COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

RECORDS.

1960/84

EXPLANATORY NOTES TO THE GEORGETOWN 4-MILE SHEET

Compiled
by

D.A. White

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INTRODUCTION

The Georgetown 4-mile Sheet covers about two thirds of the Etheridge Goldfield in North Queensland. Georgetown, the centre of the goldfield is about 200 miles south-west of Cairns.

The map, which these notes accompany, is based on the results of regional mapping carried out by a combined party of the Bureau of Mineral Resources and the Geological Survey of Queensland. The mapping of most of the Georgetown sheet was completed in 1956: the remaining 250 square miles, in the Robertson River area, were mapped in 1958.

Maps and photographs covering the Georgetown sheet are: aerial photographs flown by the R.A.A.F. at a scale of 1:43,000; photo-mosaic map (4 miles to 1 inch) prepared by and available from the Division of National Mapping, Canberra; photo-maps at 1 mile to 1 inch; dyeline maps controlled by slotted template assembly (at air-photo scale, about 1 mile to 1¼ inches) with principal points and topography; and 4 mile to 1 inch planimetric maps prepared by the Queensland Department of Public Lands in 1942 and by the Royal Australian Survey Corps in 1957, and available from the Division of National Mapping, Canberra.

The following information is taken from the Atlas of Australian Resources prepared by the Division of Regional Development, Department of National Development, Canberra. Most of the Georgetown sheet is covered with mixed tropical woodland dominated by low trees or tall shrubs of Eucalyptus with areas of low arid woodland on the Gregory Range and the Newcastle Range. The seasonal growth of pastures is restricted to the hot summer; the dry season extends from April to December. The average annual rainfall is 30 inches; January is the wettest month with an average rainfall of 8 inches. Normal mean winter (June, July, August) temperature is 65°F to 70°F. Normal mean summer (December, January, February) temperature is 80°F to 85°F. The normal annual range of temperature is 40 to 50 Fahrenheit degrees. The average number of days when the temperature exceeds 100°F is 20 per year; There are an average of 5 frosts per year.

PREVIOUS INVESTIGATIONS.

Cameron (1900 and 1909) provided the first comprehensive account of the Etheridge Goldfield; he recognised an old metasedimentary sequence intruded by granite and porphyry, and unconformably overlain by "Later Sedimentary Strata" and the "Desert Sandstone". Cameron described the gold quartz reefs around Georgetown and Forsayth and provided an up to date record of the production.

Ball (1915), Assistant Government Geologist, examined Mosquito Creek silver-lead deposits, the Percyville Goldfield, the Ortona copper mine, and the Gilberton mineral field, all of which are situated in the southern part of the Etheridge Goldfield. Ball suggested an extrusive origin for the Newcastle Range Porphyries, which previously Maitland (1891) and Marks (1911) had considered to be intrusive.

Jensen (1923) subdivided and correlated the metamorphic and sedimentary rocks of the mineral fields of North Queensland. He recognised a pre-Silurian metamorphic unit, the "Etheridge Series", which he correlated with the Precambrian metamorphics of the Croydon and Cloncurry areas; and an ?Ordovician sedimentary unit, the "Herberton Series".

Since Jensen's reconnaissance survey in 1923, investigations have been restricted to the working gold mines and new mineral deposits. The Dry Hash gold-silver-lead mine, the Cumberland, the Home Rule, the Victory Reef and Bon Successor, gold mines, and the Snake Creek silver-lead deposit were all investigated by Reid in 1932 and 1933. Reid (1932c) mapped gently dipping rhyolites, with thin basal sediments, in the Cumberland Range and he suggested that the sediments may contain fossil plants; plant remains were eventually discovered by the combined regional party in 1956. Reid correlated the Cumberland Range Rhyolites with similar rhyolites in the Newcastle Range and Carboniferous rhyolites at Silver Valley (Atherton 4-Mile Sheet).

In 1939 mining interest in the Etheridge Goldfield revived, but Cribb (1939) reported unfavourably on the discovery of new auriferous quartz reefs.

