UR 1937/36-43

10 36

REPORT ON LIMESTONE DEPOSITS IN THE VICINITY OF MELROSE & PALOONA

INTRODUCTION:

This report is based upon an examination made in January 1936 with the object of obtaining information on the physical and chemical characteristics of the limestone deposits and their extent in this area.

All outcrops were examined and sampled. The samples were channel samples or their equivalent taken across the strata at right angles to the strike. It is to be borne in mind that the analysis of a single sample from a deposit is merely indicative of the character of the deposit and much more detailed sampling and investigation is necessary to definitely prove the character of any deposit.

PREVIOUS LITERATURE:

Cement Materials at Melrose and Paloona - A.M. Reid, 27/3/25

Cement Materials at Melrose - A.M. Reid, 3/10/25

The Oil Shale Resources of Tasmania - Mineral Resources No. 8 part 1.

LOCATION AND ACCESS:

The Melrose-Paloona area is situated approximately five miles south-south-west of Devonport, the chief shipping centre of the north-west coast. It is well served with transport facilities by rail and road; the old Don-Barrington tram passing through the centre of the district. The railway is in use only as far as the Melrose quarries, a distance of approximately 8½ miles from Devonport, the rails having been removed from the Melrose-Barrington section.

Several good motor roads give access to the area, the main ones being the Tarleton-Eugenana-Barrington and the Barrington-Hamilton-on-Forth roads. The distances from Devonport would be approximately eight and ten miles respectively.

PHYSIOGRAPHY: The area under review presents marked variations in topographical relief due mainly to differential erosion. It is of relatively low relief and may be described generally as an area of fairly high hills and broad valleys. The present configuration of the land surface is largely due to stream corrosion.

The drainage of the area is effected by the Don River system; the greater portion of it being drained by the Melrose Rivulet, a north flowing tributary of the Don.

No mountains occur within the immediate area although it is almost completely surrounded by relatively high country; Kelcie's Tier to the north rises to over 500 feet, while a little over two miles to the south-east the Brown Mountain attains a height of 1100 feet.

GEOLOGY: A number of rock systems and formations of different periods, outcrop within the district. The oldest rocks are those of the Cambro-Ordovician system. Succeeding these, the oldest rocks in the district, are those of the Silurian system. Succeeding all the above and overlying them, the Permo-Carboniferous system occurs. Pre-basaltic gravels etc. occur south of the Broken Hill Proprietary Company's magazine. Tertiary basalt is represented by flow or flows north and south of Melrose.

As the actual contacts were masked in nearly all cases the true relationships could not be determined.

CAMBRO-ORDOVICIAN:

A section, south from Tugrah to Paloona, suggests a conformable series of quartzites, sandstones and slates, with a thick bed of limestone intercalated.

In the cutting on the Don-Melrose Railway about a half mile north of the Melrose station, sandstones and quartzites with a north 10° east strike and a high south-westerly dip are very well exposed. These are followed, apparently conformably, by the limestone beds. Only one small exposure was observed south of the limestone and that was in a road cutting, on the Melrose-Paloona road, just east of the old Paloona railway station; here a grit-like sandstone appears to overly the limestone. Further exposures to the south and east are concealed by basalt.

No accurate measurements of the extent of the limestone were possible but the approximate width would be nearly three miles. The thickness probably exceeds 2000 feet.

With regard to the age of this system, no very definite conclusion was reached. The slates and sandstones have been previously assigned to Cambrian and the limestone to Ordovician. As far as the field occurrence is discernible there is no apparent reason to separate the rocks into two systems, as the sandstones, slates and limestones form one conformable series. In the absence of definite stratigraphical and palæontological evidence for the division of this series into two systems, it is preferable for the present to refer the series to the Cambro-Ordovician.

SILURIAN: Sandstones and quartzites belonging to this system unconformably overlie and form the western limit of the limestone. The strike is generally north-west, with steep south-westerly dips.

Some fossils Rynchonella (sp) were observed near Paloona.

PERMIAN: Rocks of this age cover the extension of the limestone to the north-east and east. They were formerly more extensive but have now been largely removed by denudation.

The strata consists of sandstones, pebbly-mudstones and mudstones and are either horizontally bedded or dipping at small angles only.

LOWER TERTIARY:

Gravels, clays etc. belonging to this age occur on the ridge south of the Broken Hill Proprietary Company's magazine south of the Don River and in the valley of the Melrose Rivulet, near Paloona. They are classified as Lower Tertiary because the basalt, which, in Tasmania is regarded as Miocene, overlies them.

LIMESTONE:

The limestone generally, occupies the lowlands and flanks the low hills. In the flat country, between the few isolated outcrops, which stand out prominently as rocky projections with rounded contours, its presence is indicated by a brick-red, clayey soil hardly distinguishable from that

derived from the basalt; the amount of clay overburden present is extremely variable and reaches a depth of at least 25 feet in some places. The exposures in the higher country are usually devoid of clay.

