CONTENTS ENVELOPE 5475

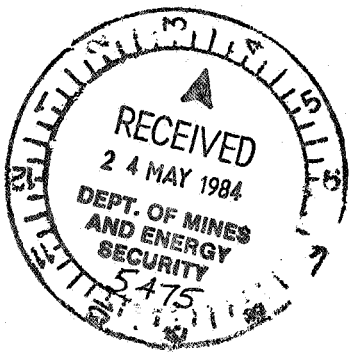
TENEMENT: Not applicable

TENEMENT HOLDER: Kaiser Aluminium Australia.

KAISER ALUMINUM
AUSTRALIA

VERMICULITE

PRELIMINARY SOUTH AUSTRALIAN SURVEY



A.K.RATH
5-3-84

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VERMICULITE - PRELIMINARY SOUTH AUSTRALIAN SURVEY

Vermiculite is the commercial name for micaceous materials that expand markedly on heating - not all are of 'vermiculite' mineralogy. Many are hydrobiotites.

General characteristics of vermiculite are hardness 1.5-3, specific gravity 2.2-2.7 and chemical composition (approximate) of $(H_2O)_x$ $(Mg, Ca)_y$ $(Al, Fe, Mg)_z \cdot (Si, Al, Fe)_4$ O_{10} $(OH)_2$; x varies, $y = 0.22 - 0.36$ and $z \leqslant 3$. (Spry, 1974).

Upon rapid heating, vermiculite expands markedly in volume, with a resultant density decrease down to about 0.2 (Berkman, 1976). Optimum exfoliation is achieved by introducing the raw material to 250°C and raising to ca 1500°C within 5 to 8 seconds, then immediate cooling to 400°C. Weight loss is about 10-12%. 1 500 000 BTU are roughly required for one ton of vermiculite (= 1 621 800 kJ/tonne) with the expansion furnace usually being vertical or inclined.

Exfoliations in Australia have been carried out by Australian Gypsum (Adelaide) and Kaiser Refractories, Sydney. (Hitchins, 1970).

Occurances of vermiculite in South Australia appear to be rather rare. Some are actually hydrobiotites eg. Henley, 1971. It also appears that major Australian production ceased in 1954.(McPheat, 1963).

Beneficiation of vermiculite rocks may be possible, where a vermiculit content of at least 50% is required, and becomes uneconomic for vermiculite contents less that 30%. (Hitchins, 1970)

However, an "economic" deposit has been documented by Forbes & Johnson, 1966:
"Vermiculite in an altered volcanic rock at P42/65 in a road cutting southeast of the Bundaleer Reservoir (see map 1).

P.42/65 : 450-25. n8 : TS15428. In hand specimen, the rock is a very soft, light grey, fine grained, vesicular volcanic. Alteration has changed most of the groundmass to clay, and the residues contain quartz, biotite, chlorite (?pyrochlorite) and carbonate.

Carbonate is present throughout the ground mass as a second stage alteration product. Carbonate and clay are pseudomorphs after ?olivine and/or ?pyroxene, the original crystal outlines of which are delineated by increased amounts of opaque minerals. Fifteen percent of the rock consists of dusty opaque material.
No remnant flow texture was observed. The hand specimen was too small to exhibit a preferred orientation of the vesicles. These vesicles are upto 1 cm in diameter and the crystals contained therein reach a maximum of 0.6 mm."

Conclusion - ~~Australia's~~ World's consumption of vermiculite is of the order of 500,000 tonnes/annum. This is largely supplied from the Palabora deposit in Transvaal and from W.R. Grace & Co. mines in Montana and South Carolina. (Berkman, 1976).
The Young River Deposit in Western Australia also supplies some of Australia's vermiculite. (Spry, 1974).

South Australia's potential, from the literature available, appears to be narrowed down to one documented occurrance of vermiculite near Spalding, South Australia. Investigation into the attributes of this deposit may prove worthwhile. (See map).

