321	549552	898800
75-76	2500	$321	802500	2500	$321	802500	6196460
	5582	$310	1730420	10218	$280	2861040	
76-77	8082	$250	2020500	12718	$175	2225650	4246150
77-78	6982	$250	1745500	13818	$175	2418150	4163650
78-79	9603	$250	2400750	11197	$175	1959475	4360225
79-80	11071	$250	2767750	9729	$175	1702575	4470325
80-81	3476	$250	869000	3352	$175	586600	1455600
Total:			12685668			13105542	25791210

Revenue from Zircon Flour and Foundry Sand

Year	Tonnes Flour	Differ-ential	Extra Revenue	Tonnes Sand	Value/ Tonne	$ Value	Total
75-76	3000	$30/tonne	90000	600	$200	120000	210000
76-77	3000	$35	105000	600	$126	75600	180600
77-78	3000	$35	105000	600	$126	75600	180600
78-79	3000	$35	105000	600	$126	75600	180600
79-80	3000	$35	105000	600	$126	75600	180600
80-81	1500	$35	52500	300	$126	37800	90300
Total:			562500			460200	1022700

...../56

14.3 Production Costs

Mine production costs are calculated using the production programme given on Table 4 which indicates the number of weeks that will be mined in each area. Weekly cost estimates outlined in Section 13 of this report have been used. The additional costs incurred in production of zircon flour is added in relation to the number of tonnes of zircon flour produced. The bagging, haulage and sea transport costs is added per year in proportion to the number of tonnes of rutile, zircon and foundry sand produced. This cost is not applied to zircon flour as this product will only replace an equivalent amount of zircon sand. There is no production cost included for foundry sand as this is a by-product and has previously been considered as reject material. However, the bagging and transport cost is applied. The production costsused in the cash flow are as follows :-

Mine Costs

Year	Deposit	Weeks	$/Week	$ Total	$ Annual Total
74-75	Lanherne	10	23076	230760	230760
75-76	"	52	23076	1199952	1199952
76-77	"	52	23076	1199952	1199952
77-78	"	12	23076	276912	
	Sea Beach	17	23076	392292	
	Back Beach	23	27377	629671	1298875
78-79	Back Beach	16	27377	438032	
	High Dune	36	33973	1223028	1661060
79-80	High Dune	52	33973	1766596	1766596
80-81	"	16	33973	543568	543568
Total:		286		7900763	7900763

Flour Milling Costs

The flour milling cost has been taken as $10 per tonne. This has been applied at the rate of $30,000 per year from 1975 to 1980. In the year 1980-81 the production cost applied is $15,000.

..../57

Bagging, Haulage and Shipping Costs

Bagging, haulage and shipping costs amount to $36 per tonne of saleable product. The total shipping costs have been arrived at by multiplying total shipping tonnes of rutile, zircon and foundry sand by $36. The annual shipping costs are as follows :-

74-75	2800 tonnes	@ $36/tonne	= $100,800
75-80	21400 "	@ $36/tonne	= $770,400 per year
80-81	7128 "	@ $36/tonne	= $256,608

14.4 Capital

The capital estimates given in Section 12 of this report have been used in the cash flow. Estimates of capital expenditure have been deducted from the pre-tax cash flow in the year that the expense is anticipated. This is not strictly as it would happen in practice but makes very little difference to the evaluation.

14.5 Tax

No tax has been deducted from profit in 1974/75 because previous operating losses will still be being paid off over this period. Payment of tax for the following years has been deferred one year as would be the actual case.

14.6 Salvage Value of the Mine

In addition to the mine, Kibuka owns various houses on King Island. Housing is generally in short supply on the Island - the other main house owner is King Island Scheelite whose operations are projected for a much longer life than the Naracoopa mine. Consequently, Kibuka houses and land could be sold at any time and are valued at a total of $157,427.00.

A schedule of these properties is given below.

...../58

Description	Value $
94 acres, Naracoopa	100
2 lots, Naracoopa	240
Charles Street, Currie	7,900
North Road, Currie	7,200
North Road, Currie	7,200
Jaycee Street, Currie	10,656
Lighthouse Street, Currie	7,874
John Street, Currie	7,374
Esplanade, Naracoopa	5,856
Esplanade, Naracoopa	5,983
Howard's Farm - 4 houses	63,876
Barracks, Naracoopa	32,768
Oil Store, Naracoopa	400
Beach Road, Currie	13,500
Total:	$157,427

In addition to the above the plant and equipment presently used for mining and concentrating would have some resale value on termination of operations. Much of the equipment will be in good condition and resaleable. However, for the purpose of this evaluation, no allowance has been made for this.

