DEPARTMENT OF MINES
SOUTH AUSTRALIA

# BRACHINA DOLOMITE DEPOSIT
# CENTRAL FLINDERS RANGES
## Hundred of Bunyeroo

by

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and

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NON METALLICS SECTION
GEOLOGICAL SURVEY

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Rept. Bk. No. 60/9
G.S. No. 3058
D.M. 1738/63

13th January, 1965

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## ABSTRACT

Mapping and sampling have confirmed high grade dolomite at the base of the Lower Cambrian Wilkawillina Limestone at Brachina Gorge. The dolomite appears chemically suitable for refractory and other industrial purposes with an average grade of 54% $CaCO_3$ and 40% $MgCO_3$. Reserves above outcrop level in the eastern portion of the deposit are estimated at 10 million cubic yards.

## INTRODUCTION

Reconnaissance sampling of the Lower Cambrian carbonate rocks near Brachina Gorge in the Central Flinders Ranges during December 1963 proved the existence of high grade limestones and dolomites.

Following appraisal of the assay results a limestone target and a dolomite target were selected for detailed investigation. The limestone deposit is the subject of a separate report (Report Book No. 59-155).

The dolomite deposit, which is situated in rugged terrain adjacent to Brachina Gorge and which extends half a mile south from the Gorge, includes the eastern portions of the original sample traverses G, H and I (see locality plan No. 64-994). Considerable bulldozing would be required to provide access for drilling or quarrying equipment.

The accompanying geological plan No. L 64-212 is based on a stadia theodolite survey by C. Fryters (Surveyor) undertaken from 19th to 28th August, 1964. The authors were assisted in chip sampling by W. Tanner (Field Assistant). Geological logs of the sample traverses are appended (Appendix I).

Chip samples were submitted to Australian Mineral

Development Laboratories for the determination of calcium-carbonate ($CaCO_3$) and magnesium-carbonate ($MgCO_3$). These results are tabulated in Appendix II.

The regional geology, location and topography have been described in a previous report - Johns, R.K., 1964, Brachina Limestone deposits, D.M. 1738/63, R.B. 58/75 unpublished.

References

Ayres, D.E. (1964): Petrology of the Enorama - Brachina Stratigraphic Section. A.M.D.L. Rept. MP 1665-63 (unpub.).

Dalgarno, C.R. (in press): Lower Cambrian Stratigraphy of the Flinders Ranges. Trans. Roy. Soc. S.Aust. vol. 88.

Johns, R.K. (1963): Limestone, Dolomite and Magnesite Resources of South Australia. Geol. Surv. of S.A. Bull, no. 38.

Olliver, J.G. and Cramsie, J.N. (1964): Brachina Limestone Deposit, Central Flinders Ranges DM 1738/63, R.B. 59/155 (unpub.).

## SAMPLING TECHNIQUES

In the reconnaissance programme, outcrop was sampled along a strike distance of 13 miles (Johns 1964). Samples were collected along the major gullies which drain to the west at right angles to the strike of the beds. Rock outcrop was chipped every 10 feet, and samples were bulked over 200 feet intervals.

During the present investigation, traverses were pegged at 100 feet intervals prior to sampling. All the pegs were accurately located during the stadia survey and are shown on the accompanying plan No. L 64-212. Rock outcrop was chipped every 3 feet and samples were bulked over 50 feet intervals.

## REGIONAL GEOLOGY

The stratigraphic sequence (Dalgarno in press) south of Brachina Gorge is tabulated below.

| | |
|---|---|
| Lower Cambrian Series | Billy Creek Formation |
| | Hawker Group |
| | Oraparinna Shale |
| | Bunkers Sandstone |
| | Wilkawillina Limestone |
| | Parachilna Formation |
| Proterozoic | Wilpena Group |
| | Pound Quartzite |

Dalgarno has subdivided the Wilkawillina limestone into two members viz,

Upper Member :- Massive, thick bedded limestones predominantly grey in colour with abundant Archaeocyathae at top.

Lower Member - Flaggy, thinly bedded, oolitic dolomites and banded grey dolomites with minor sandy and shaley interbeds.

The lower dolomitic member of the Wilkawillina limestone was mapped, together with adjoining sections of the overlying limestone member and the underlying Parachilna Formation and Pound Quartzite.

## THE DOLOMITE DEPOSIT

The stratigraphic sequence in the area mapped is as follows:

### Pound Quartzite

Hard, jointed, white to buff quartzite outcrops in the northeast of the area mapped.

### Parachilna Formation

Clays and friable clayey sandstones overlie the Pound Quartzite. This contact is regarded as locally disconformable (Dalgarno in press). The characteristic vertical

worm burrows were observed in argillaceous sandstones which outcrop in the creek bed at the start of Traverse IV. On the accompanying plans and sections this formation has been designated as Proterozoic sands and clays.

The Wilkawillina Limestone

Within the area mapped, this formation consists of high grade dolomite on the eastern side but becomes calcareous to the west.

The dolomite is predominantly mid to dark grey in colour, with zones of fawn, pink, brown, yellow and purple. The individual crystals of dolomite are generally fine grained and oolitic texture is common. Ayres (1964 unpublished) described a sample collected from near the base of the Wilkawillina limestone in Brachina Gorge (sample No. P 794-63) as an oolitic dolomite, with oolites up to 0.32 mm. in diameter. The dolomite is characterised by well developed bedding planes which locally may be wavy.

The limestone zones are generally detected by the absence of bedding planes and a microcrystalline texture.

The banded nature of the dolomite is due to the differential weathering of alternate hard and soft layers. The hard layers which outcrop strongly are thickly bedded. The well developed rectangular jointing is also widely spaced. The softer layers are thinly bedded and often intensely jointed.

Light grey cryptocrystalline chert ranging from 1 inch blebs to lenses 2 feet thick are scattered through the dolomite. Vughy pink to white quartz has intruded the dolomite both along bedding and joint planes. The largest vein of quartz was observed on the creek bank east of Traverse IV, peg 7. The vein was 60 feet long and 1 foot thick with a strike of 250° and a dip of 85° to the north. The quartz is usually present as swarms of small stringers.