The references used are by no means exhaustive, but were chosen to form a basis of investigation, with emphasis on occurr nces of vermiculite in South Australia and elsewhere.
One reference of possible significance was not located at the S.A.D.M.E. - Gourlay (1966).

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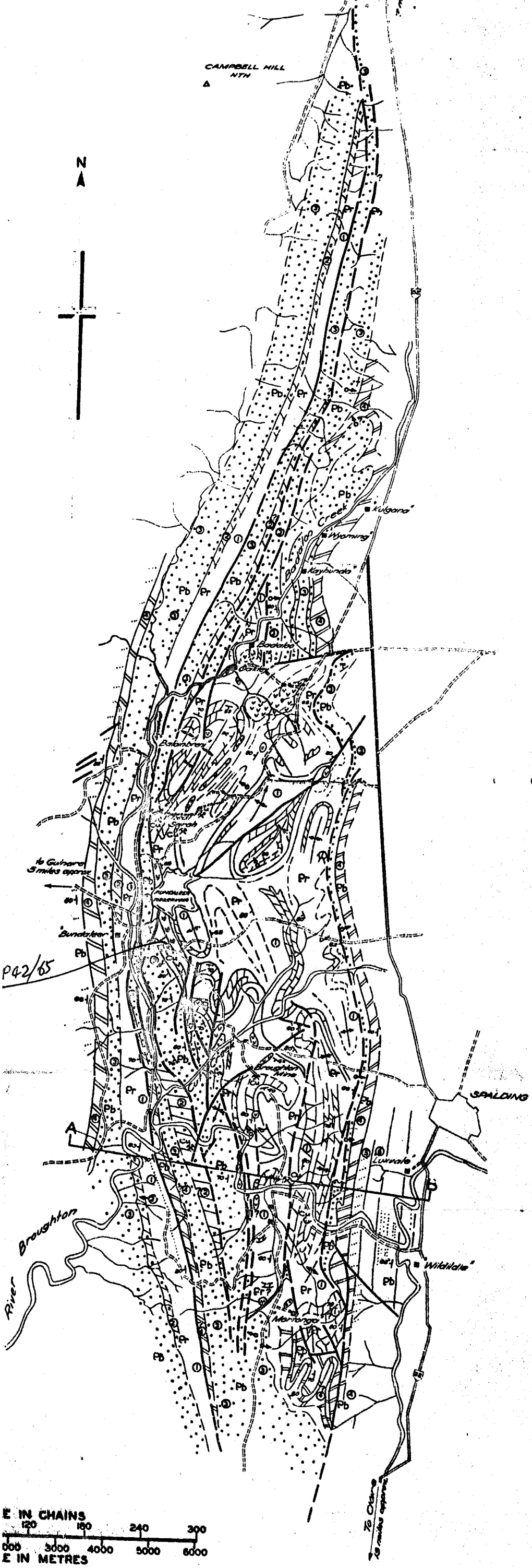
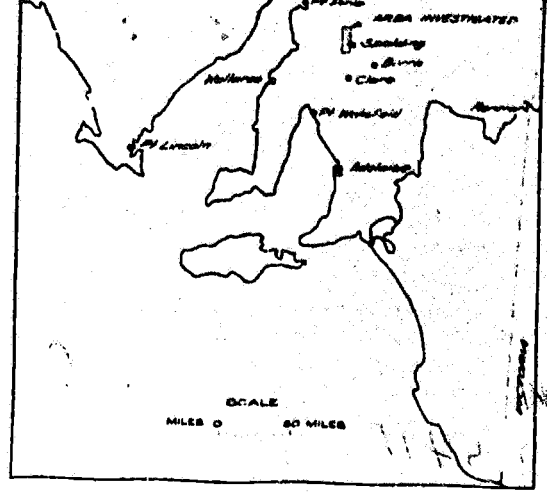
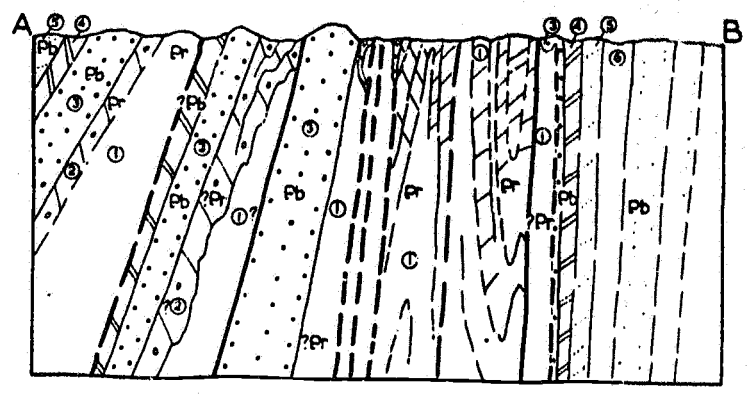
Tony Rath
05-03-84