14.7 Conclusions

The resultant projected cash flow has been discounted at 15%, 20%, and 25% and the net present value of the property at these discount rates are given below. In addition to this, to arrive at the true value, real estate value of $157,427 should be added as should the present value of the mineral stocks which amount to $341,568.92.

For a return on capital of 15%, the net present value of the property is $5,770,849.

For a return on capital of 20%, the net present value of the property is $5,388,432.

For a return on capital of 25%, the net present value of the property is $5,058,035.

. . ./59

TABLE 5

PROJECTED CASH FLOW PROVEN AND PROBABLE RESERVES

KIBUKA MINES NARACOOPA PROPERTY

YEAR	74 - 75	75 - 76	76 - 77	77 - 78	78 - 79	79 - 80	80 - 81	81 - 82	TOTAL
Production - Tonnes									
Rutile	1,088	8,082	8,082	6,982	9,603	11,071	3,476		48,384
Zircon	1,712	12,718	12,718	13,818	11,197	9,729	3,352		65,244
Zircon Flour	-	3,000	3,000	3,000	3,000	3,000	1,500		18,000
Foundry Sand	-	600	600	600	600	600	300		3,300
Revenue									
Rutile	349,248	2,532,920	2,020,500	1,745,500	2,400,750	2,767,750	869,000		12,685,668
Zircon	549,552	3,663,540	2,225,650	2,418,150	1,959,475	1,702,575	586,600		13,105,542
Zircon Flour	-	90,000	105,000	105,000	105,000	105,000	52,500		562,500
Foundry Sand	-	120,000	75,600	75,600	75,600	75,600	37,800		460,200
Total Revenue	898,800	6,406,460	4,426,750	4,344,250	4,540,825	4,650,925	1,545,900		26,813,910
Costs - $									
Mine Cost	230,760	1,199,952	1,199,952	1,298,875	1,661,060	1,766,596	543,568		7,900,763
Bagging & Transport	100,800	770,400	770,400	770,400	770,400	770,400	256,608		4,209,408
Milling (Flour)	-	30,000	30,000	30,000	30,000	30,000	15,000		165,000
Total Cost	331,560	2,000,352	2,000,352	2,099,275	2,461,460	2,566,996	815,176		12,275,171
Gross Profit	567,240	4,406,108	2,426,398	2,244,975	2,079,365	2,083,928	730,724		14,538,738
Capital									
New Capital	174,000	100,000	-	255,000	750,000	-			1,279,000
Replacement Capital	-	105,000	125,000	150,000	150,000	200,000			730,000
Total Capital	174,000	205,000	125,000	405,000	900,000	200,000			2,009,000
Pre Tax Cash Flow	393,240	4,201,108	2,301,398	1,839,975	1,179,365	1,883,928	730,724		12,529,738
Tax at 42.5%	-	-	1,785,471	978,094	781,989	501,230	800,669	310,557	5,158,010
After Tax Cash Flow	393,240	4,201,108	515,927	861,881	397,376	1,382,698	(69,945)	(310,557)	7,371,728
N.P.V. @ 15%	393,240	3,653,136	390,115	566,700	227,200	687,445	(30,239)	(116,748)	5,770,849
N.P.V. @ 20%	393,240	3,500,921	358,282	498,773	191,635	555,675	(23,424)	(86,670)	5,388,432
N.P.V. @ 25%	393,240	3,360,886	330,193	441,283	162,765	453,082	(18,286)	(65,128)	5,058,035

../60

APPENDIX 1 - ORE RESERVES

A summary of ore reserves is given in Table 3. The details of the reserves are as follows :

1. PROVEN RESERVES

1.1 Lanherne Beach

The Lanherne Beach Deposit is located at the southern end of Sea Elephant Bay on the eastern side of the Frazer River (see figure 3). The deposit is an old strandline or raised beach with a surface contour of about 11 meters above sea level.

The area was first drilled by Mt. Costigan Mines on a 400 ft. x 100 ft. grid at right angles to the beach line and later checked by McMahon & Partners in 1967.

Kibuka first drilled the deposit on a 100m x 50m grid which was later filled in to a 50m x 25m grid. The density of drilling has allowed the calculated reserves to be classified as proven.

The ore reseves were calculated entirely on the results obtained by drilling carried out by Kibuka.

The reserves of rutile and zircon were determined using chemical assay results obtained by R.K. Newman. All heavy mineral values used were determined by Kibuka.

A tonnage factor of 1.60 tonnes/cubic meter and an arbitrary cut-off grade of 2.5% H.M. was used in the ore reserve calculation.