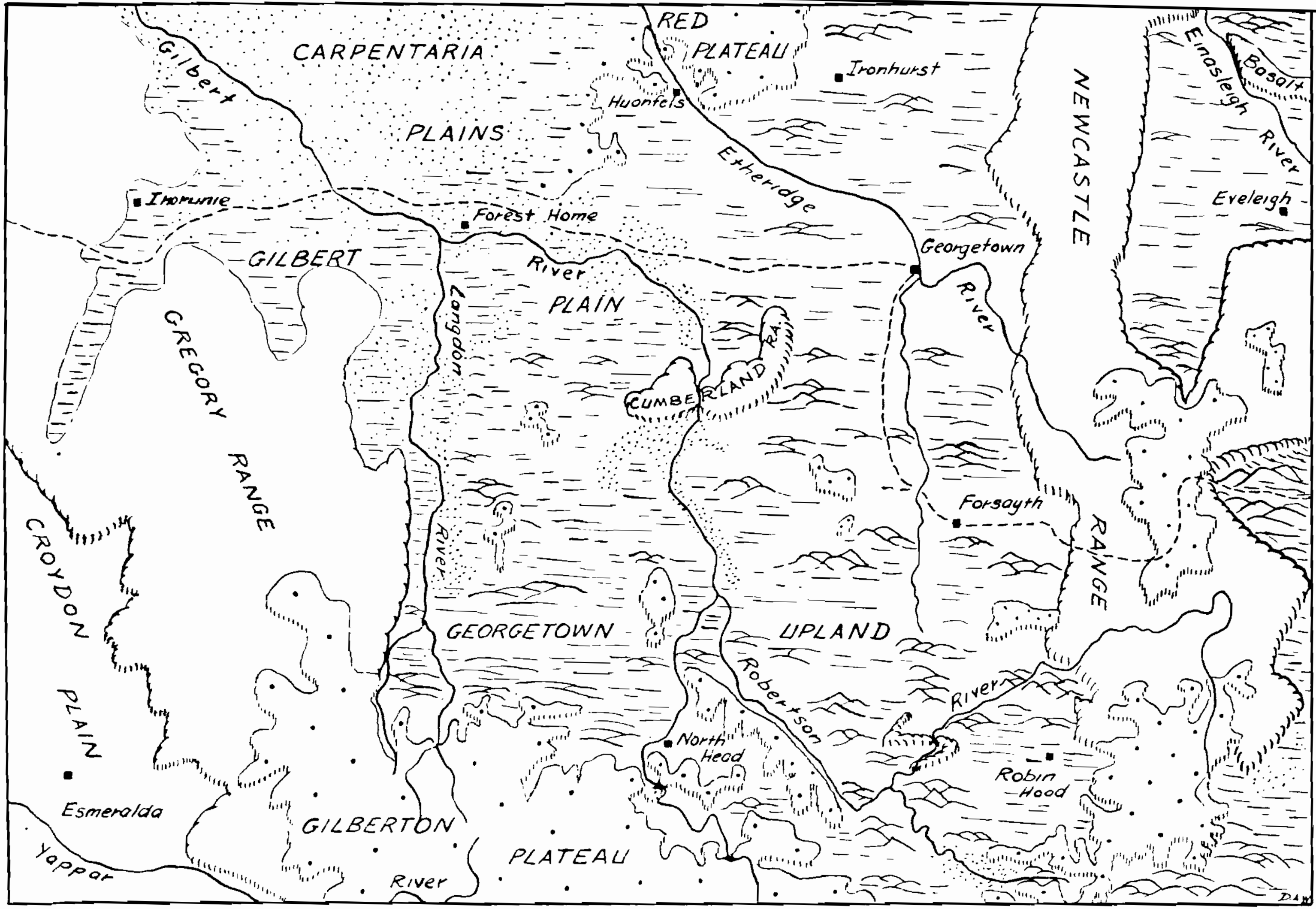


FIGURE 1: PHYSIOGRAPHICAL UNITS GEORGETOWN 4-MILE SHEET

SCALE 12 MILES TO 1 INCH

Systematic geological, geophysical and geomorphological investigations were carried out between 1953 and 1958. In 1953 and 1954 the Land Research and Regional Survey Section, Commonwealth Scientific and Industrial Research Organization, carried out a land - use survey of the Leichhardt-Gilbert area, which included the Georgetown Sheet. Some of the results are recorded by Twidale (1956). In 1954 the Bureau of Mineral Resources conducted an airborne scintillograph survey of the Georgetown sheet; the results were recorded by Goodeeve (1955). The anomalies from this survey were checked on the ground by Walpole and Langron (1955), and Taylor (1956).

In 1956 a combined geological party of the Bureau of Mineral Resources and the Geological Survey of Queensland began regional mapping of the Georgetown sheet; the mapping was extended to the neighbouring Einasleigh, Clarke River, and Gilberton sheets, and was completed in 1958. The results of this geological mapping were recorded by White and Hughes (1957); Wyatt (1957); White, Best et al.(1959). Mary White, Canberra, determined plant remains collected from Mesozoic sediments. Reynolds (1960) mapped the Mesozoic sediments on the western part of the Georgetown sheet.

PHYSIOGRAPHY

Twidale (1956) considered the Georgetown sheet to form the western part of a complex domed area termed the "Einasleigh Uplands", which ranges in altitude from 2,400 feet on the eastern side to about 600 feet on the western side. This part of the Einasleigh Uplands is drained by the Gilbert River System, which includes the Etheridge, Robertson and Langdon Rivers; these streams flow north and north-west into the Gulf of Carpentaria. Twidale (1956) subdivided the Einasleigh Uplands into six physiographical units; the "Georgetown Upland" and the "Gilbert Plain" in the centre of the sheet, on the west by the "Gregory Range", on the east by the "Newcastle Range", on the south-west by the "Gilberton Plateau" and on the north by the "Red Plateau". These units with some modifications are shown in Figure 1.

The Newcastle Range occupies about 1,000 square miles in the eastern part of the Georgetown sheet; it is about 2,400 feet above sea level and about 900 feet above the general altitude of the Georgetown Upland. The range is

60 miles long and trends north into the Red River 4-Mile Sheet. It consists of resistant shallow dipping ? Permian rhyolite, and is capped with near-horizontal ? Cretaceous sediments. The sediments are deeply weathered and form a thick lateritic red-earth soil. Twidale (1956) considers the laterite on the Newcastle Range to be part of an upwarped early to middle Tertiary surface of erosion; at one time a peneplain continuous with similar lateritic remnants on the Gilbert Plain and Gregory Range to the west.

The Georgetown Upland occupies about 2,000 square miles in the central region of the sheet. The Upland consists of Precambrian granite, metamorphics and sediments, which have been eroded to form numerous strike ridges and valleys with an average height of about 100 feet. Twidale (1956) described the Georgetown Upland as approximating to a "primärrumpf" consisting predominately of convex slopes. In the pre-middle Mesozoic the surface of the Georgetown Upland was a west-tilted plain of erosion, and was probably continuous with a similar peneplained surface formed on the acid volcanics of the Gregory and Newcastle Ranges. The Georgetown Upland descends and merges with the Gilbert Plain towards the Gilbert River and the Langdon River; this may be due to the erosion of soft shaly sediments in the Gilbert and Langdon River flood plains.

The Gregory Range trends north-north-west along the western region of the sheet; it consists of Upper Palaeozoic rhyolite porphyries capped with mesas of weathered and partially lateritized Mesozoic sandstone and shale. The maximum altitude of the Gregory Range is about 1,000 feet and it slopes gently to the west, and north towards Croydon (Croydon 4-Mile Sheet), where at an altitude of 400 feet it merges with the Croydon Plain.

