

Situation and Access:

King Island is situated at the western entrance of Bass Strait, midway between Victoria and Tasmania. Its greatest length north and south is 40 miles, its greatest breadth 10 miles.

Fraser River is a small stream which takes its rise in the south-east of the Island, flowing north-easterly for several miles, then almost due east and emptying into the sea at the southern part of Sea Elephant Bay. The total length of the river is not more than 10 miles.

Naracoopa, the chief settlement on the east coast is approximately one mile south-east of the mouth of Fraser River. Fraser jetty at Naracoopa affords facilities for shipping, and steam boats trading between the north west coast of Tasmania and Victoria make regular weekly visits to this side of the Island. In boisterous weather trading boats cannot approach the jetty owing to its unsheltered position.

Naracoopa is connected with the main road system of the Island, and is some 16 miles from Currie, the chief settlement and port of the west coast. Regular trips between Tasmania and Currie are made by the Tasmanian Government steam boat trading to the Island.

The roads of the Island are practically level, rendering transport from point to point rapid and easy. The main road from Naracoopa to Currie is parallel with the sea shore for two miles passing within a quarter of a mile of the Fraser River.

Topography:

The area comprising the black sand deposit is practically on the sea shore running north from the mouth of the Fraser River parallel with the sea coast for an estimated distance of one mile. A short distance off high water mark the foreshore rises to a height of 4 feet forming a level strip of land two chains in width. Behind this narrow strip of treeless foreshore the ground rises rather abruptly to a height of 15 to 20 feet above it forming a fairly level plain extending northerly for some miles, the width varying from a few hundred yards to a quarter of a mile. Further inland the ground is broken and irregular, becoming more elevated, but not rising above an altitude of 300 to 400 feet.

History:

It is some twenty years since attention was first directed to the possibility of working the deposit for its tin ore content. About that time a small concentrating plant operated by a steam engine was erected for the purpose of direct concentration of the sand for the extraction of the tin oxide and any gold it might contain. Following a short run with the plant operations were suspended, it being realised that the type of concentrating machines used and the plant generally was unsuitable for the work. Three tons of marketable ore assaying from 30 to 60% tin are said to have been recovered as a result of the milling operations. A good deal of investigation in the way of boring, shaft sinking etc. has been carried out on the area by various interested parties, but no serious attempt to exploit the deposit has resulted. All plant and machinery formerly used has been removed from the ground.

Economic Geology

The deposit consists of a mixture of sea sand, ilmenite and zircon sand in varying proportions with which is associated small quantities of tin oxide and gold. On the seashore to the north side of the mouth of the Fraser River, ilmenite sand shows up prominently along the beach for approximately a distance of a mile. It is most abundant near the mouth of the river, diminishing in quantity in that direction. The sea shore on the south side of the river consists of bare slate rock traversed by quartz veins. There is no sand on this side of the river at or above low tide marks. The object of this report is not for the purpose of endeavouring to account for the source of the ilmenite and associated minerals, but to investigate the economic possibilities of the deposit with a view to a separation of the valuable constituents on a commercial scale. There does not however appear to be any doubt that the minerals have been carried down the river from some point inland. On the higher ground on the road side between the 20 to 30 chains from the mouth of the river, ilmenite sand shows freely in the soil some distance above the river bank. An occurrence of Gabbro is said to have been located some distance west of the sea shore on the bank of a small tributary of the Fraser River.

The tin ore associated with ilmenite has been derived from a belt of tin-bearing country located a short distance to the north of Sea Elephant River 5 to 6 miles north west of the mouth of the Fraser River. The source of the gold has not been investigated. The quantity present is so small that it can be regarded as of little more than mineralogical interest. The distribution of the ilmenite sand in the sea sand is irregular but is most abundant along the inner portion of the low terrace above described. The enriched portion appears to be about half a chain in width lessening towards the sea shore, the tin ore present is associated with the ilmenite and zircon sand and appears to be directly proportional to the amount of these minerals present, which as stated, is variable.

In some portions of the deposit, particularly where the ilmenite sand is most abundant the deposit is cemented in horizontal layers up to six inches thick. This is due to the leaching action of ferric oxide of the ilmenite. Where a good intermixture of sea sand occurs no cementing action takes place. The cemented portions of the deposit can be readily pulverised to sand. In some portions of the deposit the underlying material has been penetrated by shafts and surface excavation. This consists of beach shingle, clearly indicating that the deposit was formed by the action of the sea waves. The depth of the deposit varies slightly, its average being about 8 feet. The surface is but six feet above high water mark. The bed of shingle underlying is therefore two feet below sea level at high tide.

