COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS.

RECORDS.

1961/98

EXPLANATORY NOTES TO THE BAUHINIA DOWNS 1:250,000 SHEET AREA

Compiled by

J.W. Smith

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INTRODUCTION

The Bauhinia Downs Sheet area lies within the latitudes 16°S and 17°S and longitudes 135°00' E and 136°30'E on the south-western side of the Gulf of Carpentaria, Northern Territory.

The European population is centred mainly at Borroloola, where there is a native mission, ~~post office and police station~~. Mallapunyah Homestead, O.T. Downs Homestead and a homestead in the Batten Creek area are the only other permanent habitations.

Road access within the area is good and has been greatly improved by the recent construction of a formed road running from Daly Waters, on the Stuart Highway, to Borroloola. The other main roads in the area run from Borroloola to Mallapunyah Homestead (andthence to the Barkly Tableland), and from O.T. Downs Homestead through Three Knobs to join the Borroloola - Mallapunyah Homestead road at Leila Lagoon; both are graded dirt roads.

Borroloola, McArthur River Homestead and Mallapunyah Homestead all have dirt airstrips which are open most of the year. A weekly service by light aircraft connects them with Mt. Isa, Queensland.

Maps covering the area are:

Bauhinia Downs aerial photographs (Scale 1:48,000) flown by the Royal Australian Air Force in 1947 and 1952.

Bauhinia Downs photoscale maps, prepared and available from the Division of National Mapping, Department of National Development.

Bauhinia Downs 4 mile topographic series - E53/3 Zone 5 Division of National Mapping, Department of National Development.

Bauhinia Downs 4 mile uncontrolled photo mosaic

McArthur River 8-mile military series - E53/3-4-7-8 Zone 5.

The annual rainfall of the area, which is 20-30 inches, falls mainly in the summer months - January to March. The average temperature is about 85° in summer and 70-75° in winter.

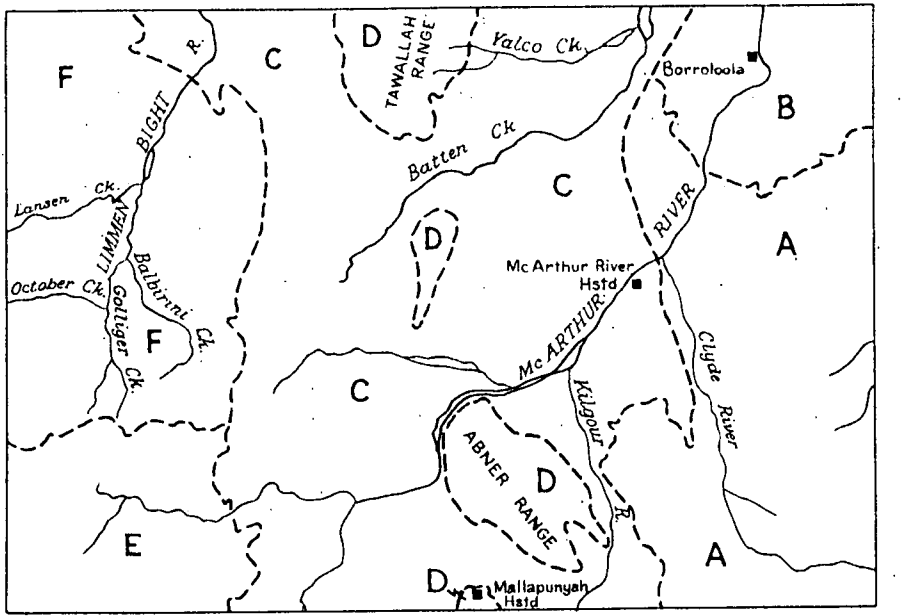
PREVIOUS INVESTIGATIONS

Lead - zinc - copper mineralisation in the area around McArthur River Homestead was first discovered by Mr. Tom Lynott in 1887 and by 1891 the area had been thoroughly prospected for silver, but without success. Interest in the area revived in 1909 when Cook's deposit was drilled and in 1953 when Bald Hills was drilled by Consolidated Zinc Corporation. Little systematic work was done on the field until Mt. Isa Mines Ltd began a programme of mapping and prospecting in 1955. Two promising prospects, the Reward and H.Y.C. were discovered; subsequently the Reward was abandoned, but drilling is still in progress at H.Y.C. (1961).

