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LIMESTONE AT CAMPANIA.

For some time past several farmers of the Richmond Municipality have been interested in obtaining local supplies of limestone suitable for crushing for agricultural needs. A possible source of supply that has received some attention is a deposit situated on the property of Mr. Dunbabin, "Ivanhoe", Brown Mountain.

This deposit is located some eight miles north north-east of Campania and can be reached by a motor road from there. The turnoff to "Ivanhoe" leaves the Colebrook Road two miles north of Campania and is followed first east and then north for five to six miles until "Ivanhoe" is reached. Half a mile beyond the homestead a track branches to the right and follows the course of White Kangaroo Rivulet for almost a mile where it crosses by means of a ford.

On the west bank of the stream at this point may be seen boldly outcropping exposures rising in cliff faces in places over a hundred feet in height. These rocks consist mainly of Permian mudstones but contain bryozoal limestone and calcareous mudstone beds, the whole flatly bedded, dipping a little north of west at 3^{o}.

In considering the suitability of a limestone for crushing for agricultural needs, the following factors should be considered.

1. Quality of the Deposit
2. Probable Tonnages
3. Ease of Quarrying
4. Proximity to markets

1. QUALITY OF LIMESTONE.

Three samples taken across the beds have been analysed with the following results :-

Constituents	I Percent	II Percent	III Percent
Acid Insoluble	35.9	43.6	62.7
Al_2O_3	2.9	4.8	4.2
Fe_2O_3	1.2	2.0	1.6
CaO	36.8	31.1	20.5
MgO	0.7	0.4	0.6
Ignition Loss	22.7	18.5	10.6

Number three sample was taken just below the ford over a width of four feet at creek level. Almost six hundred feet upstream from the ford the rock face has been weathered into a series of small caves and inlets. These beds are composed of a gray and cream, rather silicious, bryozoal limestone, containing small aggregates of calcite, which north and south along the strike appears to become more silicious. No. 1 sample was taken from creek level to 10 feet and No.2 sample from 10 to 15 feet. Above this are thick beds of silicious mudstone.

2.

Now from the analysis it can be seen that there is too much CaO to satisfy the CO_2 (or Ignition Loss) so that all the CaO is not in the form of calcium carbonate. Geologist G. Everard who examined a thin section of rock obtained from Sample I reports the existence of anorthite felspar so that portion of the CaO is contained in this. The remaining CaO is in the form of wollastonite or calcium silicate - a metamorphic mineral formed as a result of dolerite intrusion. The theoretical percentages of the various minerals present may be calculated as follows :-

Mineral	I Percent	II Percent	III Percent
Magnesium Carbonate ($MgCO_3$)	1.4	0.8	1.2
Calcium Carbonate ($CaCO_3$)	50.0	41.1	22.7
Wollastonite ($CaSiO_3$)	14.9	11.2	11.2
Felspar ($CaO.Al_2O_3.2SiO_2$)	7.9	13.0	11.5
Silica (SiO_2)	24.8	32.3	52.0
Iron Oxide (Fe_2O_3)	1.2	2.0	1.6

The only lime available to the soil when this material is crushed and spread is that contained in the $CaCO_3$ so that the available CaO in each sample may be expressed as follows :-

I 28%
II 23%
III 12.7%

It can thus be seen that even in the best sample the lime content is too low to consider it as a commercial proposition.

II QUALITIES AVAILABLE

Had the analysis revealed limestones of good grade, an approximate estimate of tonnages could have been made and it would have been found that these were quite large as the samples were taken over nearly twenty feet and the beds extended for many hundreds of feet laterally. However the grade being what it is, there is no point in elaborating the sampling and estimating available tonnages.

III EASE OF QUARRYING

As mentioned above the limestone beds outcrop at creek level and thick mudstone beds occur above them, so that even if the grade were good, the amount of overburden would preclude the economic winning of any quantity of limestone.

IV PROXIMITY TO MARKETS.

Although this limestone does occur at the extremity of agricultural land, it is easily accessible as far as roads are concerned and closer to potential users than any other recorded deposit.

CONCLUSION.

The poor grade of the beds sampled and the large overburden of mudstone seems to preclude the exploitation of this material for agricultural needs.

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