Both the chert and the quartz veins constitute only a small proportion of dolomite bed.

From 0 - 250 feet in Traverse II, the dolomite contains thin interbeds of light grey-green shale. Dolomite is underlain by similar sediments and a 6 inch thick quartzite band exposed in the creek bank. Ripple marks were observed on the quartzite which was traced along a strike distance of 30 feet. Lenses and bands of quartzite up to 1 foot thick are interbedded with the dolomite from 0 to 250 feet in Traverse IV.

The strata strike approximately north-south. The strike varies from 140° to 200° and the dip ranges from 20° to 65° to the west.

## GRADE OF THE DOLOMITE

On the accompanying plans and cross sections, the dolomite has been sub-divided into the following grades based on $MgCO_3$ content. All boundaries indicate changes in grade and are not geological boundaries.

| | $MgCO_3$(%) |
|---|---|
| Dolomite | |
| Grade A | greater than 40 |
| Grade B | 35-40 |
| Calcareous Dolomite | 22.8-35 |
| Limestone | less than 22.8 |

The calculated weighted means of traverse intervals showing persistent high grade are tabulated below.

| Traverse | Interval (feet) | | | Calculated Mean (%) | | |
|---|---|---|---|---|---|---|
| | From | To | | $CaCO_3$ | $MgCO_3$ | Total Carbonate |
| I | 0 | 450 | 450 | 51.5 | 39.8 | 91.3 |
| | 1350 | 2150 | 800 | 55.0 | 41.9 | 96.9 |
| II | 300 | 600 | 300 | 51.2 | 41.2 | 92.4 |
| | 750 | 1200 | 450 | 53.3 | 41.3 | 94.6 |
| | 300 | 1200 | 900 | 51.2 | 40.5 | 91.7 |
| III | 0 | 1350 | 1350 | 52.7 | 41.3 | 94.0 |
| | 1600 | 2000 | 400 | 56.6 | 40.5 | 97.1 |
| IV | 650 | 900 | 250 | 52.4 | 42.1 | 94.5 |
| | 1050 | 1250 | 200 | 54.4 | 40.0 | 94.4 |
| | 1900 | 2800 | 900 | 57.3 | 40.3 | 97.6 |

These averages, which are based on length of traverse and not true thickness, represent only the grade of surface material. Average grade would be increased by considering the

height of stone above outcrop level.

High grade dolomite zones are generally more resistant and therefore form the major north-south ridges, as at

| | | |
|---|---|---|
| Traverse | I | from 1400 to 2100 feet |
| | II | " 750 to 1200 feet |
| | III | " 850 to 1250 feet |
| | IV | " 300 to 400 feet |
| | and | " 1900 to 2350 feet |

(See accompanying cross sections Plan No. 64-1090). Samples were not collected along Traverse IV from 2000 to 2300 feet as the slope of the ground approximates the dip of the strata.

The weighted mean of the above intervals and the highest grade samples are compared with the theoretical composition of pure dolomite in the following table.

| | $CaCO_3$ | $MgCO_3$ | Total Carbonate |
|---|---|---|---|
| Theoretical | 54.4 | 45.6 | 100.0% |
| Weighted Mean | 53.8 | 40.9 | 94.7% |
| Purest dolomite (Traverse IV at 850-900 feet) | 54.2 | 43.8 | 98.0% |
| Cleanest Sample (Traverse IV at 2750-2800 feet) | 56.4 | 42.9 | 99.3% |

The most satisfactory dolomites for refractory purposes contain:

| | |
|---|---|
| not more than | 1% $SiO_2$ |
| not more than | 1.5% $Al_2O_3$ and $Fe_2O_3$ |
| and at least | 38-40% $MgCO_3$ |

## RESERVES

Reserves of dolomite above outcrop level are estimated at 10 million cubic yards. This volume is based on an area from cross section B-B' to E-E' including the following traverse intervals.

| | | |
|---|---|---|
| Traverse | I | from 0 to 450 feet |
| | II | " 0 to 1200 feet |
| | III | " 0 to 1350 feet. |

(allowing a 60° batter at the western limit).

Reserves can be increased by quarrying below creek level. Vegetation, in the form of salt bush and trees, is the only overburden.

The maximum true thickness of high grade dolomite (containing more than 35% $MgCO_3$) is 850 feet as indicated on cross section B-B' (i.e. Traverse III from 0 to 1350 feet).

## CONCLUSIONS

Detailed mapping and chip sampling has confirmed the presence of high grade dolomite at the base of the Wilkawillina Limestone.

The dolomite contains a weighted average of 54% $CaCO_3$ and 40% $MgCO_3$ and appears to be chemically suitable for metallurgical usage.

Maximum stratigraphic thickness of the high grade dolomite is 850 feet.

Reserves are estimated at 10 million cubic yards above outcrop level.

Further reserves are available below creek level.

A track would have to be built to provide access before the deposit could be tested by diamond drilling.

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NON METALLICS SECTION

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13/1/65

# APPENDIX I

## GEOLOGICAL LOGS OF SAMPLE TRAVERSES

## SAMPLE TRAVERSE I

| Interval (feet) From | To | Description |
|---|---|---|
| 0 | 350 | Light to dark grey finely crystalline dolomite with minor fawn mottling. |
| 350 | 750 | Mid grey finely crystalline dolomite with pink mottling, banded in parts. Limestone from 450 to 500 feet. |
| 750 | 1050 | Pink, fawn and mid to dark grey, microcrystalline dolomite. |
| 1050 | 1300 | Pink, purple and mid grey finely crystalline limestone with occasional calcite veins. |
| 1300 | 1600 | Mid grey oolitic dolomite. |
| 1600 | 1850 | Mottled fawn and buff finely crystalline dolomite. |
| 1850 | 2200 | Pale grey dolomite with fawn and pink patches. |