Until 1955 little was known of the geology of the Sheet area, apart from the region around McArthur River Homestead. H.Y.L. Brown (1908), W.G. Woolnough (1912) and H.I. Jensen (1914) visited the area but confined most of their observations to the route from Borroloola to the Barkly Tableland; Woolnough also travelled from Tanumbirini Homestead east to McArthur River Homestead. In 1955 geologists of Mt. Isa

Sketch (1)

SKETCH OF PHYSIOGRAPHIC DIVISIONS



Mines Ltd carried out reconnaissance mapping of the Bauhinia Downs Sheet area as part of a survey of the country between the Queensland/Northern Territory Border and the Roper River, N.T.

In 1959 the Bureau of Mineral Resources completed a reconnaissance gravity survey from Burketown to Daly Waters, crossing the Bauhinia Downs Sheet area en route: and during 1960 mapped the Sheet area. Detailed mapping of an Authority to Prospect of 600 square miles around McArthur River Homestead was begun by geologists of Mt. Isa Mines Ltd in the same year.

PHYSIOGRAPHY

The Bauhinia Downs Sheet area is situated on the south-west of the Gulf of Carpentaria. Apart from isolated ranges the country slopes gradually from 500 to 750 feet above sea level in the south and south-west to the Gulf coastal plains near Borroloola which are between 50 feet and 70 feet above sea level. The isolated ranges are 200-500 feet above the surrounding country.

The Sheet area may be divided into the following physiographic regions: (See Sketch map (1))

(A) Bukalara Range

(B) Coastal Plains

(C) Central Lowland Area excluding (D)

(D) Isolated ranges

(E) Favenc Range

(F) Limmen Plateau

(A) The Bukalara Range is in the east and south-east of the area and extends into the adjacent Walhallow, Robinson River, and Calvert Hills Sheet areas. The Range is mainly a dissected plateau of flat-lying Bukalara Sandstone standing 100 to 200 feet above the surrounding country. In places the rivers,

principally the Clyde River and its tributaries, have cut through the Bukalara Sandstone and are superimposed on the McArthur Group and Roper Group. The Roper Group crops out more extensively in the north.

(B) Around Borroloola Coastal Plains surrounding the Gulf of Carpentaria extend on to the Bauhinia Downs Sheet area. The plains are in part a flood plain of the McArthur River. Scattered residuals of Mesozoic and Roper Group sediments, e.g. the McLeod Range, rise to 100 feet height above the plain.

(C) The Central Lowland Area is mainly in a north-trending belt between the Bukalara Range and the Limmen Plateau. The area is generally low-lying and undulating, and comprises most of the outcrop area of McArthur Group rocks. Resistant beds, such as the Tatoola Sandstone and Yalco Formation, form strike ridges rising to about 200 feet above the surrounding country. In places some units have a lateritic cap e.g. the Yalco Formation. Remnants of Mesozoic sediments form scattered small plateaus, particularly in the south-west and north-east.

(D) There are four Isolated Ranges 200-500 feet high, in the central part of physiographic region (C). These are the Tawallah Range; an unnamed feature north-north-east of Leila First Crossing, and another around Mallapunyah Station; and the Abner Range. The first three ranges are composed of rocks of the Tawallah Group and the last of Roper Group. All are composed of resistant sandstone ridges, separated by steep-sided valleys formed by erosion of softer beds. The resistant sandstone ridges of the Roper Group have a characteristic strong rectangular jointing pattern which upon weathering, causes the formation of isolated pillars up to 50 feet high.

(E) The Favenc Range occurs in the south-west of the Sheet area and is a dissected plateau capped by flat-lying Mesozoic sediments. The northern edge of the Range is a continuous scarp about 100 feet about the Limmen Plateau. Southwards the Range is dissected into scattered, low, flat-topped hills.

(F) The Limmen Plateau occurs in the west of the Sheet area and is bounded in the south by the Favenc Range and in the east by a line striking approximately north through Three Knobs. Low hills, mainly of Roper and Mesozoic Group sediments, project above a plain composed of sand and subsidiary lateritic soils. In the extreme west - centre, low ranges formed of rocks of the Tawallah, McArthur and Roper Groups strike generally north. In the Golliger Creek - Balbirini Creek area residual black soils have formed on Tertiary limestones - the Golliger Beds; black soils also occur between Lansen Creek and October Creek in the extreme West.

The Bauhinia Downs Sheet area is drained mainly by the McArthur River. The Limmen Plateau however, is part of the drainage system of the Limmen Bight River, whilst the eastern side of the Bukalara Range is drained by tributaries of the Foelsche and Wearyan Rivers.

The McArthur River rises on the Walhallow Sheet area and flows north-eastwards across the Bauhinia Downs Sheet area. Along its central portion the river is braided but at McArthur River Homestead it forms one main channel. The river is deeply incised with steep banks up to 50 feet high. During the dry season scattered water-holes, some of which are permanent, are present in the upper and central reaches; by McArthur River Homestead there is a gentle flow of water for most of the year, and the river becomes tidal about 6 miles upstream of Borroloola.

