PRELIMINARY REPORT ON TAMAR SANDS

Scope of the Report

A systematic investigation of the sands of Tasmania has not been attempted; but considerable data relating to some deposits, which lie within easy reach of lines of transport, have been collected and recorded. The importance of gaining full knowledge of the sand resources of the State is evinced by the number of enquiries received in the Mines Office from time to time concerning silica.

During the recent investigation sufficient data were collected to enable the writer to present fairly informative accounts concerning certain widely separated deposits, but the country intervening is not known well therefore it is thbught desirable, before attempting a complete report, that a geological Survey of the whole district should be undertaken. In the meantime this preliminary report is presented for information of particular owners of sand areas.

For the purpose in view a tentative division of the sands into classes according to their uses is made as follows:-

1. Silica Sands for glass manufacture.
2. Moulding Sands
3. Building Sands
4. Sands for miscellaneous Uses.

It should be understood that a brief description only can be given of any individual deposit; and references to some occurrences will, of necessity, have to be omitted.

Location and Area

The area included in the investigation along the west bank of Tamar River reaches from Deviot to Beauty point, a distance of ten miles, and extends back from the river half to one mile.

Nature of the Deposits

The various unconsolidated materials which make up those deposits consist of white quartz sands and white clays. They are the products of washings of submerged materials by slow - moving waters. That is the reason for the wide spread occurrence of stoneless clay and fine evenly assorted beds of sands, and the small and rare deposits of gravel and coarse sand.

The thickness of these unconsolidated deposits has not been determined at may points. They are actually upper members of the Launceston Basin Tertiary formation. A large number of pits have been sunk through the uppermost layer of sands (6 to 20 feet thick) to the first bed of white clay, but exploration below the clay has not been attempted. The sands consist of a fine white quartz interbedded with layers of coarse subangular to rounded quartz of average pea size, well assorted and containing little clayey

material and organic matter.

In places Knight's quarry for instance, the sand is partly cemented by oxide of iron (leaching from nearby diabase hills) and contains more clay than usual.

These sands are adjacent to Tamar River along parts of the terranes which mark a former level of the river, before it had cut down to the present bed. The terraces (200 to 400 feet above sea-level) are not continuous as they have been cut away to a large extent by the present river; furthermore they carry sand in a few localities only, therefore they are not very extensive, and are not more than a mile wide and a few miles long.

The best examples of these alluvial sand-covered terraces are to be found at Deviot and between Beaconsfield and Beauty Point.

The Deposits on Room's Land:-

These deposits, situated on the hillside and hilltop close to Deviot jetty, have been explored by means of pits on the 35 acre and 16-acre lots. The depth of sand as shown in the pits is from 4 to 7 feet, but many of the pits are not down to bedrock therefore the actual depth is not known. The sands lie close to surface under a cover of peat one to two feet thick, and are made up of mixed fine to coarse grades of vitreous subangular to rounded quartz with a very little felspathic interstitial matter. Generally they are clean white and are loosely compacted. Near the bottom of the 7 foot pits consolidation has set in, but this also is easily broken by aid of the pick.

Four samples were obtained from this property. No. 358 is a sample from a 6-foot pit near the summit of the hill. No. 87A is a general sample taken from the dumps of a number of pits over a considerable area. Number 359 and 360 are representative of the material opened in pits on the 35-acre lot.

Assuming the sand area is 40 acres, an average depth of 4½ feet, and allowing a loss of one third in working the tonnage amounts to 418,000.

The following estimate of costs of production and transport has been prepared by W. B. Smith, Consulting Engineer of Beaconsfield.

Two shovel-men filling into truck 10 tons each	£1.10.0
Six boys bagging and sewing (7/6d. each)	2. 5.0
One horse and dray and driver	1. 5.0
	£5. 0.0

Cost of quarrying and bagging 20 tons	
Cost of quarrying and bagging one ton 5/-	
Cement bags, at 9/- per doz. can be used three times therefore the cost is 3/- per doz. plus freight or empty bags 1/- per doz., or of 4/- per doz. on 6/6d. for 20 bags	
Total cost of quarrying and bagging is	11.6
To this is added cost of delivery to the wharf at Deviot and loading	2.6
Supervision, repairs etc.	2.6
Freight to Melbourne	15.0
Total Cost	£1.11.6

The deposits on this property (Room's) lie along the river front one quarter to one half mile from the shore. Deviot jetty is directly below the property, and roads lead to it from all quarters. It is stated that the depth of water off Deviot jetty is not less than 9 fathoms and not greater than 14 fathoms, and that there are no obstacles to navigation for ships up to 2000 tons gross.