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## SAMPLE TRAVERSE II

| | | |
|---|---|---|
| 0 | 1300 | Mid grey oolitic or finely crystalline dolomite with traces of pink, fawn and brown. |
| 1300 | 1800 | Mid to dark grey limestone with bands of brown and fawn dolomite. |
| 1800 | 1900 | Grey medium grained dolomite. |
| 1900 | 2050 | Brown, grey and fawn limestone. |
| 2050 | 2150 | Pink dolomite with white calcite veins. |
| 2150 | 2300 | Grey dolomite with minor fawn and pink patches. |
| 2300 | 2350 | Grey and fawn limestone with pink mottling. |
| 2350 | 2400 | Fawn and grey dolomite. |
| 2400 | 2500 | Pale grey limestone with pink mottling. |
| 2500 | 2650 | Light pink, yellow and brown dolomite. |
| 2650 | 2900 | Fawn, pink and grey microcrystalline limestone. |

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## SAMPLE TRAVERSE III

| Interval (feet) From | To | Description |
|---|---|---|
| 0 | 1400 | Grey, fawn and pink dolomite, banded in parts. Finely crystalline. Oolitic in parts. |
| 1400 | 1450 | Light grey finely crystalline limestone. |
| 1450 | 2000 | Mid grey dolomite with fawn and pink patches. |

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## SAMPLE TRAVERSE IV

| | | |
|---|---|---|
| 0 | 1250 | Grey, brown and fawn dolomite, finely crystalline, oolitic in parts. |
| 1250 | 1300 | Light to dark grey limestone |
| 1300 | 1750 | Grey dolomite with pink mottling. |
| 1750 | 1850 | Pale grey microcrystalline limestone with minor fawn patches. |
| 1850 | 3250 | Grey, fawn, and brown dolomite - banded and mottled. |
| 3250 | 3300 | Buff limestone. |

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# APPENDIX II

## RESULTS OF PARTIAL CHEMICAL ANALYSES FOR CALCIUM CARBONATE ($CaCO_3$) AND MAGNESIUM CARBONATE ($MgCO_3$)

## SAMPLE TRAVERSE I

| Sample No. | Dept. No. | Interval | % $CaCO_3$ | % $MgCO_3$ | Total Carbonate |
|---|---|---|---|---|---|
| 1 | A3912/64 | 0- 50 | 50.8 | 37.9 | 88.7 |
| 2 | A3913/64 | 50- 100 | 52.8 | 41.9 | 94.7 |
| 3 | A3914/64 | 100- 150 | 52.1 | 40.8 | 92.9 |
| 4 | A3915/64 | 150- 200 | 51.7 | 41.0 | 92.7 |
| 5 | A3916/64 | 200- 250 | 50.8 | 40.1 | 90.9 |
| 6 | A3917/64 | 250- 300 | 51.2 | 36.2 | 87.4 |
| 7 | A3918/64 | 300- 350 | 51.0 | 40.0 | 91.0 |
| 8 | A3919/64 | 350- 400 | 51.0 | 40.0 | 91.0 |
| 9 | A3920/64 | 400- 450 | 52.3 | 40.6 | 92.9 |
| 10 | A3921/64 | 450- 500 | 74.0 | 19.9 | 93.9 |
| 11 | A3922/64 | 500- 550 | 62.6 | 31.3 | 93.9 |
| 12 | A3923/64 | 550- 600 | 46.4 | 37.0 | 83.4 |
| 13 | A3924/64 | 600- 650 | 65.9 | 30.6 | 96.5 |
| 14 | A3925/64 | 650- 700 | 54.2 | 37.6 | 91.8 |
| 15 | A3926/64 | 700- 750 | 57.6 | 35.0 | 92.6 |
| 16 | A3927/64 | 750- 800 | 66.8 | 28.5 | 95.3 |
| 17 | A3928/64 | 800- 850 | 57.4 | 36.8 | 94.2 |
| 18 | A3929/64 | 850- 900 | 58.3 | 36.6 | 94.9 |
| 19 | A3930/64 | 900- 950 | 71.6 | 24.0 | 95.6 |
| 20 | A3931/64 | 950-1000 | 64.6 | 31.5 | 96.1 |
| 21 | A3932/64 | 1000-1050 | 55.4 | 40.6 | 96.0 |
| 22 | A3933/64 | 1050-1100 | 73.6 | 22.7 | 96.3 |
| 23 | A3934/64 | 1100-1150 | 87.2 | 10.1 | 97.3 |
| 24 | A3935/64 | 1150-1200 | 74.0 | 22.5 | 96.5 |
| 25 | A3936/64 | 1200-1250 | 69.4 | 25.3 | 94.7 |
| 26 | A3937/64 | 1250-1300 | 54.5 | 40.8 | 95.3 |
| 27 | A3938/64 | 1300-1350 | 63.1 | 31.7 | 94.8 |
| 28 | A3939/64 | 1350-1400 | 55.2 | 39.7 | 94.9 |
| 29 | A3940/64 | 1400-1450 | 54.3 | 41.9 | 96.2 |
| 30 | A3941/64 | 1450-1500 | 53.9 | 42.1 | 96.0 |
| 31 | A3942/64 | 1500-1550 | 55.4 | 42.1 | 97.5 |
| 32 | A3943/64 | 1550-1600 | 55.4 | 42.7 | 98.1 |
| 33 | A3944/64 | 1600-1650 | 55.0 | 42.3 | 97.3 |
| 34 | A3945/64 | 1650-1700 | 54.5 | 43.3 | 97.8 |
| 35 | A3946/64 | 1700-1750 | 54.8 | 42.5 | 97.3 |
| 36 | A3947/64 | 1750-1800 | 54.8 | 42.6 | 97.4 |
| 37 | A3948/64 | 1800-1850 | 54.8 | 41.9 | 96.7 |
| 38 | A3949/64 | 1850-1900 | 54.1 | 42.5 | 96.6 |
| 39 | A3950/64 | 1900-1950 | 54.8 | 42.0 | 96.8 |
| 40 | A3951/64 | 1950-2000 | 54.7 | 41.1 | 95.8 |
| 41 | A3952/64 | 2000-2050 | 54.4 | 42.3 | 96.7 |
| 42 | A3953/64 | 2050-2100 | 56.3 | 41.0 | 97.3 |
| 43 | A3954/64 | 2100-2150 | 57.5 | 39.7 | 97.2 |
| 44 | A3955/64 | 2150-2200 | 71.0 | 26.4 | 97.4 |