The present drainage system is post Mesozoic and largely superimposed on Upper Proterozoic rocks. Erosion has removed most of the Mesozoic sediments and the superimposed drainage has been modified by the structure of the Upper Proterozoic rocks.

STRATIGRAPHY

The stratigraphy and geology of the Bauhinia Downs Sheet area have been summarised in Table 1. General distribution of the units is shown in sketch 3.

The Upper Proterozoic rocks in the Bauhinia Downs area were laid down in the McArthur Basin, which covers a large area of the south-western part of the Gulf of Carpentaria. The extent of the Basin is not known; but a gravity traverse and geological mapping suggest that its eastern margin may be somewhere near the 137° longitude and is believed to strike north.

During the deposition of the Tawallah Group and the McArthur Group a north striking trough or embayment was formed in the central part of the Sheet area. Subsidence was not uniform and was most rapid between two major hinge lines - the Tawallah-Abner line and the Emu Fault line. To the east of the Emu Fault a stable shelf existed and persisted into Roper Group and Cambrian times. To the west of the Tawallah-Abner line sinking was also fairly rapid. The nature of the sediments suggest that at this time the western margin of the basin may have been only a little to the west of the Sheet area.

However by the start of the deposition of the Roper Group the main axis of downwarping had shifted westwards to the

western Bauhinia Downs - eastern Tanumbirini area although the whole of the Bauhinia Downs area continued to sink except the area to the east of the Emu Fault.

After the tectonic movements at the end of the deposition of the Roper Group, the area was relatively stable. In the Abner Range area some downwarping continued until post-Bukalara times. Minor uplift occurred after the deposition of the Bukalara Sandstone and again after the deposition of the Mesozoic.

UPPER PROTEROZOIC

TAWALLAH GROUP

The Tawallah Group has been divided into five formations and correlation between the exposures on the Bauhinia Downs Sheet area is shown in Table 2.

The Tawallah Group is conformably overlain by the McArthur Group but nowhere in the Sheet area is the base exposed. However on Bickerton Island, near Groote Eylandt, sediments of the Tawallah Group directly overlie probable Lower Proterozoic granite andmetamorphics.

The relationship between the Scrutton Volcanics and the rest of the Tawallah Group is doubtful. Conglomerate immediately overlying the Scrutton Volcanics to the east of Tawallah Homestead contains volcanic pebbles, and a local unconformity may be present.

The most complete section (about 13,000 feet) on the Sheet area is in the Tawallah Range; elsewhere, except for the exposure of Tawallah Group to the north-north-east of Leila First Crossing only the upper part of the Tawallah Group is exposed.

The Tawallah Group is mainly composed of arenites with subordinate siltstone, conglomerate, limestone and volcanics. The dominant rock type is a white to pink, ripple-marked, medium-grained quartz-sandstone, which occurs mainly in the Yiyintyi Formation and the Nathan Sandstone. Limestone is almost entirely confined to the Rosie Creek Formation.

Volcanic rocks occur principally in the Scrutton Volcanics and the Warramunna Volcanics Member of the Yiyintyi Formation but are found locally elsewhere in the Yiyintyi Formation, the Rosie Creek Formation and the Nathan Sandstone. Apart from local lapilli tuff in the Nathan Sandstone the volcanics are intermediate to basic types with, in places, rare, acid flows. The most common rock type is an iron-rich vesicular trachyte. Quartz gabbro locally intrudes the Scrutton Volcanics, and microgabbro associated with the volcanics in the Nathan Sandstone may also be intrusive. (Intrusives not associated with volcanics are dealt with under a separate heading.)