LOCALITY PLAN



DIAGRAMMATIC GEOLOGICAL CROSS-SECTION
SOUTH-WEST OF SPALDING

INTERPRETATIVE GEOLOGICAL SKETCH-SECTION

LEGEND

BURRA GROUP Pb

- Auburn Dolomite (SW of Spalding) (Wakefield Sandstone Member)
- Undalya Quartzite
- Skillogalee Dolomite
- Rhynie Sandstone

RIVER WAKEFIELD GROUP Pr

- Benbournie Dolomite
- Dolomite.
- Mainly siltstone, phyllite, quartzite

- Igneous rocks
- Volcanics near Bundaleer Reservoir

- Inferred faults
- Fold axis
- Dip of bedding
- Top of bed, usually from cross-bedding
- Cu Copper prospect
- Quarry.
- Boundary of Geochemical Project Area.

SCALE

MILES 1 1/2 0 1 2 3 4 MILES

To accompany report by A.A.Gibson
After J.E.Johnson and B.G.Forbes, also A.H.Bliese

DEPARTMENT OF MINES — SOUTH AUSTRALIA

GEOLOGICAL MAP OF WILLOURAN INLIER WEST OF SPALDING

FIGURE 1		DRN. B.G.F.	SCALE: As shown
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DIRECTOR OF MINES		END.	DATE: 1 - 12 - 66

