COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

RECORDS.

1960/83

Copy 3

EXPLANATORY NOTES TO THE GILBERTON 4-MILE SHEET

Compiled by

D. A. WHITE

EXPLANATORY NOTES TO THE GILBERTON 4-MILE SHEET

Compiled by

D. A. WHITE

RECORDS 1960/83

INTRODUCTION

The Gilberton 4-mile sheet area is situated in the southern portion of Cape York Peninsula in North Queensland. It is bounded by latitudes 19°00' and 20°00', and longitudes 142°30' and 143°30'. The sheet area contains the mineral fields of Gilberton, Percyville and Woolgar, and part of the Artesian Basin. The area is divided into distinct geological and geographic units by the Gregory Range, which crosses the central region from north-west to south-east, and finally joins the Great Dividing Range a few miles east of the sheet boundary. It is impossible to cross the Gregory Range by vehicle; elsewhere is by rough vehicle tracks that link many isolated homesteads.

The Gilberton sheet area was regionally mapped in 1956, and 1958 by a combined geological party of the Bureau of Mineral Resources and the Geological Survey of Queensland. Until 1956 geological mapping of the Gilberton sheet area was confined to the detailed examination of mineral deposits in the Gilberton, Woolgar and Percyville areas.

Maps and aerial photographs covering the Gilberton sheet are: aerial photographs flown by the R.A.A.F. at a scale of 1:50,000; 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 inch) with principal points and topography; and 4 mile to 1 inch planimetric maps prepared in 1944 and 1959 by the Department of the Army and available from the Division of National Mapping, Canberra.

The following information was taken from the Atlas of Australian Resources prepared by the Division of Regional Development, Department of National Development, Canberra. Much of the north-eastern part of the sheet area is covered with mixed tropical woodland, and the western part of the sheet contains low arid woodland. The seasonal growth is restricted to the hot wet summer (December-February). The annual average rainfall is 25 inches: the wettest month is January when the average rainfall is 7 inches. The area has less than 5 days per year of frosts. The normal mean winter temperature (June, July, August) is 65°F.; the normal mean summer temperatures (December, January, February) are 80°F - 85°F. The normal annual range of temperatures is 50°F - 60°F.; average number of days per year when the temperatures exceed 100°F. is 20 days.

PREVIOUS INVESTIGATIONS

Daintree (1868 and 1872) made the first geological reconnaissance on the Gilberton sheet area; he recorded "metamorphic - mica schists intruded by dykes of elvanite, diorite, hornblende rocks, etc." of Lower Silurian age in the Gilberton Mineral Field. These rocks were shown on the first geological map of Queensland compiled by Daintree in 1872.

In 1898 Maitland attempted to delineate the artesian water area west of the Gregory Range and he provided the first comprehensive account of the hydrology of this area.

In the early part of the twentieth century Cameron (1900) and later, in more detail, Ball (1915) investigated the mines and mineral deposits of the Gilbert in the Percyville and Woolgar areas. Saint-Smith (1922) reported on the Woolgar Goldfield and provided a comprehensive account of the gold mining. Jensen (1923) carried out a broad reconnaissance of the Cairns Hinterland, that included the Precambrian part of the Gilberton sheet.

After the general investigations in the early 1920's by Saint-Smith and Jensen, there were minor geological surveys in 1945 of the scheelite deposit at Percyville by Morton, and agate in Agate Creek by Ridgway.

Whitehouse (1955) and Ogilvie (1955) studied the geology and hydrology of the Great Artesian Basin for the

Queensland Co-ordinator General's Department.

In 1953 and 1954 the Land Research and Regional Survey Section, Commonwealth Scientific and Industrial Research Organization, Canberra, carried out a land-use survey of the Leichhardt-Gilbert area, that included the Gilberton sheet area. Twidale (1956a, 1956b) has recorded some of the geological and physiographical results of this survey.

In 1955 the Bureau of Mineral Resources with D.C.3 and Auster aircraft airborne scintillograph surveyed the north-eastern part of the sheet area. The results of this survey are recorded by Parkinson and Mulder (1956). After this survey a combined geological party of the Bureau of Mineral Resources and the Geological Survey of Queensland in 1956 began systematic regional mapping of the Georgetown, Gilberton, Einasleigh, Clarke River and Atherton Sheets. The mapping of the Gilberton sheet was continued in 1958 and completed in 1959. The results of this geological mapping are recorded by White and Hughes (1957), White, Best, et al. (1959), Branch (1959), White and Wyatt (1960) and Reynolds (1960). Mary White (1958 and 1959) assisted in the regional mapping by her determination of plants from the Upper Devonian-Carboniferous and Permian sediments.

PHYSIOGRAPHY

Recently Twidale (1956) studied the geomorphology and the physigraphy of the Leichhardt-Gilbert area. Figure 1 shows the physiographical units as named by Twidale in the Gilberton area. Most of the physiographic boundaries in Figure 1 agree with those shown by Twidale (p.869), except he shows the Gilberton Precambrian area as the southern part of the Georgetown Upland and I show it as the southerly extension of the Newcastle Range.

From consideration of accordance of heights of ridge crests, hill tops or mountain peaks, and other features,