## SAMPLE TRAVERSE II

| Sample No. | Dept. No. | Interval | % $CaCO_3$ | %$MgCO_3$ | Total Carbonate |
|---|---|---|---|---|---|
| 1 | A3980/64 | 0- 50 | 46.6 | 36.8 | 83.4 |
| 2 | A3981/64 | 50- 100 | 41.6 | 32.7 | 74.3 |
| 3 | A3982/64 | 100- 150 | 48.7 | 39.7 | 88.4 |
| 4 | A3983/64 | 150- 200 | 48.6 | 40.1 | 88.7 |
| 5 | A3984/64 | 200- 250 | 51.0 | 39.9 | 90.9 |
| 6 | A3985/64 | 250- 300 | 45.3 | 36.7 | 82.0 |
| 7 | A3986/64 | 300- 350 | 51.4 | 41.3 | 92.7 |
| 8 | A3987/64 | 350- 400 | 48.6 | 40.4 | 89.0 |
| 9 | A3988/64 | 400- 450 | 51.8 | 41.6 | 93.4 |
| 10 | A3989/64 | 450- 500 | 53.0 | 42.1 | 95.1 |
| 11 | A3990/64 | 500- 550 | 52.8 | 42.1 | 94.9 |
| 12 | A3991/64 | 550- 600 | 49.6 | 39.9 | 89.5 |
| 13 | A3992/64 | 600- 650 | 41.3 | 33.4 | 74.7 |
| 14 | A3993/64 | 650- 700 | 48.8 | 39.5 | 88.3 |
| 15 | A3994/64 | 700- 750 | 45.1 | 37.4 | 82.5 |
| 16 | A3995/64 | 750- 800 | 51.7 | 41.8 | 93.5 |
| 17 | A3996/64 | 800- 850 | 53.9 | 42.5 | 96.4 |
| 18 | A3997/64 | 850- 900 | 51.8 | 40.7 | 92.5 |
| 19 | A3998/64 | 900- 950 | 49.7 | 40.0 | 89.7 |
| 20 | A3999/64 | 950-1000 | 54.8 | 41.1 | 95.9 |
| 21 | A4000/64 | 1000-1050 | 54.0 | 41.4 | 95.4 |
| 22 | A4001/64 | 1050-1100 | 55.6 | 41.3 | 96.9 |
| 23 | A4002/64 | 1100-1150 | 53.8 | 40.9 | 94.7 |
| 24 | A4003/64 | 1150-1200 | 54.3 | 41.8 | 96.1 |
| 25 | A4004/64 | 1200-1250 | 58.3 | 29.7 | 88.0 |
| 26 | A4005/64 | 1250-1300 | 63.3 | 28.1 | 91.4 |
| 27 | A4006/64 | 1300-1350 | 71.1 | 23.8 | 94.9 |
| 28 | A4007/64 | 1350-1400 | 80.7 | 15.3 | 96.0 |
| 29 | A4008/64 | 1400-1450 | 92.4 | 5.5 | 97.9 |
| 30 | A4009/64 | 1450-1500 | 86.0 | 9.1 | 95.1 |
| 31 | A4010/64 | 1500-1550 | 74.4 | 22.8 | 96.2 |
| 32 | A4011/64 | 1550-1600 | 68.7 | 26.0 | 94.7 |
| 33 | A4012/64 | 1600-1650 | 75.3 | 22.2 | 97.5 |
| 34 | A4013/64 | 1650-1700 | 87.1 | 10.8 | 97.9 |
| 35 | A4014/64 | 1700-1750 | 71.4 | 25.6 | 97.0 |
| 36 | A4015/64 | 1750-1800 | 85.1 | 13.3 | 98,4 |
| 37 | A4016/64 | 1800-1850 | 67.4 | 29.3 | 96.7 |
| 38 | A4017/64 | 1850-1900 | 57.0 | 39.0 | 96.0 |
| 39 | A4018/64 | 1900-1950 | 75.3 | 21.6 | 96.9 |
| 40 | A4019/64 | 1950-2000 | 63.7 | 33.3 | 97.0 |
| 41 | A4020/64 | 2000-2050 | 80.8 | 16.6 | 97.4 |
| 42 | A4021/64 | 2050-2100 | 51.6 | 37.4 | 89.0 |
| 43 | A4022/64 | 2100-2150 | 57.9 | 38.2 | 96.1 |

| Sample No. | Dept. No. | Interval | % $CaCO_3$ | % $MgCO_3$ | Total Carbonate |
|---|---|---|---|---|---|
| 44 | A4023/64 | 2150-2200 | 57.2 | 40.4 | 97.6 |
| 45 | A4024/64 | 2200-2250 | 58.3 | 40.3 | 98.6 |
| 46 | A4025/64 | 2250-2300 | 65.8 | 30.8 | 96.6 |
| 47 | A4026/64 | 2300-2350 | 78.8 | 18.3 | 97.1 |
| 48 | A4027/64 | 2350-2400 | 56.5 | 40.8 | 97.3 |
| 49 | A4028/64 | 2400-2450 | 65.0 | 18.1 | 83.1 |
| 50 | A4029/64 | 2450-2500 | 66.9 | 32.0 | 98.9 |
| 51 | A4030/64 | 2500-2550 | 62.1 | 35.9 | 98.0 |
| 52 | A4031/64 | 2550-2600 | 71.8 | 25.0 | 96.8 |
| 53 | A4032/64 | 2600-2650 | 59.1 | 38.2 | 97.3 |
| 54 | A4033/64 | 2650-2700 | 84.0 | 14.2 | 98.2 |
| 55 | A4034/64 | 2700-2750 | 73.7 | 24.9 | 98.6 |
| 56 | A4035/64 | 2750-2800 | 71.1 | 24.8 | 95.9 |
| 57 | A4036/64 | 2800-2850 | 91.3 | 6.5 | 97.8 |
| 58 | A4037/64 | 2850-2900 | 93.3 | 4.8 | 98.1 |