McARTHUR GROUP

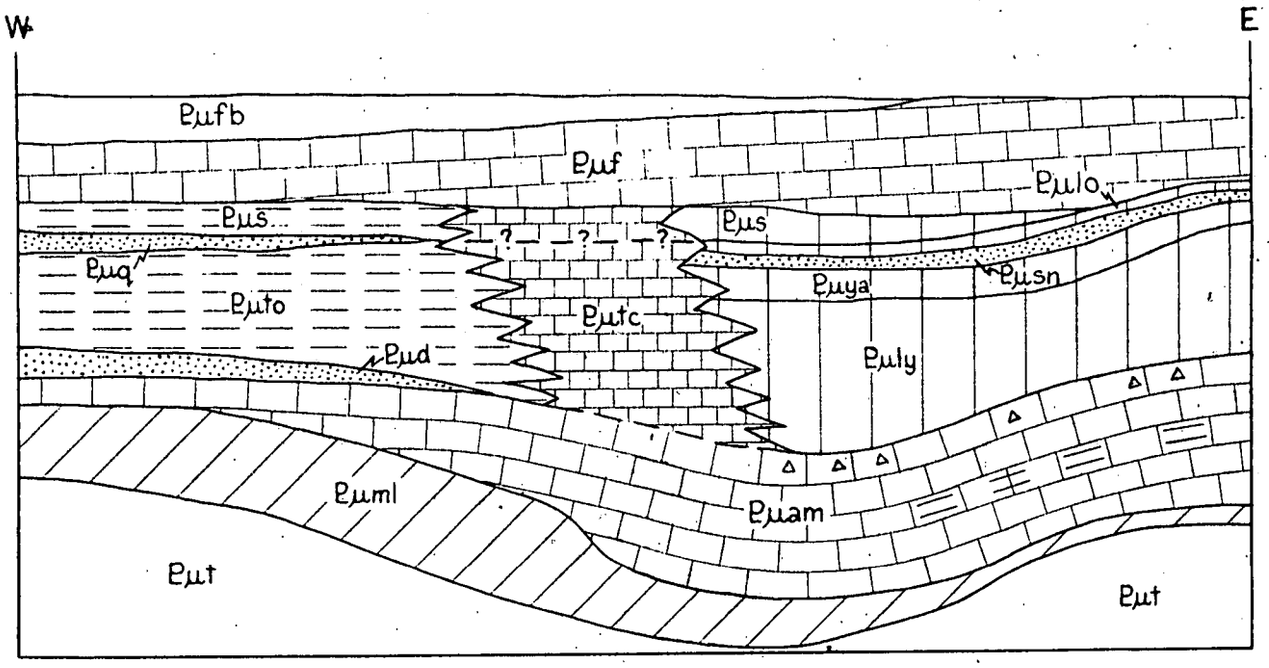
Outcrops of the McArthur Group occur principally on the Bauhinia Downs Sheet area with extensions on to the Walhallow and Mt. Young Sheet areas. Carbonate rocks in similar stratigraphic position occur in the Urapunga Sheet area (Urapunga and Mount Rigg Groups) (Dunn, 1961) and in the Calvert Hills, Robinson River, Westmoreland and Mount Drummond Sheet areas (Wollogorang Formation)(Firman, 1959). The main outcrops are found between the Bukalara Range and the Limmen Plateau - Favenc Range area; minor outcrops also occur in the extreme west of the area, around Lansen Creek.

Deposition of the carbonate-rich McArthur Group took place in a semi-enclosed basin. A major north-striking faulted hinge-line - the Tawallah-Abner Fault - affected sedimentation during deposition of the Group, as also may have the Emu Fault. Several distinct environments have been recognised. (See sketch (2)).

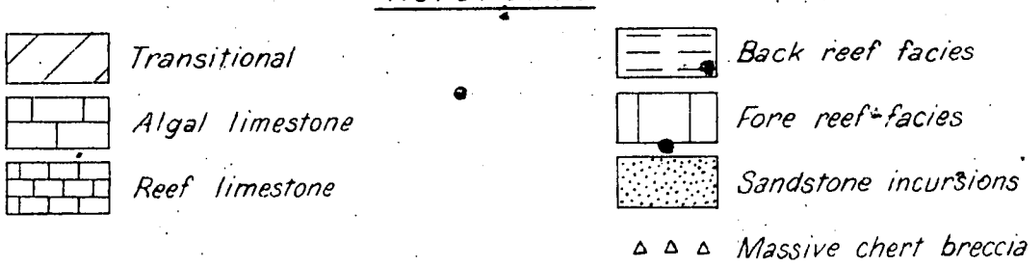
Sketch (2)

DIAGRAMMATIC SKETCH SECTION ACROSS THE McARTHUR GROUP

(Three Knobs - Emu Fault)



Reference



(a) A transitional period between the open sea conditions of the Tawallah Group and the carbonate sequence of the McArthur Group is represented by the Mallapunyah Formation.

(b) Widespread algal limestones with associated slump breccias, and minor lenses of a rhythmical sequence of lagoonal limestone, siltstone and sandstone as shown by the Amelia and Emmerugga Limestones.

(c) Reef Limestone, which is finely crystalline, massive and contains few algae, is represented by the Top Crossing Limestone. It was developed along the Tawallah-Abner line during deposition of the Tatoola Sandstone, Tooganinie Formation, Leila Sandstone, Lynott Formation, Yalco Formation, Batten Formation and probably the Amos Formation.

(d) Back-reef facies. Rhythmically alternating flaggy to massive algal limestone, calcareous sandstone, calcareous siltstone with numerous halite pseudomorphs, as shown by the Tooganinie and Amos Formations, are considered to represent back-reef lagoonal facies.

