SECTION

Rept.Bk.No. 66/80
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DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

REGIONAL SURVEYS DIVISION

NOTES ON THE GEOLOGY OF TORRENSIAN ROCKS IN THE VICINITY OF THE HOUGHTON INLIER - MT. LOFTY RANGES

by

A.F. WILLIAMS
STUDENT GEOLOGIST
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D.M. 71/68

19th March, 1968

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PLAN

Plan No.	Title	Scale
68-221	Geological Map Houghton Inlier Area	1"; 1 mile

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ABSTRACT

About 15 miles northeast of Adelaide, the Houghton inlier, composed of Older Precambrian schist, gneiss and pegmatite is overlain unconformably by younger Precambrian sedimentary rocks of the Adelaide System. The inlier forms the core of an anitcline which is overturned to the west; north-trending faults are common and many form the junction between Adelaide System and Older Precambrian rocks.

The lowest Adelaidean formation, of Torrensian age, is the Aldgate Sandstone, a conglomeratic sandstone containing sporadic carbonate lenses. It is overlain by the Castambul Dolomite, phyllites and quartzites then Montacute Dolomite. These three units are considered to be equivalent to the Skillogalee Dolomite of the Riverton-Burra region to the north and are best seen in the Torrens Gorge. The dolomites are of a lenticular nature and appear to be absent near Williamstown where some small lenses of dolomite are thought to be equivalent to the Beaumont Dolomite, higher in the Torrensian sequence. The sediments have been subject to slight metamorphism producing phyllites of chloritic grade.

INTRODUCTION

Mapping around the Houghton inlier on the Gawler and Adelaide 1 mile maps was carried out during part of January and February, 1968, to attempt to clarify the structure and stratigraphy of the Adelaide System beds. The work was designed as a contribution to the Adelaide 1:250,000 sheet mapping project.

PREVIOUS WORK

The Adelaide 1 mile sheet was previously mapped by Sprigg, Whittle and Campana (1951) and Spry (1951) and the Gawler 1 mile sheet by Campana (1953). More detailed work has been done by Webb (1953) (Houghton area-basement rocks) Nixon (1961

(Dolomite in the Torrens Gorge); Mills (1963) (Mount Crawford area); Talbot (1963) (Houghton inlier); Offler (1966) (PhD thesis - Geology of the Pewsey Vale area); Robinson (1964) (unpublished regional mapping around North Para River).

STRATIGRAPHY

Aldgate Sandstone

This formation, the basal unit in the Torrensian Series, is represented by a cross bedded, slightly feldspathic, heavy mineral banded sandstone, the heavy mineral being titaniferous hematite. Grain size varies from fine to coarse, the sandstone being noticeably conglomeratic towards the base and gritty elsewhere. The conglomerate pebbles are nearly all rounded quartz. This is well examplified near Castambul where the Aldgate Sandstone rests near conformably on older Precambrian schists. Further north the unit is overlain by a veneer of Tertiary laterite in many places, the iron for this probably being derived from the Sandstone. The concentration of heavy minerals may reach ore concentrations in places.

Near the Kangaroo Creek Damsite and further west, the Sandstone contains a small lens of fawn to buff or pink fine grained dolomite and to the east, small pods of carbonate are to be seen in the section along the old Gorge road. Recrystallized carbonate is also present along joints. This outcrop has not been mapped on the published Adelaide 1 mile sheet. Along the southeast portion of the inlier the Sandstone is faulted against the Older Precambrian, however it is continuous around the northern tip of the inlier. The formation is structurally repeated by the Kitchener Fault around the Warren Reservoir.

The occurrence of carbonate members in the Aldgate Sandstone further justifies correlation with the Rhynie Sandstone, the type section of which occurs on the Burra 1:250,000 sheet.

The Castambul Dolomite

This unit occurs immediately above the Aldgate Sandstone although on the Adelaide 1 mile map legend - approximately 100feet of phyllites and slates are placed between these two units. No such rock types have been found around the southern tip of the inlier, however, further north on the Gawler 1 mile sheet, dolomitic siltstones and phyllites occur in the same stratigraphic horizon and are thicker than 10 feet.

The Castambul Dolomite is a fawn, cream and buff dolomite fine-grained, dendritic in parts and slightly siliceous. Its type section occurs in the Torrens Gorge near Castambul, where arkosic quartzite rests above it. It is lenticular, thus explaining its haphazard appearance around the inlier. It may also be faulted out northeast of Kangaroo Creek. Between Sandy Creek and One Tree Hill the formation is represented by buff to cream dolomitic siltstones, phyllites and low grade schists. A good example of the lenticular nature of the dolomitic beds occurs in Tena feate Creek where strongly dolomitic siltstones occur in the creek bed but there grade into phyllites about 100 yards further south.