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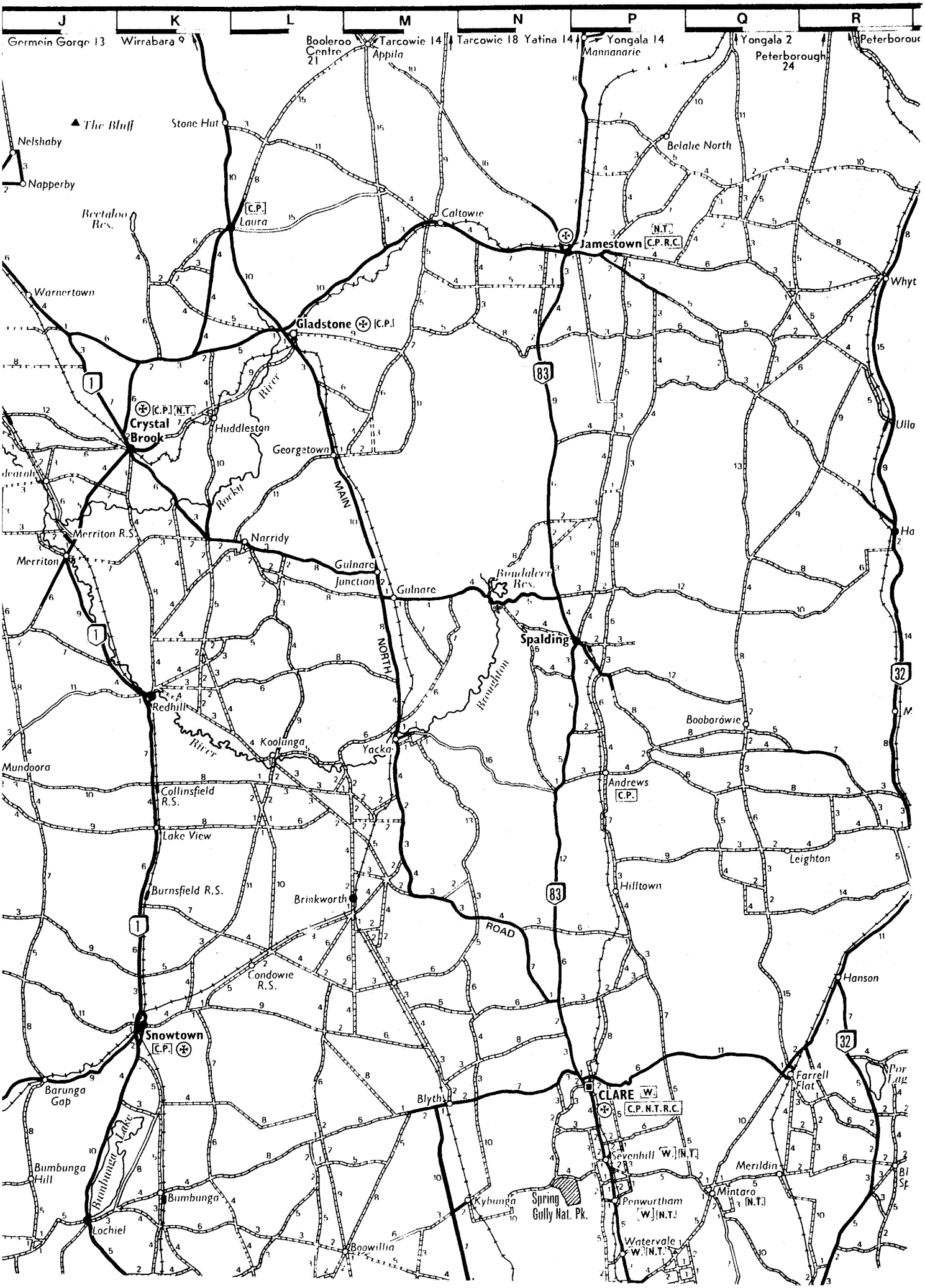
J
K
L
M
N
P
Q
R
Germein Gorge 13
Wirrabara 9
Booleroo Centre 21
Tarcowie 14
Appila
Tarcowie 18
Yatina 14
Yongala 14
Mannanarie
Yongala 2
Peterborough 24
Peterboroug
The Bluff
Stone Hut
Nelshaby
Napperby
Belalie North
Beetaloo Res.
C.P.
Laura
Caltowie
N.T.
Jamestown C.P.R.C.
Whyt
Warnertown
Gladstone C.P.
1
83
C.P. N.T.
Crystal Brook
Huddleston
River
Georgetown
MAIN
NORTH
ROAD
Rocky
Merriton R.S.
Merriton
Narridy
Gulnare Junction
Gulnare
Bundaleer Res.
Spalding
Redhill
Broughton
River
Koolunga
Yacka
Booborowie
Mundoora
Collinsfield R.S.
Andrews C.P.
Lake View
Leighton
Hilltown
Burnsfield R.S.
Brinkworth
Condowie R.S.
Hanson
32
Snowtown C.P.
Barunga Gap
Blyth
CLARE W. C.P. N.T.R.C.
Farrell Flat
Bumbunga Lake
Bumbunga Hill
Sevenhill W. N.T.
Meridin
Bumbunga
Kybunga
Spring Gully Nat. Pk.
Penwortham W. N.T.
Mintaro N.T.
Lochiel
Boowillia
Watervale W. N.T.