In May, 1974, the reserves were calculated using influence area-depth method and were found to be :-

Tonnes Sand	Tonnes H.M.	% H.M.	Tonne Rutile	% R	Tonnes Zircon	% Z
4,338,300	466,952	10.76	29,783	0.69	45,155	1.04

...../61

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534071

The reserves were re-calculated using the cross-section method and at the time of writing this report were :-

Tonnes Sand	Tonnes H. M.	% H. M.	Tonnes Rutile	% R	Tonnes Zircon	% Z
3,725,400	402,717	10.81	25,421	0.68	39,725	1.07

The Lanherne Beach Deposit which is currently being mined is located within the existing mineral leases at Naracoopa.

1.2 Milford and Sea Beaches

The Milford and Sea Beach reserves occur adjacent to and east of the Lanherne Beach Deposit (see figure 3). Milford Beach is an old strandline approximately 2 meters above sea level. Sea Beach is the present beach at Naracoopa.

Detailed drilling of these beaches was first carried out by Mount Costigan Mines on a 400 ft x 100 ft grid at right angles to the beach line.

McMahon & Partners conducted a hand drilling program to check the reserves obtained by Mount Costigan Mines. Results confirmed the volume of sand, but owing to the adoption of different conversion factors, the tonnage of rutile and zircon was slightly lower.

These beaches, which were mined during the period from 1968 to 1970, have been recropped with heavy mineral by the sea.

For a short period during 1974, the tails from the primary plant were placed on the beaches. These tails have only contributed marginally to the reserves.

The reserve calculation is based on drilling carried out on a 25m x 10m grid during late 1974. The reserves of rutile and zircon have been determined using grain counts done by Kibuka. Chemical assays from R. K. Newman for rutile and zircon were not available at the time of writing. Grain counts were done on

..../62

071

composites of heavy mineral obtained from 100m sections of the beach.

The mineable reserves of Milford and Sea Beaches are :

Tonnes Sand	Tonnes H. M.	% H. M.	Tonnes Rutile	% R	Tonnes Zircon	% Z
392,029	50,894	12.98	3,097	0.79	6,145	1.57

Part of the beaches are excluded from mining due to the presence of submarine cables in that area and are not included in the reserves.

1.3 Back Beach

The deposit occurs north of the depositsat Naracoopa and south-west of Cowper Point (see figure 3). It is the largest, most extensive, and highest grade strandline so far located in the area.

Drilling first located the deposit in 1967 when it was drilled on a 1,000 ft x 100 ft grid. Detailed drilling by Kibuka on a 50m x 25m grid indicated a deposit approximately 2,250 meters long and 50 meters wide.

The ore reserves are calculated entirely on Kibuka's drilling results. Grain counting by Kibuka was used to determine the percentages of rutile and zircon for the ore reserves.

The reserves set out below are the preliminary ore reserves calculated using the influence area-depth method.

Tonnes Sand	Tonnes H. M.	% H. M.	Tonnes Rutile	% R	Tonnes Zircon	% Z
1,195,440	89,460	7.48	6,550	0.55	14,051	1.18

The final ore reserves will be calculated using the cross-section method when topographic maps of the area become available.

...../63

2. PROBABLE RESERVES

2.1 High Dunes

This deposit is located adjacent to the coast at the northern end of Sea Elephant Bay (see figure 3) and covers an area of approximately 3,000m x 300m.

The deposit was first drilled by McMahon & Partners in 1967 using a 1,000 ft x 100 ft grid. The ore indicated was 11,885,500 tonnes of sand with an average grade of 0.28% rutile and 0.25% zircon using a cut-off grade of 1.5% H.M.

Re-interpretation of McMahon's drilling results by Colin Gibson, a consulting geologist to Kibuka, using a cut-off grade of 2.5% H.M., still indicated substantial reserves of material.

The reserves indicated are :

Tonnes Sand	Tonnes Rutile	% R	Tonnes Zircon	% Z
8,925,000	29,444	0.33	25,925	0.29

Drilling by Kibuka on a 100m x 25m grid was commenced in January, 1975, and is still continuing.

It is considered that the density of drill holes at the completion of this initial drilling program will be sufficient to allow a preliminary proven ore reserve calculation to be done.

The drilling grid in this area will be closed to 50m x 25m for final ore reserves and mine planning.

...../64

APPENDIX 2 - CAPITAL REQUIREMENTS

APPENDIX 2

CAPITAL REQUIREMENTS

1. Summary

The capital requirements for the various stages of the mine exploitation, based on the concept described in section 9 of this report, are summarised below.

Year	Project	$	Replacement Capital	Total
1974-75	Production Expansion	174,000		174,000
1975-76	Zircon Milling	100,000	105,000	205,000
1976-77	-----		125,000	125,000
1977-78	Back Beach Deposit	255,000	150,000	405,000
1978-79	High Dune Deposit	750,000	150,000	900,000
1979-80	-----		200,000	200,000
		1,279,000	730,000	2,009,000

. . . . / 65

075

534076

2. 1974-1975 CAPITAL ESTIMATE

Capital estimates have been made and have been approved by the Board of Directors for the purposes of maintaining present production and expanding that production to 400 tonnes/week of saleable product.