The general strike of the cleavage is north 10°-20° east with a steep south-westerly dip; owing to the upturned edges percolating waters have easy access to cleavage planes and joints and bores put down by the Broken Hill Proprietary Company have indicated the presence of clay bands (61 per cent insoluble) up to five feet thick at depths of 100 feet.

The limestone varies in texture from compact to wavy and even schistose. The dominant colour is a bluish grey; it weathers along cleavage planes to a lilac-coloured material.

Calcite, reprecipitated from percolating solutions, has been deposited in cleavage planes, joints etc. and in places becomes fairly abundant.

No limestone deposit is entirely free from impurities, the most common of which are silica, alumina, iron compounds, organic matter and sulphur. The average composition of 14 samples taken show that with probably one exception, the silica, none of the deleterious substances are present in harmful amounts for most practical purposes.

$CaCO_3$	89.1 per cent	varying from 73.1	to 95.0 per cent
Acid Insoluble	6.86 " "	" "	3.64 " 20.6 " "
Al_2O_3	0.40 " "	" "	0.14 " 0.85 " "
MgO	0.76 " "	" "	0.38 " 1.84 " "
Fe_2O_3	0.21 " "	" "	0.34," 2.53 " "
MnO	0.025" "	" "	0.01 " 0.09 " "
Phosphorous	0.01 " "	" "	0.01 " 0.04 " "
Sulphur	0.10 " "	" "	0.03 " 0.61 " "

The analysis of Nos. 1 and 11 suggest the presence of pyrite.

All outcrops with sample sections referred to are located on the accompanying geological map. The heights shown were obtained by abney level readings in conjunction with the railway survey. The contours are reasonably accurate at the individual outcrops and, while those in the vicinity of the Broken Hill Proprietary Company's area were taken from one of the Company's surveys, elsewhere, they are more in the nature of form-lines and are only very approximate.

NO.1 OUTCROP: This is situated about six chains north of the Broken Hill Proprietary Company's office and is nearly 400 feet long and 100 feet wide; it rises to a height of about 30 feet above the general level. The following analysis indicate the quality of the limestone:-

Sample	No.9 (Reg.No.144)	No.10 (Reg.No.145)
Moisture at 105°C	0.10	0.10
Loss on ignition	39.72	39.84
Acid Insoluble	8.00	7.36
CaO	50.24	50.64
MgO	0.72	0.76
Al_2O_3	0.49	0.40
Fe_2O_3	0.77	0.62
MnO	0.01	0.01
P_2O_5	0.01	0.01
S	0.06	0.04
$CaCO_3$	90%	90.15%

The most northerly outcrop (No.2) occurs on A. Rundle's property approximately six chains north of the Melrose railway station and extends northward, over a width of at least 400 feet for 15 chains. This outcrop rises to over 120 feet above river level and presents no features strikingly different to the general character of the limestone.

A smaller outcrop occurs to the east on Walter Lyne's property but this was not sampled.

The average quality of the stone is indicated by the following analyses:-

	(1) Reg.No. 136	(2) Reg.No. 137	(3) Reg.No. 138	(4) Reg.No. 139	(5) Reg.No. 140
Moisture at 105°C	0.12	0.06	0.06	0.06	0.06
Loss on ignition	33.56	39.66	39.34	39.60	39.54
Acid Insoluble	20.60	8.84	10.80	8.52	7.88
CaO	41.04	50.14	48.98	50.24	50.7
MgO	0.38	0.59	0.49	0.62	0.49
Al_2O_3	0.53	0.16	0.28	0.17	0.24
Fe_2O_3	2.53	0.84	0.98	0.77	0.90
MnO	0.09	0.03	0.01	0.01	0.01
P_2O_5	0.04	0.01	0.01	0.01	0.01
S	0.48	0.07	0.06	0.04	0.05
SO_3	0.27				
$CaCO_3$	73.1%	89.75%	87.5%	90%	90.25%

Due west of the Broken Hill Proprietary Company's Melrose quarry, and just south of the Don River, No.3 outcrop rises to a height of approximately 180 feet above sea level, that is, 80 feet above the general ground level. The massive outcrop of limestone extends over 450 feet in length with a maximum width of at least 200 feet. A small quarry was opened by Messrs. Cornelius & Dally on the south side, many years ago, for the purpose of obtaining limestone for burning.

The strike of the cleavage north 15° east with the almost vertical dip shows no marked deviation from the general strike and dip of the series.

