

UR 1944/1-16

DOLOMITE IN THE SMITHTON AREA

INTRODUCTION

In company with Dr. R.L. Jack and Mr. A. Macandie, a close examination and sampling campaign of the known outcrops of the dolomite areas was carried out. While it was understood that the samples would not be absolutely representative of the dolomite at depth, they would be a measure of relative comparison, giving some idea of the grade in widely separated areas.

One of the matters discussed at length as having a very important bearing on any sampling campaign was the effect of weathering on the dolomite. Samples were thus submitted to the Mines Department Laboratory, Launceston, with the following results :-

1. <u>Fresh unweathered material</u>	2. <u>Weathered Sample</u>
SiO ₂ - 1.28	SiO ₂ - 1.24
Al ₂ O ₃ - 1.18	Al ₂ O ₃ - 1.73
Fe ₂ O ₃ - 0.26	Fe ₂ O ₃ - 0.23
CaO - 30.05	CaO - 30.2
MgO - 20.58	MgO - 20.46

From this it is perfectly obvious that the whiter and more weathered material does not differ much from the more unweathered material. The test, however, is not absolutely conclusive as it could not be guaranteed that the samples represent the same band. Surface and weathered material will not be appreciably different from the fresher material, but the complicated geological structure makes it unsafe to assume that the beds exposed at the surface will be those encountered at depth.

GEOLOGY

The outcrops that were examined in detail can be considered under the following geographical headings :-

1. Smithton
2. Edith Creek
3. Irishtown
4. Montague River
5. Black River

1. SMITHTON AREA

This is the largest area, but owing to the flatness and sand cover of the country it is impossible to mark in the western boundary with any degree of accuracy.

The base of the dolomite is located near the debouch of the Mowbray Creek. Here interbedded brown shales mark a gradual passage to the underlying beds. The black limestones are near

the base of the Dolomite but the actual relationship could not be determined.

GEOLOGY

The factors that have to be considered in assessing the grade of dolomite that can be mined, will be considered under the following headings. These general factors are equally applicable to the other deposits.

- (a) Shaley bands
- (b) Quartz inclusions and cherty bands
- (c) Quartz Reefs
- (d) Brecciated Dolomite
- (e) Fine Grained and Crystalline Dolomite

(a) Near the base of the Dolomite, there are interbedded shale bands up to two feet thick. Higher in the sequence they are not as abundant but occasional thin bands occur e.g. about a chain upstream from the Blackwood Bridge. These are thin and are difficult to separate from the thin beds of the fine-grained (muddy type) dolomite.

Samples were forwarded for analysis -

Analysis No. 67/1944 - SiO ₂	-	5.20	
	Al ₂ O ₃	-	6.88
	Fe ₂ O ₃	-	0.48 - Analyst
	CaO	-	27.8 W.St.C. Manson
	MgO	-	16.39

From this it can be seen that even the apparently more impure bands contain a surprisingly high percentage of Dolomite.

(b) Quartz has been recorded in the dolomite occurring as interstitial grains between the crystals of dolomite. Larger blebs are very often abundant along the bedding planes of the dolomite, & are often so abundant that to a visual inspection they form about 5 percent of the exposed surface. The exposures under the Blackwood Bridge form typical examples and another large area occurs near the northern edge of the south-east Smithton Quarter Sheet. These beds, which may be 30 feet thick, would be unsuitable, if high grade dolomite is required.

Where there is a thickness of beds characterised by an abundance of blebs of silica, there is a tendency for beds of siliceous or cherty material to be present e.g. under the Blackwood Bridge, the larger lenticles of these beds would be 6 feet long and up to 2 feet in diameter. As a rule they would be much thinner than this. A similar association to the above was also noticed on the Montague River, about half a mile upstream from the road bridge, at Edith Creek and at Irishtown.

(c) Quartz Reefs - Reef Quartz invades the dolomite. One vein up to 1 foot is present at Watson's Bend, and thin quartz veins are present along fault lines. In the Irishtown area, these are especially abundant, and make parts of this outcrop unsuitable for quarrying. Careful testing would thus be necessary to ensure that quarrying is not carried out in these areas.