The Gilberton Plateau covers an area of about 400 square miles in the southern part of the Gregory Range. The plateau extends south into the Gilberton 4-Mile Sheet; it consists of near-horizontal Mesozoic sediments. Twidale (1956) described the Croydon Plain as a piedmont forming an integral part of the Carpentaria Plains, which extends between Normanton and Croydon to the west of the Georgetown sheet and are a pre-Cretaceous stripped surface. The Croydon Plain consists of Mesozoic sediments which are covered with thick Cainozoic soil. It has an altitude ranging from 300 feet in the north-western part of the sheet to 600 feet,

[illegible]
between Forest Home and Huonfels Stations in the north of the sheet, where it merges with the Carpentaria Plains.

STRATIGRAPHY

Table 1 summarizes the stratigraphy of the Georgetown sheet. The rock units have been named according to the Australian Code of Stratigraphic Nomenclature. Twenty five rock units ranging in age from Archaean to Cainozoic have been mapped; nine of these units are Precambrian and nine are Upper Palaeozoic. About half the number of rock units are igneous rocks. From evidence on the adjacent Clarke River sheet the older granites must be pre-Upper Ordovician and until age determinations by radioactive measurements are obtained, they are tentatively assigned to the late Precambrian. In the Upper Palaeozoic igneous activity the Elizabeth Creek Granite is tentatively regarded as Permian, since it intrudes rhyolite which unconformably overlies *Rhacopteris* Carboniferous beds on the adjacent Atherton sheet. The other Upper Palaeozoic granites were intruded during Carboniferous.

The Precambrian sequence has been divided into Archaean and Proterozoic from evidence of two contrasting grades of metamorphism. The high grade regional metamorphics of the amphibolite and granulite facies are regarded as Archaean; the sediments and their locally contact metamorphic deriviatives are assigned to the Proterozoic. This twofold division of the Precambrian is considered valid since these Archaean metamorphics have been retrograde metamorphosed or little altered by the late Precambrian granites, which in turn have extensively contact metamorphosed the Proterozoic sediments

STRUCTURE.

Folding.

The Proterozoic sediments are folded into widely spaced anticlines and synclines, which pitch at 25° to 35° to the west and north-west between the Gilbert and Langdon Rivers. Elsewhere the folding is tight and in places isoclinal. Except in the Ironhurst area, where the two fold trends are oblique to each other, the trend of the Proterozoic fold axes roughly conform to the shape of the Archaean mass, which appears to form a central nucleus or core in the north and eastern part of the sheet. The trend of the fold axes and the bedding is arcuate, ranging from north-east in the north, through south, to west in the southern and eastern parts of the sheet. The folding along west trending axes in the Robertson River area has formed "b" lineations, which have had superimposed on them a later set of lineations due to doming by the Cobbold Dolerite.

The folding of the Archaean is not known. Foliation dips range from 80° to 90°.

Faulting.

The Precambrian, Upper Palaeozoic and Mesozoic successions have been faulted by strong vertical movements. A major fault zone, which for most of its length is intruded by rhyolite dykes, extends shouth for about 60 miles from near Ironhurst Homestead through Georgetown to Cave Creek; in places this fault coincides with the Proterozoic/Archaean boundary. Faulting parallel to this boundary in ? Permian time formed a north trending rift-valley, which was subsequently filled with the Newcastle Range Volcanics. Horizontal movement took place in post Precambrian time along north-west trending strike-slip faults in Precambrian sediments near the Langdon River. A sharp swing in the course of the Robertson River near its confluence with the Gilbert River coincides with a major north-west fault, which has down-thrown and tilted a block of Mesozoic sediments against the Precambrian sediments.

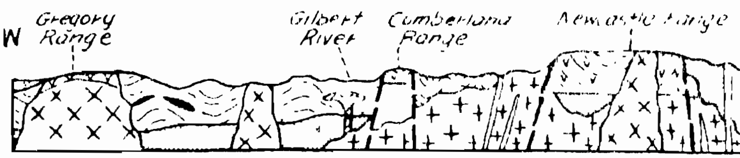
Joints.

A system of north, north-east, and north-west trending joints is well exposed in the Upper Palaeozoic Croydon Felsite in the Gregory Range and in the Newcastle Range Volcanics. Mesozoic sediments in the Robertson River area conform numerous north-east trending joints. Elsewhere jointing is not well exposed.

FIGURE 2 TECTONIC HISTORY GEORGETOWN 4 MILE SHEET

6. CAINOZOIC

Extrusion of basalt along valley of Einasleigh River
Erosion to present day

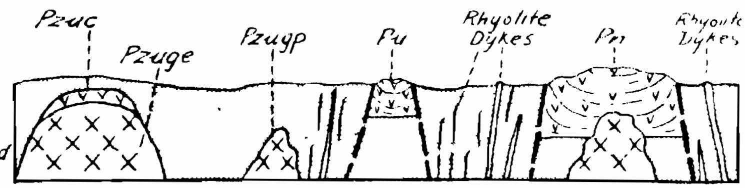


5. MESOZOIC

Submergence of land with slope to west Marine transgression to Gregory Range and freshwater transgression east to Newcastle Range

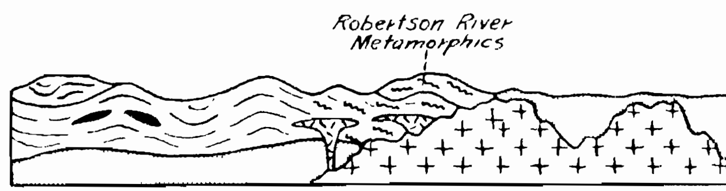
4 UPPER PALAEOZOIC

Major fracturing and rejuvenation of old basement fractures with formation of rift valleys. Filling of rifts with rhyolite – Newcastle Range Volcanics (Pn) – and related acid volcanics – Cumberland Range (Pu). High level intrusion of granites – Prestwood (Pzugp) and Esmeralda (Pzuge) with its chilled hood of Croydon Felsite (Pzuc).



