

WHITTON'S LIMESTONE QUARRY

The Quarry is situated on the west side of Proctors Road about three miles distant from Hobart. The Quarry is as yet only in a state of partial development and the machinery at present being used is more or less inefficient. It is the intention of the proprietor to extend his operations and excavations are being made to facilitate the erection of storage bins and for the foundations of bigger and more efficient treatment plant.

The original object of the quarrying operations was the production of metal for the manufacture of concrete bricks and for road making. It was during these operations that a band of calcareous material was exposed which, on analysis, revealed a comparatively high content of lime. The lime content was such that it was considered that the crushed material would have some virtue as a beneficiating material for agricultural purposes.

In March last, Geologist T. D. Hughes examined the quarry and referred to samples which the proprietor had had analysed. He then drew attention to the ratio between the Lime, Acid Insoluble and Ignition Loss percentages and suggested that samples which were then obtained by Mr Robertson would give concrete evidence of the conditions existing in the rocks.

Four samples were taken by Mr Robertson and the results were as follows :-

Reg. No.	CaO	MgO	Insol.	Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	Ignition Loss	TiO <sub>2</sub>
169/50	35.90	0.3	46.2	1.1	0.7	14.4	0.2
170/50	31.0	0.3	49.3	1.2	1.7	15.8	0.2
171/50	9.4	0.5	75.8	2.2	2.8	8.2	0.6
172/50	42.2	0.1	34.6	0.7	1.2	20.2	0.2

The high proportion of Acid Insoluble and the low proportion of Ignition Loss compared with the proportion

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of Lime (CaO) suggested that the lime was not present only as Calcium Carbonate but was present as both the Carbonate and the Silicate.

By allotting the full amount of the Ignition Loss to CaO to give Calcium Carbonate (CaCO<sub>3</sub>) and then allotting sufficient Insoluble as Silica to absorb all the remaining Lime it was found that there was an excess of Insoluble as shown below :-

Regn. No.	CaCO <sub>3</sub>	CaSiO <sub>3</sub>	X. S. Insoluble
169/50	32.7	36.4	27.4
170/50	35.9	22.5	37.7
171/50	16.78	-	75.8
172/50	45.9	34.1	17.0

A further examination of the quarry was made during the period 4th to 7th July inclusive. A further series of samples was taken as being representative of the exposures in the quarry.

There have been two openings made on the area, the lower of the two being situated only a little above the creek level and is designed for the accommodation of hoppers for the storage of the crushed product from the quarry. In this lower opening the rocks have the appearance more of a quartzite than a limestone although a few fossils were visible. Field tests with acid failed to show effervescence except on the shell fragments and the analysis of samples taken from this site showed an exceptionally high proportion of insoluble matter.

In the main quarry the exposures were sampled in widths representative of bands which were more or less prominent in the face of the quarry. It was considered that these bands could possibly be hand picked during quarrying and so give some degree of selective mining if the analyses

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suggested that this course was advisable. Twelve samples were taken from the main quarry in widths ranging from 5 inches to 48 inches to show the grades of the tiers relative to each other.

Hand specimens of the rock were also taken with a view to microscopic examination. Micro slides of the specimens were cut by Mr Robertson and examined by Mr Everard who reports the presence of considerable quantities of Wollastonite and some Garnet.

The presence of these minerals suggest that the rocks have been subject to some degree of contact metamorphism resulting in the alternation of normal limestones to the Wollastonite-Garnet <sup>bearing</sup> rocks now exposed.

The results of the analyses of the fourteen samples taken are shown below. In this table the calculated percentages of Calcium Carbonate, Calcium Silicate and excess Insoluble are shown.