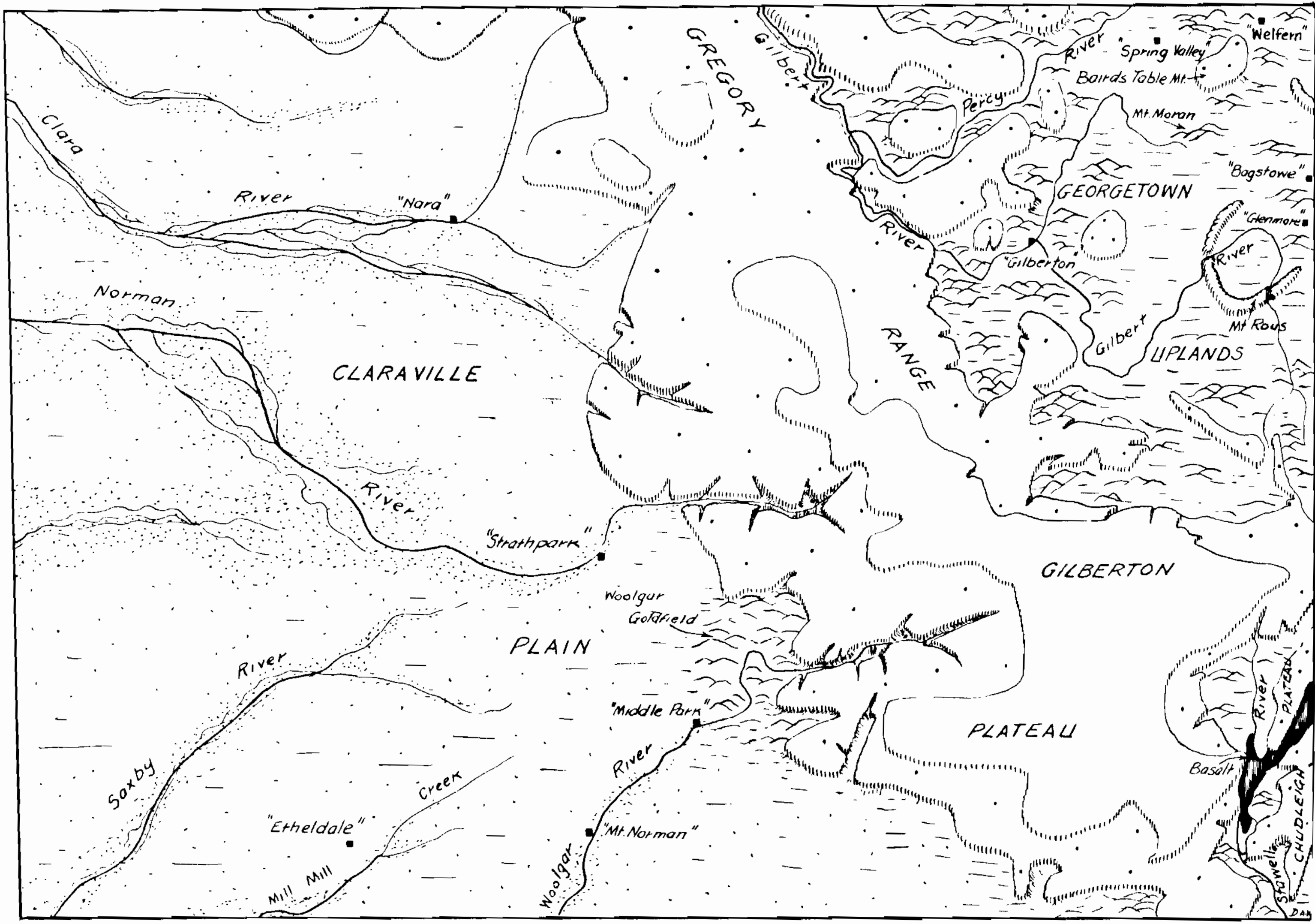


FIGURE 1: PHYSIOGRAPHICAL UNITS GILBERTON 4-MILE SHEET

SCALE 12 MILES TO 1 INCH

Twidale outlined three polygenic plains of erosion:

(i) The <u>Claraville Plain</u> of late Tertiary-Quaternary age;

(ii) the <u>Gilberton Plateau</u> of early to middle Tertiary age;

(iii) the <u>Einasleigh Uplands</u> that includes the Georgetown Uplands, a pre-middle Mesozoic surface of erosion.

The <u>Claraville Plain</u> occupies the western part of the Gilberton sheet area. It is a rolling plain 50 miles long; its height decreases from 1,000 feet near Middle Park Homestead to 650 feet in the south-western corner of the sheet area. Twidale (p. 871) considers that its gentle topography is due to weakly resistant Cretaceous shales. The Claraville Plain consists of thick sandy and clayey soils, unsorted and unconsolidated sands and gravels, with little or no outcrop. The main rivers draining the plain are, named from north to south, the Clara, the Norman, the Saxby and the Woolgar. All these rivers except the Saxby rise in the Gregory Range and Gilberton Plateau. The Norman and Woolgar Rivers have cut deep gorges in the Gilberton Plateau by rejuvenation of old faults. After flowing west a short distance over the Claraville Plain the rivers are aggrading and their courses are braided.

The <u>Gilberton Plateau</u> occupies an area 80 miles long by 40 miles wide that trends north-west in the eastern part of the sheet area. Twidale (p. 873) describes the plateau as a "little-dissected sandstone plateau which has been tilted down to the west". The height of the Gilberton Plateau ranges from 1,500 feet to 2,500 feet. It merges with the Gregory Range to the north and decreases in height to 1,200 feet. The plateau consists of partly lateritized flat-lying Cretaceous sandstone, shale and conglomerate. The Gilberton Plateau forms a local divide between the north-flowing Gilbert River and the westerly-flowing Norman River, and the southerly-flowing Saxby and Woolgar Rivers. A north-trending corridor of uplands along the Stawell River separates the Gilberton Plateau from the Chudleigh Plateau, which extends east into the Clarke River sheet area.

The Georgetown Uplands occupies the north-eastern part of the sheet. It consists of resistant steeply dipping Precambrian sediments that are eroded into rough strike ridges and steep gulleys, and granite and metamorphics eroded to smooth undulating rises. The height of the Georgetown Uplands ranges from 1,500 feet to 2,600 feet, at which height it merges with the Newcastle Range to the north on the adjacent Georgetown sheet area. Mt. Moran, Bairds Table Mountain and Mount Rous are prominent peaks in the Georgetown Uplands.

STRATIGRAPHY AND PALAEONTOLOGY

Table I summarises the stratigraphy and palaeontology. Rock units have been named according to the Australian Code of Stratigraphical Nomenclature. The ages of the rock units range in age from Archaean to Recent. The ages of the granites are not precisely known; they are tentatively regarded as Upper Palaeozoic and late Precambrian.

The division of the Precambrian into two units is based on strongly contrasting grades of metamorphism and, in some places, marked differences of trends. The younger unit, consisting of sediments and contact metamorphics, is tentatively placed in the Proterozoic; the older unit, which consists of high grade regional metamorphics, is assumed to belong to the Archaean.

STRUCTURE

Folding

Archaean. The Archaean metamorphics are foliated and lineated. Generally near the Proterozoic boundary the foliation dips nearly vertical and its north-east trend conforms to that of the Proterozoic beds. However farther from the boundary the Archaean foliation trend is north and oblique to the trend of the Proterozoic sediments. The foliation trend is about east in the Woolgar area.

Proterozoic. The trend of the sediments and meta-sediments is arcuate from north-east near Welfern Homestead to east in the Gilberton area. The sediments are moderately folded into flat (about 30°) pitching anticlines and synclines. Folding is probably isoclinal in the Gilberton area.

Faulting

Major faults have been active in the Precambrian and Palaeozoic histories of the area. Faults may have determined the configuration of the Proterozoic basin of deposition; arcuate faults have assisted the emplacement of the Upper Palaeozoic granites and rhyolite ring dykes into the Precambrian basement.

A major fault coincides with the Proterozoic/Archaean boundary and trends west-south-west near the Gilberton Homestead; farther west the trend of this fault changes to south-west and the fault displaces Cretaceous sediments in the Gregory Range and finally terminates at Woolgar. This fault may be an old basement fault along which movement has taken place at least twice during the history of the area.

Arcuate faults are well exposed in the Precambrian Dumbano Granite area and these faults have controlled the emplacement of rhyolite ring dykes and oval-shaped high level granite intrusions.

Block faults with some transcurrent movement has displaced Cretaceous sediments along the Norman and Woolgar Rivers.

Joints

A system of east-west joints are exposed in the Cretaceous sediments of the Gregory Range and the Gilberton Plateau. These joints are the result of movements in a thin crust of Cretaceous sediments overlying east-west trending Proterozoic sediments.