(d) Brecciated Dolomite - One of the greatest difficulties in the way of obtaining dips and strikes to work out the detailed structures, is the widespread occurrence of outcrops of dolomite breccias. After much examination it became evident that these belts represent belts of fracturing. In some cases the association with faults and folds was unmistakable but in other cases this is not so evident. The brecciation may, in some cases, be due to rock deformation in the initial stages of folding, but the widespread occurrence and close association with folding and faulting points to these being the major cause of the brecciation. The abundance of these belts shows that the structure of these belts of dolomite is more complicated than at first apparent. These breccias are essentially composed of dolomite, the included fragments as well as the enclosing cementing material, so that while the folding is more complicated, the grade of dolomite is not altered appreciably.

(e) Fine-Grained and Crystalline Dolomites
Two types of dolomite occur -

- (i) "Fine-grained type" usually thin bedded.
- (ii) "Coarse-grained type" - which is finely crystalline in hand specimens.

The former is thin bedded and the latter is more thickly bedded. Where good exposures are available, it is seen that the crystalline variety is only sparingly present, and in these areas is not present in sufficient quantity to be mined. The normal type available for mining in these places would be the fine-grained type.

Along Mowbray Creek and further to the west in the drains near E.V. Riley's and M. Malburg's property, the rock is crystalline and massive so that dips and strikes are difficult to obtain. The question arises whether the crystalline variety is a surface feature due to crystallisation. This could be tested by shallow shafts and by boring. As the crystalline types are the purest in grade (v. Bull. 41 P. 101), it is important that whether this recrystallisation is a surface feature or not should be investigated.

Very little crystalline dolomite was seen in the available exposures near Watson's Bend, although much was supposed to be present in the road quarries to the south of this bend.

General Structures

The prevailing westerly dip in most of the sections is a well marked feature but this simple structural idea is not entirely correct as folding is very prevalent. Not only the dips of the beds vary but also their strike.

If the beds of the Duck River from the Smithton Bridge up to the first rapids are examined at low tide, several folds can be distinguished, pointing to a much smaller thickness of the dolomite beds than was supposed to be present. This thickness, however, is far greater than the depth to which quarrying operations could be carried out.

Over most of the areas examined, the dolomite is covered by recent unconsolidated sands or by peat, and exposures are limited to the banks of the rivers and creeks or to drains cut to drain the ground.

The best sections are along the Duck River. This river has entrenched into the sand plains during the most recent uplift, which on available evidence is about 15 feet. One of the areas where most rock is exposed is that in Watson's Bend. Here floods of previous times have partially swept away the sand and laid bare the dolomite over large areas.

This small area was mapped in some detail on a previous visit, and on this occasion the surface was carefully sampled; the position of the various samples is shown on the plan. The results of this sampling should show whether there are any differences in grade in the various exposures.

One of the main drawbacks is the low level of this area, as the maximum height recorded is just over 10 feet above High Water Mark, as seen on the small jetty upstream at the Duck River.

The quarries would be sub-surface quarries which would extend some distance below creek level, where it is affected by tidal water. There was no indication anywhere that any serious floods had taken place or that abnormally high tides had overflowed the bank of the river.

The remaining factor that would affect sub-surface quarrying is the possibility of striking underground water. In several places there is evidence of cracks and caverns and although none of any appreciable extent have been found in Watson's Bend, there is always a possibility of their being present.

Bores sunk by Mr. Zeigler (see appendix) show that crevices in the dolomite are very abundant, and in testing the area it would be necessary to note when water was struck, and, if possible, the flow of the water in the bores.

2 THE EDITH CREEK AREA

This lies to the south of the Smithton area and differs from the former in that it occupies relatively high ground bordering the flat ground. As far as can be argued from the mapping of the quarter sheets, it is probably the southern extension of the main mass, although structurally it is quite different.

A feature of some importance is the presence of a succession of sink-holes in the dolomite. A section of one of these or else a decomposed dyke 50 feet wide is to be seen in the railway cutting, north of Edith Creek Railway Station.

Near this clay-like formation bands of cherty material occur in the dolomite. Near where the road

crosses the railway there is a quarry which discloses good sections of the dolomite. Near the eastern end, the beds are much decomposed, and this belt of decomposition is in line with the sink holes further up the hillside. The rest of the quarry is very complexly folded, and over a length of 40 feet shows a very large overfold which is faulted on the western side, the line of this fault being marked by a thin laminated quartz-seam. On the western side of the fault, the beds are still overfolded with numerous horizontal crenulations. On the road East of the quarry, brown shales underline the dolomite.