Prospecting and Development

As already stated a good deal of attention has been given to the deposit extending at intervals over a period of twenty years. A number of shafts have been sunk and many bore holes have been put down to test the tin and gold values of the sand. It is not known if any properly systemised method of sampling the deposit has been undertaken. A large number of assays of the material are available; the determinations being carried out at the Geological Survey Laboratory, Launceston. The average results of the assays taken

from various parts of the deposit indicate a metallic tin content of slightly under 0.5% with little more than a trace of gold. Some of the samples assayed as high as 0.75% but there is nothing to show what quantity of the latter grade material is present.

This deposit could be tested at a minimum of cost and as a preliminary to any further investigations the work of boring should be undertaken. This work would have invaluable information as to the relative proportion of the payable to the non-payable parts of the area. The sites of bores should be set out systematically in order to enclose half chain areas and sectional samples taken from each hole. A boring plan of the area should be made with the number of each hole and depth thereof marked thereon together with assay of samples from each bore.

Ilmenite

Ilmenite is a heavy, black iron mineral consisting of oxide of iron and titanium in varying proportions. Its specific gravity is 4.5, hardness 5.6. The specific gravity of tin oxide is 6.8-7.1. Ilmenite is feebly magnetic. Its separation from non-magnetic material can be effected by the electro magnet. The use of titanium oxide as a pigment is growing. It is not used alone but is precipitated with barium and calcium salts or both, titanitic oxide forming only 25% of the mass. It is used with zinc oxide and is said to form an excellent pigment. The use of titanitic oxide as a substitute for white lead should greatly increase. It is non-poisonous and not affected by sulphuretted hydrogen gas.

For commercial use the quality required (52% TiO₂) is higher than the Fraser River deposit. For the above quality material a limited market is said to be available. The highest assay in TiO₂ from the most finely divided material of the magnetic product of the sand is 44.88%. The results of some tests carried out on the black sand are appended below:-

<u>Magnetic Product</u>		<u>TiO₂</u>	<u>Fe</u>
	%	%	%
On 60 mesh	3.12	11.80	6.93
80 "	29.68	30.16	14.10
100 "	34.37	43.52	21.53
120 "	20.32	44.56	26.23
Thro 120 "	12 51	44.88	33.66

<u>Non-Magnetic Product</u>		<u>ZrO₂</u>	<u>Sn</u>
	%	%	%
On 60 mesh	4.00	40.90	nil
80 "	13.00	4.14	0.20
100 "	39.00	58.00	nil
120 "	30.00	32.10	0.15
Thro 120 "	14.00	27.45	0.45

Zircon sand

Zircon is a double oxide of zirconium and silicon. It is found only as crystals which in form have a remarkable similarity to that of tin oxide. The colour of zircon is variable; the most frequent colour is brown, the crystals occurring with the ilmenite sand at Fraser River are light brown and are very minute. The specific gravity of zircon ranges between 4.0 to 4.7, being almost equal to that of ilmenite.

Method of Working

The only minerals of present commercial value in the deposit are tin oxide and gold; of the latter the quantity is so small that it cannot be considered of any value. The tin oxide is present in relatively large quantities if regarded as an alluvial deposit but as special treatment is necessary for its extraction owing to the fine state of division of the tin ore and the relatively high specific gravity of the associated mineral sands, the deposit viewed in the light of a concentrating problem is low grade.

The first essential in any proposal to treat the sand for the extraction of tin is to determine by boring or shaft sinking the approximate quantity and grade of the tin bearing sand. When this is known an outline for a preliminary treatment scheme can then be formulated. Judging from experiments made there should be little difficulty in obtaining a much enriched product by screening. It will be observed that in assaying the screened products that the whole of the tin oxide present in the sand passed through a screen of 120 mesh. The experiments carried out are of much value as a guide in the design of a concentrating plant. In view of the fact that simple screening of the sand will eliminate most of the coarser particles leaving a well sized enriched tin oxide product, the cost of treatment will be very low. If it is found that by screening a product containing 2 per cent or more of tin can be obtained, the further concentration of the material can be effectively carried out by hydraulic classifiers, operating on a fine mesh screen.

To raise the sand for treatment a small powered engine only would be necessary to operate as a preliminary 2" centrifugal sand pump and a small nozzle to blow the sand from the face to the pump. A water supply can be obtained either from Fraser River close by, or probably as there is a heavy seepage on the inner side of the deposit a sufficient supply for all purposes with a circulation of water can be obtained. From the foregoing it will be gathered that the deposit is very favourably situated both in regard to transport and facilities for working. To ascertain its commercial value it remains to be tested in value and extent also the best method of treatment on the lines indicated.

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