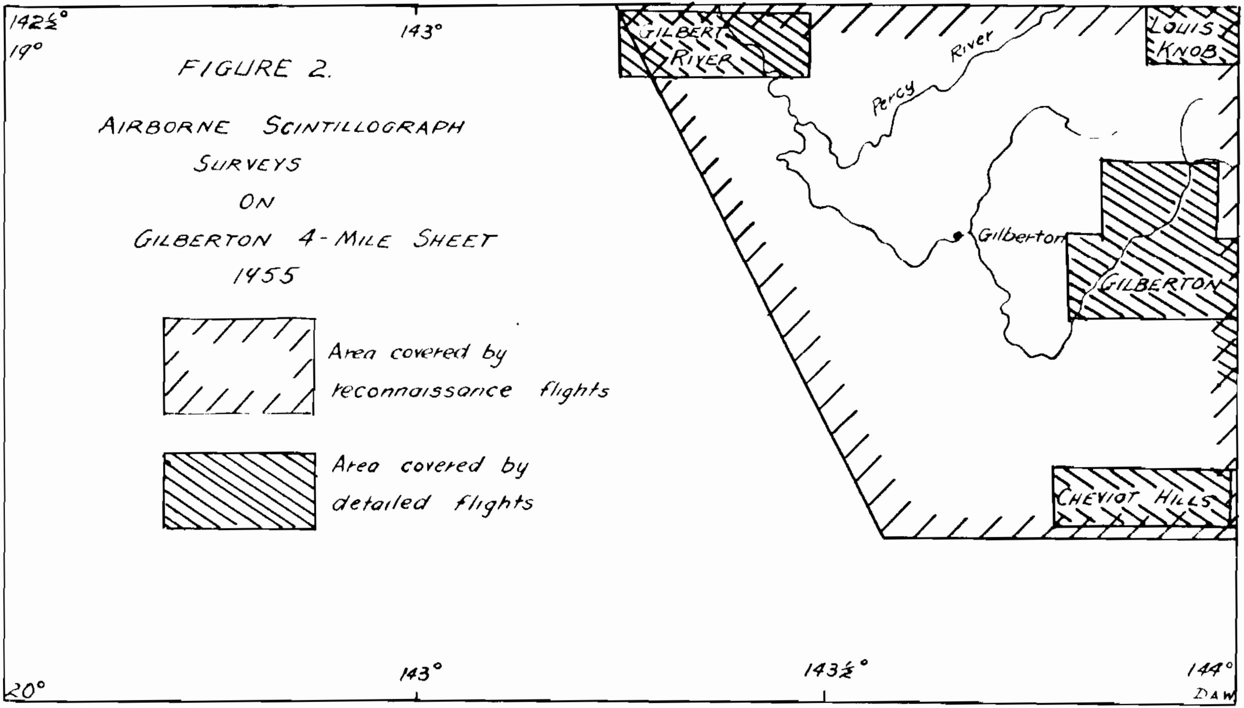
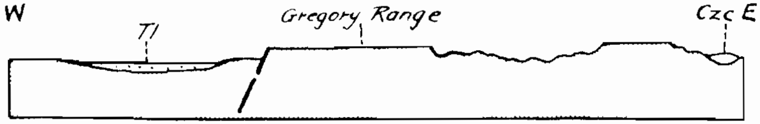

142½°
19°
143°
FIGURE 2.
AIRBORNE SCINTILLOGRAPH SURVEYS ON GILBERTON 4-MILE SHEET 1955
Area covered by reconnaissance flights
Area covered by detailed flights
GILBERT RIVER
Percy River
LOUIS KNOB
Gilberton
GILBERTON
CHEVIOT HILLS
20°
143°
143½°
144°
DAW

FIGURE 3. TECTONIC HISTORY GILBERTON 4-MILE SHEET

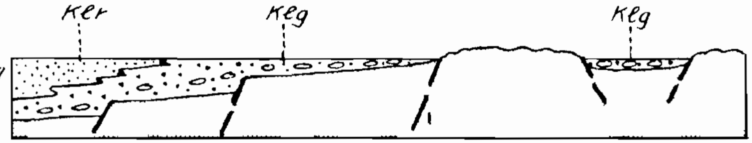
7. CAINOZOIC

Deposition of unsorted sand, and clay (Tl) over western Cretaceous sediments Flow of basalt (Czc) along Stawell River.



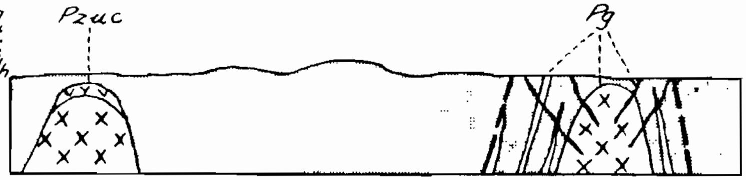
6. LOWER CRETACEOUS

Formation of major basin probably by basement faulting in western area. Small basins in east. Deposition of conglomerate, sand (Klg) and



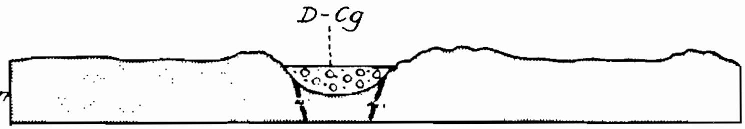
5. UPPER PALAEOZOIC

Major faulting and ring fracturing of Archaean/granite basement. Intrusion of rhyolite ring dykes, cone sheets and associated high level granites - Bagstowe (Pg) and Butlers (Pb) Complexes - with some rhyolite hoods and ?flows - Croydon Felsite (Pzuc).



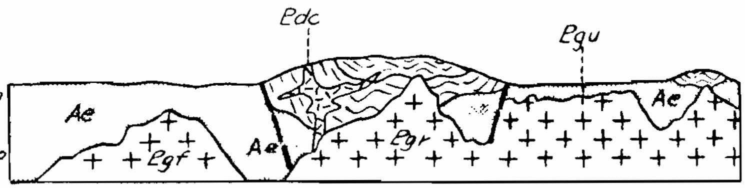
4. UPPER DEVONIAN-LOWER CARBONIFEROUS

Sagging of land mass in Gilberton area. Deposition of freshwater sediments - Gilberton Formation (D-Cg) - with fish and plants.



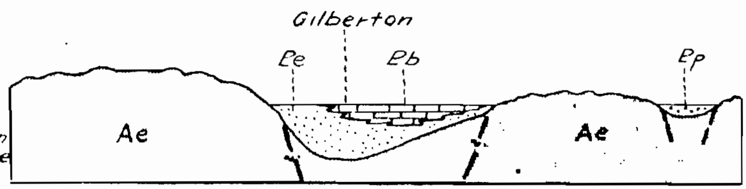
3. LATE PRECAMBRIAN

Folding and uplift of Proterozoic sediments to form land. Major faulting along Proterozoic/Archaean boundary. Intrusion of Cobbold Dolerite (Ɇdc) and granites (Dumbano - Ɇgu; Robin Hood (Ɇgr) and Forsayth (Ɇgf)).



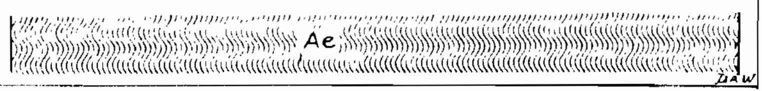
2. PROTEROZOIC

Uplift of Archaean basement. Formation of land and sea, probably by faulting. Deposition of siltstone and claystone - Etheridge Formation (Ɇe) - and calcareous siltstone and sandstone - Bernecker Creek Formation (Ɇb).