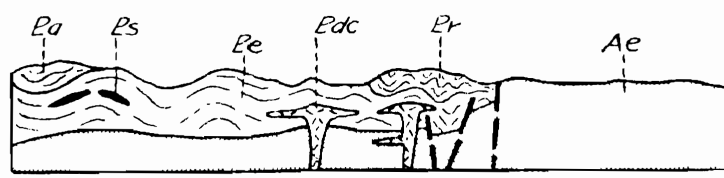
3b. LATE PRECAMBRIAN

Intrusion of Forsayth Granite (Egf) and related granites (Egr, Equ)
In places intrusion along fractured Proterozoic/Archaean boundary High grade contact metamorphism of Proterozoic Sediments (Er)



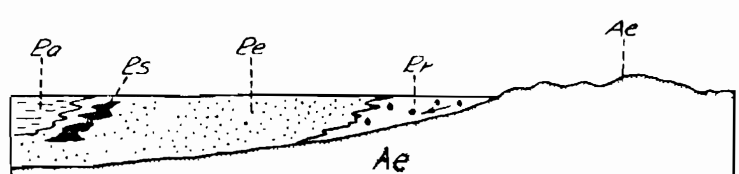
3a LATE PRECAMBRIAN

Folding and uplift of Proterozoic sediments to form land.
Major fracturing along Proterozoic/Archaean boundary.
Intrusion of Cobbold Dolerite (Edc)



2. PROTEROZOIC

Uplift of Archaean basement
Formation of land and sea
Deposition of quartz sands shale (Er), clays, silts, chert – Etheridge Formation (Ee) – carbonaceous silt (Es), shale, clay, quartz greywacke – Langdon River Formation (Ea)



1. ARCHAEAN

Formation of basement – Einasleigh Metamorphics (Ae) – High grade regional metamorphism.

DAW

GEOPHYSICAL SURVEYS

In 1954 an airborne scintillograph survey of the Georgetown sheet was carried out by the Bureau of Mineral Resources. The results of the survey were reported by Goodeve (1955). Most of the 41 radiometric anomalies were subsequently investigated on the ground by Walpole and Langron (1955), Taylor (1956), White and Hughes (1957) and found to be uneconomic.

TECTONIC HISTORY

Figure 2 summarizes the tectonic history of the Georgetown sheet.

ECONOMIC GEOLOGY

Gold.

About 600,000 oz. of gold have been won from the Etheridge Goldfield since mining operations began in 1877 with an average grade of 1½ ozs. Au/ton; today there are no mines being worked on this field; in 1957 unsuccessful attempts were made to open the City of Glasgow. Cameron's (1900 and 1909) comprehensive descriptions of the auriferous quartz reefs on the Etheridge Goldfield have been supplemented by later mine descriptions by Reid (1932a,b,d, and 1933) and Cribb (1939).

In the primary zone the gold in the reefs contains pyrite, galena, chalcopyrite, and sphalerite; the oxidised zone extends from 60 feet to 100 feet deep. Only 14 mines were worked to a depth greater than 200 feet and in general the gold content decreased below 300 feet.

The principal gold mines were the Cumberland, which produced 65,713 oz. of gold from ore averaging 1 oz. 18 dwt. Au per ton and the Durham near Georgetown; the Queenslander and Nil Desperandum near Forsayth. The Union Mine, situated near the southern boundary of the Georgetown sheet in the Percyville field, contained rich pockets of ore which yielded up to 100 oz. Au/ton. 2,800oz. of gold were extracted from the Union Mine. The primary ore averaged 20 per cent to 25 per cent copper and 6oz. to 7oz. gold per ton.

Silver-lead.

Ball(1915) described the Mosquito Creek silver-lead field, situated about 12 miles west of Forsayth. The ore was contained in quartz reefs injected slate along bedding planes. 2,600 tons of ore were extracted from the Mosquito Creek field, 2,000 tons of which were mined before 1915. The ore averaged 50 per cent to 60 per cent lead and the silver content ranged up to 90 oz. per ton. The deepest workings were 184 feet at the Southern Cross Mine; the reefs averaged 3 feet wide and several hundred feet long.

The Eveleigh silver-lead mine near Eveleigh Homestead in the north-east of the Georgetown sheet was described by Denmead and Ridgway (1947) and Denmead (1950). The ore was exposed in minor fissures and as irregular impregnations in the Archaean metamorphics. The galena is associated with copper and zinc, in one lode with tin and in another with gold. The largest lode is mineralized over a length of 75 feet and was developed to a depth of 40 feet. In 1947 North Broken Hill Ltd. drilled one inclined hole to 600 feet without any economic intersections.

Copper.

In 1942 about 60 tons of ore was extracted from the Mcmillan Creek copper lodes situated on the western slopes of the Newcastle Range about 15 miles south-west of the Eveleigh Homestead; the lodes occupied fissures in the Archaean/Einasleigh Metamorphics. The Questend was the principal mine of the Mcmillan Creek workings from which 32.7 tons of ore averaging 19 per cent copper and 48 oz. of silver per ton were extracted.

The Talaroo Copper Mine, near Talroo Homestead on the Einasleigh River, was a pipe ore body 2 feet to 3 feet wide and worked to a depth of 35 feet; it yielded 57½ tons of 13½ per cent copper ore and contained very little gold and silver.

Uranium.

Uranium was discovered in 1954 in Kurrajong Creek, 5 miles east-north-east of Percyville. The prospect is known as "Limkin's Prospect". The uranium prospect has been described by Walpole and Langron (1955), Taylor (1956) and Wyatt (1957). Limkin's Prospect is located on an east trending, quartz filled fracture in kalonized granite.

Production and reserves have been negligble.

Minor radioactivity, of no economic significance, is associated with lead at Blackwells mine, 8 miles west of Georgetown.

Other metals.

Ridgway (1943a) has recorded alluvial tantalite at Glenrowan, about 12 miles west of Forsayth; Ridway (1943b) also recorded alluvial and lode columbite, 10 miles south of Georgetown. Both occurrences are associated with pegmatite.

A mica deposit was described by Ridgway (1945) at Branch Creek near the old Tweeside battery, 10 miles south of Forsayth. Very little commercial-grade mica has been won from this locality.