(e) Fore-reef facies. The Lynott Formation, Yalco Formation, and parts of the Batten Formation which all lie east of the Tawallah-Abner line are fore-reef facies. They consist of calcareous siltstone, calcareous sandstone, calcarenite, chert and chert breccia.

(f) Sandstone incursions. The development of the Tatoola Sandstone and the Leila Sandstone in the back-reef area and the sandstone of the Batten Formation (Stretton Sandstone Member) in the fore-reef area suggest periodic marginal uplift. The Leila Sandstone and the Stretton Sandstone are probable time equivalents whilst the Tatoola Sandstone is roughly equivalent to massive chert breccia within the Amelia Limestone to the east of the Tawallah-Abner line.

In the north-east of the Sheet area the rocks below the Lynott Formation and above the Nathan Sandstone consist of siltstone, limestone, quartz sandstone and chert breccia. They do not resemble the Mallapunyah Formation and the Amelia Limestone and have therefore been linked into one formation (as yet unnamed). Volcanics occur in this formation in the Mount Young Sheet area.

The only other volcanics known in the McArthur Group are in the Barney Creek Member of the Amelia Limestone. Rocks, referred to in the field as green cherts, appear to be tuffs when examined in thin section (W.J. Murray, Senior Geologist, Mt. Isa Mines, personal communication). They occur in the foot-wall of the H.Y.C. prospect.

The outcrops of the McArthur Group around Lansen Creek consist of white to brown fine-grained sandstone, white to pink chert and siltstone, flaggy pink fine-grained limestone, rare bands of rhythmically alternating calcareous sandstone and limestone with halite pseudomorphs, and pebble to cobble conglomerate. The percentage of non-carbonate rocks is greater than in the main area of outcrop of McArthur Group rocks, and may suggest proximity to the margin of the basin. Correlation of these rocks with the rest of the McArthur Group is not possible.

The thickness of the Group in the east of the main area of outcrop is 13,000-14,000 feet and in the west about 10,000 feet, and probably only about 7,000 feet in the north-west.

ROPER GROUP

The Roper Group has a widespread distribution in the McArthur River Basin. In the Bauhinia Downs Sheet area the main areas of outcrop are the Limmen Plateau, the Abner Range, and east of the Emu Fault.

The Roper Group is unconformable on the McArthur Group. With local exceptions the unconformity both of dip and strike between the two Groups is very slight. Normally the basal unit of the Roper Group - the Limmen Sandstone - overlies the Emmerugga Limestone, the Billengarrah Member or the Stott Beds. In the east the Limmen Sandstone overlies various units of the McArthur Group as low in the succession as the Lynott Formation. In the south-west a basal conglomerate contains pebbles of rocks characteristic of the McArthur Group.

The dominant rock types of the Roper Group are quartz sandstone and siltstone with subordinate ferruginous siltstone, ferruginous sandstone, fine to cobble conglomerate and glauconitic sandstone - the latter being characteristic of the Crawford Sandstone and the coarser parts of the Mainoru Formation.

The Cobanbirini Formation is not completely exposed hence no accurate thickness can be estimated for the Roper Group. The Group thins from west to east; in the west the thickness is about 10,000 feet, in the Abner Range about 6,000 feet, and east of the Emu Fault about 1500 feet. The upper part of the section has markedly thinned in the latter area. The Limmen Sandstone thins from about 5,000 feet on the Tanumbirini Sheet area to about 10-100 feet in the Abner Range and east of the Emu Fault.

CAMBRIAN

BUKALARA SANDSTONE

The Bukalara Sandstone occurs widely throughout the Carpentaria region. It crops out principally east and south-east of the Bauhinia Downs Sheet area but also occurs in the Abner Range and in the extreme north-west of the Sheet area. The Sandstone, which is commonly flat-lying or, in places, gently folded, forms a plateau over the folded Upper Proterozoic rocks. It ranges from 100-300 feet in thickness, but in the Abner Range, where it is folded into a syncline, it is 1000 feet thick.

Previously regarded as Upper Proterozoic, the sandstone has been shown to be interbedded with volcanics of Lower to Middle Cambrian age (Dunn, 1961a).

TOP SPRINGS LIMESTONE

The Top Springs Limestone crops out only in the extreme south of the Bauhinia Downs Sheet area but may be more widely distributed on the Walhallow Sheet area.

The Limestone unconformably overlies units of the McArthur Group and Roper Group, but its relationship to the Bukalara Sandstone is not known. No fossils have been found in it but it is tentatively regarded as being younger than the Bukalara Sandstone because its geographical position suggests a relationship with the (?)Middle Cambrian Barkly Tableland sequence. The Limestone is overlain by Mesozoic sediments.