1. ARCHAEAN

Formation of basement - Einasleigh Metamorphics (Ae). High grade (amphibolite facies) metamorphism



GEOPHYSICAL SURVEYS

Airborne scintillograph surveys of the Precambrian succession of the eastern part of the Gilberton sheet area were carried out in 1955 by the Bureau of Mineral Resources. The area covered is shown in Figure 2. The results of the survey are recorded by Parkinson and Mulder (1956). The anomalies were examined on the ground and reported by White and Hughes (1957). Most of the anomalies are located in granite rocks and are of no economic value.

TECTONIC HISTORY

Figure 3 summarises the tectonic history of the Gilberton sheet area.

ECONOMIC GEOLOGY

Gold

Percyville. The Percyville mineral field is located on the Percy River in the northern part of the sheet area. The Percyville gold reefs are near the contact of Precambrian metamorphics and granite, that have been both intruded by pegmatite and rhyolite dykes. Ball (1915) describes the lodes as generally siliceous. The gold reefs are narrow with an average width of 2 feet and some reefs are nearly a quarter of a mile long. Most of the workings do not penetrate beyond the oxidised zone, which is probably between 100 feet and 150 feet deep. The deepest workings were 500 feet deep in the Union Mine. The gold ore contained appreciable amounts of lead, silver, zinc and copper e.g. one assay at the 100 feet level of the Homeward Bound Mine was Cu-2%; Ag-15½ oz per ton; Au-1¼ oz per ton; Au-1¼ oz per ton; Pb-13%.

The total production figures from the Percyville goldfield are not known since they were generally included in the returns from the adjacent Etheridge Goldfield and Gilberton Mineral field. The largest tonnage produced from any one mine was 2,800 oz of gold from the Union Mine. The primary ore averaged 20 to 25 percent copper and 6 to 7 oz gold per ton, with exceptional small rich patches of 100 oz per ton.

Woolgar. The Woolgar Goldfield covers an area of 1,100 square miles; most of the mines occupy an area of 400 square miles on the Woolgar River on the south-western edge of the Gregory Range in the southern part of the sheet area. The most comprehensive description of the field is by Saint-Smith (1922).

The gold reefs are situated in Precambrian and granite and in metamorphics that are both intruded by dolerite ("diorite") and pegmatite dykes. Saint-Smith described the reefs as occupying "shrinkage lines along the margins of pegmatitic granite dykes". The reefs ranged from 10 to 700 feet long (average 200 feet),they were 2 feet wide and worked to an average depth of 80 feet, that was about the depth of the water table. The reefs were generally steeply dipping from 80 to 85 degrees. Some of the gold ore contained lead, copper and manganese.

The main production from the Woolgar Goldfield was between 1880 and 1887 when 15,000 oz gold was won, which included 4,000 oz of alluvial gold. Production declined after this period and up to the time of Saint-Smith's 1922 inspection 3,000 oz of gold, averaging 1.1/3rd oz per ton, were produced. The main producing mines were the Preserverance-Try Again, Soapspar and the Mowbray. The Soapspar and the Redjacket mines were the only mines working in 1958.

Gold has been mined from quartz reefs in Precambrian granite at Mt. Hogan on the headwaters of Granite Creek in the north-eastern part of the sheet area. No information is available on the size of the reefs. Jack and Etheridge (1892) record 4,500 oz of gold averaging 1¾ oz per ton were produced for the period 1885 to 1890.

Gold averaging 2 to 3 oz per ton was mined at Mt. Moran, two miles north of Ortona Copper mine near the northern boundary of the sheet area. Gold values were obtained from quartz veins in weathered and leached dolerite dykes between depths of 50 feet and 300 feet below a cover of Cretaceous sediments. The Mt. Moran Mine should not be confused with Mt. Moran, a prominent peak in the Mt. Hogan gold field.

Copper.

Ortona copper mine was the main producer of copper in the Gilberton sheet area. The mine is situated on the Percy River some 4 miles from its junction with the Gilbert River in the northern part of the sheet. L.C. Ball (1915) described the mine, which has now ceased production. The reefs fill fissures or contraction joints in diorite dykes and have a maximum width of 15 feet and a maximum length of 600 feet. The ore consists of quartz and hematite, with copper, silver and gold. The mine was worked to a depth of 140 feet in the oxidised zone. The secondary ore averaged about 35 per cent copper. The total production is about 1,750 tons of ore averaging 25 per cent copper.

Gilberton. The Eight Mile area is situated on Eight Mile Creek near its junction with the Gilbert River, 8 miles west of Gilberton Homestead. Ball (1915) described the copper lodes as occupying fissures in steeply dipping Precambrian slates and limestones intruded by "diorite" dykes and stocks, and rhyolite dykes. The copper has probably been introduced by the diorite. There are three main lodes known as "Caledonia", "Ironclad" and "Oratava". The lodes are 100 feet to ½ mile long (average 1,000 feet), average 10 feet wide and 50 feet deep. About 100 tons of ore averaging 25% - 35% copper with 10 to 12 oz silver and 7 dwt. per ton of gold have been won from the Eight Mile area.

The Twelve Mile copper area is situated about 12 miles west of Gilberton near the junction of 12 Mile Creek and the Gilbert River. The lodes are in steeply dipping east-west trending Precambrian slates and near an intrusion of dolerite.

Workings were small and consist of one 50 feet deep shaft sunk on a quartz-veined feruginous clayey slate. This lode is named "Carsons" and is about 150 feet long and 60 feet wide. Ball (1915) records 30 tons of 5 per cent copper ore containing dense limonite, disseminated malachite, cuprite and glance.

Other Metals

Tungsten and Bismuth. Scheelite and bismuth have been obtained from an area locally known as the "8 Mile , Percyville". This locality was first recorded by Jensen (1919) and later described by Morton (1945). The ore bearing quartz veins range from 2 to 12 inches thick; they are mainly in dolerite ("diorite") that intrudes steeply dipping east trending Pre-cambrian schists. The workings are generally shallow and reach a maximum depth of 30 feet, scattered over a length of 1650 feet. Seven tons of scheelite concentrate (65 to 70% WO_3) were mined for the period 1918-1937 and ½ ton bismuth concentrate between 1918 and 1919.

Alluvial bismuth (72%) and tantalum (80%) are recorded by Ball (1915) as obtained in small quantities at Dividend Gully near Percyville.

In 1957 cobalt in the form of gersdorffite (Ni,Co, Fe) As S) was exposed in a 4 inch wide vein in a 4 feet deep pit near the old Ortona copper workings.

Agate

Ridgway (1945) records agate workings near the head-waters of Agate Creek in the north of the sheet. Agate is in veins and basalt amygdales of the Permian Agate Creek volcanics. Reserves of the crude mineral are estimated at 8 tons per vertical foot.

Water

Reynolds (1960) has recently studied the hydrology of the Artesian Basin in the Gilberton sheet and surrounding area to the west and south. Most of the following information is taken from Reynold's report.

