81-1620
TOE-JV SUMMARY – ELS 7/65&6/65
OCEAN MINING A.G. – DJ YOUNG

TOE - JV SUMMARY

RINGAROOMA BAY, TASMANIA

Ocean Mining A.G.

April, 1988

928002 young

SPECIAL NOTE : THE FOLLOWING REPORTS RELATE TO OCEAN MINING AG AT RINGAROOMA BAY DURING THE 1960S - TCR 81-1620 TCR 81-1621 TCR 94 - 3648

TOE - JV SUMMARY,

RINGAROOMA BAY, TASMANIA

Ocean Mining A.G.

April 1969

AMG REFERENCE POINTS ADDED

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Refer appendix D in October 1965 Prospect

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1. SUMMARY

About US$500,000 has been spent by the TOE-JV partners on an exploration programme for tin and other minerals in Ringarooma Bay, north east Tasmania.

This exploration led to the discovery of a relatively large, low grade alluvial tin, zircon and rutile deposit in water depths of between 60 and 120 feet.

Assuming a cut-off grade of two ounces tin metal per cubic yard (US$0.20) this deposit contains between 3,300 and 4,500 long tons tin metal, with a value of US$10 to 14 million. Associated rutile and zircon contained in the area increase the gross value by between US$1.5 and $3 million dollars.

The drill hole spacing on which these estimates are based is relatively wide with some important holes being as much as 1,000 yards apart. It is possible that closer spaced deeper drilling to bedrock could about double the grade and the volume of the Ringarooma Bay deposit to perhaps 50 to 60 million yards averaging US$0.90.

2. SUMMARY OF OPERATIONS

GENERAL

Between February, 1966, and March, 1967, Ocean Mining A.G., conducted an intensive exploration programme for alluvial tin, rutile and zircon in Bass Strait, off the north coast of Tasmania.

The first phase of this exploration began in February, 1966. It was conducted with three small, locally chartered, fishing vessels equipped with seismic and sampling equipment. During the first five months 3,500 line miles of bathymetric and seismic profiling were run, mostly around the east and north coasts of Tasmania but also off Flinders Island and King Island to the east and west of Bass Strait respectively.

Detailed maps and profiles showing sediment thickness, bathymetry, and bedrock topography were compiled from these records. From this and other information targets were selected for reconnaissance drilling and 158 samples were obtained by jet air lift sampler, and assayed.

An evaluation of the results of the programme indicated several areas of potential interest and one in particular, Ringarooma Bay off the north-east coast of Tasmania, showed considerable promise.

Phase II operations were then immediately initiated to evaluate Ringarooma Bay and the several other targets indicated by the preliminary exploration. This evaluation was to be based on more precise, deeper, and closer spaced drilling.

The drilling vessel, Wando River, equipped with drilling capability to 100 feet in up to 200 ft of water, arrived in Tasmania in September, 1966. By late February, 1967, a total of 177 cores had been collected from selected target areas in Ringarooma Bay, Oyster Bay, King Island and Mussel Roe Bay. Over 1,300 samples were submitted to the Tasmanian Department of Mines Laboratories in Launceston for tin, titanium and zirconium assay and for preliminary mineral dressing studies.

A total of 138 holes were drilled in Ringarooma Bay in water depths ranging from 30 to 120 feet. Sediment thickness in this bay rarely exceeds 40 feet, so maximum drill penetration was of this order and averaged about 20 feet. Core recovery was about 95 percent if allowance is made for a few holes from which, for various reasons (*e.g. jammed core catcher*), no core was recovered. These holes were immediately redrilled.

The cost of this programme, to February, 1967, was approximately US$500,000.

A summary of Phase I and Phase II operations is given in Table 1.

TABLE 1.

SUMMARY: TOEC OPERATIONS - TIN EXPLORATION 1st February 1966 - 28th February 1967

Exploration Licence	Area: Sq miles surveyed	PHASE I			PHASE II	
		Bathymetric line miles	Seismic line miles	Test Holes Jet Lift	Drill Holes	Samples
Oyster Bay	740	450	460	48	12	170
N.E. Coast[1]	1,000	610	329	41	149	1,041
E. King Island	600	310	267	28	16	94
Flinders Island	1,600	442	380	30		
Cox Bight	93	150		11		
Totals:	4,033	1,962	1,436	158	177	1,305

(1) Including Mussel Roe Bay

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RESULTS AND INTERPRETATION

3. Ringarooma Bay - Mineralisation

Although traces of tin were found in all areas sampled and richer pockets that were clearly too small to have economic potential were also located, the most promising tin mineralisation was discovered in an area of about five square miles in the centre of Ringarooma Bay.

