DEPARTMENT OF ATOMIC ENERGY

DEVELOPMENT OF MINERAL SAND INDUSTRY

The Beach Sands of Kerala are rich in ilmenite, zircon, rutile, monazite and sillimanite. The individual minerals are concentrated to a high purity by the Minerals Division of Indian Rare Earths Limited, a public-sector undertaking under the Department of Atomic Energy. The processing of the mineral sands is done at the Company's plants at Manavalakurichi and Chavara.

(i) Manavalakurichi

General

The mineral sand industry was at one time a flourishing business. In the early forties, India had a world monopoly in ilmenite. However, for a number of reasons, the market for Indian ilmenite gradually declined. With a view to regain the old position, the Company is reorganising the industry on modern lines.

The Company has just completed the erection of a 300 tonnes day plant at Manavalakurichi to produce the following minerals in the quantities against each, annually:

Mineral	Quantity (m.t.)	Value (n.a.w.) (Rs.lakhs)
Ilmenite	40,500	10.94
Monazite	3,000	9.81
Zircon	3,600	10.80
Rutile	800	7.88
Garnet	1,500	(depending on demand)

The entire production from this plant is committed, ilmenite and zircon for exports, monazite for captive consumption and rutile for internal market. The zircon will be the raw material for the production of zircaloy at the Zircon Plant in the Nuclear Fuel Complex.

This modernisation programme has been put through at a cost of approximately Rs.50 lakhs. The annual production would be of the value of Rs.50 lakhs (f.o.b.) and the annual operating expenditure approximately Rs.35 lakhs, leaving a profit of approximately Rs.15 lakhs. Foreign exchange earning is expected to be nearly Rs.30 lakhs annually and import substitution approximately Rs.15 lakhs.

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Future plans

It is proposed to produce certain zirconium salts like zirconium oxide, zirconium sulphate, zirconium acetate etc., on a small scale at Manavalakurichi. Investigations have been undertaken and with the co-operation of Bhabha Atomic Research Centre, work on this is expected to be started shortly.

In view of the increase in the demand for monazite, it is also proposed to marginally expand the capacity of the existing plant.

(ii) Chavara Plant

The current level of production of the existing plant at Chavara is as under:-

Ilmenite	.....	50,000 m.tonnes
Monazite		160 "
Rutile	.....	1,800 "
Zircon	.....	60 "

After a very careful assessment of the material potential, especially abroad, for the Quilon Grade ilmenite, it has been decided to put up a modern Plant with a capacity to treat 650 tonnes/day of dry sand with provision for doubling the capacity at a later stage, if required. The annual production of this plant, the erection of which will be completed in about 2-2½ years from now, is expected to be as follows:-

Mineral	Quantity (m.t.)	Value(n.a.w.) (Rs. lakhs)
Ilmenite	100,000	35.00
Rutile	5,850	41.00
Zircon	7,000	21.00
Monazite	585	1.90
Sillimanite	4,100	10.20

The plant is expected to cost a little over Rs.1.50 crores. Equipment, land and other assets of the existing plants in operation in Chavara are being utilised.

No difficulty is expected in the disposal of these minerals. 40,000 tonnes of ilmenite produced are expected to be exported and the balance 60,000 tonnes are expected to be upgraded to chemical rutile to increase its TiO_2 content to a little over 95%. It is understood that Dharangadhra Chemical Works have been given a licence by Government for this purpose. The world market for the other minerals continues to be buoyant and no difficulty is likely to be experienced in exporting them in case the indigenous market is unable to absorb the entire quantities produced.

When the 650 tonnes/day plant goes into full production the total turnover of this plant would be of the ord r of Rs.1.10 crores(n.a.w.)and the gross profit approximately Rs.50 lakhs. Foreign exchange earning would be of the order of Rs.65 lakhs (f.o.b.).

A small unit with an outlay of approximately Rs.5 lakhs is being set up to produce rutile and zircon from tailings. This plant will later become a part of the 650 tonnes/day that is being erected.

Future plans

(i) It is understood that two private entrepreneurs have soughtlicence from the Government of India to put up a titanium complex, each consuming about one lakh tonnes of ilmenite. If one of these materialises, the additional demand for Quilon grade ilmenite would be of the order of 1,50,000 tonnes per annum, for meeting which it may be necessary to increase the capacity of the 650 tonnes/day plant. A decision on this can be taken after the demand for the ilmenite has pickedup.

(ii) A plant at Chavara for the manufacture of zircon opacifier which is extensively used in the ceramics and tiles industry and is currently being imported is being set up. Work on this plant, which is expected to cost about Rs.22 lakhs will begin shortly and will be completed before the end of the year. The turnover of this plant is estimated to be of the order of about Rs.15 lakhs and the profit yield approximately Rs.6 lakhs per annum.

(2) Rare Earths Plant, Alwaye

General

The monazite extracted from the beach sands by the Minerals Division of the Indian Rare Earths Ltd., is processed by them at Alwaye Plant for extraction of rare earths compounds which have a ready overseas market. The Alwaye Plant to treat monazite was erected and went into production during the latter half of 1952. It was originally designed to treat 1500 tonnes of monazite per annum. After this, the rare earth products got well established in the international market and the demand increased. This necessitated doubling the capacity which was completed in 1959. Further demand was responsible for a recent expansion of capacity by 600 tonnes. The plant has now a capacity to treat 3600 tonnes/annum of monazite.

Present status

After the recent expansion of capacity, the Alwaye plant now produces 4,320 tonnes of rare earths chloride, 5,000 tonnes of trisodium phosphate and 650 tonnes of thorium hydroxide per annum. The entire production of rare earths chloride is exported and earns foreign

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exchange to the tune of Rs.1.00 crores per annum. Trisodium phosphate is consumed indigenously by textile and chemical industries and brings in a revenue of Rs.35 lakhs. A part of the thorium hydroxide produced is utilised at Trombay by the Thorium Factory for producing thorium nitrate.

Future plans

In view of increasing demand for rare earth products, it is proposed to further expand the capacity of the existing plant to treat an additional quantity of 400 tonnes/annum of monazite. This expansion will involve an outlay of only Rs.1 lakh and is expected to bring in an additional revenue of Rs.5 lakhs annually.

Studies are being undertaken on the economics of setting up of a parallel plant at Alwaye to treat approximately 1500 tonnes/annum of monazite. This programme, if found economically feasible and if approved, can be put through within the next five years.

The Company also plans to produce rare earth oxide and rare earth carbonate.

Another product for which pilot plant trials are being undertaken at Bhabha Atomic Research Centre in association with the engineers of the Company, is the separation of Lanthanum oxide. This plant is also likely to be put through within the next few years.

A study is being undertaken to produce misch metal. If these studies are successful, a pilot plant is likely to be set up shortly and a full-fledged plant later.

Experiments are being conducted on the possibility of separating individual rare earths, particularly europium and yttrium. If these experiments are successful, it is proposed to set up production facilities for separating these. A portion of the rare earths chloride produced will be earmarked for this purpose.

(ii) Foreign Exchange earnings

These operations currently earn foreign exchange to the extent of Rs.1.40 crores which is expected to go up considerably after the expansion plans of the Company are completed.

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