

TR9-158-160

## R. 461

## 23. BEACH SANDS, FRASER RIVER, KING ISLAND

**Sample**

A sample of beach sand weighing approximately 40 lbs was submitted by Mr. W. C. Burrows. The sample was stated to have been obtained from the Fraser River, in the vicinity of the Cable Station, King Island, Tasmania.

Concentration tests were requested to determine the recoveries, by jigging, tabling and magnetic separation, of cassiterite, rutile, monazite and gold.

**Sizing**

The sizing analysis of the sample was as follows:—

| Mesh B.S.S. | Per Cent Weight |
|-------------|-----------------|
| Plus 22     | 0.3             |
| Plus 60     | 3.3             |
| Plus 100    | 49.9            |
| Plus 200    | 45.7            |
| Minus 200   | 0.8             |

The sample consisted predominantly of heavy minerals.

**Assays**

Tin—0.13 per cent  
Rutile—17.7 per cent  
Gold—Nil.

**Investigation**

Three methods of treatment were investigated:—

A. Jigging, followed by table concentration of the jig tailing and dry magnetic separation of both jig and table concentrates. A "top concentrate" rich in tin was taken during the tabling of the jig tailing. This concentrate was not further treated.

B. Dry magnetic separation of the whole feed followed by table concentration of the non-magnetic fraction which contains the tin and rutile. As in "A" a top strip was taken from the concentrate and was not further treated.

C. Table concentration of the whole feed to discard quartz and some garnet as a table tailing. As before, the concentrate was taken in two parts, a top strip and a main concentrate. In this case both concentrates were subjected to dry magnetic separation.

No attempt has been made to separate rutile and zircon in the non-magnetic concentrate. This separation can usually be made by electrostatic means.

**Summary of Results**

1. No appreciable concentration of tin or rutile occurred in jiggling operations and apart from the removal of some quartz the mineral content of the jig concentrate approximates that of the feed. The jig concentrate amounted to 37 per cent by weight and contained 0.13 per cent of tin and 16.9 per cent of rutile.

2. Magnetic separation of the whole feed followed by table concentration showed high recoveries of tin and rutile in the concentrates produced. The "top strip", concentrate (1) amounted to 0.62 per cent weight and contained 17.8 per cent of tin with an overall tin recovery of 84.9 per cent. The concentrate contained 1.18 per cent rutile.

The second concentrate amounted to 53.4 per cent by weight and contained 32.3 per cent rutile with a rutile recovery of 97 per cent. Tin content amounted to 0.02 per cent.

3. Methods A and C were less effective than method B (Magnetic Separation followed by tabling). Test results by the three methods are shown in the tabulations.

4. A monazite concentrate produced in test method C appears to be of satisfactory grade but amounted to only 0.41 per cent by weight overall. Overall percentage monazite recovery was not determined.

**Test Results**

A. Jiggling, table concentration of jig tailings and magnetic separation of concentrate.

| Products                       | Weight | Per Cent |        | Per Cent Distribution |        |
|--------------------------------|--------|----------|--------|-----------------------|--------|
|                                |        | Tin      | Rutile | Tin                   | Rutile |
| Jig Conc. Highly Mag. ....     | 13.43  | 0.02     | ....   | ....                  | ....   |
| Jig Conc. Feebly Mag. ....     | 1.66   | 0.07     | ....   | ....                  | ....   |
| Jig Conc. Non Mag ....         | 22.23  | 0.20     | 28.4   | 39.1                  | 35.7   |
| Composite Jig Conc. ....       | 37.32  | 0.13     | 16.9   | 42.6                  | 35.7   |
| Table Conc. 1 ....             | 0.72   | 6.92     | 6.5    | 43.8                  | 0.3    |
| Table Conc. 2 Highly Mag. .... | 19.95  | 0.01     | ....   | 1.8                   | ....   |
| Table Conc. 2 Feebly Mag. .... | 3.51   | 0.02     | ....   | 0.6                   | ....   |
| Table Conc. 2 Non Mag ....     | 32.60  | 0.03     | 33.4   | 8.6                   | 61.6   |
| Table Tailing ....             | 5.90   | 0.05     | 7.3    | 2.6                   | 2.4    |
| Composite Jig Tailing ....     | 62.68  | 0.10     | 18.1   | 57.4                  | 64.3   |
| Composite feed ....            | 100.00 | 0.11     | 17.7   | 100.0                 | 100.0  |

| Products  | Weight | Per Cent |        | Per Cent Distribution |        |
|---|--------|----------|--------|-----------------------|--------|
|   |        | Tin      | Rutile | Tin                   | Rutile |
| Rutile Concentrate—<br>(Composite N.M. Product) | 54.83  | 0.10     | 31.4   | 47.7                  | 97.3   |
| Tin Concentrate—                                |        |          |        |                       |        |
| (Table Concentrate 1) ...                       | 0.72   | 6.92     | 6.5    | 43.8                  | 0.3    |

B. Magnetic separation. Table concentration of Non Magnetics.

|                             |        |       |      |       |       |
|-----------------------------|--------|-------|------|-------|-------|
| Highly magnetic ... ..      | 31.48  | 0.01  | ...  | 2.4   | ...   |
| Feebly magnetic ... ..      | 9.75   | 0.03  | ...  | 2.2   | ...   |
| Composite Non Magnetic ...  | 58.77  | 0.21  | 30.1 | 95.4  | 100.0 |
| N.M. Table Concentrate 1—   |        |       |      |       |       |
| (Tin Concentrate) ... ..    | 0.62   | 17.80 | 1.18 | 84.9  | Trace |
| N.M. Table Concentrate 2—   |        |       |      |       |       |
| (Rutile Concentrate) ... .. | 53.39  | 0.02  | 32.3 | 8.3   | 97.4  |
| N.M. Table Tailing ... ..   | 4.76   | 0.06  | 9.6  | 2.2   | 2.6   |
| Composite Feed ... ..       | 100.00 | 0.13  | 17.7 | 100.0 | 100.0 |

No attempt was made to concentrate the tin to a higher grade concentrate than that above.

C. Table concentration. Magnetic separation of Table concentrates.

|                                   |        |      |      |      |       |
|-----------------------------------|--------|------|------|------|-------|
| Concentrate 1—                    |        |      |      |      |       |
| Highly magnetic ... ..            | 0.77   | ...  | ...  | ...  | ...   |
| Monazite fraction ... ..          | 0.41   | ...  | ...  | ...  | ...   |
| Non Mag. (Tin Conc.)              | 2.64   | 3.77 | 1.53 | 76.5 | 0.2   |
| Concentrate 2—                    |        |      |      |      |       |
| Magnetics ... ..                  | 35.28  | ...  | ...  | ...  | ...   |
| Non Mag. (Rutile<br>Conc.) ... .. | 48.18  | 0.04 | 33.0 | 14.8 | 89.9  |
| Table Tailing ... ..              | 12.72  | 0.03 | 13.7 | 2.9  | 9.9   |
|                                   | 100.00 | 0.13 | 17.7 | ...  | 100.0 |