About 1 mile south of the South Para Reservoir, a creamy dolomitic bed occurs in phyllites. These phyllites are too far above the Aldgate Sandstone to be equivalents of the Castambul Dolomite and are probably equivalents of the "Lower Phyllites" (see later).

Unnamed Phyllites and Quartzites

A reasonable thickness of phyllites and quartzites occur between the Montacute and Castambul Dolomites. Further north on the Gawler sheet, a fairly thick (above 200ft.) arkosic quartzite with phyllites above and below it separates the two dolomites.

The Montacute Dolomite Formation

This formation consists of siltstones phyllites, dolomites and minor quartzites and is characterized by grey to blue coloured rocks. The dolomites are blue to grey in colour, siliceous in parts and contain magnesite pods, occasional chert bands and recrystallized calcite veins. The dolomite distribution around the inlier is again sporadic due to their lenticular nature. Much of the Dolomite around the Torrens Gorge, Montacute and Anstey Hill is quarried for road metal and concrete aggregate. A good section through the Formation may be found approximately ESE of Batcheler's Bridge along Kangaroo Creek in the Torrens Gorge.

A similar situation as was the case with the Castambul Dolomite occurs on the northwest side of the inlier. There the Montacute Dolomite is represented by dolomitic siltstones and phyllites with some sandy beds - all dominantly blue-grey to grey in colour. Again the Dolomite lenses out to the south near Tenafeate Creek.

No dolomite equivalent to the Montacute Dolomite appears on the eastern side of the inlier. However, a few lenses of blue-grey siliceous dolomite about 4000feet long and of varying thickness outcrop near the South Para Reservoir.

This dolomite is associated with blue siltstones and phyllites and is above a fairly thick sequence of quartzites,

sandstones and phyllites and is more likely to be an equivalent of the Beaumont Dolomite rather than the Montacute Dolomite.

This outcrop typifies the lenticular nature of the dolomites around the inlier.

"Lower Phyllites"

This is a thick (1100'+) sequence of phyllites with some sandier beds above the Montacute Dolomite. These are markedly dolomitic in the North Para River where they have been noticeably altered by folding. A strongly easterly dipping cleavage, crenulated and also obliterating bedding in places, has been developed in response to folding. Quartz veins have been injected parallel to this cleavage.

Stonyfell Quartzite

This is a fine to medium grained arkosic quartzite outcropping extensively on both Adelaide and Gawler 1 mile sheets. It is often occurs as two as more thinner quartzites with phyllites interbedded with it, particularly on the eastern side of the inlier and on the Gawler sheet.