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TABLE 1: STRATIGRAPHY OF THE GEORGETOWN 4-MILE SHEET

AGE	PERIOD	ROCK UNIT	LITHOLOGY	THICKNESS	DISTRIBUTION	TOPOGRAPHY	STRUCTURE	RELATIONSHIP	PALAEONTOLOGY, AGE, AND CORRELATION	ECONOMIC GEOLOGY	PRINCIPAL REFERENCES
CAINOZOIC	QUATERNARY	Alluvium (Qa)	Mainly sand		Beds of rivers, creeks, and on flood plains.	Creek beds, flood plains				Good water at shallow depths near major rivers.	
CAINOZOIC	QUATERNARY	Residual soils (Qs)	Grey and brown sandy soil; red and white sand	68 feet in Dinner Creek bore, Esmeralda	Scattered deposits in northern and western parts of the sheet and over the Cretaceous sediments in the east.	Shallow gullies and alluvial? plains; low hills over sandstone; steep river banks		Resorted alluvium and from older sediments			
CAINOZOIC		Lyrd Formation (Czd)	Unsorted sandy and pebbly clay or clayey sandstone; ?mound spring deposits		Along Langdon and Gilbert Rivers to north-west part of sheet; scattered patches in west part of area.	Shallow gullies; steep river banks ?spring mounds	Gully fill	Unconformably overlies Gilbert River Formation and older rocks; spring deposits?	cf. Glendower Formation (?Pliocene) of Whitehouse (1954). (Hughenden 4-Mile Sheet)	Spring water potable; some good supplies	Whitehouse (1954) Laing and Power (1959) Reynolds (1960)
CAINOZOIC		McBride Basalt (Czm)	Dark grey olivine basalt; vesicular and iddingsitized	50 feet	Einasleigh River in north-east corner	Steep rough river banks	Flat river-valley fill	Unconformably overlies Archaean Einasleigh Metamorphics	?Pliocene to Pleistocene; Chudleigh Basalt and Nulla Basalt (Clarke River 4-Mile Sheet)	Good supply of water	Twidale (1956) Best (1959)
MESOZOIC	LOWER CRETACEOUS	Gilbert River Formation (Klg)	Mainly sandstone and conglomerate in southern part; interbedded with siltstone and shale in northern part; fossiliferous	180 feet (Robertson River section)	Large areas of Newcastle and Gregory Ranges capped by Gilbert River Formation	Deeply dissected, flat-bedded caps of ranges; form steep scarps and benches on edges	Low regional dip to west; local dips up to 10°; jointing of under-lying formations reflected in lowest beds.	Unconformably overlies Inorunie Sandstone, Palaeozoic and Precambrian formations; covered in part by Cainozoic deposits	Plant remains; top beds with brachiopods, pelecypods, gastropods, radiolaria; fauna mainly like that of Roma Formation (Whitehouse, 1954); age: Lower Cretaceous; cf. Blythesdale Formation (Whitehouse, 1954)	Surface water and springs in ranges; artesian water in Great Artesian Basin to west of area	Whitehouse (1954) Laing and Power (1959) Reynolds (1960)
MESOZOIC	?JURASSIC	Inorunie Sandstone (Ji)	Thin-bedded fine-grained micaceous sandstone, upper parts white indurated, with thin shale bands	1,000 feet (Little River section)	Area of about 120 square miles east-south-east of Inorunie	Deeply dissected hills	Minor folds; dips up to 10°; relects jointing of underlying Croydon Felsite	Unconformably overlies Croydon Felsite; overlain unconformably by Gilbert River Formation	No fossils have been found; possibly Jurassic		Laing and Power(1959) Reynolds (1960)

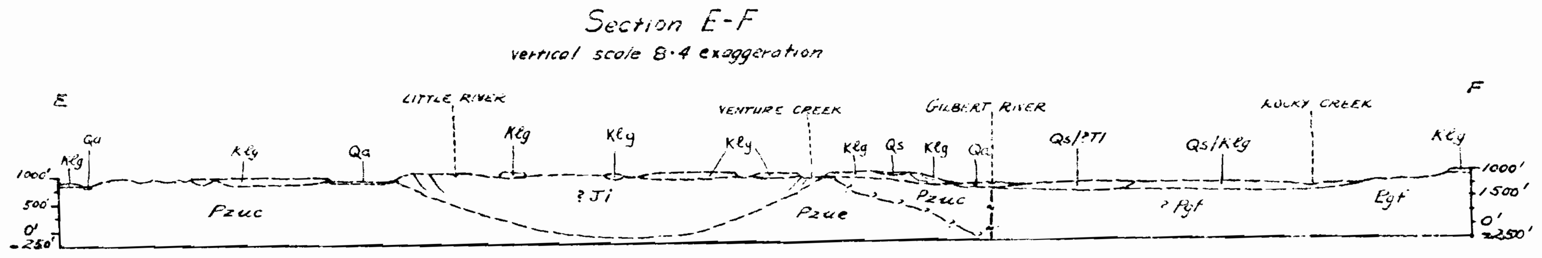
AGE	PERIOD	ROCK UNIT	LITHOLOGY	THICKNESS	DISTRIBUTION	TOPOGRAPHY	STRUCTURE	RELATIONSHIP	PALAEONTOLOGY, AGE, AND CORRELATION	ECONOMIC GEOLOGY	PRINCIPAL REFERENCES
UPPER PALAEOZOIC		Undifferentiated (Pzu)	Rhyolite, rhyolite porphyry, quartz porphyry		Dykes around the margins of the Newcastle Range Volcanics and in Forsayth Granite in Cumberland Mine area.	Resistant linear rises	Vertical dip. Well jointed	Intrude Precambrian granites and metamorphics	Upper Palaeozoic. Newcastle Range Volcanics and Cumberland Range Volcanics.	Minor gold	White and Hughes (1957) Branch (1959)
		Croydon Felsite (Pzuc)	Grey porphyritic rhyolite. Mainly massive with flow banding or margins. Generally graphitic	Unknown ?750 feet	Occupies about 1,000 square miles in Gregory Ranges between Esmeralda, Croydon and Forest Home.	Rugged resistant range (Cumberland) 300'-400' above general ground level	?Arch: Shallow dips up to 45° Probably a flat chilled hood of the Esmeralda Granite	Grades downwards into Esmeralda Granite unconformably overlies the Langdon and Etheridge Formations. Unconformably overlain by Mesozoic sediments.	Cumbana Rhyolite Porphyry	Gold (Croydon) and Tin (Starhills)	Reid (1935) Clappison (1937) Honman (1937) White and Hughes(1957)
		Esmeralda Granite (Pzue)	Grey massive even grained granite with pegmatite Generally graphitic		Scattered outcrops around margin of Croydon Felsite especially at Esmeralda, Croydon and Forest Home. Total area is 50 square miles.	Low resistant hills	Tors.	Mainly grades into Croydon Felsite with some local intrusion.. Intrudes Etheridge and Langdon River Formations. Uncomformably overlain by Mesozoic sediments.	Prestwood Microgranite and Elizabeth Creek Granite	Gold (Esmeralda and Croydon)	White, Best et.al. (1959)
		Prestwood Microgranite (Pzup)	Massive, grey porphyritic biotite microgranite. Phenocrysts of quartz, orthoclase and biotite		100 square miles near Prestwood Homestead on the Gilbert River.	High rugged hills.		Intrudes the Forsayth Granite along contact with Precambrian sediments.	Upper Palaeozoic. Esmeralda Granite and ?Oweenee Granite (Clarke river Sheet)	Gold	White, Best et. al. (1959)
	PERMIAN	Agate Creek Volcanics (Pa)	Rhyolite, tuff, agglomerate amygdaloidal basalt, shale and arkose.	4,000 feet	Occupies about 30 sq. miles from the Ortona/ Forsayth track south onto Gilberton Sheet to the Percy River.	Steep rough resistant hills.	?Basin: shallow dips up to 40°.	Unconformably overlies the Forsayth Granite, Etheridge and Robertson River Formations.	Plants <u>Glossopteris</u> <u>Gangamopteris</u>. Permian. Newcastle Range Volcanics. Cumberland Range Volcanics.	Agate	Ridgway (1945b) Mary White (1959) White and Hughes (1957)