These Edith Creek outcrops are ideally located as to the railway, but the presence of siliceous bands, and of the clay filled sink holes would make it necessary to test the area in detail, as certain of the material available would have to be rejected.

Sample 27 does not include the cherty bands, but is representative of a length of 240 feet along the railway line (in this width there is 50 feet of the clayey material which was not included in the samples).

Sample 26 is from the quarry near the rail and road crossing, while Sample 25 is from the small Ballast Quarries alongside the railway line between areas of samples 26 and 27.

3. IRISHTOWN

According to Bulletin 41, Geo.Surv. Tasmania, the dolomite at Irishtown lies stratigraphically beneath the main body of dolomite and belongs to the Sub-Dolomite Stage. In the southern portion where the outcrops form a very wide belt, they are hidden by the widespread basalt flow which covers the hill country. Immediately east of the township of Irishtown, the outcrops form the flanks of the hills.

The Wiltshire-Irishtown Railway cuts through the dolomite near its widest extent. This cutting was sampled in two sections, one for 130 feet east of the $\frac{3}{4}$ mile peg in the cutting and one 120 feet to the west. South of the railway cutting, a large amount of dolomite is exposed between the railway and the short road further south, along a ridge which is capped by basalt.

Further east, dolomite outcrops only near the base of the Northern slopes of the basalt covered hills but the presence of dolomite on the flat soil-covered area immediately south of the railway is indicated by occasional outcrops and the presence of several sink holes. It would be necessary to sink trial shafts to determine the depth of overburden and quality of dolomite in this area.

There is a northerly extension of the dolomite from the railway to Fahey's Lane.

Sample 21 is from east of a small quarry on the road corner and includes 15 chains of Fahey's Lane.

Sample 22 includes chip samples from the area fault of east-west portion of Fahey's Lane. Part of these outcrops were siliceous and the siliceous portions were not included in the sample.

Dip and strike readings were difficult to obtain but some of the outcrops show steep and opposing dips and in the old quarry on the top of the ridge some recent quarrying had been attempted. On the freshly exposed faces there were undoubted slickensides. Apart from quartz veins and spurs, cherty bands are also present.

The outcrops around Irishtown are ideally located for open-cutting and are on an existing railway line. The land is mostly under cultivation and while the problem of overburden will become more important as quarrying is extended, the outcrops show that siliceous rocks are more prevalent than in any other area that has been examined and would have to be thoroughly tested before any quarrying operations were initiated.

A sample of the harder and apparently more siliceous Dolomite was sent to the Mines Department Laboratory, Launceston, with the following result:-

	%
SiO ₂	4.16
Al ₂ O ₃	2.12
Fe ₂ O ₃	0.40
CaO	29.1
MgO	19.67

This result was surprising as it disclosed the presence of more dolomite than was expected.

4. MONTAGUE RIVER

The occurrence on the Montague River is very similar to that on the Duck River in that the exposures are along the river, where it has entrenched itself through the sand and on to the dolomite beneath. The sand cover is deeper than is customarily seen along the Duck River and as the Montague is the smaller river, the exposures are not as extensive as along the Duck River.

On the whole, the dips are easterly, and this, coupled with the fact that easterly dips occur along the sea-shore north of Montague, would point to a structural connection with the Smithton area.

The structure is not quite as simple as this, as is shown by the presence of folds in the dolomite itself in the cattle yards about half a mile south of the Montague River bridge and halfway between Smithton and Montague on the northerly extension of the Christmas Hill, small roadside pits exhibit flat dips indicating another anticline here with flat dips of up to 10° and a southerly pitch of about 6°.

The actual geological structure between Montague and Smithton is thus not known in detail.

The lithology of the dolomite is similar to that at Smithton. Most of the exposures show a good grade in hand specimen, but in certain parts, the small lenses of quartz are very abundant together with the usual association of quartzite beds, with individual thicknesses of up to 6 inches.

The absence of a railway, the thick cover of sand, and the paucity of natural outcrops, militate against the commercial utilisation of this deposit.

Sample 34 is a chip sample from about 200 feet up and down the river from the Bridge.

Sample 35 is from the Montague River and down to the Cattle Yards. The more siliceous bands have been omitted from the sampling.

5. THE BLACK RIVER DEPOSITS

Apart from the occurrence of Dolomite near the road and railway on the Black River, very little was known of this deposit.