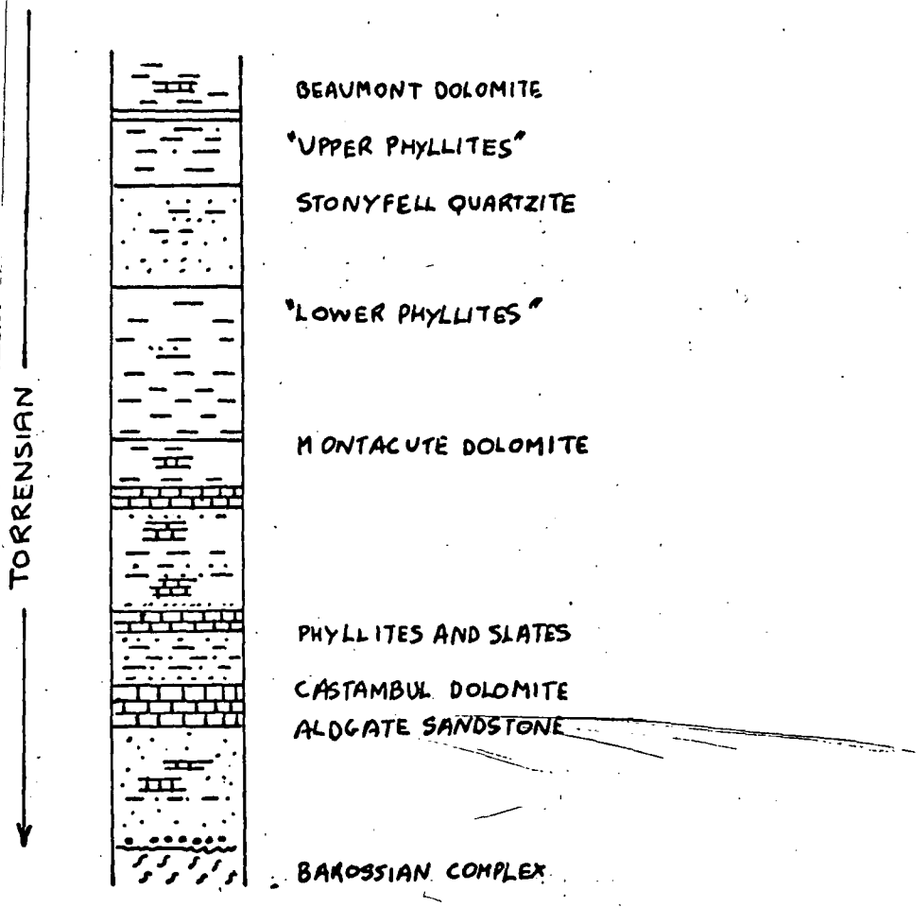
"Upper Phyllites" and Beaumont Dolomite

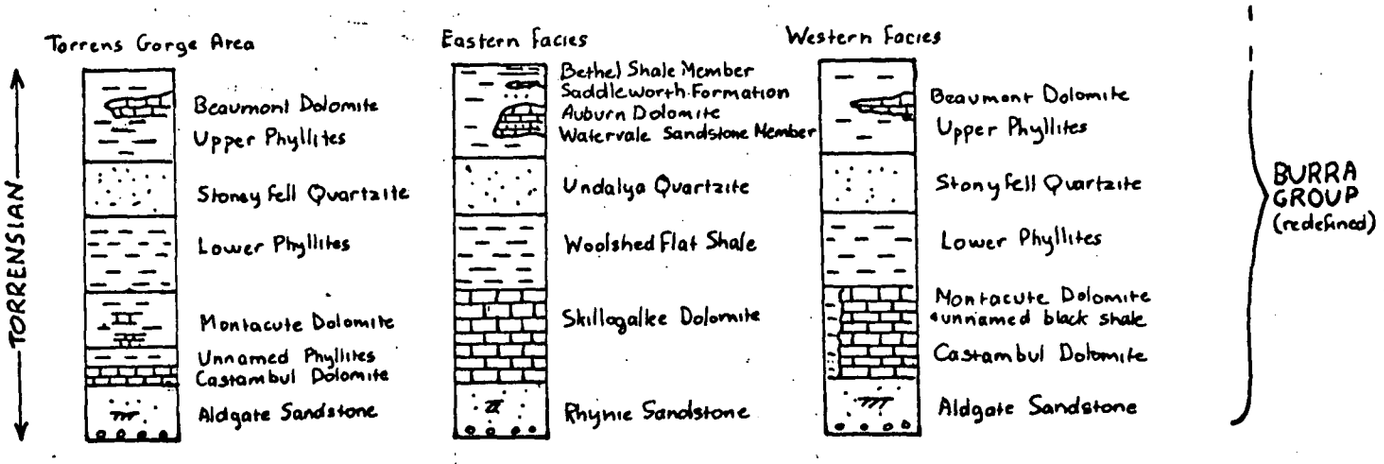
Above the Stonyfell Quartzite there is a thick sequence of phyllites minor quartzites and dolomites towards the top of this formation. These dolomites are probably those encountered near the South Para Reservoir.

No work was done on any units above this formation.

The dolomites proved useful marker beds due to their lithology and their weathering characterisitcs particularly in areas where a reasonable thickness of soil cover persisted.

THE LOWER TORRENSIAN SERIES IN THE TORRENS GORGE





(After BP Thomson 1968 – unpublished)