[illegible]	PERIOD	ROCK UNIT	LITHOLOGY	THICKNESS	DISTRIBUTION	TOPOGRAPHY	STRUCTURE	RELATIONSHIP	PALAEONTOLOGY, AGE, AND CORRELATION	ECONOMIC GEOLOGY	PRINCIPAL REFERENCES
	? PERMIAN	Elizabeth Granite (Pgz)	Pink to red, massive, medium to fine grained slightly porphyritic granite with little amount of mafic mineral.		Occupies about 15 sq. mls. is N.E. of Georgetown sheet. Extends E. onto Einasleigh sheet and N.E. onto Atherton Sheet. Total area 240 sq. mls.	Steep rough resistant hills.		Grades upwards into the Cumbana Rhyolite Porphyry.	?Permian	Tin, Wolfram, copper.	White, Best et al. (1959)
		Newcastle Range Volcanics (Pn)	Rhyolite, some tuff and breccia, (with basal lenses of arkose, shale and limestone on Georgetown sheet.	2,500 feet to 3,000 feet.	1,000 square miles in Newcastle Range.	Rough range	Basin and rift-valley. Dips 30° - 45° on margins with 0°- 10° in centre. Well jointed.	Unconformably overlies precambrian Forsayth Granite and Einasleigh Metamorphics.	?Permian Agate Creek Volcanics Cumberland Range Volcanics.	?Copper, tin. Local water supply in joints and faults.	White and Hughes (1957) White, Stewart et.al(1959) Branch (1959)
	?PERMIAN	Cumberland Range Volcanics (Pu)	Rhyolite, breccia, agglomerate with thin lenses of shale, sandstone at base.		32 square miles in Cumberland Range.	Steep rough hills.	Basin or rift valley. Dips up to 45°. Well jointed.	Unconformably overlies the Precambrian succession. ?Intruded by Prestwood Microgranite.	Indeterminate plant fragments in basal sediments. Newcastle Range Volcanics and Agate Creek Volcanics.		White, Best et. al (1959) Branch (1959)
		Cumbana Rhyolite Porphyry (Pm)	Pink flow banded rhyolite porphyry with phenocrysts of quartz and feldspar. Groundmass microgranitic in parts.		Over 10 sq. mls. between the Einasleigh River and Cumbana Homestead. (Einasleigh Sheet).		?Arch; shallow dips up to 35°. Probably a flat, chilled hood of the Elizabeth Creek Granite.	Grades downwards into Elizabeth Creek Granite.	Croydon Felsite.	Tin.	White, Best et. al. (1959)
PRECAMBRIAN	? PROTEROZOIC	Forsayth Granite (Bgf)	Grey, coarse-grained massive to porphyritic biotite granite. Platy flow on margins.		Crops out over 2,000 square miles, half of which is exposed on Georgetown Sheet, other half exposed on Einasleigh Sheet.	Deeply weathered scattered tors.		Intrudes Precambrian succession and Cobbold Dolerite. Intruded by Upper Palaeozoic igneous rocks.	Late Precambrian. Robin Hood Granite and Dumbano Granite.	Gold, lead silver, tantalite. Local water in deeply weathered parts.	White and Hughes (1957) White, Best et. al. (1959)
		Robin Hood Granite (Bgr)	Pink-grey, massive, coarse to medium-grained hornblende-biotite granite. Quartz frequently porphyritic.		360 square miles between Robin Hood Homestead and Mt. Hogan (Gilberton Sheet)	Deeply weathered. Scattered tors.		Intrudes Precambrian Robertson River Metamorphics and Cobbold Dolerite. Unconformably overlain by ?Mesozoic sediments.	Late Precambrian. Forsayth Granite and Dumbano Granite.	Gold, uranium. Local water in deeply weathered parts.	White, Best, et.al. (1959)