Reg.No.	Sample No.	Acid Insoluble	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	CaO CaO	MgO MgO	Ign. Loss.	TiO <sub>2</sub>	CaO as CaCO <sub>3</sub>	CaO as SiO <sub>2</sub>	CaCO <sub>3</sub>	CaSiO <sub>3</sub>	X.S. Insoluble	Depth of Sample
548/50	1	39.0	1.3	0.9	0.20	45.0	0.4	12.7	0.1	16.1	28.9	28.8	59.9	8.0	22½"
549/50	2	68.8	7.3	1.3	0.06	14.3	0.4	7.0	0.4	9.0	5.3	16.0	11.0	63.0	13"
550/50	3	40.7	1.0	0.8	0.10	44.3	0.2	12.5	0.1	15.9	28.4	28.4	58.8	10.3	16"
551/50	4	27.1	1.4	0.7	0.10	47.0	0.4	22.8	0.05	29.0	18.0	51.8	37.2	7.9	17"
552/50	5	39.3	2.1	0.9	0.10	40.5	0.4	16.2	0.1	20.6	19.9	36.8	41.2	18.0	12"
553/50	6	72.8	3.8	1.9	0.09	10.3	1.2	9.6	0.3	10.3		18.4		72.8	14"
554/50	7	70.8	4.6	1.9	0.18	11.6	0.7	10.0	0.3	11.6		19.1		70.8	21"
555/50	8	70.2	5.0	2.4	0.02	11.2	0.2	9.8	0.2	11.2	14.5	20.0	30.0	70.2	5"
556/50	9	51.1	3.3	1.0	0.20	30.5	0.3	12.6	0.1	16.0		28.6		35.6	32"
557/50	10	83.8	4.3	3.0	0.07	2.8	0.9	4.2	0.3	2.8		5.0		83.8	48"
558/50	11	84.9	2.4	2.3	0.09	1.3	1.3	6.5	0.1	1.3		2.3		84.9	22"
559/50	12	83.0	4.2	2.5	0.13	3.6	0.5	4.6	0.3	3.6		6.4		83.0	26"
560/50	13	78.5	6.9	1.1	Tr	6.9	0.4	5.4	0.2	5.6		11.0		78.5	30"
561/50	14	79.1	4.7	1.0	0.03	9.1	0.2	4.9	0.2	6.2	3.1	11.1		76.0	22"

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In some of the samples the ratio between the CaO (Lime) and the Loss on Ignition is just sufficient for the formation of Calcium Carbonate by the combination of the two factors. In such cases there is no Calcium Silicate present and the Silica is then shown all as excess Insoluble. This Silica would be in combination with the Alumina and Iron in the formation of clay or it may be present as Quartz grains as shown in some of the micro slides. It is noticed in all cases that Magnesium Oxide is present to a small degree. It is certain that this occurs also as the carbonate but the amount is insignificant and the figures shown as calcium carbonate are therefore all slightly in excess of actual fact. They are, however, definitely representative of the grade of limestone.

The analyses show that the highest percentage of available Calcium Carbonate to be expected for the beneficiation of soils would be 29.0% and in this instance 18.0% of lime is held as the stable Silicate to give 37.2% of Calcium Silicate which cannot be regarded advantageously for the treatment of soils.

In the main quarry a face of approximately 11 feet was measured at the point of sampling. Sample 1 was taken from a low wall in the middle of the quarry where the quarry had been deepened to test the underlying material. A section of 9 inches of highly siliceous rock was revealed below the sample but was repeated in the main face of the quarry where it was sampled as Sample No.2

Samples 2 to 9 inclusive represent the full face of the quarry and they reveal that of the total thickness of eleven feet a thickness of 40 inches shown by samples 6, 7 and 8 is extremely hard and siliceous and would, in any scheme designed for the production of limestone, have to be discarded.

The microscopic examination of the rocks from the quarry has shown the presence of Wollastonite and to a lesser extent garnet. As these minerals are suggestive of contact metamorphism it is probable that some degree of improvement in the quality of the limestone would be shown at points further removed from the point of contact with the igneous mass. Therefore, there may be some virtue in the suggestion by Mr Whitton that the deposit be tested towards the east by drill holes by Jack hammer to depths of say twelve feet to note if any improvement takes place. A development of at least four feet of overburden takes place in an easterly direction and prevented the efficient operation of the Jack hammer when tests were being made.

A report by Geologist Everard on the microscopic characters of the rocks is attached hereto.

H.G.W. Keid

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