Drawn by AFW

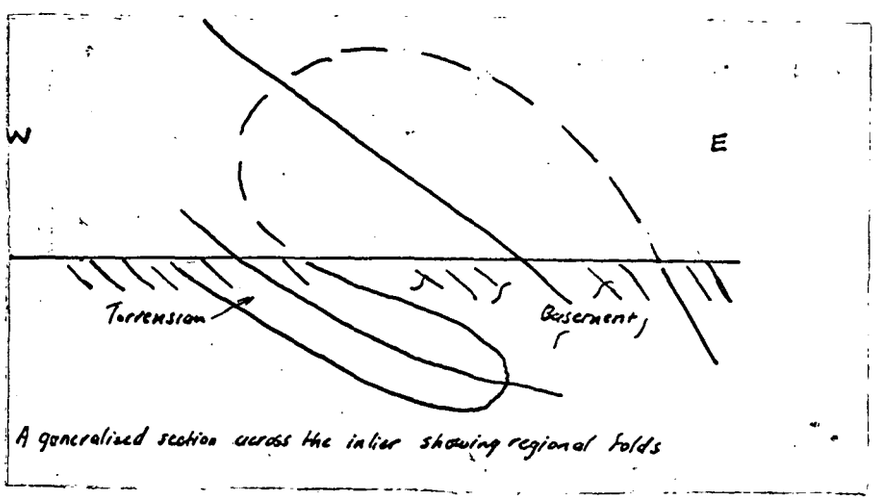
CORRELATION

Correlation between the units in the Torrens Gorge area and the units for the Burra and Adelaide 1:250,000 sheets, after B.P. Thomson is summarized below. The only variation applies to the Woolshed Flat shale and siltstones and shales above the Undalya Quartzite which have metamorphised equivalents in the form of phyllites on the Adelaide and Gawler 1 milesheets. Also the Skillogallee Dolomite has been split into three distinct formations - the Montacute Dolomite, an unnamed sequence of phyllites and minor quartzites and the Castambul Dolomite. As mentioned before, the Skillogallee equivalents on the Gawler and Adelaide 1 mile sheets are not necessarily dolomitic but consist of undifferentiated phyllites, low grade schists and quartzites.

These three formations have been shown as Skillogallee equivalents on the map accompanying this report.

STRUCTURE

The main structural feature of this area is an anticline with its western limb overturned. The varying plunge accounts for the structure exposing the crystalline basement in the core. Main folds have a northerly trend. A generalized section through the core is shown below.



A generalized section across the inlier showing regional folds

This section has been drastically changed by north-sou

faulting. The overturned syncline plunges gently to the south near Gawler thus producing there a large cover area of "lower phyllites". The axial plane of the syncline has been measured by B.P.Thomson and dips 20° to the east. The beds do not dip more than 45° in this structure and the axial plane of the fold becomes very flat in places.

Cleavage-bedding studies along the North Para River enabled the structure to be analysed. The cleavage in these beds dips constantly east, varying from 25 - 60 degrees and striking approximately north-south and may easily be mistaken for bedding since it is crenulated and quartz veins have been injected parallel to it. Also lithological boundaries appear to be parallel to the cleavage. However, if close study is made on different outcrops, the bedding is seen to undulate gently - dipping both to the east and west in the trough of a syncline. The bedding may only be seen in a few instances since it has almost been obliterated by folding and metamorphism. Dips and strikes on the Gawler 1 mile sheet around the North Para River and Gawler Town Hill refer to cleavage and not bedding as marked on the Gawler 1 mile sheet.

The disappearance of the dolomites in the Tea Tree Gully area is unusual. One explanation may be that the dolomites have been faulted out by a northeasterly trending fault. This area is critical since to the north of it, the beds are overturned while to the south they are not. Faulting probably took place along the hinging of this western limb and shearing of the dolomites may occur. Coarse quartz breccia crops out sporadically throughout this area.

The disappearance of the dolomite north of this area is probably due to lensing since the quartzites above and below the dolomite continue northward with no major structural breaks. One

dolomite bed has been traced several hundred yards from the main road where it appears to lens out quickly into phyllites and siltstones and the other dolomite in the core of the anticline disappears into the side of a hill withoutany further trace. (See Diag.) The equivalents to the dolomites are non-calcareous phyllites which become dolomitic further north. Several traverses across the strike of these phyllites and quartzites in the Hermitage area have failed to show the presence of any calcareous beds.

CONCLUSIONS

The haphazard appearance around the basement inlier of the Castambul, Montacute and Beaumont Dolomites may be attributed to stratigraphic rather than structural effects.

Marked facies changes are observed around the inlier and often the stratigraphic position of the dolomites is occupied by shales and phyllites with minor quartzites.

Faulting prevents any possible outcropping of the Castambul Dolomite around the southeast corner of the inlier. The strong development of dolomite around the Gorge area may be due to shallower water conditions since magnesite is prominent especially in the Montacute Dolomite Formation.

ACKNOWLEDGEMENTS

This work was carried out under the direction of B.P. Thomson Supervising Geologist of theRegional Surveys Division of the Geological Survey of South Australia and the author wished to thank him for his helpful suggestions.