## SAMPLE TRAVERSE III



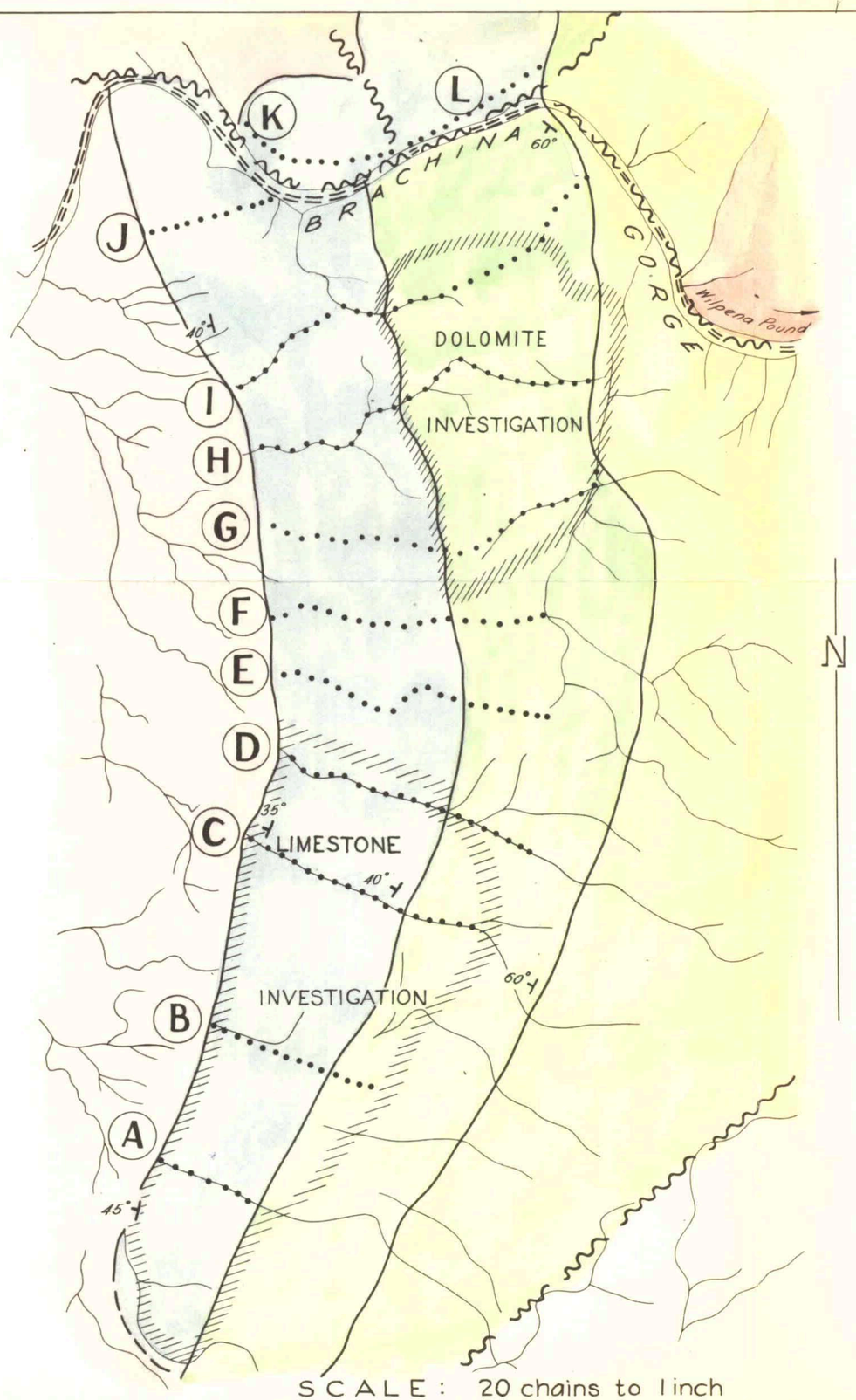
| Sample No. | Dept. No. | Interval (feet) | % $CaCO_3$ | % $MgCO_3$ | Total Carbonate |
|---|---|---|---|---|---|
| 1 | A4038/64 | 0- 50 | 51.0 | 40.1 | 91.1 |
| 2 | A4039/64 | 50- 100 | 53.2 | 43.2 | 96.4 |
| 3 | A4040/64 | 100- 150 | 52.6 | 42.9 | 95.5 |
| 4 | A4041/64 | 150- 200 | 49.3 | 43.0 | 92.3 |
| 5 | A4042/64 | 200- 250 | 49.7 | 40.8 | 90.5 |
| 6 | A4043/64 | 250- 300 | 53.4 | 42.9 | 96.3 |
| 7 | A4044/64 | 300- 350 | 52.0 | 43.6 | 95.6 |
| 8 | A4045/64 | 350- 400 | 45.8 | 37.9 | 83.7 |
| 9 | A4046/64 | 400- 450 | 49.5 | 39.3 | 88.8 |
| 10 | A4047/64 | 450- 500 | 53.4 | 42.5 | 95.9 |
| 11 | A4048/64 | 500- 550 | 49.1 | 38.9 | 88.0 |
| 12 | A4049/64 | 550- 600 | 46.4 | 36.1 | 82.5 |
| 13 | A4050/64 | 600- 650 | 51.9 | 41.8 | 93.7 |
| 14 | A4051/64 | 650- 700 | 54.3 | 43.6 | 97.9 |
| 15 | A4052/64 | 700- 750 | 53.9 | 43.7 | 97.6 |
| 16 | A4053/64 | 750- 800 | 53.9 | 42.4 | 96.3 |
| 17 | A4054/64 | 800- 850 | 48.4 | 37.9 | 86.3 |
| 18 | A4055/64 | 850- 900 | 54.5 | 43.2 | 97.7 |
| 19 | A4056/64 | 900- 950 | 55.2 | 42.4 | 97.6 |
| 20 | A4057/64 | 950-1000 | 55.0 | 42.5 | 97.5 |
| 21 | A4058/64 | 1000-1050 | 55.1 | 41.3 | 96.4 |
| 22 | A4059/64 | 1050-1100 | 55.0 | 41.5 | 96.5 |
| 23 | A4060/64 | 1100-1150 | 54.8 | 41.9 | 96.7 |
| 24 | A4061/64 | 1150-1200 | 54.8 | 43.4 | 98.2 |
| 25 | A4062/64 | 1200-1250 | 56.1 | 41.4 | 97.5 |
| 26 | A4063/64 | 1250-1300 | 55.0 | 38.6 | 93.6 |
| 27 | A4064/64 | 1300-1350 | 59.8 | 38.9 | 98.7 |
| 28 | A4065/64 | 1350-1400 | 70.7 | 26.7 | 97.4 |
| 29 | A4066/64 | 1400-1450 | 88.5 | 8.2 | 96.7 |
| 30 | A4067/64 | 1450-1500 | 70.1 | 28.3 | 98.4 |
| 31 | A4068/64 | 1500-1550 | 75.2 | 23.1 | 98.3 |
| 32 | A4069/64 | 1550-1600 | 72.0 | 24.0 | 96.0 |
| 33 | A4070/64 | 1600- 1650 | 53.0 | 39.5 | 92.5 |
| 34 | A4071/64 | 1650-1700 | 54.5 | 41.7 | 96.2 |
| 35 | A4072/64 | 1700-1750 | 54.2 | 42.5 | 96.7 |
| 36 | A4073/64 | 1750-1800 | 63.2 | 35.3 | 98.5 |
| 37 | A4074/64 | 1800-1850 | 56.1 | 42.1 | 98.2 |
| 38 | A4075/64 | 1850-1900 | 57.5 | 40.9 | 98.4 |
| 39 | A4076/64 | 1900-1950 | 56.3 | 41.3 | 97.6 |
| 40 | A4077/64 | 1950-2000 | 58.3 | 40.5 | 98.8 |