Of the 138 holes drilled in Ringarooma Bay 27 yielded interesting tin concentrations, 16 of them having a minimum grade over their total depth, generally less than 40 feet, of better than two ounces (US$0.20) metallic tin per cubic yard along with minor quantities of rutile zircon and gold. From these 27 holes, 192 samples were assayed of which 90 contained from one ounce of tin metal per cubic yard, to as much as 22 ounces (US$2.20).

The accompanying map (Fig. 1) shows water depth, drill hole location and tin isograds in Ringarooma Bay. It shows clearly the linear nature of the mineralisation extending seawards from the mouth of the Ringarooma River, the main drainage feature from the tin-bearing Devonian granites of the area. Small pockets of mineralisation occur both to the east and west of the main channel and indeed traces of tin were discovered in most drill holes in the Bay. This lower grade tin, however, which is not now associated with the main mineralisation, has almost certainly resulted from minor resorting and redistribution by marine agencies of material transported by the Ringarooma River.

Although it is quite possible that a concentration of heavy minerals could be present along a buried strand line in the bay no such concentration has so far been detected.

The sediment filled course of the Pleistocene Ringarooma River offshore from the present coastline was traced by seismic methods during Phase I and its position confirmed by drilling. The average gradient of the bed of the river offshore is only 9.5 ft per mile, and of the sea bed in the area only between five and seven feet per mile. A river having a thalweg of this order would be subject to frequent changes in course which in turn would lead to a very patchy distribution of any mineralisation. This certainly applies to the area in question where very little correlation of sediment type or cassiterite occurrence is possible between drill holes, even over short distances. A limited amount of close spaced drilling suggests that the deposit is patchy both areally and vertically, as is not uncommon in alluvial deposits

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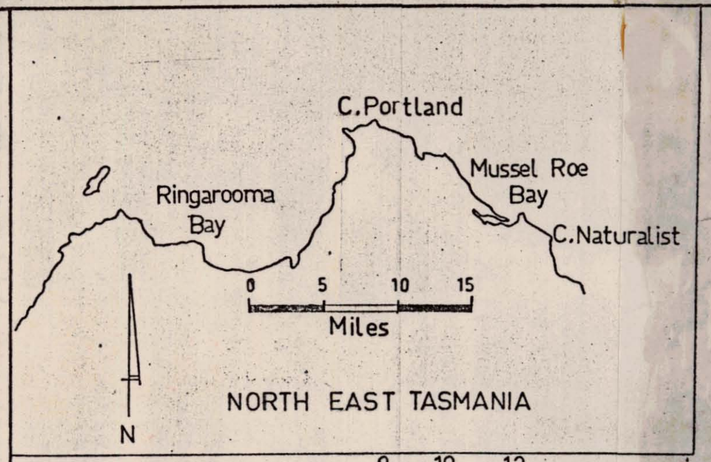

CAPE PORTLAND
AMG579200E
5489650N

TOMAHAWK PT.
AMG563700E
5475700N

0 1 2 3
MILES

5 cm

KEY

2 — 2 Bathymetric Contours (Fathoms)

2 — 2 Tin Isograds oz/yd³

Drill Hole Sites

AMG REFERENCE POINTS ADDED

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TIN ISOGRADS

RINGAROOMA BAY

FEBRUARY. 1969

Fig. 1

of this type. It is possible, however, that mineralisation within the gutter of the old Ringarooma River could be more persistent than that in the upper levels which have probably been resorted from time to time, but too few holes have been drilled into it for this to be determined. In this respect it is of interest to note that six drill holes bottomed in comparitively rich material (up to 10ozs/cu. yd).

The highest values are generally contained in samples of medium to coarse grained quartz sand and fine gravel which often includes well rounded granules and pebbles to three inches diameter. The association of high tin grade with coarse sediments is clearly marked, although exceptions have been noted. It is also evident that many of the richest samples in the upper levels of the sediment body overlie layers of very fine grained sticky silt or semi-compacted white clay and it is probable that these layers have acted as a "false bottom". No cassiterite has been recovered from any of the very fine sediments except where they form the matrix for coarser material as, for example, in a clay-conglomerate.

Although some of the cassiterite is very fine grained much of it occurrs within the 150-250 microns range and ore dressing tests on a few small samples of approximately representative material indicates that tin recovery by tabling could possibly exceed 95 percent.