The expenditure that has been approved is given below as are the amounts that have been spent to date and which areoutstanding at 31st March, 1975.

	Approved $	Spent $	To Spend $
Mining Equipment	118,100	101,999	16,101
Primary Plant	58,100	2,676	55,424
Secondary Plant	57,850	31,596	26,254
Dry Plant	40,500	17,116	23,384
Workshop Equipment	3,600	2,522	1,078
Light Vehicles	9,000	13,113	(4,113)
Housing	24,000	8,075	15,925
Laboratory	2,525	593	1,932
Internal Telephones	860	809	51
Electric Motors	2,800		2,800
Contingencies	44,665	9,145	35,520
Total:	362,000	187,644	174,356

The outstanding amount will be expended during the next three months, i.e., in the 1974-75 financial year.

...../66

3. ZIRCON MILLING CAPITAL REQUIREMENT

Approval has been received from the Board of Directors to purchase a zircon mill. The capital estimate for purchasing and installing this mill is given below.

6' x 60" Harding Conical Ball Mill with Separator, Gearbox and Cyclone	18,500
9/6 Merco Pulsaire Dust Collector	2,500
Mill Fan - Richardson 3m x 5 c/w 5 hp Motor	1,500
Ni-Hard Liners - 1 set	13,000
Rotary Air Locks - 2 off	2,000
Exhaust Fan "Richardson" No. $1\frac{1}{2}$	850
St. Regis Bagging Machine	7,000
120 hp, 960 rpm Slip Ring Motor and Starter	6,500
Ball Charge and Spare Charge	2,200
Compressor 280 cfm 100 psi	900
Elevator	2,000
Feed Bin 24' x 6' D	2,000
Product Bin 14 tonne capacity	1,500
Electric Wiring	3,500
Building c/w concrete floors, 60' x 30' x 35'	10,000
Mill Foundations	2,000
Supports, access ways and floors	3,000
Freight	4,000
Mill Installation	1,800
Ducting	1,200
Contingencies	10,000
Total:	95,950

The majority of this capital will be expended in 1975-76.

. . . /67

077

4. CAPITAL REQUIREMENT BACK BEACH DEPOSIT

Before mining can commence on the Back Beach Deposit, the following capital expenditure will be necessary :-

4.1 Summary

	$
Access Road	10,000
Water Supply	52,000
Mining Pipes	30,000
Mineral Transport	54,000
Workshop facilities	20,000
Communications	5,500
Employee facilities	6,000
Transportation of plant	15,500
Housing	30,000
	223,000
Contingencies	32,000
	255,000

This capital would be expended in the year 1977-78.

4.2 Access Road

In order to move equipment and plant into the mining area it is necessary to construct one kilometer of road. A sand-based road with trommel trash surface will be adequate for the traffic.

The cost of constructing this road would be $10,000.

. . . /68

4.3 Water Supply

Sea water would be used in the mining and primary separation processes. Water would be delivered to the site from the sea in the vicinity of the Blowhole. A new diesel driven pump would be required and a new steel pipeline. The suction pipe would require bolting to the sea bed.

The cost of purchasing and installing this system would be :-

Pump	14,000
Diesel Engine	14,000
Pipe and Flanges	20,000
Installation	4,000
Total:	$ 52,000

4.4 Mining Pipes

In addition to the water supply a large quantity of new mining pipes will be required. The estimated cost for these pipes is $30,000.

4.5 Mineral Transport

Concentrate from the primary plant will be stockpiled, loaded into dump trucks and transported to the dry mill at Naracoopa. An extra front end loader will be required for loading trucks and road maintenance.

The cost of a Cat. 950 would be $54,000.

Dump trucks would not be required as this work would be contracted out to a local contractor.

...../69

4.6 Workshop Facilities

Maintenance personnel would still be based at Naracoopa where the main workshop facilities would remain. In order to facilitate maintenance on the mining and primary plant, a workshop would be required together with welding equipment, tools, etc. The workshop would be mounted on a semi-trailer.

The estimated cost of workshop and tools and equipment is, $10,000.

A service vehicle would be necessary for servicing bulldozers, diesel motors, etc. The cost of a 4-wheel drive vehicle equipped with air compressor, lube oil storage tank, etc. would be $10,000.

4.7 Communications

The cheapest and best method of communication between the mining and primary separation plant and the dry plant etc would be by two-way radio. A complete system, fully installed would cost $5,500.

4.8 Employee Facilities

It would be necessary to have showers, toilets, and an equipped lunch room on site in order to cut out travelling time. The cost of a mobile facilities unit, secondhand, on the Island, would be $6,000.