From the quarries to the wharf the sands may be carried over self-acting tranway or aerial line at a low cost.

The Cementoid Construction Co.

This company has been formed for the purpose of quarrying sand and using it as the base for the manufacture of a number of articles in everyday domestic use. Such articles are sandsoap and the like, specimens of which have been examined by the writer and demonstrations have been witnessed of their qualities. It is claimed by the promoters that these articles can be placed on the market at 25 per cent less cost than those of mainland firms.

The ground to be worked by this company is contained in a 37 acre block close to Beauty Point and a quarter to a half mile west of the Main Road leading to that port. A section of the formation opened by J. Torney near his orchard is:-

quartz grit (pea size)	3 to 5 feet
fine quartz sand	2 to 3 feet
coarse & fine compacted sands	5 feet
soft white clay, thickness not determined.	

This formation is covered with a peaty soil one to three feet thick on which grows heath and light scrub. The organic matter has not penetrated deeply into the sands. In a few places the sands have become cemented but are easily disintegrated by mechanical aids.

These deposits, which lie at an elevation of 300 to 400 feet above sea-level, can be removed cheaply by ordinary methods of quarrying.

Sample 87B is representative of the beds of fine sand.

Davis Quarries

Adjoining the Cementoid Construction Co. property to the north are the properties of W.A.T. Davis. The deposits on these properties have been opened in pits, trenches and quarries, and shipments of the ungraded materials have been made to Melbourne.

The full depth of the deposit has not been determined. In the faces of the quarries are shown fine and coarse sands to a depth of 10 feet. The grit particles are generally of pea size, but occasional pebbles of half-inch diameter are found. The coarser grits are separated by bands of fine sand, slightly iron stained, consisting largely of vitreous subangular quartz with very little interstitial felspathic material.

These beds are so compacted that the roots of shrubs have not penetrated the sand farther than a few inches.

Sample 87C is representative of the sands of main quarry.

Pedder Deposit

It is reported that this deposit is of similar materials and of considerable extent (a detailed account will be presented in a later report)

CHEMICAL TABLE OF ANALYSES

Registered Number	Texture of sand	Remarks	Silica	Ferric Oxide	Alumina	Lime	Magnesia	Ignition Loss
87C	Coarse to fine	Before washing	95.60	1.79	0.49	nil	0.07	0.32
		After washing	96.08	1.93	0.35	nil	0.07	0.26
358	fine	Before washing	96.88	1.08	2.08	nil	trace	0.16
		After washing	97.28	0.94	0.98	nil	trace	0.04
359	medium grain	Before washing	96.80	0.96	1.40	nil	trace	0.24
		After washing	97.36	1.28	0.04	nil	trace	0.10
360	coarse	Before washing	96.64	1.56	1.64	nil	trace	0.12
		After washing	96.88	1.36	0.84	nil	trace	0.10
87A	Coarse to fine	Before washing	95.84	1.86	0.46	nil	0.07	0.28
		After washing	96.00	1.86	0.34	nil	0.07	0.26
87B	Fine	Before washing	96.32	1.08	1.32	nil	0.07	0.36
		After washing	96.40	1.36	0.64	nil	0.07	0.36

Granulometric Test

One of the most important features of sand is its grain size or, as it is termed, its texture. The texture is determined by granulometric analysis as follows:-

A 100-grain sample is passed through a series of screens the material retained on each screen being collected, weighed, and noted. Since the sample weighs 100-grains, the weight recorded as retained on each screen is the percentage retained on the screen. The cumulative percentage of all material that would be retained on any given screen , if that screen alone were used, can readily be determined. In order to gain some idea of the relative fineness of texture and to be able to express this in one figure, the average fineness of the sample is calculated as follows. The percentage of material passing through each screen and retained on the next smaller is multiplied by the mesh of the screen passed through. The results obtained are totalled and divided by 100, the resultant being the average fineness. In other words, if all the grains of a sample were brought to one average size, they would just pass through a screen whose mesh was equal to the average fineness of the sample.