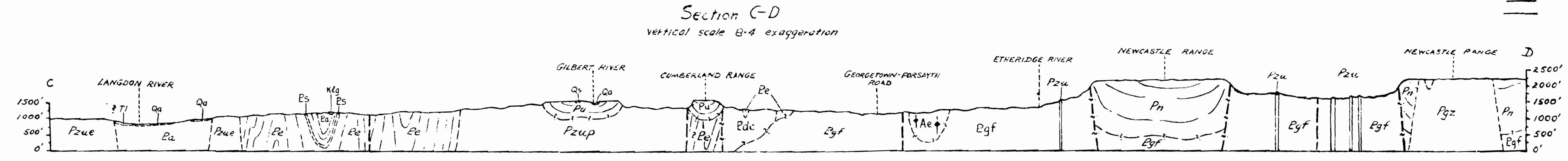
AGE	PERIOD	ROCK UNIT	LITHOLOGY	THICKNESS	DISTRIBUTION	TOPOGRAPHY	STRUCTURE	RELATIONSHIP	PALAEONTOLOGY, AGE, AND CORRELATION	ECONOMIC GEOLOGY	PRINCIPAL REFERENCES
		Dumbano Granite (Egu)	Medium grained grey biotite granite with pink porphyritic feldspar.		1 square mile in S.E. corner of sheet.	Weathered tors and pavements separated by thick sandy soil	Platy flow.	Intrudes Einasleigh Metamorphics.			White, Best et. al. (1959)
	?PROTEROZOIC	Cobbold Dolerite (Bdc)	Fine-grained dolerite; locally metamorphosed to amphibole and gabbro near granite intrusions.		30 square miles between Gilbert River and Little Robertson River in south. Small isolated areas in central part of sheet.	Rough hills	Sills and dykes. Dome.	Intrudes Precambrian succession. Intruded by late Precambrian granites.	Late Precambrian.	?Gold.	White and Hughes. (1957) White, Best et. al. (1959)
PRECAMBRIAN		Langdon River Formation (Ba)	Red-brown shale, claystone, siltstone, some lenses of quartz greywacke and sandstone. Locally contact metamorphosed to andalusite hornfels.	10.000 feet (mod.)	Along Langdon River from Gilbert River south for 35 miles. Maximum width 4 miles.	Strike ridges.	Tightly folded along north-west and east axes. Dips from 60° to 90°.	Conformably overlies Etheridge Formation and Stockyard Creek Siltstone. Contact metamorphosed by Esmeralda Granite.	?Proterozoic Etheridge Formation.		White and Hughes (1957) White, Best et. al (1958)
	?PROTEROZOIC	Etheridge Formation (Be)	Black to grey quartz siltstone, shale, fine grained quartz sandstone, lenses of chert and carbonaceous siltstone. Locally metamorphosed to mica Schist.	15,000 feet - 20,000 feet.	800 square miles in central part of sheet.	Strike ridges.	Tightly folded along east axes. Dips from 60° to 90°.	Conformably underlies Langdon River Formation. Interlingers with Stockyard Siltstone towards top of formation. Grades into black mica schist along eastern boundary. Conformably underlies Robertson River Metamorphics.	?Proterozoic Langdon River Formation.	Gold, lead and silver.	White and Hughes (1957) White, Best et. al. (1959)
		Stockyard Creek Siltstone Member (Bs)	Black carbonaceous siltstone. Generally pyritic. Contains up to 5% carbonaceous material.	30 feet to 300 feet.	Narrow belt from Gilbert River south for 35 miles to Candlow Dam.	Strike ridges. Thick vegetation.	Steep to vertical dips.	Conformably underlies Langdon River Formation. Interlingers with Etheridge Formation. towards top.	?Proterozoic Etheridge Formation.		White and Hughes (1957) White, Best et. al (1959).

AGE	PERIOD	ROCK UNIT	LITHOLOGY	THICKNESS	DISTRIBUTION	TOPOGRAPHY	STRUCTURE	RELATIONSHIP	PALAEONTOLGY, AGE, AND CORRELATION	ECONOMIC GEOLOGY	PRINCIPAL REFERENCES
PRECAMBRIAN	? PROTEROZOIC	Robertson River Metamorphics (Br)	Quartz-muscovite schist, garnet-quartz-mica schist, Staurolite-garnet-mica schist, biotite schist and lenses of quartzite. In many places metamorphics are lineated.	5,000 feet - 7,500 feet.	250 square miles in Robertson River area.	Undulating low strike ridges. Quartzite forms prominent steep hill. (Tin Hill).	Tightly folded along east-west axes. "B" lineations.	Intruded by Forsayth and Robin Hood Granites. Intruded and domed by Cobbold Dolerite. Conformably overlies Etheridge Formation.	?Proterozoic. Metamorphism is low grade regional. Metamorphics at Tate River Township (Atherton Sheet).	Gold, ?tin.	White, Best et.al (1959)
	? ARCHAEAN	Einasleigh Metamorphics (Ae)	Gneiss, banded granulite, migmatite, garnetiferous quartzite, amphibolite.	Unknown	20 square miles in Ironhurst area (north) and 50 square miles in south-east of sheet. 100 square miles in Eveleigh area (north-east).	Pavement outcrops in creeks. Low rises.	Steep to vertical foliation.	Metamorphic unconformity with metamorphics of Etheridge Formation.	? Archaean. Hall's Reward Metamorphics (Einasleigh Sheet).	Lead, silver, gold.	White and Hughes (1957) White, Best et.al (1959)