4.9 Transportation of Plant

It would be necessary to break up the mining and primary separation plants into pieces of transportable size and to re-build on the new site. The estimated cost of this operation is :-

Labour	6,000
Hire of Crane	1,500
Hire of Low Loader	3,000
Repairs to Damage	2,500
Electrical	2,000
	$15,000

...../70

4.10 Housing

Additional housing would be required for increase of staff. Estimate for single quarters block and house is $30,000.

..../71

5. CAPITAL REQUIREMENT HIGH DUNE DEPOSIT

In order to mine the lower grade High Dune deposit of the Cowper Point area and to continue to produce rutile and zircon at the same rate from the dry plant it will be necessary to increase the throughput of the mining and primary separation plants to 550 tonnes per hour.

Capital requirement for this expansion has been estimated as follows :

5.1 Summary

	$
Road Construction	20,000
Water Supply	25,000
Mining Equipment	220,000
Primary Concentration	308,000
Power Supply	40,000
Total:	613,000
Contingencies	137,000
Total:	750,000

This capital would be expended in the year 1978-79.

. . . /72

5.2 Road Construction

To give access to the southern end of the High Dune orebody in order to transport equipment in and heavy mineral concentrate out, it will be necessary to construct two kilometers of road. The cost of constructing this road would be $20,000.

5.3 Water Supply

The same pump and motor would be used as for the Back Beach deposit but additional pipeline would be required. The cost of this pipeline would be $25,000.

5.4 Mining Equipment

The mining rate of this deposit would be approximately double those previously mined. Two additional bulldozers would be required in order to be able to mine, level tails, and have standby capacity. The cost of two Cat. D8 bulldozers would be $220,000.

The buried loader pumps and motors would be suitable for handling the tonnage when turbo-charged and after cooled.

5.5 Primary Concentration

The capacity of the primary concentration plant would be increased by 250 tonnes per hour. A 250 module to work side by side with the 300 tonne plant would cost as follows :

	$
Trays (100 starts)	78,000
Spirals (56)	20,000
Head Feed pumps	15,000
Tails pumps	15,000
Scavenger pump	10,000
Spirals pump	10,000
Cleaner pump	10,000
Cons pump	5,000
Structure & Cladding	30,000
Bins	50,000
Instrumentation	15,000
Pipes & Hoses	5,000
Assembly	15,000
Freight	10,000
Design	20,000
Total:	308,000

5.6 Power Supply

A larger portable diesel engined electrical generating set would be required for this area. The cost of such a set and appropriate housing, cooling equipment, etc. would be $40,000.

6 REPLACEMENT CAPITAL

In addition to the new capital requirements authorised previously, it will be necessary from time to time to buy replacement bull-dozers, front end loaders, trucks, light vehicles, diesel engines, pumps, dryer shells, etc. The estimated requirement is given below :

$ x 1,000

	75-76	76-77	77-78	78-79	79-80	Total
Bulldozers	50	50	50	50	100	300
Front End Loaders	25	25	25	50	50	175
Trucks	10		10			20
Light vehicles	10	10	10	10	10	50
Diesel engines		15	15	15	15	60
Pumps		15	15	15	15	60
Dryer Shell			15			15
Miscellaneous	10	10	10	10	10	50
Total:	105	125	150	150	200	730

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APPENDIX 3 - PRODUCTION COSTS

3.1 Summary of Actual Mining Costs for 1974-75 to Date

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APPENDIX 3 - PRODUCTION COSTS

3.1 Summary of Actual Mining Costs for 1974-75 to Date — Mining & Dredging - A/cs 101-106

	3/8/74	31/8/74	28/9/74	31/10/74	30/11/74	31/12/74	31/1/75	28/2/75	31/3/75
Wages	10673	10534	10347	9190	10727	11639	13847	9743	8894
Accrued Wages(Dr)				1630	2680	1188	(215)	-	336
Accrued Wages(Cr)				-	(1630)	(2680)	(1188)	215	
Sub-Total	10673	10534	10347	10820	11777	10147	12444	9958	9260
Stores Issued	303	1582	-	1755	-	-	-		
Distillate	1223	1012	934	1400	1658	1505	1851	1470	1629
Power Generation	360	384	517	766	1308	1441	558	861	877
Lease Rentals	1191	1191	1191	1191	1191	1191	1722	1722	1722
Direct Charges	1372	2115	7219	834	2225	4016	7846	1437	3301
Accrued Creditors (Dr)	1098	4341	2834	5581	701	7798	1435	1256	1687
Accrued Creditors (Cr)	(903)	(1098)	(4341)	(2834)	(5581)	(701)	(7798)	(1435)	(1256)
Transfers									
Monthly Totals	15295	20060	18701	19513	13279	25397	18058	15269	17220
Cumulative Total		35355	54056	73569	86848	112245	130303	145573	162793
Average per Period		17678	18018	18392	17369	18707	18615	18197	18088