GRANULOMETRIC ANANLYSIS

Sample Number	360		359		358		87A		87B	
Mesh	Unwashed		Unwashed		Unwashed		Unwashed		Unwashed	
	per cent	cumm lative %	per cent	cumm lative %	per cent	cumm lative %	per cent	cumm lative %	per cent	cumm lative %
Retained on 10	36.8	36.8	17.2	17.2	1.76	1.76	50.0	50.0	0.73	0.73
" 20	22.5	59.3	12.2	29.4	2.61	4.37	23.2	73.2	0.69	1.42
" 30	6.7	66.0	6.5	35.9	2.61	6.98	12.4	85.6	0.80	2.22
" 40	2.0	68.0	2.9	38.8	2.46	9.44	2.0	87.6	0.89	3.11
" 60	6.4	74.4	15.2	54.0	18.73	28.17	2.36	89.96	32.20	35.31
" 80	9.1	83.5	22.8	76.8	38.52	66.69	3.4	93.36	44.52	79.83
" 100	1.9	85.4	2.0	89.8	4.58	87.74	0.76	96.12	3.07	91.90
" 120	4.8	90.2	11.0	87.8	16.47	83.16	2.0	95.36	9.00	88.83
" 200	8.2	98.6	9.6	99.4	12.21	99.95	3.88	100.00	9.09	99.99
Average Fineness	45.72		67.23		60.61		28.96		88.61	

Preparation of the Sand for Market.

From Davies quarry a few hundred tons of sand has been excavated and shipped ungraded to Melbourne for use in building construction. Probably the sand was graded there before use.

It is desirable that the sand should be graded on the spot, and bagged, branded with the grade number, and shipped as distinct lots. At Room's quarry it is proposed to erect revolving screens and an automatic bagging plant in order to separate the sand into four sizings and bag each for shipment. At first the dry method will be employed, but this may later be replaced by the wet process. The dry process can be operated under the most favourable weather conditions only unless a steam drying plant is added and the capacity is much smaller. Moreover, the wet process allows of the removing of some deleterious substance such as roots and other vegetable matter, clay, and iron oxide.

At present, the screening plant will be sufficient for the purpose in view.

Utilisation

Use in Concrete

The study of the sands available in the district, and the results of tests made on the samples collected have already been referred to and tabulated in a previous section. From these results it is clear that the sands are quite suited for use in concrete. As the fine aggregate (material passing through ¼ inch mesh) of a concrete mixture this sand should find a ready market. A source of supply for concrete materials in the Tamar River district is of considerable local importance since if any large works of construction are to be carried on, concrete will, without doubt, be one of the principal building materials employed. As sand and broken stone or gravel compose more than 80 per cent of the total mass of concrete very large quantities are required for general construction work.

Use in glass making

Some of the sands may be used for glass making, especially those of very high silica content and of medium grainsize. The better the sand for this purpose the higher the proportion of silica. Objectionable impurities are compounds of iron, lime, alumina, magnesia, and alkalies. Iron oxide imparts to glass a green, yellow, or red colour, the intensity varying with the amount of the impurity. Alumina tends to decrease the transparency of glass and increase the fusion point. Magnesia also raises the fusion point of the charge, but lime in small amount is not very injurious. Organic matter colours the glass a dark amber.

In general the samples taken indicate an excess of alumina and ferric oxide, but for bottle glass some of the sands are suitable.

While considerable latitude is allowable in size of grains in good glass sand, uniformity is desirable. Grains larger than 14-mesh are harder to melt than the rest of the batch on charge and, combining too slowly with the fluxing ingredients, cause stringing of the glass.

Summarising a sand for glass manufacturer should be one of uniform grain, medium fineness, as high in silica as possible, and should be almost free of iron and other impurities.

3. Moulding.

Sands from these deposits have been used with success in Launceston foundries for moulds of castings.

4. Miscellaneous Uses

Articles for household use have been manufactured of these sands with the addition of other necessary ingredients.

A. McIntosh Reid.
DIRECTOR OF MINES.

Mines Department,
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