The physiographical setting is similar to that along the Duck and Montague Rivers. The Black river flows in a general north-easterly direction and its channel narrows abruptly at "The Jam", where it cuts across a conglomerate and quartzite band. These bands can be traced in a general south-westerly direction, the eastern side passing behind the house to the east of the river, where they dip to the North-West.

The exposures in the railway cutting dip to the south. Here there are overfolded black mudstones immediately beneath the conglomerate, apparently suggesting the usual relationship of the folding together of competent and incompetent beds. The conglomerate beds can be traced to the quarry and a smaller hillock further south.

The general structure of the area is thus fairly clear - a narrow synclinal structure striking along this part of the river and pitching to the South-West. The river has cut through the axis of this fold at "The Jam" which is the narrow portion through the hard conglomerate and quartzites.

Further downstream, near where the river turns before entering the sea, flat beds of mudstone mark the extension of the synclinal axis.

Overlying the conglomerate are beds of chert, which are succeeded in turn by the dolomite. The dolomite is apparently of good grade, but the geological section shows that the amount present is not great, as the river by corrasion and lateral erosion has removed the greater part of the dolomite.

Further to the South-West there are some river flats where no outcrops were apparent, and the extension in this direction has not been established.

The limited quantity of dolomite that is available in this syncline as far as known at present does not render it a suitable proposition for large quarrying operations.

CONCLUSIONS

General Structure

The dolomite at Smithton is the largest yet known in the State, but sub-surface quarrying would be necessary. The geological structure of the dolomite

shows that folding is present as well as faulting. In surface outcrops this is difficult to decipher, but the stresses present have given rise to brecciated belts, which could be favourable for the accumulation of much ground water.

Grade

In no area is the grade of the dolomite entirely uniform. The impurities are mainly the development of quartz (or quartzite) blebs, small lenses of similar material along the bedding planes, beds of quartzite (of irregular thickness but up to 6" thick), and thin beds of dolomitic shales. In places, particularly near the base of the dolomite, there are beds of mudstones or shales up to three feet wide. It is thus imperative that any area on which quarrying operations are to be initiated, should be tested in detail as to grade. The geological structure is too complex to ensure that what is seen on the surface will persist in depth.

The amount of crystalline material is limited in depth in all good exposures. The large surface exposures of crystalline material along the drains at Riley's in the west and along Mowbray Creek, should thus be tested in order to prove the depth of this crystalline material. This can be done either by drilling or shaft sinking.

In the Irishtown outcrops, both near Fahey's Lane and south of the Wiltshire Railway, it would be possible to open up good quarries. Near Fahey's Lane some selection, due to the presence of quartz and charts, would be necessary. Apart from some soil, no overburden would have to be removed. South of the Wiltshire Railway, except perhaps near the spur near the railway cutting, overburden, due to the presence of basalt and sub-basaltic deposits in the hill slopes to the south, would be an increasingly costly item in all quarrying. Whether water would be a big problem depends on the location and depth of the quarry with regard to the ancient leads beneath the basalt. There is some silicified Tertiary Limestones under the basalt, but this has not yet been found in situ.

In the Edith Creek area, normal quarrying operations are feasible, but here again there is obvious variation in grade, as well as much clayey material along the sink holes.

The railway lines are favourably located as regards Irishtown and Edith Creek; the ease of quarrying so evident; the danger of meeting underground water small compared with the flatter areas near the swamps, that these deposits should be tested. Although surface indications show variability of product, testing should be carried out to determine the amount of workable material that is available.

The most extensive outcrop in the immediate vicinity of Smithton is in Watson's Bend, and surface indications point to its being of high grade. The maximum height above Local High Water Mark is just over 10 feet, so that sub-surface quarrying is indicated. When the quality of this deposit is being tested, attention should be paid to the quantity of water met with in the bores and, if possible, pumping tests carried out to obtain this information. The presence of the water table at shallow depths would definitely hinder any developments here.

The same objections would prevail in connection with surface areas of crystalline dolomite along Mowbray Creek and at Riley's. Near the western boundary of the Smithton dolomite, there are abundant Spring mounds, the flow from two of these amounting to 30,000 gallons per hour, and under sufficient pressure flow out 12 feet above the normal plain level. If water of this nature was encountered, pumping would not be economical.