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534088

280

Primary Concentration - A/cs 201-203

	3/8/74	31/8/74	28/9/74	31/10/74	30/11/74	31/12/74	31/1/75	28/2/75	31/3/75
Wages	4221	3471	2825	3240	2886	2037	3038	2685	2170
Accrued Wages (Dr)				660	720	340	(44)	44	116
Accrued Wages (Cr)					(660)	(720)	(340)		
Sub-Total	4221	3471	2825	3900	2946	1657	2654	2729	2286
Stores Issues	25	396	-	52	-	-	-		
Distillate Usage	382	142	10	222	152	124	(27)	245	266
Power Generation	1079	1153	1552	2300	1308	1441	1669	2585	2633
Direct Charges	1680	285	35	65	413	161	567	105	855
Accrued Creditors (Dr)	-	22	42	441	270	618	119	653	
Accrued Creditors (Cr)	(137)	-	(22)	(42)	(441)	(270)	(618)	(119)	(653)
Transfers									
Monthly Totals	7251	5468	4442	6939	4647	3731	4364	6198	5387
Cumulative Total		12719	17161	24100	28747	32478	36842	43041	48427
Average Per Period		6360	5720	6025	5749	5413	5263	5380	6053

..../77

534089

850

Secondary Concentration - A/cs 301/304

	3/8/74	31/8/74	28/9/74	31/10/74	30/11/74	31/12/74	31/1/75	28/2/75	31/3/75
Wages	4880	4318	3939	6338	6025	6764	7614	7491	7151
Accrued Wages (Dr)				970	1500	1448	(294)		256
Accrued Wages (Cr)					(970)	(1500)	(1448)	294	
Sub-Total	4880	4318	3939	7308	6555	6712	5872	7785	7407
Stores Issued	396	171	-	678	-	-			
Distillate Usage	258	222	176	208	236	207	340	189	352
Power Generation	2430	2731	4690	6092	5105	5536	4179	3859	5436
Direct Charges	490	203	649	277	1211	1079	3235	334	1963
Accrued Creditors (Dr)	-	649	659	1028	550	3210	1019	439	1773
Accrued Creditors (Cr)	(72)	-	(649)	(659)	(1028)	(550)	(3210)	(1019)	(439)
Lease Rental	759	759	759	759	759	759	759	759	758
Transfers									
Monthly Total	9141	9052	10223	15690	13388	16953	12194	12346	17250
Cumulative Total		18193	28416	44106	57494	74447	86641	98987	116237
Average Per Period		9096	9472	11026	11499	12408	12377	12373	12915

...../78

Dry Separation - A/cs 401-405

	3/8/74	31/8/74	28/9/74	31/10/74	30/11/74	31/12/74	31/1/75	28/2/75	31/3/75
Wages	4160	3318	3797	4164	5543	5120	7022	4710	4381
Accrued Wages (Dr)				770	1390	1227	(254)		
Accrued Wages (Cr)					(770)	(1390)	(1227)	254	293
Sub-Total	4160	3318	3797	4934	6163	4957	5541	4964	4674
Stores Issued	238	215	-	617	-	-			
Distillate Usage	1099	1320	1466	1218	1665	1536	1249	1287	1068
Power Generation	1054	1410	2361	3049	2493	2497	1709	1699	2269
Direct Charges	1034	246	464	860	1902	3088	4885	1812	9940
Accrued Creditors (Dr)		407	994	1908	3429	2494	5653	3272	1038
Accrued Creditors (Cr)	(14)		(407)	(994)	(1908)	(3429)	(2494)	(5653)	(3272)
Transfers	-	(46)	-			24			
Monthly Total	7571	6870	8676	11592	13744	11166	16543	7381	15717
Cumulative Total		14441	23117	34709	48453	59619	76162	83543	99260
Average Per Period		7220	7706	8677	9690	9937	10880	10443	11029