The main supplies of water are in sandstones of the Lower Cretaceous Gilbert River Formation. They supply water to bores in the Great Artesian Basin in the southern and western parts of the Gilberton sheet area, and also to springs in the Cretaceous cappings of the Gregory Range. The aquifers are over shallow bedrock partly on the "Euroka Shelf" (Whitehouse, 1954) some 600 feet below sea level.

The greatest initial flows were from artesian bores along the western edge of the Gilberton sheet area; the Cockatoo Creek Bore supplied 1½ million gallons per day from at least four aquifers; Nevertire(Saxby 21) bore supplied 320,000 gallons per day; the Saxby No.16 bore supplied 120,000 gallons per day.

Lenses (? sand) in the marine Roma shales overlying the Gilbert River Formation yield mostly sub-artesian and salty supplies of water. Aquifers in the overlying Tertiary Lynd Formation generally yield salty water.

The temperature of the artesian water ranges from 94 to 106 degrees F. The water is of good quality and contains a few dissolved salts. Ogilvie (1954) states that the fluorine content in the Great Artesian Basin increases towards bedrock.

Water also occurs as springs in the sandy forest country west of the Gregory Range in the Gilbert River Formation, in a restricted basin formed by the Euroka Shelf and the Gregory Range. Maitland (1898) refers to one of these springs as a small but continuous supply of water. Most of these springs have ceased flowing. Ogilvie (1954) states that the spring water supplies in the area are fairly hard.

East of the Gregory Range water is obtained in the Gilbert River, that runs nearly all the year. When the river ceases to flow large permanent water pools are formed by resistant dolerite bars.

BIBLIOGRAPHY

BALL, L.C. 1915 - The Etheridge Mineral Field. Qld Geol.Surv.Pub., 245

BRANCH, C.D. 1959 - Progress report on Upper Palaeozoic intrusions controlled by ring fractures near Kidston, North Queensland. Bur.Min.Resour.Aust.Rec., 1959/104 (unpubl.)

BRYAN, W.H. 1932 - Early Palaeozoic Earth movements in Australia. A.N.Z.A.A.S. Rep., 21, 90.

BRYAN, W.H. & JONES, O.A., 1944 - A revised glossary of Queensland Stratigraphy. Univ.Qld.Pap.Dept. Geol., 11(11).

BRYAN, W.H. & JONES, O.A., 1946 - The Geological History of Queensland. Ibid. 11(12).

CAMERON, W.E. 1900 - The Etheridge and Gilbert Mineral Fields. Qld Geol. Surv. Publ., 151.

COTTON, L.A. 1930 - An outline and suggested correlation of the Precambrian formations of Australia. Proc.Roy.Soc.N.S.W.,64, 10-64.

DAINTREE, R. 1870 - Report by Mr. R. Daintree, late Government Geologist, North Queensland, on the Ravenswood, Mt. Wyatt and Cape River Gold Fields. Notes and Proc. Leg.Assemb., 3rd session of 1870, 1.

DAINTREE, R. 1872 - Notes on the geology of the colony of Queensland. Quart.J.geol.Soc.Lond., 28, 271-317.

DAVID, T.W.E., 1932 - Explanatory Notes to accompany a new Geological Map of the Commonwealth of Australia. Sydney, Australasian Medical Publishing Co.Ltd.

DAVID, T.W.E.(Ed. BROWNE, W.R.) 1950 - The Geology of the Commonwealth of Australia. London,Arnold.

DICKINS, J.M. 1960 - Cretaceous Marine Macrofossils from the Great Artesian Basin in Queensland. Bur.Min.Resour.Aust.Rec. 1960/69 .

DUNSTAN, B. 1913 - Queensland mineral index and guide. Qld.geol.Surv. Publ., 241

HILLS, E.S. 1936 - Records and descriptions of some Australian Devonian Fishes. Proc.Roy. Soc.Vic., 48(11), 161-171.

HILLS, E.S. 1946 - Some aspects of the tectonics of Australia. Proc.Roy.Soc.N.S.W., 79, 67-91.

HILL, D. 1951 - Geology - a Handbook for Queensland. Aust.Ass.Adv.Sci., Brisbane, 13-24.

JACK, R.L. 1887 - Geological observation in North Queensland. Qld.Geol.Surv.Publ., 35.

JACK, R.L. & ETHERIDGE, R. 1892 - Geology and palaeontology of Queensland and New Guinea.

JENSEN, H.I. 1919 - The scheelite field near Percyville. Qld.Govt.Min.J., 20(January),12.

JENSEN, H.I. 1920 - The geology and mineral prospects and future of North Queensland. Qld.geogr. J., 34-35, 23-36.

JENSEN, H.I. 1923 - The geology of the Cairns Hinterland and other parts of North Queensland. Qld. geol.Surv. Publ., 274.

LAING, A.C.M. & POWER, P.E. 1959a New names in Queensland Stratigraphy (Part 1) Carpentaria Basin. Aust.Oil Gas J., 5(8), 35-36

LAING, A.C.M. & POWER, P.E. 1956b Idem (part 2). Ibid., 5(9), 28

MAITLAND, A.G. 1898 - The delimitation of the artesian water area north of Hughenden. Qld Geol.Surv. Publ., 121.

MARKS, E.O., 1911 - The Oaks and eastern portion of the Etheridge Goldfield. Qld Geol.Surv. Publ.,234.

MORTON, C.C. 1945 - Scheelite, Percyville district. Qld Govt Min.J., 46(May)

OGILVIE, C. 1954 - The hydrology of the Queensland portion of the Great Australian Artesian Basin. Appendix H; in Artesian Water Supplies in Queensland. Dep.Co-ord.Gen.Public Works Parl.Pap. A.56-1955

PARKINSON, W.D. & MULDER, J.M. 1956 - Preliminary report on airborne scintillograph survey at Chillagoe and Einasleigh-Gilberton,Queensland. Bur.Min.Resour.Aust., Rec.1956/63 (unpubl.)

QLD DEP.MIN. 1932 - The Woolgar Goldfield. Prospects for Miner and Mill owner. Present stage of Development. Qld Govt Min.J.,33(December) 386-389.

REID, J.H. 1929 - The marginal formations of the Great Artesian Basin in Queensland in Rep. Fifth Interstate Conference on Artesian Water. Govt. Printer, Sydney.

REYNOLDS, M.A. 1960 - Mesozoic and younger sediments of the Georgetown and Gilberton 4-Mile sheets areas Queensland. Bur.Min.Resour.Aust. 1960/68

RIDGWAY, J.E. 1945 - Re agate - Agate Creek, Percyville. Qld Govt Min.J., 46(Oct.)

SAINT-SMITH, E.C. 1922 - Woolgar Goldfield. Qld Govt Min.J. 23(March),95-98: 23(Feb.), 51-55

TAYLOR, J. 1956 - Observations on airborne scintillograph anomalies and uranium prospects in the Georgetown-Forsayth-Einasleigh area of North Queensland. Bur.Min.Resour. Aust. Rec., 1956/86 (unpubl.)