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AFW:OB
19.3.1968

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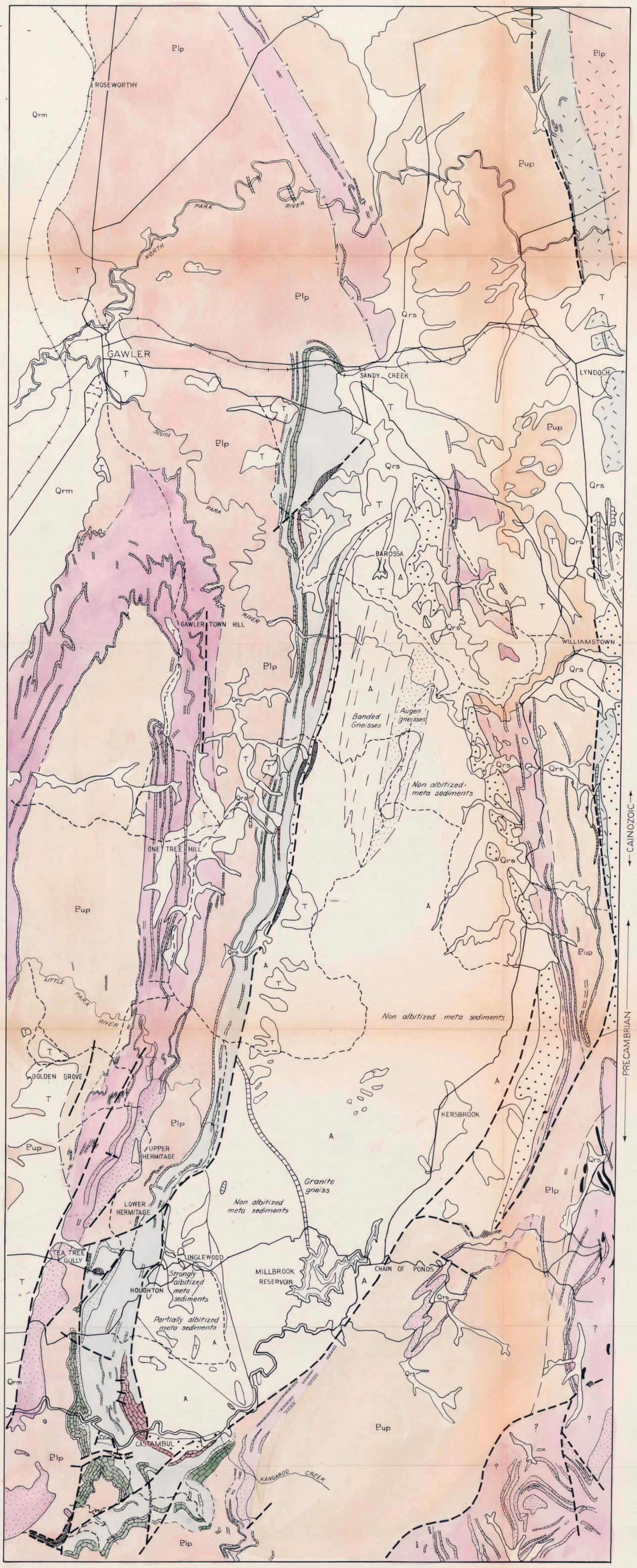

N

LEGEND

CAINOZOIC — QUATERNARY

- Qrs — Shallow alluvium of the creek beds
- Qrm — Alluvial clays and sands

TERTIARY

- T — Laterites, sands and clays.

PRECAMBRIAN — TORRENSIAN

		Equivalents on Burra 1:250,000 sheet
	Beaumont Dolomite	Auburn dolomite
Pup	"Upper Phyllites"	Saddleworth Formation
	Stoneyfell Quartzite	Undalya Quartzite
Plp	"Lower Phyllites."	Woolshed Flat Shale
	Montacute Dolomite	Skillogalee Dolomite
	Unnamed Phyllite	
	Castambul Dolomite	
	Aldgate Sandstone	Rhynie Sandstone
	Regional Unconformity	

BAROSSIAN

- A — Schists, gneisses and pegmatites.

- Geological Boundary (definite)
- Geological Boundary (inferred)
- Fault
- Road
- Track
- River
- Railway line
- Breccia

To accompany report by A.F. Williams.

SCALE

MILES 1 0 1 2 3 4 5 MILES

DEPARTMENT OF MINES — SOUTH AUSTRALIA

GEOLOGICAL PLAN

HOUGHTON INLIER AREA

Drn. A.F.W. | SCALE: 1 INCH = 1 MILE

Tcd. R.A.J.

Ckd. L.V.W. | 68-221 GH

Exd. | DATE: 19TH JUNE '68

Director of Mines