MESOZOIC

Mesozoic sediments crop out extensively in the northern part of the Northern Territory as cappings on older rocks. In the Bauhinia Downs Sheet area they crop out widely in the west and south-west but also occur elsewhere.

In general claystone and shale overlie sandstones but either may be absent. A basal conglomerate, with some boulders up to 3 feet across is present in some places; pebbles also occur intermittently throughout the sandstones.

Fossils indicate both marine and freshwater environments; in some outcrops marine and freshwater fossils are found together. Only plant remains have been found in the south-west and the west of the Sheet area. Fossils include pelecypods, belemnites, gastropods, plant remains and worm tracks. Only the pelecypods have yet been described (Skwarko, 1961 and Progress Report) and these seem to indicate a Neocomian age, but they may be Aptian.

In most places the thickness of the Mesozoic is less than 100 feet but locally it is up to 300 feet thick e.g. east of Tawallah Homestead. The Mesozoic sediments were deposited throughout most of the area and covered a pre-Mesozoic land surface

with a relief similar to that of today. Mesozoic sediments cap parts of the Tawallah Range - about 600 feet above present sea-level.

TERTIARY

GOLLIGER BEDS

The Golliger Beds crop out poorly in the Golliger Creek area between O.T. Downs Homestead and Three Knobs, and north-west of Bauhinia Downs Homestead in the Limmen Bight River. The Beds, which are massive white to light yellow limestone, are commonly covered by residual black soil. Black soils around Lansen and October Creeks may also overlie the Golliger Beds.

The Beds contain gastropods and may be Tertiary lacustrine deposits. Similar limestones, also considered to be Tertiary although unfossiliferous, are found elsewhere in the Carpentaria province and the Barkly Tableland e.g. Carl Creek Limestone (~~Calvert~~ Lawn Hills 1:250,000 (~~Firman 1959~~ Carter and Öpik 1961) and Cleanskin Beds (Mount Drummond 1:250,000 (Smith and Roberts, 1960)).

The thickness of the Golliger Beds is not known, but is probably less than 50 feet.

IGNEOUS INTRUSIONS

Apart from the basic intrusions already mentioned as being associated with the Scrutton Volcanics and probably with volcanics in the Nathan Sandstone, intrusions also occur on the east side of the Tawallah Range and in the Emu Fault zone, east of McArthur River Homestead. Both occurrences are close to large faults. In both places intrusion is into the Tawallah Group but they differ from the other intrusions in not being obviously associated with vulcanism and in being more acid in composition. The intrusions appear to be microsyenites and syenites and form dykes up to 200 feet thick.

STRUCTURE

The structure of the area is shown in Sketch 3.

Folding

The direction of folding of the Upper Proterozoic rocks in the Bauhinia Downs Sheet area has been controlled by the Tawallah - Abner Fault and the Emu Fault both of which were probably active in the Upper Proterozoic. The general strike of the rocks is north but in the Reward area it is west.

The Upper Proterozoic rocks are folded into a broad central anticline with synclines to the east and west. The anticline is faulted on the east by the Tawallah Fault. The Emu Fault forms the margin of the eastern syncline. The Amelia Limestone is exposed in the core of a west trending cross anticline in the Reward area. The centre of the western syncline is modified by a north-striking anticlinal flexure. To the east of the Emu Fault the Upper Proterozoic rocks are largely covered by the Bukalara Sandstone but they appear to be folded, with very shallow dips, along north-west axes.