TWIDALE, C.R. 1956a- Chronology of denudation in North West Queensland. Bull.Geol.Soc.Amer. 67(7), 867-882

TWIDALE, C.R. 1956b- A physiographic reconnaissance of some volcanic provinces in North Queensland, Australia. Bull.Volcan.,2(18),3-23

WALPOLE, B.P. & LANGRON, W. 1955 - Reconnaissance report of the George-town area, North Queensland. Bur.Min. Resour.Aust.Rec. 1955/66(unpubl.)

WHITE, D.A. 1959 - New names in Queensland stratigraphy. Aust.Oil Gas J., 5(10), 31-36

WHITE, D.A. 1959 - New stratigraphic units in North Queensland Geology. Qld Govt Min.J., 50 (692), 442-447.

WHITE, D.A., BEST J.G., & BRANCH, C.D. 1959 - Progress report on regional geological mapping North Queensland, 1958. Bur. Min.Resour.Aust.Rec. 1959/115(unpubl.)

WHITE, D.A. & WYATT, D.H. 1960 - Precambrian of the Etheridge Goldfield Geol.Soc.Aust.J. (in press)

WHITE, M.E. 1958 - Plant fossils from the Einasleigh region, north-east Queensland. Bur.Min. Resour.Rec. 1958/38 (unpubl.)

WHITE, M.E. 1959 - Report on further collection of plant fossils from the Einasleigh region of north-east Queensland.Bur.Min.Resour. Aust.Dec., 1959/75. (unpubl.)

WHITEHOUSE, F.W. 1955 - The geology of the Queensland portion of the Great Australian Artesian Basin. Appendix G; in Artesian Water Supplies in Qld. Dep.Co-ord.Gen.Public Works Parl.Pap.A. 56-1955

WHITEHOUSE, F.W. 1945 - Additional Notes on the geology of the Basin. Appendix D; in Artesian Water Supplies in Queensland, Dep.Co-ord. Gen.Public Works.

WHITEHOUSE, F.W. 1926 - The Cretaceous ammonoides from eastern Australia. Mem.Qld.Mus.,8/95-242.

WHITEHOUSE, F.W. 1940 - Studies in the late geological history of Queensland. Pap.Univ.Qld.Dep.Geol. 2 N.S.,(1)

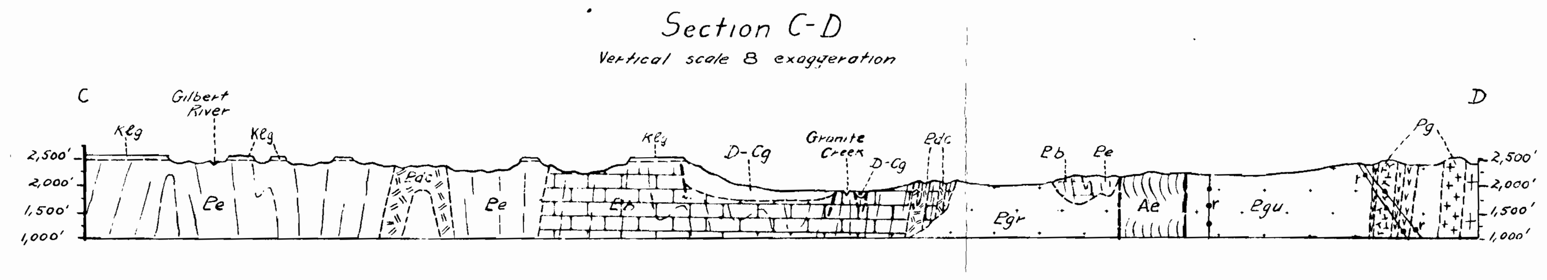
WYATT, D.H. 1957 - Larkin's Uranium Prospect, Percyville. Qld Govt Min.J.,58(663), 39-43.

STRATIGRAPHY CLARKE RIVER 4-MILE SHEET

Period	Age	Rock Unit	Lithology	Thickness	Distribution	Topography	Structure	Palaeontology, Age Correlation	Stratigraphic Relationship	Economic Geology	Principal References
CAINOZOIC		Alluvium (Qa)	Light-textured high sand content in granitic terrains. Black high clay content in basaltic areas.	0-50 feet	Along Burdekin, Einsaleigh and Clarke Rivers, Gray Creek. Widespread along McKinnon's Creek system.	Flat flood plains Steep river banks.	Flat lying			Good water at shallow depths.	White, Stewart et al. (1959)
		Residual soils (Qs)	Sandy soils. Clayey soils in basaltic areas.	Superficial	Along Great Dividing Range in northern part of the sheet.	Plains	Flat to undulating.			Good water at shallow depths, particularly granitic soils	
	Late Pleistocene to Early Recent	Toomba Basalt (Qrt)	Olivine basalt	Unknown (? 100 feet)	About 100 square miles in south-eastern corner of sheet	Rough plain, consisting of jagged blocks of basalt with little to no soil.	Lava walls, fissures, tunnels	Late Pleistocene to early Recent Kinrara Basalt.	Unconformably overlies Nulla Basalt.		Twidale (1956)
		Undifferentiated ([illegible])	White clayey friable quartz sandstone, shale, conglomerate	150 feet max.	Gray Creek near Miner's Lake. About 2 square miles near Clarke River Telegraph Station.	Plains. Steep river banks.	0° to 5° dip. Ancestral river -or lake-fill	Unlithified sediments near junction of Glendhu & Burdekin Rivers. (Einasleigh sheet)	Metamorphosed by basalt to form billy. Unconformably overlies Perry Creek Formation & Tribute Hills sandstone.	Tin. (Clarke River) Good water at shallow depths	
		Laterite & Lateritic soils (Czl)	Mottled & pallid zones with thin ferruginous zinc	20 feet max.	Great Dividing Range Along telephone line between Porphyry Cr. & Clarke River	Mesas & plateaux.	Flat lying		Formed on Palaeozoic sediments Precambrian granite & Mesozoic sediments	Springs	White & Hughes (1957) White, Stewart et al. (1959)
		Basalt (C[illegible]b)	Olivine basalt	100 feet	Isolated areas	Plains	Valley-Fill Craters	?Pliocene to ? Pleistocene. McBride Basalt & older basaltic flows on Einasleigh sheet	Uncomformably overlies Precambrian metamorphics	Good supply of water	
		Billy (Czy)	Quartzite (metamorphosed quartz sands)	5 to 15 feet	About 10 square miles near Clarke River Telegraph Station along Clarke River	Resistant low rises	0° to 5° dip	Billy in Camel Creek region (Einasleigh sheet)	Unconformably overlain by Cainozoic basalts		White, Best et al. (1959)
		Chudleigh Basalt (Czc)	Olivine basalt, commonly vesicular & amygdaloidal	10 ft to 500 feet	Covers about 500 square miles. Flows fill valleys of Einasleigh & Copperfield Rivers.	Plateau. Rough plains with numerous rises, black soil & basalt boulders	Valley-fill. Craters near Chudleigh Park Station	?Pliocene to ?Pleistocene McBride Basalt (Einasleigh sheet) & Nulla Basalt	Unconformably overlies billy, Precambrian & Palaeozoic successions.	Good supply of water	White, Best et al. (1959)
		Nulla Basalt (Czn)	Olivine Basalt	200 to 500 feet	2,500 square miles in southern half of sheet	Plateau	Flat lying	?Late Pliocene to ?early Pleistocene	Unconformably overlies Mesozoic, Palaeozoic & Precambrian successions		Twidale (1956)