..../79

Power House - A/cs 501-503

	3/8/74	31/8/74	28/9/74	31/10/74	30/11/74	31/12/74	31/1/75	28/2/75	31/3/75
Wages	1633	2045	2348	2599	2707	3435	4249	2704	2759
Accrued Wages (Dr)				600	680	894	(94)		
Accrued Wages (Cr)					(600)	(680)	(894)	94	152
Sub-Total	1633	2045	2348	3199	2787	3649	3261	2798	2911
Stores Issued	11	-		12					
Distillate Usage	3627	3311	3893	4258	4243	4600	3217	5221	4394
Direct Charges	1600	192	2114	3293	3301	218	9613	2943	119
Accrued Creditors (Dr)	358	2978	2290	5252	6140	9363	3066	790	6001
Accrued Creditors (Cr)	(1614)		(358)	(2978)	(2290)	(5252)	(6140)	(9363)	(790)
Sub-Total	5615	8525	7667	13725	11219	11690	9794	8686	12635
Cumulative Total		14140	21807	35532	46751	58441	68235	76921	89556
Transfers	(5615)	(8525)	(7667)	(13725)	(11219)	(11690)	(9794)	(8686)	12635
Balance	nil	nil	nil	nil	nil	nil	nil	nil	nil
Average Per Period		7070	7269	8883	9350	9740	9748	9615	9951

. . . /80

General Services - A/cs 601-610

	3/8/74	31/8/74	28/9/74	31/10/74	30/11/74	31/12/74	31/1/75	28/2/75	31/3/75
Wages	932	3072	2201	2630	4992	6544	8748	6903	6520
Accrued Wages (Dr)				360	1250	868	(251)		
Accrued Wages (Cr)					(360)	(1250)	(868)	251	
Sub-Total	932	3072	2201	2990	5882	6162	7629	7154	6520
Stores Issues	385	161	254	14	-	-	-		
Direct Charges	7436	2723	3257	10243	20025	15192	27496	16116	20402
Accrued Creditors (Dr)	246	8923	13074	9809	11250	27362	19861	12633	9446
Accrued Creditors (Cr)	(5118)	(246)	(8923)	(13074)	(9809)	(11250)	(27362)	(19861)	(12633)
Transfers	-	(28)	-	10	-	25 -		(29)	
Petrol Issues								761	275
Monthly Totals	3881	14605	9864	9992	27349	37491	27624	16774	24010
Cumulative Total		18486	28350	38342	65691	103182	130806	147580	171590
Average Per Period	3881	9243	9450	9585	13138	17197	18686	18447	19066

../81

Laboratory & Metallurgy - A/cs 621-623

	3/8/74	31/8/74	28/9/74	31/10/74	30/11/74	31/12/74	31/1/75	28/2/75	31/3/75
Wages	2158	2154	2217	3452	2390	1922	2026	1764	1804
Accrued Wages (Dr)				160	600	635	(64)		
Accrued Wages (Cr)					(160)	(600)	(635)	64	76
Sub-Total	2158	2154	2217	3612	2830	1957	1327	1828	1880
Stores Issues									
Direct Charges	442	376	17	1283	1242	2928	585	1380	1082
Accrued Creditors (Dr)	38	155	869	1702	2190	948	1661	1060	606
Accrued Creditors (Cr)	(206)	(38)	(155)	(869)	(1702)	(2190)	(948)	(1661)	(1060)
Transfers						(3)			
Monthly Totals	2432	2647	2948	5728	4560	3641	2625	2607	2508
Cumulative Total		5079	8027	13755	18315	21956	24581	27188	29696
Average Per Period	2432	2540	2676	3439	3663	3659	3511	3398	3299

...../82

Exploration & Drilling - A/cs 631-633

	3/8/74	31/8/74	28/9/74	31/10/74	30/11/74	31/12/74	31/1/75	28/2/75	31/3/75
Wages	1145	845	932	1070	638	1035	835	950	803
Accrued Wages (Dr)				200	160	-			
Accrued Wages (Cr)					(200)	(160)			75
Sub-Total	1145	845	933	1270	598	875	835	950	878
Stores Issued	2	54	28						
Direct Charges	155	43	55	1292	520	222	609	26	192
Accrued Creditors (Dr)	-	78	142	194	-	426	230	75	95
Accrued Creditors (Cr)	(122)	-	(78)	(142)	(194)	-	(426)	(230)	(75)
Transfers									
Sydney Office Costs					1292	2451	540	1265	
Petrol Issues									30
Monthly Totals	1300	1020	1080	2614	2216	3974	1788	2086	1120
Cumulative Total		2320	3400	6014	8230	12204	13992	16078	17198
Average per Period	1300	1160	1700	1504	1646	2034	1999	2009	1911

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Packing & Transport - A/cs 701/708

	3/8/74	31/8/74	28/9/74	31/10/74	30/11/74	31/12/74	31/1/75	28/2/75	31/3/75
Wages	23		116			1310	4136	4	70
Accrued Wages (Dr)						179			
Accrued Wages (Cr)							(179)		
Sub-Total	23		116			1489	3957	4	70
Stores Issued	21	19	22						
Direct Charges	9046	7171	44066	13075	9862	39785	82895	27849	58584
Accrued Creditors (Dr)	392	45067	18180	18247	52960	46853	13372	55824	59854
Accrued Creditors (Cr)	(609)	(392)	(45067)	(18180)	(18247)	(52960)	(46853)	(13372)	(55824)
Transfers				(559)		739			
						8868			
Sydney Office Costs							16500	4400	
Monthly Totals	8873	51865	17317	12584	44574	44774	69871	74705	62684
Cumulative Totals		60738	78055	90639	135213	179987	249858	324563	387247
Average per Period		30369	26018	22592	27043	29998	35608	40570	43027