## SAMPLE TRAVERSE IV

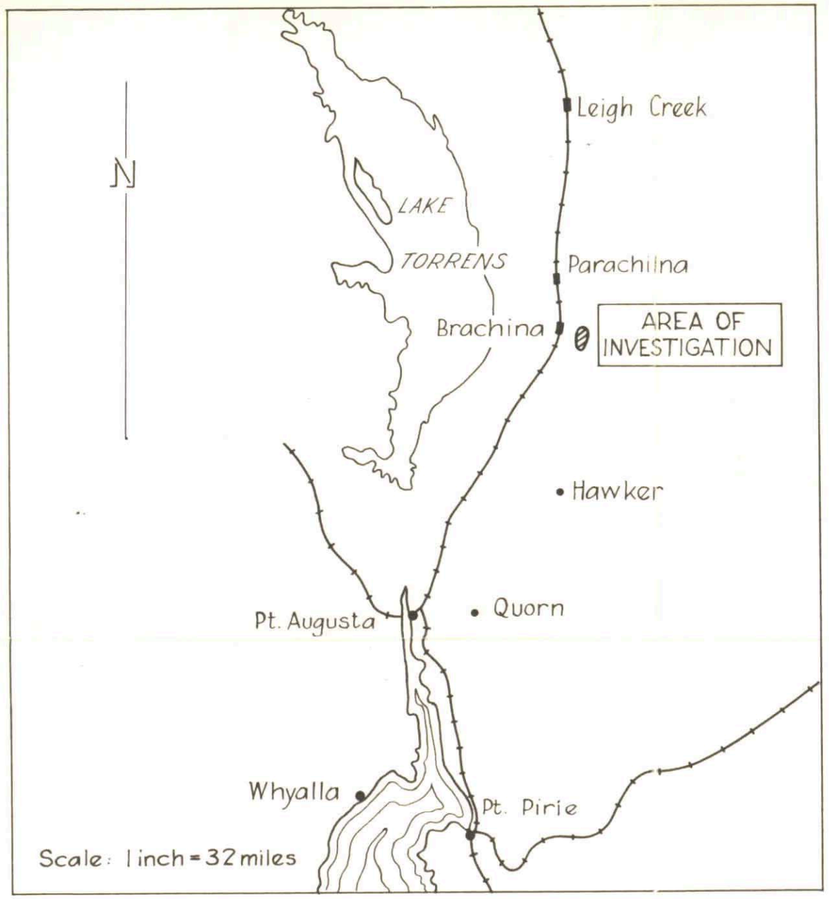


| Sample No. | Dept. No. | Interval (feet) | % $CaCO_3$ | % $MgCO_3$ | Total Carbonates |
|---|---|---|---|---|---|
| 1 | A4078/64 | 0- 50 | 47.1 | 36.3 | 83.4 |
| 2 | A4079/64 | 50- 100 | 52.7 | 42.0 | 94.7 |
| 3 | A4080/64 | 100- 150 | 48.0 | 38.0 | 86.0 |
| 4 | A4081/64 | 150- 200 | 36.5 | 29.2 | 65.7 |
| 5 | A4082/64 | 200- 250 | 47.1 | 38.0 | 85.1 |
| 6 | A4083/64 | 250- 300 | 45.9 | 36.9 | 82.8 |
| 7 | A4084/64 | 300- 350 | 49.4 | 40.8 | 90.2 |
| 8 | A4085/64 | 350- 400 | 48.2 | 40.7 | 88.9 |
| 9 | A4086/64 | 400- 450 | 47.1 | 39.0 | 86.1 |
| 10 | A4087/64 | 450- 500 | 45.0 | 36.6 | 81.6 |
| 11 | A4088/64 | 500- 550 | 47.3 | 39.0 | 86.3 |
| 12 | A4089/64 | 550- 600 | 46.7 | 38.6 | 85.3 |
| 13 | A4090/64 | 600- 650 | 48.4 | 40.1 | 88.5 |
| 14 | A4091/64 | 650- 700 | 53.9 | 43.0 | 96.9 |
| 15 | A4092/64 | 700- 750 | 50.1 | 40.7 | 90.8 |
| 16 | A4093/64 | 750- 800 | 51.3 | 40.8 | 92.1 |
| 17 | A4094/64 | 800- 850 | 52.3 | 42.1 | 94.4 |
| 18 | A4095/64 | 850- 900 | 54.2 | 43.8 | 98.0 |
| 19 | A4096/64 | 900- 950 | 50.0 | 38.5 | 88.5 |
| 20 | A4097/64 | 950-1000 | 44.2 | 34.3 | 78.5 |
| 21 | A4098/64 | 1000-1050 | 48.8 | 37.8 | 86.6 |
| 22 | A4099/64 | 1050-1100 | 54.5 | 40.4 | 94.9 |
| 23 | A4100/64 | 1100-1150 | 55.3 | 36.4 | 91.7 |
| 24 | A4101/64 | 1150-1200 | 54.0 | 42.9 | 96.9 |
| 25 | A4102/64 | 1200-1250 | 54.0 | 40.1 | 94.1 |
| 26 | A4103/64 | 1250-1300 | 83.0 | 14.6 | 97.6 |
| 27 | A4104/64 | 1300-1350 | 62.6 | 34.8 | 97.4 |
| 28 | A4105/64 | 1350-1400 | 55.9 | 40.3 | 96.2 |
| 29 | A4106/64 | 1400-1450 | 51.3 | 37.5 | 88.8 |
| 30 | A4107/64 | 1450-1500 | 49.4 | 37.7 | 87.1 |
| 31 | A4108/64 | 1500-1550 | 51.5 | 35.9 | 87.4 |
| 32 | A4109/64 | 1550-1600 | 45.8 | 37.5 | 83.3 |
| 33 | A4110/ 4 | 1600-1650 | 53.6 | 43.4 | 97.0 |
| 34 | A4111/64 | 1650-1700 | 47.3 | 36.8 | 84.1 |
| 35 | A4112/64 | 1700-1750 | 66.1 | 27.5 | 93.6 |