Period	Age	Rock Unit	Lithology	Thickness	Distribution	Topography	Structure	Palaeontology, Age Correlation	Stratigraphic Relationship	Economic Geology	Principal References
MESOZOIC	Lower Cretaceous	Gilbert River Formation (Klg)		100 feet	Extends east as far as Gregory Springs Hs. & Hann Highway.	Mesas	Flat lying	Indeterminable plants at Gregory Springs. Elsewhere on Georgetown & Gilberton sheets Lower Cretaceous. Blythesdale sandstone	Unconformably overlies Precambrian	Springs	White & Hughes(1957) Reynolds (1960)
		Undifferentiated (Pzu)	Rhyolite, rhyolite porphyry, quartz porphyry & agglomerate								
		Montgomery Range Rhyolite Porphyry (Pzum)	Rhyolite porphyry & rhyolite		120 square miles in Montgomery Range. Forms part of Great Dividing Range	Rough hills	Steeply dipping intrusives to 35° dipping sills and ? flows. Well jointed	Upper Palaeozoic	Intrudes Lower Carboniferous Bundock Creek Formation.		White, Stewart et al(1959) White, Best Branch (1959)
		Oweenee Granite (Pgo)	Coarse, pink porphyritic granite & micrograntie & some rhyolite		65 square miles along eastern margin of sheet	Rough hills	well jointed NNW & NNE	Upper Palaeozoic (?Permian) Esmeralda granite, Croydon felsite	Intrudes the Carboniferous Clarke River formation	Tin	White, Stewart et al (1959)
PALAEOZOIC	?Permian	Lochaber Granite (Pgl)	Grey-pink porphyritic (in felspar) granite withminor amounts of mafic minerals. Rhyolite		300 square miles in north-western part of sheet	Rough hills about 500 ft above surrounding country	Oval-shaped mass. Granite grades marginwards to a flow banded rhyolite hood. Tors well jointed .	?Permian Elizabeth Ck. Granite & Butlers Knob Complex(Einasleigh 4-mile sheet)	Intrudes Precambrian & probably core of Bagstowe Ring Dyke Complex.	Wolfram	Branch (1959)
	?Permian	Bagstowe Ring Dyke Complex (Pg)	Rhyolite		300 square miles in NW part of sheet	Rough hills to low rough rises	Steeply dipping ring dykes, core sheets & dyke swarms	?Permian Ring dyke complexes on Atherton 4-mile	Intrudes Precambrian		Branch (1959)
UPPER	?Permian	Butlers Igneous Complex (Pb)	Medium-grained pink granite, rhyolite porphyry & trachyte.		14 square miles in NW corner of sheet	Rough hills. Butlers Knob prominent peak	Oval-shaped mass. Inclined granite sheet intruded into its rhyolite hood Ring dykes	?Permian Granite similar to Lochaber Granite. Genetically related to Bagstowe Ring Dyke Complex & similar ring dykes on Atherton 4-mile sheet	Intrudes Precambrian Dumbano Granite		Branch (1959)
	Carboniferous	Clarke River Formation (Cc)	Quartz-jasper conglomerate, quartz greywacke sandstone, shale, lenses of limestone & calcareous siltstone	5,000 to 7,500 feet (1st. 10 to 50 feet)	300 square miles between Gray Cr. & Clarke River. Outlier of 60 square miles in Blue Range	Uplands of strike ridges	Dips 10° to 35° basinwards with steeper to vertical dips on faulted margins	Chonetes, gastropods, nautiloids. ?Productella, ?Streptorhynchus, ?Productus. Plants Calamites radiatus, Lepidodendron cf. veltheimianum, Rhacopteris ovata, Sigallaria, Stigmaria ficoides, Diplothmema? Lower Carboniferous (Tournaisian) to Middle Carboniferous. Bundock Creek Formation, Gilberton Formation(Gilberton sheet), Silver Valley Conglomerate (Atherton sheet). Star Beds (Townsville 4 mile)	Unconformably overlies the Perry Creek, Kangaroo Hills & Greenvale Formations. Faulted against Broken River & Wairuna Formations along its western boundary. Intruded by Oweenee Granite along its eastern margin		White, Stewart et al. (1959)

PERIOD	AGE	ROCK UNIT	THICKNESS	LITHOLOGY	DISTRIBUTION	TOPOGRAPHY	STRUCTURE	CORRELATION PALAEONTOLOGY AGE	STRATIGRAPHIC RELATIONSHIP	ECONOMIC GEOLOGY	PRINCIPAL REFERENCES
PRECAMBRIAN	PROTEROZOIC	Forsayth Granite (Bgf)		Grey, coarse-grained massive to porphyritic biotite granite.	2 square miles near Agate Creek in north of sheet area. Extensive area north on Georgetown sheet.	Tors separated by sandy plains.	Platy flow on margins.	(Robin Hood and Dumbano Granites). Late Precambrian.	Intruded by Agate Creek Volcanics. Intrudes Etheridge Formation.	Gold	White, Best, Branch (1959).
		Robin Hood Granite (Bgr)		Pink-grey, massive hornblende-biotite granite. Quartz frequently porphyritic.	100 square miles in Percyville/Mt. Hogan area. Extends north into Georgetown sheet.	Scattered tors in sand covered plains.		Dumbano Granite, Forsayth Granite. Late Precambrian.	Intrudes Etheridge and Bernecker Creek Formations, and Archaean metamorphics.	Gold	White, Best, Branch, (1959).
		Dumbano Granite (Bgu)		Grey, medium-grained, biotite granite with pink porphyritic.	600 square miles in central eastern part of sheet. Extends east into Clarke River sheet.	Scattered tors in sand covered plains.	Foliated	Robin Hood and Forsayth Granites. Late Precambrian.	Intrudes Etheridge Formation. Dyked by Bagstowe Ring Complex.	Gold	White, Best, Branch, (1959).
		Cobbold Dolerite (Bdc)		Dolerite and some amphibolite.	Ortona and Gilberton.	Hard resistant bars.	Well jointed. Sills and dykes.	Late Precambrian.	Intrudes the Proterozoic sediments.	Gold Copper.	White, Best, Branch, (1959)
		Paddys Creek Formation (Bp)	1,000 ft. to 3,000 ft.	Quartzite, quartz schist.	5 square miles near boundary with Clarke River sheet.	Strike ridges.	Vertical to overturned (west) dips.	?Proterozoic	Intruded by Dumbano Granite. Faulted against Archaean metamorphics.		White, Branch, Green, (1958).
		Bernecker Creek Formation (Bb)	10,000 ft. to 16,000 ft.	Calcareous quartz sandstone, calcareous quartz siltstone, impure limestone, calc-silicate hornfels.	250 square miles in north central part of sheet area.	Strike ridges.	Steep (70°-80°) dips. Crossbedding.	Lucky Creek Formation (Einasleigh Sheet). ?Proterozoic.	Conformably overlies and interfingers the Etheridge Formation. Intruded by Cobbold Dolerite and late Precambrian granites.		White & Hughes (1957). White, Best, Branch (1959).
		Etheridge Formation (Be)	15,000 ft. to 20,000 ft.	Black to grey quartz siltstone, shale, claystone.	200 square miles in northern part of sheet area.	Strike ridges.	Steep (70°-90°) dips. Well bedded.	?Proterozoic	Conformably underlies and interfingers with Bernecker Creek Formation. Intruded by late Precambrian dolerite and granite.	?Gold ?Copper.	White & Hughes (1957).
	ARCHAEAN	Einasleigh Metamorphics (Ae).	?	Gneiss, granulite, migmatite, garnetiferous quartzites, schist.	200 square miles in Gilberton area. 50 square miles in Woolgar Goldfield.	Undulating country.	Vertical to steep foliations.	Hall's Reward Metamorphics. ?Archaean.	Faulted against Proterozoic sediments and separated from them by metamorphic unconformity.	?Gold	White, Best, Branch, (1959).