Water Depth

Fig. 1 shows that water depth increases towards the north along the line of mineralisation from 60 feet about one mile offshore to over 100 feet. It is apparent from the open ended nature of the tin isograds that the alluvial deposit trends even further offshore towards the north west. No drilling occurred in water deeper than 120 feet.

4. RESERVES

Phase II exploration revealed the existence of a relatively extensive, low grade, alluvial tin deposit in Ringarooma Bay.

The overall grade, depth and lateral extent of the richer tin bearing ground is still uncertain because of the relatively wide spacing of the drill holes. However, an estimate based on the Phase II results has been made and this suggests that at least 30 million cubic yards of sediment with an average grade of about four ounces of tin metal exists within the main 4½ square mile area of interest.

This represents about 3,300 long tons of tin metal worth, at US$3,000 per long ton, nearly US$10,000,000.

The area also contains about three ounces of zirconium and 1.5 ounces of titanium (TiO_2 as rutile) per cubic yard. The combined value of the titanium and zirconium is between $0.05 - $0.10 per cubic yard or about $1.5 to 3 million dollars.

Significant amounts of ilmenite are also present but the chrome content varies from 0.1 to 0.3 per cent, well above the acceptable chrome level (0.03%) for pigment manufacture. Traces of gold and minor amounts of monazite also occur.

5. ECONOMIC POTENTIAL

TOE-JV drilling in Ringarooma Bay has outlined about 30 million cubic yards of tin, zircon and titanium bearing alluvium averaging about $0.45.

The areal distribution of the mineralisation is known to be patchy and only 20 of the 138 holes drilled in Ringarooma Bay intersected areas of significant mineralisation. As a consequence the distance between most drill holes is relatively large (up to 1,000 yards.)

Because of the patchy nature of the mineralisation and the wide drill hole spacing it is thought possible that additional fill-in drilling could intersect more of the higher grade areas. The effect of this would be to reduce the volumes of influence of the existing lower grade holes and generally upgrade the deposit. In addition, more drilling around the periphery of the deposit, particularly to the east and further offshore, would probably increase the minable reserves, but some of this material would be in water depths greater than 120 feet.

It is difficult to estimate by how much the grade and volume of the deposit might be increased by these means but there is room for about a doubling of the volume to, say, 50 to 60 million yards. Then, if only four or five rich patches of mineralisation about equal in grade to the top few so far discovered were intersected in drilling, the overall grade would also be about doubled to US$0.90 per cubic yard. On this basis the gross value of the deposit would be around US$50 million.

6. MINING

Ocean Mining A. G.,in collaboration with OSE and other experienced consultants, conducted a mining feasibility study on the basis of information about the area and the deposit available at the end of 1966.

The various systems considered applicable (taking into account reductions in operating capacity for floating equipment in offshore Tasmanian conditions) are summarised in Table 2. This table shows that operating costs and amortization in the vicinity of US$0.30 per cu. yd. could be expected over the life of the deposit by mining with a large bucket dredge.

7. King Island

While evaluating the Phase I bathymetric, seismic and jet lift sampling data it became obvious that very good targets for tin and rutile existed within the King Island exploration licence, particularly along the east coast offshore from Naracoopa.

However, neither of the two targets selected, a major, deep sediment filled channel and Elephant Shoal, was adequately drilled by the Wando River in spite of two determined attempts to do so. In each case,even though the areas were off the sheltered eastern side of the island, drilling was continually hampered or prevented by high and continuous swell conditions.

As a consequence the potential of this area remains largely untested.

8. LICENCES

Of the five tin exploration licences covering an area of about 4,000 square miles originally held, only two areas, totalling 1,255 square miles, have been retained. The location of these licences is shown on the accompanying map and the relevant details are as follows:

Licence No.	Location	Renewal Date(1)	Area (sq.ml.)	Fees A$
E.L. 6/65	N.E. Tasmania	18th May, 1969	900	168.75
E.L. 7/65	King Island	18th May, 1969	355	84.00

Although no field work has been undertaken within these for over 18 months. verbal discussion with the Tasmanian Department of Mines indicates that approval to renew them for six months beyond May, 1969 would probably be forthcoming but probably at a somewhat higher fee. It will be necessary to indicate that substantial efforts are being made to initiate further exploration.

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OCEAN MINING A. G.

EXPLORATION LICENCES

APRIL 1969

Fig. 2