

SECOND REPORT ON CEMENT MATERIALS AT DALMAYNE
AND SALTWATER LAGOON.

This report describes the results of a second visit to the East Coast districts. The known limestone and clay deposits were inspected and representative samples taken from them. Large parcels of approximately 50 pounds weight were despatched to England for testing, while smaller samples were taken from them for analyses, the results of which are given in the report below. The samples and resulting analyses can be taken as much more reliable than those in the first report.

LIMESTONE

The limestone in Picanini Creek was sampled as thoroughly as possible by taking small pieces of freshly broken limestone from every bed exposed. Sample No. 3 represents the upper, No. 4 the middle and No. 5 the lower portion of the limestone, but Nos. 4 and 5 are not absolutely representative as they were somewhat intermixed. The three samples mixed together form as representative a sample as possible to be obtained under the existing conditions.

The upper portion consists generally of white, pink and light coloured types. In some beds silicification has taken place, small irregular veins (up to 1 and 2 inches wide) of silica occurring parallel to the bedding planes. The middle portion consists partly of the light coloured types of the upper portion and partly of darker-coloured types of the lower portion. The lower portion consists for the most part of dark, grey and greyish brown types of coarser grain. Except for the above evidence of silicification and the difference in colour, there is nothing to suggest differences in quality throughout the limestone. The analyses of samples 3, 4, and 5 gives the best indications of the relative quantities of the upper, middle and lower portions of the limestones. These show that the upper and middle portions are similar in composition with 20% silica and 75% to 77% calcium carbonate respectively, while the lower is of poorer quality with 23% silica and 71% calcium carbonate. The average composition of the three portions would be 21.32% silica and 74.87% calcium carbonate. This agrees fairly closely with sample No. 13 (24.60% silica and 72.00% calcium carbonate) which consisted of small pieces of limestone from the full thickness of the Dalmayne beds.

SALTWATER LAGOON

A geological sketch map of this district accompanies this report. It is for the most part copied from the map by Mr. H.G.W. Keid in the Coal Resources of Tasmania. The principal exposure of limestone occurs to the north and west of Saltwater Lagoon, while there is a probable continuation to the south. On the eastern side the limestone overlies the basal conglomerates and sandstones and its eastern boundary has been determined by the denudation along the coast. The northern boundary has been determined similarly. The western boundary is limited by the fault shown on the sketch map, the limestone and containing beds have been downthrown to the west approximately 500 feet. The probable extension to the south is indicated on the plan. With regard to the limestone to the west of the fault, the following information is taken from the report by H.G.W. Keid "The western portion of the area i.e. in the vicinity of Moulting Lagoon, is comparatively flat, the strata outcropping on these flats being Permo-Carboniferous

limestones and Tria-Jura grits. Practically the whole of the Trias-Jura strata have been denuded a small thickness of basal grits being found on the numerous small ridges of the area, while Permo-Carboniferous limestones outcrop in the intervening gullies. The eastern slope of Mt. Paul falls abruptly through Trias-Jura sandstones till the Permo-Carboniferous limestones are met, but further to the east the limestones are again found to outcrop at an altitude much above the base of the Trias-Jura grits. A fault is present." The latter reference is to the limestone near Saltwater Lagoon, so it appears that two areas of limestone occur to the west of the fault, one immediately adjacent to the fault and the other on the flats along Moulting Lagoon. These areas do not appear from the report to be so favourably situated for economic working as does the one at Saltwater Lagoon. The limestone at Saltwater Lagoon extends over an area of 200 to 350 acres. The maximum thickness is in the vicinity of 300 feet. Assuming an average thickness of 200 feet over 200 acres the reserve of limestone would be 80,000,000 tons. This reserve together with the probable extension to the south and the other outcrops to the west, is sufficient to warrant the establishment of a cement industry, other things being satisfactory. Sample No. 1 represents 70 feet of limestone (between 350 and 420 feet) on the western fall of spur above Saltwater Lagoon. Sample No. 2 represents 150 feet of underlying beds (between 190 and 330 feet above the sea) on the eastern fall of the spur. These two samples form as representative a sample as it is possible to obtain of the limestone of this locality under the conditions available. The analyses show that the upper portion contains 15.40% silica and 82.40% calcium carbonate while the lower contains 18.40% silica and 76.50% of calcium carbonate. The average composition (combining the above in the ratio of the thickness) would be 17.4% silica, 2.24% ferric oxide, 1.85% alumina, 78.37% calcium carbonate, and 0.58% magnesia.

CLAY

DALMAYNE

As shown on the sketch map of the Dalmayne area accompanying the first report, granite outcrops over a considerable area in the vicinity of the crossing of the aerial ropeway and the main road. The granite does not outcrop to any great extent at the surface and the following section explains the occurrence. (a) The surface is occupied by a sandy soil which extends to a depth of about 6 inches. (b) Underlying the soil, a light brownish coloured clay forms a layer averaging 9 to 12 inches in thickness. (c) The clay gives place to completely weathered granite several feet in thickness. (d) The weathered granite passes insensibly into the hard unweathered granite at depth. Sample No. 6 represents the clay immediately adjacent to the main road. Sample No. 11 represents similar clay 300 yards to the west. No. 6 contains 51.72% silica and 32.36% alumina, while No. 11 has 58.40% silica and 28.28% alumina. Sample No. 7 represents the weathered granite while No. 12 represents a combined sample of the clay and decomposed granite. No. 7 contains 65.12% of silica and 23.24% alumina, while No. 12 has 70.20% silica and 15.85% alumina. This clay would probably be found to extend over the area which the granite is shown to outcrop on the plan accompanying the first report. Its exact extent, and the reserve available should be determined by means of shallow pits sunk over the granite and adjacent areas.