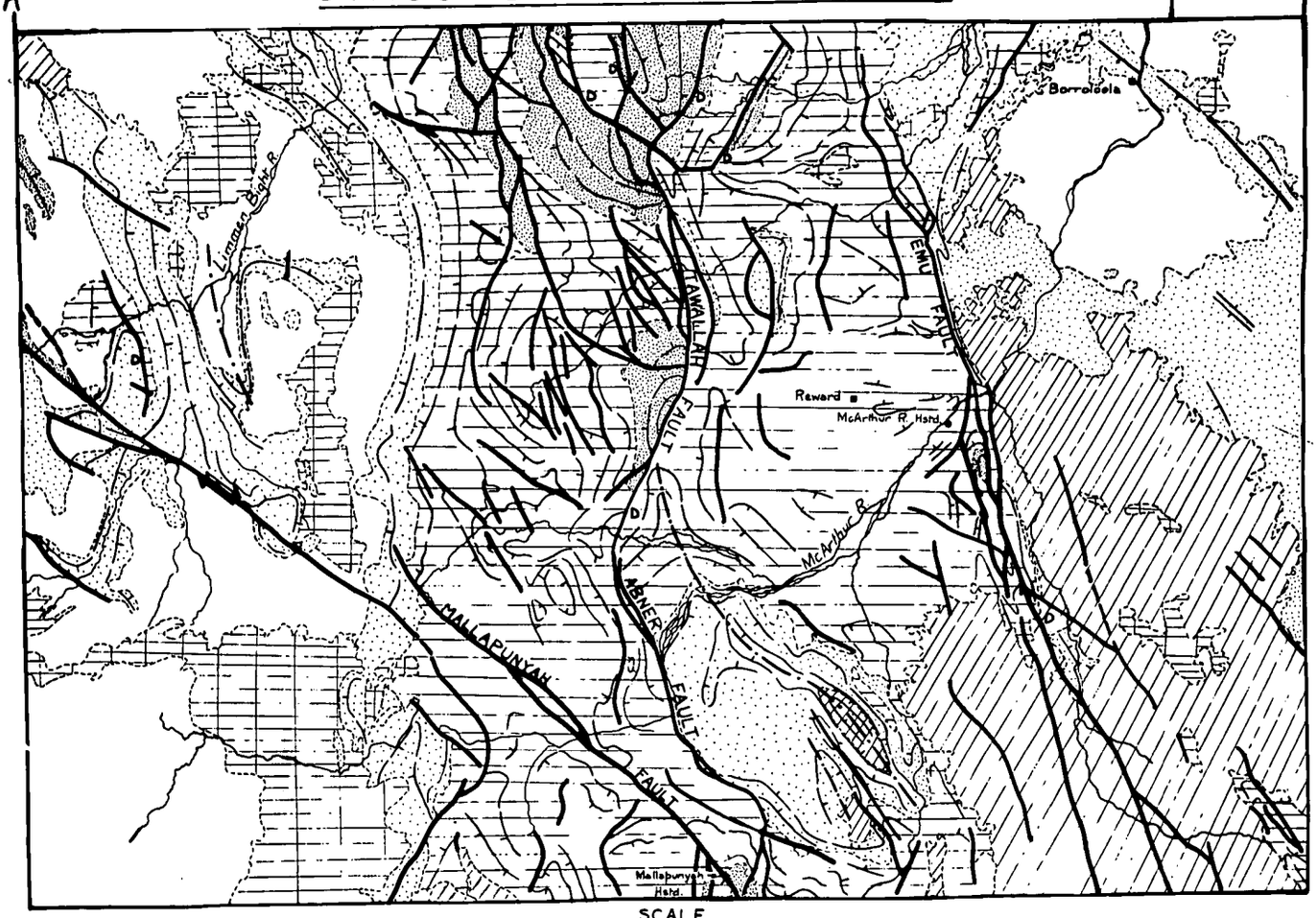
Folding in the anticline and eastern syncline has been much affected by faulting.

Dips within the Upper Proterozoic rocks are generally shallow and average about 20°. They steepen to about 50° on the western limb of the western syncline and in the Abner Range where the Roper Group crops out in a closed syncline. Elsewhere dips are steeper where affected by faulting; in places they are overturned adjacent to major faults. The degree of folding is the same in the Tawallah and McArthur Groups and the unconformably overlying Roper Group.

The Cambrian, Mesozoic and Tertiary sediments are commonly flat-lying, but in places the Bukalara Sandstone is gently folded, in particular in the Abner Range where it is folded into a syncline with dips of up to 20°.

SKETCH 3

STRUCTURAL SKETCH MAP



SCALE

4 0 4 8 12 16

LEGEND

- Synclinal axis
- Anticlinal axis
- Fault (with downthrow side)
- Trend line
- Geological boundary

- Recent
- Mesozoic
- Cambrian
- Roper Group
- McArthur Group
- Tawallah Group

Faulting

The two major faults of the Sheet area are the Tawallah-Abner Fault and the Emu Fault. Both of these were probably active throughout the Upper Proterozoic.

Tawallah - Abner Fault.

The Tawallah - Abner Fault runs north through the centre of the Sheet area. The Tawallah Fault runs from the south Tawallah Range (where its continuation northwards is obscured by other major faults) southwards to west of Cape Crawford where it joins the Abner Fault. The latter persists southwards to near Mallapunyah Homestead in the south of the Sheet area.

Movement on the Fault is east side down but is variable in magnitude with the largest throw north-north-east of Leila Creek First Crossing; the Fault appears to be dying out around Mallapunyah Homestead.

There is no evidence as to whether the Fault was active during the deposition of the Tawallah Group, but during the deposition of the McArthur Group the Tawallah-Abner line played a major role in determining the distribution of the units of the Group. A reef limestone (Top Crossing Limestone) was developed along the line, lagoonal sediments were deposited to the west of it, and fore-reef sediments to the east.