Careful testing is thus necessary at all the sites, and attention has to be paid not only to grade and quantity of ore, but the presence and amount of water that is encountered. The actual boring programme will be determined to a large extent by the results of assays from the various areas, which are listed below, but boring at first should be extensive rather than intensive.

From the field evidence the following are considered the most favourable areas :-

1. Watson's Bend
2. Irishtown
3. Edith Creek
4. On a line from Riley's to the Mowbray Creek, (where large areas of crystalline dolomite are exposed in the limited outcrops that are available).

Sgd. D.E. Thomas, D.Sc.,

GOVERNMENT GEOLOGIST

The Department of Mines,
HOBART

18th February, 1944.

APPENDIX

Details of the following bores were supplied by Mr. Zeigler of Smithton.

(for position of bores see large plan).

Cheese Factory -
(on W.Geale's Property)

Depth 54 feet.
0 - 13' sand
13 - 38' solid dolomite
38'-42' layers and crevices full of water.
42' - 45' dolomite
then large crevice with water.

T.J. Murphy -

Depth 45 feet.
0 - 25' sand
25' - 29' dolomite
29' - 54' ironstone bed, gravel with much water.

S. Dunn -

Depth 56 feet.
0 - 22' sand
22' - 56' thin layers of Dolomite and ? limestone and very holey.

S. Jones -

Depth 58 feet.
0 - 14' sand
14 - 58' hard flint or dolomite.



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SAMPLES OF DOLOMITE

(Results of Assays from Newcastle to be listed).

1. (Not of dolomite).
2. Quarry reserve seven acres west of Watson's Bend, Smithton, in B. Burnley 1137 acres and east of N.R. Reeman.
3. Bank of Duck River, Watson's Bend (v. detailed plan of area).
4. 100 feet to North-West of Allot. 3, North-Eastcorner.
5. Downstream from (3), over length of 50 feet.
6. 100 feet North-West corner of Albert Street. (150 feet length).
7. 100 feet West of station 5 - on detailed plan Watson's Bend.
8. 250 feet South West of station 4 - on detailed plan Watson's Bend.
9. N.80°E. for 290 feet from station 5 - on detailed plan Watson's Bend.
10. Quarry in dolomite 100 feet N.W. of station 10 - detailed plan Watson's Bend.
11. Along big outcrop over width of 400 feet, near station 10 - detailed plan on Watson's Bend - (Some quartz veinlets omitted from sampling).
12. 200 feet W.N.W. of station 7 - on detailed plan. (Outcrop measures 300' x 200').
13. General sample from outcrop. Between stations 12 and 13 - on Watson's Bend plan and for 400 feet eastwards to Tidal Creek.
14. 500 feet to East of station 13 - on plan.
15. Bed of Tidal Creek.
100 feet South line joining stations 13 and 14.
16. N. and N.W. of station 11.
Grey crystalline. Contains also veinlet of quartz.

17. Large scattered area around station 14.
(weathered more deeply than usual - some shaly bands and odd quartz seams).
18. To East of Reservation Fence Watson's Bend.
N.20°E. from station 15.
19. Blackwood Bridge.
Exposures along Duck River, West and South of the bridge - some shale bands and much quartz.
20. First Quarry (selected best blue material) to South and West of Blackwood Bridge on Quarry Reserve.

IRISHTOWN

21. Road South East from Fahey's Lane and east of quarry on corner, including 15 chains of Fahey's Lane.
22. From surface outcrop in Paddock South of East West parts of Fahey's Lane. Parts that were very siliceous not included.
23. In railway cut near $\frac{3}{4}$ -mile peg from Irishtown. Sample over 130 feet East of peg.
24. In above railway cut for 120 feet west of peg.

EDITH CREEK

25. Ballast Quarries. South of ones shown on plan accompanying Bull. 41.
26. Big Quarry shown on above plan to north of Edith Creek station, near intersection road and railway. (This quarry shows good overfolds).
27. In railway cutting near $22\frac{3}{4}$ mile peg and South of above. Sample over length of 240 feet: cherty beds in places, and 50 feet of clayey material ? sink hole or decomposed dyke not included.

DUCK RIVER

28. Upstream from second bridge on Duck River on Lower Scotchtown Road.

B

29. Quarry at River Bend downstream from above
- very solid, very dense and not much disturbed.
30. Riley's Property, just at Western edge of
Dolomite Reservation, and about 1 mile south
of Marrawah Road. 300 yards in drain - all
in massive buff coloured crystalline material.
31. Mowbray Creek. Over length of 200 yards,
immediately South of road. Beds strike E. and
W. and dip to South.