MT. PETER - MT. PAUL

Three samples of clay were obtained by Mr. Bingham from localities along the railway route to the west of Mt. Peter and Paul. Samples (8) and (9) are stated to be from granite country (on the plan (9) does not come on the granite, but this is probably due to the sketch map being slightly out of position with regard to this railway route) while No. 10, is from the diabase country. Sample No. 8 contains 73.40% silica and 15.94% alumina; No. 9 has 67.24% silica and 18.80% alumina; while No. 10 has 75.82% silica and 11.38% alumina. In all of these the silica is comparatively high compared with the alumina and ferric oxide especially for siliceous limestones like those of the East Coast.

CONCLUSIONS

It is evident from the above that the limestones at Dalmayne and Saltwater Lagoon are of low grade as regards calcium carbonate content. The Dalmayne limestone has an average content of 72 to 75% and the Saltwater Lagoon a content of 78.37%. The upper portions of both these are a little above the average, but if such were utilised, the available tonnages would not be so large. As a cement mixture for standard Portland cement has to contain 75% calcium carbonate, and the above contains approximately this percentage, it is obvious that little, if any, other material can be mixed with the limestone. The composition of the remaining 28% to 22% of the limestone is therefore of great importance. If the silica, alumina and ferric oxide are in the desired proportions, the limestone will represent a natural cement rock. In the Dalmayne limestone the ratio of silica to combined alumina and ferric oxide is 4.99 to 1, while in the Saltwater Lagoon stone the corresponding ratio is 4.25 to 1. In ordinary practice this ratio is between 2½ and 3 to 1, so that the above limestones are too high in silica to represent a natural cement rock. The only alternative is to mix with the higher grade limestones, small amounts of clays high in alumina. The limestone at Saltwater Lagoon appears from the above results to be the better quality. The clay with least silica and highest alumina content is that at Dalmayne. Samples 6 to 11 represent this clay and show the composition varies somewhat. The average of the two analyses would be approximately 55% silica, 30% alumina and 2.84% ferric oxide. In order to produce a mixture containing 75% calcium carbonate, such mixture would have to contain 95.70% of Saltwater Lagoon limestone and 4.3% Dalmayne clay. The resulting mixture would then contain 19.01% silica, 2.26% ferric oxide and 3.06% alumina. This would probably contain too much silica for standard Portland cement. It would appear therefore that limestone of still higher grade would have to be selected in order to produce a suitable mixture. This would have disadvantages affecting selective mining viz. reduced reserves and increased costs.

RECOMMENDATIONS

It must be pointed out that the above remarks are based upon the analyses of samples taken from the deposits. These samples represent the best and most representative ones obtainable under the existing conditions. Only those beds which outcrop can of course be included in such samples. It may be that the contained impurities such as silica determines the resistant properties of the limestones, in which only the more impure ones would then be found to outcrop. More complete and representative samples could be obtained by surface trenching or boring.

Hobart,
10th July, 1926.

P.B. NYE,
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LIST OF SAMPLES FROM DALMAYNE AND SALTWATER LAGOON

- No. 1 Limestones, Western slope spur above Saltwater Lagoon.
Between 350' and 420' above sea level.
- No. 2 Limestone, Eastern fall to sea above Saltwater Lagoon.
Between 190' and 330' above sea.
- No. 3 Limestone Picanini Dalmayne. Upper portion.
- No. 4 " " " Middle portion.
- No. 5 " " " Lower portion.
- No. 6 Clay 9"-12" thick overlying decomposed granite at inter-
section. Aerial ropeway and main road Dalmayne.
- No. 7 Decomposed granite underlying clay at same locality as (6).
- No. 8 Clay. 5m. 60 ch. peg on East Coast Railway.
- No. 9 Clay. 7m. 25 ch. peg on East Coast Railway.
- No.10 Clay. 8m. 40 ch. peg on East Coast Railway.
- No.11 Clay as in (6) but 300 yards west of road.
- No.12 Clay and decomposed granite 3 feet deep ditch along road,
12 chains south of (6).
- No. 13 Small representative sample of limestone in Picanini Creek.

ANALYSIS OF SAMPLES FROM DALMAYNE AND EAST COAST.

Sample	Silica	Ferric Oxide	Alumina	Lime	Magnesia	Potash	Soda	Titania	Ignition Loss
1	15.40	2.15	0.45	82.40	0.29	-	-	-	-
2	18.40	2.29	2.51	76.50	0.65	-	-	-	-
3	20.16	2.29	0.43	77.60	0.29	-	-	-	-
4	20.28	3.86	1.54	75.32	0.36	-	-	-	-
5	23.52	2.00	2.68	71.69	0.50	-	-	-	-
6	51.72	3.96	32.36	Nil	0.62	-	-	0.48	11.00
7	65.12	3.54	23.24	Trace	0.64	-	-	0.30	7.84
8	73.40	3.82	15.94	Nil	0.72	-	-	0.44	6.22
9	67.24	5.68	18.80	Nil	0.58	-	-	0.92	7.50
10	75.82	5.96	11.38	Trace	0.60	-	-	0.74	6.64
11	58.40	1.72	28.28	0.40	1.08	-	-	-	11.30
12	70.20	4.15	15.85	Nil	0.58	3.27	1.73	-	5.50
13	24.60	2.86	0.34	72.00	0.86	-	-	-	-