Reference

CAINOZOIC

QUATERNARY
- Qa — Alluvium
- Qs — Soil
- Czl — Laterite and lateritic soil

TERTIARY
- Chudleigh Basalt — Czc — Olivine basalt.
- Lynd Formation — Tl — Unsorted sand, gravel and clay. Qs/Tl - Soil covered Tl

MESOZOIC

LOWER CRETACEOUS
- Roma Formation — Klr — Shale, sandstone, limestone. Qs/Klr - Soil covered Klr.
- Gilbert River Formation — Klg — Conglomerate, sandstone and siltstone.

UPPER PALAEOZOIC
- Pzu — Undifferentiated rhyolite, quartz porphyry, syenite
- Pzug — Granite
- Croydon Felsite — Kzc — Rhyolite and rhyolite porphyry.

PALAEOZOIC

PERMIAN
- Agate Creek Volcanics — Pa — Rhyolite, pyroclastics, basalt
- Bagstowe Ring Dyke Complex — Pg — Granite; Pink and grey rhyolite; Andesite; Syenite
- Butlers Igneous Complex — Pb — Rhyolite; Granite

UPPER DEVONIAN to LOWER CARBONIFEROUS
- Gilberton Formation — D-Cg — Arkose, conglomerate and shale

PRECAMBRIAN
- pЄ — Undifferentiated granite and metamorphics.

PROTEROZOIC
- Robin Hood Granite — Egr — Pink-grey hornblende-biotite granite.
- Dumbano Granite — Egu — Grey biotite granite
- Forsayth Granite — Egf — Grey porphyritic biotite granite
- Cobbold Dolerite — Edc — Dolerite and amphibolite.
- Paddys Creek Formation — Ep — Quartzite, quartz schist
- Bernecker Creek Formation — Eb — Calcareous sandstone, calcareous siltstone, marble, calc-silicate hornfels
- Etheridge Formation — Ee — Shale siltstone sandstone and chert

ARCHAEAN
- Einasleigh Metamorphics — Ae — Granulite, gneiss, migmatite, amphibolite and schist

Geological Boundaries

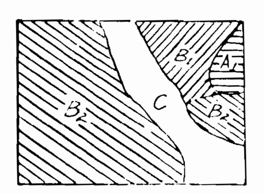
- Established boundary, position accurate
- Established boundary, position approximate
- Inferred, probable or indefinite boundary
- Strike and dip of strata
- Inclined
- Strike and dip of Foliation
- Inclined
- Vertical
- Photointerpretation
- Trend lines
- Outcrop with dip 0°-15°
- Joint pattern
- Folds
- Plunge of anticline; Overturned syncline showing trace of fold axis
- Faults
- Established fault, position accurate
- Established fault, position approximate
- Inferred or probable fault
- Inferred or probable fault, concealed.
- Dyke
- r-rhyolite s-syenite d-dolerite p-pegmatite
- Marine fossil locality
- Freshwater fossil locality
- Mine
- Au-gold Bi-bismuth Cu-copper
- Pb-lead W-tungsten
- Vehicle track
- Fence
- •B Water Bore
- •A Artesian Water bore
- S Spring
- S(bx) Black spring
- •W Well
- Wind pump
- "Nora" Homestead
- Astro station
- • 2000 Barometric spot height m.s.l.
- Dam

Scale
4 Miles to 1 inch
Miles — Miles

INDEX TO ADJOINING SHEETS
Showing magnetic declination

CROYDON	GEORGETOWN	EINASLEIGH
MILLUNGERA	GILBERTON	CLARKE RIVER
JULIA CREEK	RICHMOND	HUGHENDEN

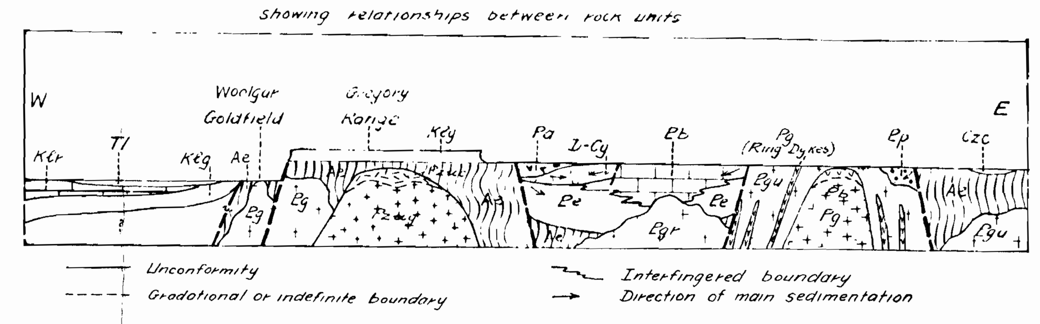
(Annual change)



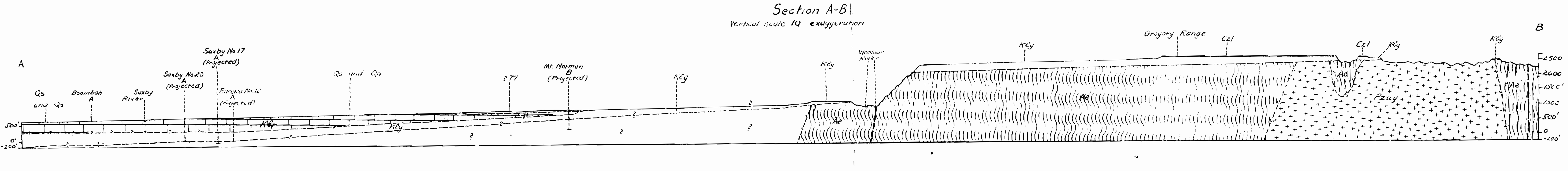
A₁ Detailed mapping
B₁ Detailed reconnaissance - numerous traverses and air photo interpretation
B₂ Reconnaissance - traverses and photo interpretation
C Air photo interpretation

Geology by: D.A. White, C.D. Branch, K. Hughes, M.A. Reynolds, D.H. Wyatt, R.J. Paten
Compiled May 1960 by: D.A. White
Drawn by:

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



- Unconformity
- Gradational or indefinite boundary
- Interfingered boundary
- Direction of main sedimentation



GILBERTON
SHEET E54-16