The average quality is indicated by the following analysis:

Sample		No.6 (Reg.No.141)	No.7 (Reg.No.142)	No.8 (Reg.No.143)
Moisture at 105°C		0.06	0.06	0.06
Loss on ignition		40.44	41.50	41.76
Acid Insoluble		6.56	3.64	5.28
Ca O		51.34	53.22	50.50
MgO		0.78	1.00	1.84
Al_2O_3		0.17	0.14	0.34
Fe_2O_3		0.49	0.34	0.70
MnO		0.01	0.03	0.03
P_2O_5		0.03	0.06	0.06
S	$CaCO_3$	91.75%	95.0%	90.0%

Approximately one half mile west-south-west of the Broken Hill Proprietary Company's quarry a small outcrop No.4 occurs near the western boundary of G.E. Cooper's 139 acres S.S. property. It is over 300 feet in length with a maximum width of at least 150 feet and rises nearly 50 feet above the general/level approximately 170 feet above sea level. ground

The character of this deposit differs in no way from the other outcrops described. A few small, isolated outcrops are exposed in the Melrose Rivulet for a further distance of four chains to the west. No outcrops occur west of this exposure.

The following analysis is indicative of the average quality.

Sample	No.13 (Reg. No. 148)
Moisture at 105°	0.10 per cent
Loss on ignition	40.80 " "
Acid Insoluble	5.68 " "

Sample	No.13 (Reg.No.148)
CaO	51.10 per cent
MgO	0.72 " "
Al_2O_3	0.68 " "
Fe_2O_3	0.92 " "
MnO	0.03 " "
P_2O_5	0.01 " "
S	0.03 " "
$CaCO_3$	91.2 per cent

On the old reserved road about a half a mile south of the Broken Hill Proprietary Company's quarry a small outcrop No.5 occurs south of the area proved by that Company by means of bores. Further south, Tertiary gravels and basalt mask any extension of the limestone.

The same average quality is maintained as the following shows:-

Sample	No.14 (Reg. No.149)
Moisture at 105°C	0.08 per cent
Loss on ignition	40.22 " "
Acid Insoluble	7.28 " "
CaO	50.50 " "
MgO	0.44 " "
Al_2O_3	0.85 " "
Fe_2O_3	0.70 " "
MnO	0.04 " "
P_2O_5	0.01 " "
S	0.03 " "
$CaCO_3$	90.1 per cent.

About 12 chains east of the Don River bridge on the Eugenana-Melrose road, A.R. Rundle has opened a quarry in the most easterly of the prominent outcrops (No.6) for the purpose of obtaining limestone for burning. The overburden reaches a depth of at least ten feet. The limestone has almost a gneissic structure with eyes of calcite well developed. The strike is north 10° east and the dip almost vertical. This exposure is covered south of the Don River by basalt.

The average quality is indicated by the following analysis:-

Sample	No.11 (Reg. No.146)
Moisture at 105°C	0.08 per cent
Loss on ignition	38.44 "
Acid Insoluble	9.64 "
CaO	49.48 "
MgO	0.72 "
Al_2O_3	0.40 "
Fe_2O_3	0.92 "
MnO	0.03 "
P_2O_5	0.01 "
S	0.19 "
SO_3	0.10 "

$CaCO_3$ 88.5 per cent.

The only other exposure worth noting is the outcrop No.7 occurring on J. Jefferies' property about eight chains south-east of where the overhead railway bridge crosses the Melrose-Paloona road. Here the limestone is exposed over a width of at least 15 chains to a height of 240 feet on the side of a hill rising, on a grade of about 1 in 3, where it is overlain with basalt, at approximately 460 feet above sea level.

The limestone appears to be more massive in this exposure than those further north, although there is little variation from the general composition as the following indicates:-

Sample	No.12 (Reg. No.147)
Moisture at 105°C	0.08 per cent
Loss on ignition	40.90 "
Acid Insoluble	6.00 "
CaO	50.70 "
MgO	1.12 "
Al_2O_3	0.70 "
Fe_2O_3	0.56 "
MnO	0.01 "
P_2O_5	0.01 "
S	0.03 "

$CaCO_3$ 90.25 per cent.

CONCLUSIONS:

From this brief examination, which included only those outcrops outside the Broken Hill Proprietary Company's main quarry at Melrose and the area bored south of the Don River, it was readily apparent that almost unlimited quantities of good average grade limestone are available; that the limestone continues to a depth far below the reach of mining operations, is without doubt.

Situated on completely cleared agricultural lands, within eight or nine miles by rail and road from Devonport an important shipping centre, and requiring, to command the most distant outcrop, only the relaying of rails on the existing formation, for a distance of less than three miles, the conditions for economical operation with excellent transport facilities are extremely favourable.

Q. J. HENDERSON,
ACTING FIELD GEOLOGIST

Mines Department,
HOBART.

17th June, 1937.