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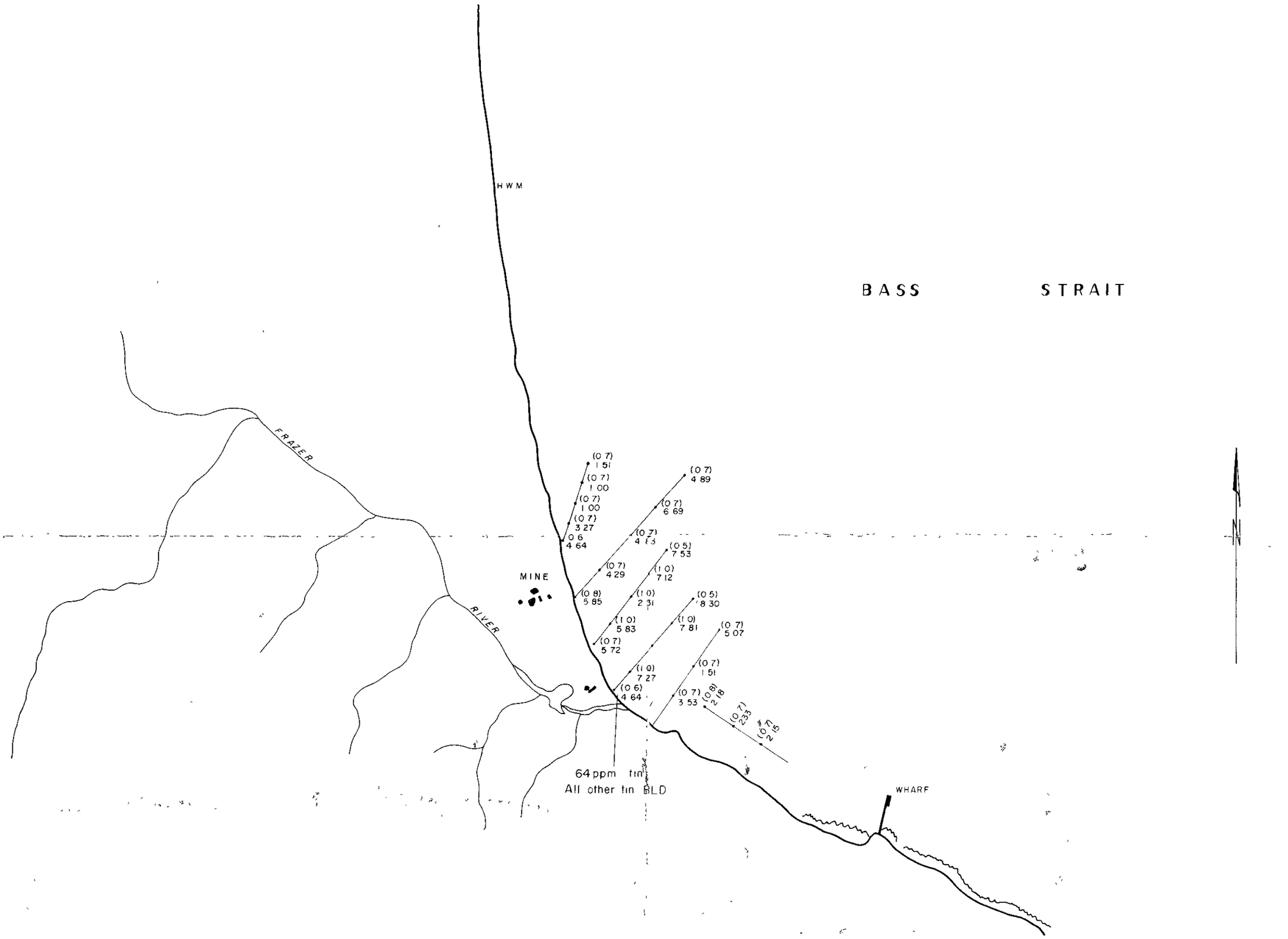

LEGEND

(1 0) 2 18 DEPTH IN METRES
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5 cm

75-1085

AMDEX MINING LIMITED

King Island, Tasmania

OFF - SHORE DRILL LINE LOCATION MAP

Scale 20 000 | Data by. T Neale | Date March '76

This map does not belong with 6/ but has been included as figure 4