| 36 | A4113/64 | 1750-1800 | 71.8 | 24.0 | 95.8 |
| 37 | A4114/64 | 1800-1850 | 70.4 | 22.0 | 92.4 |
| 38 | A4115/64 | 1850-1900 | 64.7 | 30.8 | 95.5 |
| 39 | A4116/64 | 1900-1950 | 55.9 | 42.0 | 97.9 |
| 40 | A4117/64 | 1950-2000 | 55.2 | 42.4 | 97.6 |
| 41 | | 2000-2050 | | | |
| 42 | | 2050-2100 | | | |
| 43 | | 2100-2150 | not sampled. | | |
| 44 | | 2150-2200 | | | |
| 45 | | 2200-2250 | | | |
| 46 | | 2250-2300 | | | |

| Sample No. | Dept. No. | Interval | % $CaCO_3$ | % $MgCO_3$ | Total Carbonates |
|---|---|---|---|---|---|
| 47 | A4118/64 | 2300-2350 | 55.0 | 40.6 | 95.6 |
| 48 | A4119/64 | 2350-2400 | 70.8 | 24.8 | 95.6 |
| 49 | A4120/64 | 2400-2450 | 55.6 | 42.5 | 98.1 |
| 50 | A4121/64 | 2450-2500 | 57.8 | 39.8 | 97.6 |
| 51 | A4122/64 | 2500-2550 | 64.1 | 35.3 | 99.4 |
| 52 | A4123/64 | 2550-2600 | 57.1 | 40.7 | 97.8 |
| 53 | A4124/64 | 2600-2650 | 56.9 | 41.5 | 98.4 |
| 54 | A4125/64 | 2650-2700 | 58.1 | 39.9 | 98.0 |
| 55 | A4126/64 | 2700-2750 | 57.3 | 41.0 | 98.3 |
| 56 | A4127/64 | 2750-2800 | 56.4 | 42.9 | 99.3 |
| 57 | A4128/64 | 2800-2850 | 72.0 | 25.1 | 97.1 |
| 58 | A4129/64 | 2850-2900 | 61.0 | 37.0 | 98.0 |
| 59 | A4130/64 | 2900-2950 | 56.6 | 42.1 | 98.7 |
| 60 | A4131/64 | 2950-3000 | 61.6 | 36.1 | 97.7 |
| 61 | A4132/64 | 3000-3050 | 65.5 | 31.3 | 96.8 |
| 62 | A4133/64 | 3050-3100 | 61.6 | 35.2 | 96.8 |
| 63 | A4134/64 | 3100-3150 | 61.3 | 35.7 | 97.0 |
| 64 | A4135/64 | 3150-3200 | 56.0 | 40.7 | 96.7 |
| 65 | A4136/64 | 3200-3250 | 59.5 | 38.0 | 97.5 |
| 66 | A4137/64 | 3250-3300 | 80.3 | 17.5 | 97.8 |




SCALE: 20 chains to 1 inch




## LEGEND

CAMBRIAN

- Billy Creek Formation. Red siltstones & shales
- Wilkawillina Limestone — Massive grey, buff & pink limestone
- Grey flaggy dolomite, dolomitic limestone

UPPER PROTEROZOIC (Adelaide System)

- Pound Quartzite
- Wonoka Formation. Purple shales.

Strike & dip of bedding ... 60°
Fault ...
Sample lines ...