BLACK RIVER

32. Exposures on River.
33. Near Railway and Road Bridges.

MONTAGUE RIVER

34. Near Bridge on Montague River.
35. Near Cattle Yards about half a mile upstream
from 34. (more siliceous beds not included).
36. On flats to South and east of railway cutting
samples 23 and 24 above.

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SAMPLES OF DOLOMITE FROM SMITHTON DISTRICT
BY MESSRS. JACK AND MAGANDIE - FEBRUARY,
1914

Sample No.	Location.	SiO ₂	MgO	Fe ₂ O ₃	Al ₂ O ₃	MnO	CaO	Ignition Loss
* 2.	Near Quarry Reserve West from Watson's Bend	.34	21.22	.76		.10	31.03	46.52
3.	Temporary Reservation. Western group	.16	21.25	.44		.10	31.34	46.70
4.	do. do.	.14	21.14	.48		Tr.	31.52	46.66
5.	do. do.	.14	21.68	.32		Tr.	31.04	46.78
6.	do. do.	.10	21.44	.32		Tr.	31.44	46.70
7.	do. Mid-west group	.70	21.12	.52		Tr.	31.38	46.04
8.	do. do.	.12	21.10	.42		Tr.	31.19	47.16
9.	do. Mid-east group	3.10	21.02	1.70		Tr.	28.45	45.60
10.	do. Mid-west group	.40	21.03	.66		Tr.	31.03	46.88
11.	do. do.	1.10	20.76	1.10		Tr.	30.83	46.20
12.	do. do.	.71	20.66	.66		Tr.	31.15	46.80
13.	do. Eastern Group	3.16	20.73	1.98		Tr.	28.45	45.40
14.	do. do.	4.20	19.71	2.86		.03	28.96	44.00
15.	do. do.	2.72	20.31	2.14		.02	29.73	45.18
16.	do. Mid-east group	2.80	20.31	1.64		.03	29.93	45.25
17.	do. Eastern Group	4.16	19.40	3.00		.03	28.90	44.11

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Sample No.	Location	SiO ₂	MgO	Fe ₂ O ₃	Al ₂ O ₃	MnO	CaO	Ignition Loss
18.	Outside do. do.	2.24	20.48	1.80		.01	30.25	45.29
19.	Blackwood Bridge. Duck River.	3.90	19.80	2.04		.02	29.94	44.22
* 20.	7 Acre Quarry Reserve	.30	22.14	.42		N11	31.59	45.02
21.	Irishtown. Fahey's Lane East.	3.68	22.76	.88		N11	30.47	41.72
22.	do. do. West.	2.96	22.36	.62		N11	31.92	41.59
23.	do. Railway Cutting.	3.16	21.66	.70		N11	31.27	42.88
24.	do. do.	2.68	21.89	1.68		N11	30.53	42.82
25.	Edith Creek.	4.08	22.45	1.51		N11	31.11	41.48
26.	do.	5.20	20.58	3.40		Tr.	27.50	43.30
27.	do.	4.80	19.76	4.10		Tr.	28.33	43.00
28.	South of Mowbray Creek at Duck River Bridge.	3.50	20.44	3.10		Tr.	29.24	43.70
29.	do.	4.20	19.58	3.04		Tr.	29.87	43.30
* 30.	Riley's Farm in drain	.80	20.34	.72	.28	Tr.	31.24	46.60
* 31.	Mowbray Creek in bed.	.30	20.80	.58	.22	Tr.	31.06	47.03
* 32.	Outside (N.) of Temporary Reservation Western group	.30	20.59	.58	.22	Tr.	31.20	47.10
33.	Black River	.70	21.16	.44	.26	Tr.	31.02	46.40
34	Montague River at Bridge	.20	19.99	.72	.18	Tr.	32.29	46.61

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Sample No.	Location	SiO ₂	MgO	Fe ₂ O ₃	Al ₂ O ₃	MnO	CaO	Ignition Loss
35.	do.	1.10	19.64	1.30	1.10	Tr.	31.34	45.50
36.	Irishtown in Flats to East of Cutting	1.30	20.32	.72	.58	Tr.	31.16	45.90

* These samples highly crystalline.

MELBOURNE

22nd March, 1944.

RLJ:SL.