Section E-F
Vertical scale 8·4 exaggeration



Section C-D
Vertical scale 8·4 exaggeration

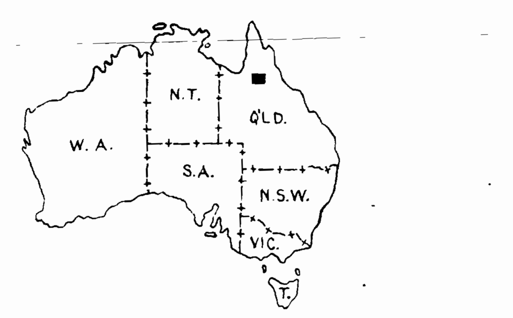


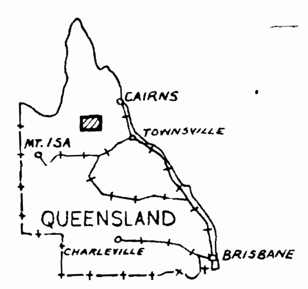
Reference

CAINOZOIC	QUATERNARY		Qa	Alluvium
			Qs	Soil
		Lynd Formation	Tl	Unsorted sand, gravel and clay
		McBride Basalt	Czm	Olivine basalt
MESOZOIC	LOWER CRETACEOUS	Gilbert River Formation	Klg	Conglomerate, sandstone and siltstone
	?JURASSIC	Inorunie Sandstone	?Ji	Micaceous quartz sandstone
UPPER PALAEOZOIC			Pzu	Undifferentiated rhyolite, quartz porphyry and volcanics
		Croydon Felsite	Pzuc	Rhyolite and rhyolite porphyry
		Esmeralda Granite	Pzue	Grey biotite granite
		Prestwood Microgranite	Pzup	Grey porphyritic biotite microgranite
		Cumbana Rhyolite Porphyry	Pm	Pink rhyolite porphyry
		Elizabeth Creek Granite	Pgz	Pink massive granite
	?PERMIAN	Agate Creek Volcanics	Pa	Rhyolite, pyroclastics, basalt
		Newcastle Range Volcanics	Pn	Rhyolite, some pyroclastics.
		Cumberland Range Volcanics	Pu	Rhyolite, tuff, arkose, sandstone.
PRECAMBRIAN		Forsayth Granite	Egf	Grey porphyritic biotite granite
		Robin Hood Granite	Egr	Pink-grey hornblende-biotite granite
		Dumbano Granite	Egu	Grey biotite granite
		Cobbold Dolerite	Edc	Dolerite, amphibolite.
	PROTEROZOIC	Robertson River Metamorphics	Er	Quartz-muscovite-garnet-cordierite schist, quartz-muscovite schist, quartzite lenses.
		Langdon River Formation	Ea	Shale, siltstone, quartz greywacke
		Etheridge Formation	Ee	Shale, siltstone, sandstone, chert
		Stockyard Creek Siltstone Member	Es	Carbonaceous siltstone
	ARCHAEAN	Einasleigh Metamorphics	Ae	Gneiss, migmatite, granulite schist, amphibolite.

Geological boundaries
Established boundary, position accurate.
Established boundary, position approximate.
Inferred, probable or indefinite boundary.
Strike and dip of strata
Inclined
Horizontal
Trend lines by photo-interpretation
Outcrop with dip 0°-15° (photo-interpretation)
Outcrop with dip 15°-45° (photo-interpretation)
Strike and dip of foliation
Inclined
Vertical
Direction and plunge of lineation
Joints
Joint pattern (photo-interpretation)
Folds
Established anticlinal crest - position approximate
Axis of major fold with plunge or pitch - position accurate
Plunge of anticline
Plunge of syncline
Faults
Established fault - position accurate.
Established fault - position approximate
Inferred, probable or indefinite fault
Miscellaneous
Dyke q-quartz p-pegmatite d-dolerite r-rhyolite
Marine fossil locality
Freshwater fossil locality
Mine
Mineral deposit Ag-silver Au-gold Cu-copper Mi-mica Mn-manganese Pb-lead Sn-tin Ta-tantalite, columbite U-uranium

Geology by: D.A. White, K. Hughes, J.B. Firman, C.D. Branch, J.G. Best, D.H. Wyatt, M.A. Reynolds
Compiled November 1959 by: D.A. White
Drawn by:

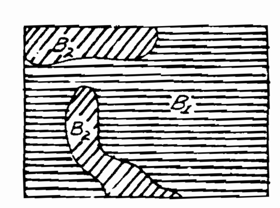




INDEX TO ADJOINING SHEETS
Showing magnetic declination

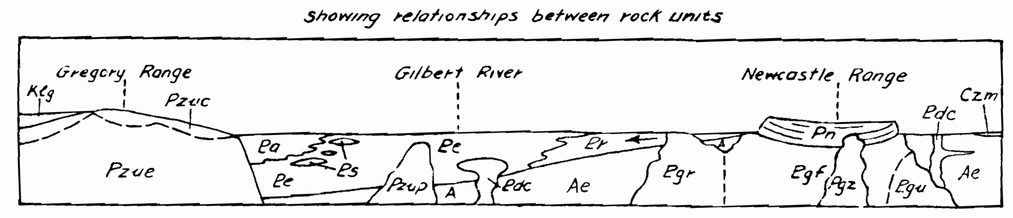
NORMANTON	RED RIVER	ATHERTON
CROYDON	GEORGE-TOWN	EINASLEIGH
MILLUN-GERA	GILBERTON	CLARKE RIVER

Scale
4 Miles to 1 inch
0 4 8 12 16 MILES



Detailed reconnaissance - numerous traverses and photo interpretation
Reconnaissance - traverses and photo interpretation

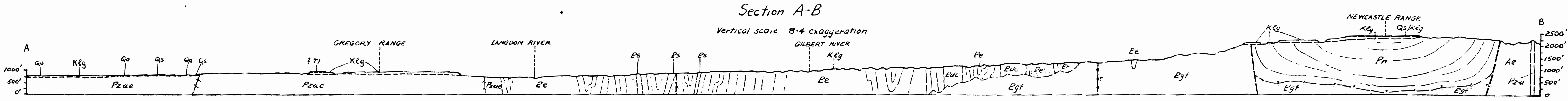
DIAGRAMMATIC SKETCH SECTION (NOT TO SCALE)
Showing relationships between rock units



Unconformity
Gradational or indefinite boundary
Interfingering boundary
Direction of main sedimentation

Miscellaneous Ctd.
Vehicle track
Telephone line
Railway line
Dam
Bore
Hot spring
Well
Wind pump
"Robin Hood" Homestead
Airstrip
Astro station
Barometric spot height: M.S.L.
Spring
Block spring

Section A-B
Vertical scale 8·4 exaggeration



GEORGETOWN
SHEET E54-12