To accompany report by J.G. Olliver & J.N. Cramsie

S.A. DEPARTMENT OF MINES

BRACHINA LIMESTONE & DOLOMITE DEPOSIT LOCALITY PLAN

| | Approved | Passed | Drn. | Scale: As shown |
|---|---|---|---|---|
| | | | Tcd. PAQ | 64-994 Fa 4/6 |
| | Director | | Ckd. | Exd. |
| | | | | Date 5.11.64 |

No. Amendment Exd. Date

300—4.63 1423

Recorded

## LEGEND

CAMBRIAN — Willouwillina Limestone

PROTEROZOIC — Pound Quartzite — Parautilina Form
Sands and clays
Quartzite — Pound Q.

Dolomite ; Percent $MgCo_3$
Grade A , greater than 90
Grade B , 35-90
Calcareous dolomite, 22·8 to 35
Limestone, less than 22·8

X 45° Strike and dip of bedding

## SCALE

Feet 100 0 100 200 300 400 500 Feet

△Stn.10 1163 Station No. Survey Station R.L.
○ II 6 Line and number of sample peg
1180 / 1200 / 1220 Contours (20 ft. intervals) arbitrary datum

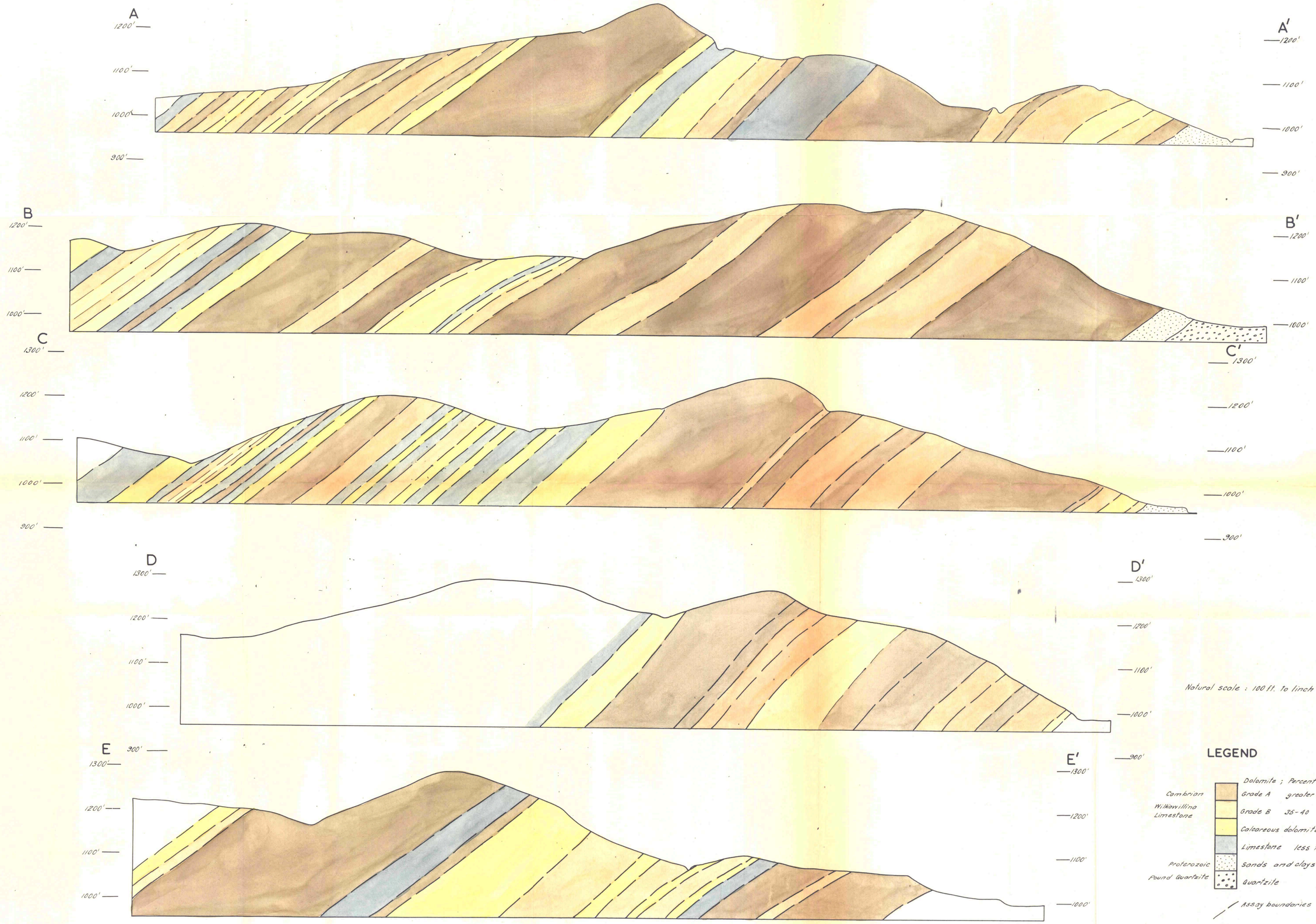
S. A. DEPT. OF MINES

# BRACHINA DOLOMITE DEPOSIT
# GEOLOGICAL PLAN

Stadia field books 306 and 307
Survey by C.W. Fyfers

To accompany report by J. G. Oliver & J. N. Cromsie

L64-212
Date: 1-12-64




To accompany report by J. G. Oliver and J. N. Cramsie.

**S.A. DEPT. OF MINES**

200—2.59 8248

| Associated Drawing | No. | No. | Amendment | Exd. | Date |
|---|---|---|---|---|---|
| | | | | | |

Req. No.
D.M.
Compiled from

# BRACHINA DOLOMITE DEPOSIT
# CROSS SECTIONS

| Approved | Passed | | Scale : 100 Feet To 1 Inch |
|---|---|---|---|
| | | Drn. | 64-1090 |
| | | Tcd. B.L.S. | |
| Director of Mines | | Ckd. | Fo. |
| | | Exd. | Date 2-12-64 |