The Fault appears to have had no effect on sedimentation during deposition of the Roper Group but movement along the Fault may have occurred in Cambrian times as indicated by the unusual thickness of Bukalara Sandstone developed in the Abner Range.

Emu Fault

The Emu Fault lies in the central east of the Sheet area and strikes north-north-east. In the north the Fault is a single shear plane but in the Coxco Valley, east of McArthur

River Homestead, where movement is greatest, at least three parallel shear planes exist. Farther south the fault bifurcates. Movement on the fault is east side down.

Observed displacement on the fault is nowhere great although the adjacent rocks are considerably distorted. The apparent sense of movement on the fault is not in agreement with sedimentary indications that the region between the Tawallah and Emu Faults was a sinking trough; and it is possible that initially the Emu Fault may have been west side down.

The Upper Proterozoic on the eastern side of the fault is largely obscured by the Cambrian Bukalara Sandstone and the effect the fault had on sedimentation is difficult to ascertain. Variations in the Lynott Formation across the fault and sharp thinning in parts of the Roper Group suggest that it may have been active during at least part of Upper Proterozoic time. Some movement occurred after the Bukalara Sandstone was deposited but this may not have been great.

Other faults in the area trend north-west to north. Major faults occur around Mallapunyah Homestead and in the Tawallah Range; and some of these have throws of more than 7000 feet. Faults with the largest throw commonly trend north. Faults trending north-west usually have small movement; but exceptions occur such as the Mallapunyah Fault - a transcurrent fault on which the movement is south side west. North-west trending faults are particularly common on the west limb of the central anticline; and these may be complementary to the Tawallah Fault, suggesting that there may have been some lateral movement on the fault.

Faulting in the Tawallah and McArthur Groups is more severe than in the Roper Group and may be a result of stabilisation in the sinking embayment with lack of movement on the Tawallah-Abner line. Movement in post-Cambrian times

appears to have been, at least in part, along established fault lines such as the Emu Fault. Minor movement, mostly along pre-existing faults, occurred after the deposition of the Mesozoic.

Jointing

The sandstones of the Tawallah Group, the Abner and Bassie Creek Sandstones, and the Bukalara Sandstone, all have characteristic joint patterns. Jointing in the sandstones of the Tawallah Group is irregular; in places it is strongly developed but in general is patchy. The joints are commonly normal to the bedding but in some places two joint directions are present and form a rectangular pattern.

Strong rectangular jointing is characteristic of both the Abner and Bessie Creek Sandstones. The strike of the joints varies with the strike of the bedding, one joint commonly being normal to the bedding. Pillars up to 50 feet high are formed by weathering of the rock along the joint planes.

The Bukalara Sandstone is strongly jointed in a west to north-west direction. In many places the joints persist over several miles and appear in places to have been developed prior to faulting.

ECONOMIC GEOLOGY

Lead, zinc and copper mineralization in the Bauhinia Downs Sheet area occurs mainly in the McArthur River Homestead area. Table 3 lists the main occurrences. Most of the prospects are small and of no economic value; the three largest are Reward, Cooks, and H.Y.C. The Reward and Cooks have been tested and found to be of no economic value; but the H.Y.C. is considered to be highly promising and at the time of writing (1961) Mt. Isa Mines Ltd are conducting an extensive drilling programme to determine the extent of the

ore horizon on the eastern limb of the anticline on which H.Y.C. is situated. Supplementary to this work geologists of Mt. Isa Mines Ltd are mapping the area around the McArthur River Homestead and the Bureau of Mineral Resources is conducting a geochemical survey in the same area.

The prospects in the area may be divided into two groups - those in the Coxco Valley and those in the Reward H.Y.C. area. The Coxco Valley prospects are Cooks, Coxs, Turnbull, Squib and Cooleys, (Cooleys is not in the Coxco Valley but in the same general area) and are all close to the Emu Fault Zone and may be remobilised syngenetic deposits e.g. Cooks which is on the junction of two major faults. The second group of prospects occur in the Amelia Limestone and are the H.Y.C., Reward, W. Fold, Bald Hills, Barneys, and Teena prospects. The H.Y.C. and W. Fold prospects are stratigraphically controlled and lie in the Barney Creek Member of the Amelia Limestone.

The Barney Creek Member is composed of calcareous, ferruginous shale, "green chert", limestone breccia and flaggy limestone. Mineralisation at H.Y.C. consists mainly of zinc with subordinate lead and minor copper and silver. At depth it is in pyritic shale. Elsewhere the ferruginous shale, which is probably also pyritic at depth, crops out at W. Fold and in a south-west plunging syncline two miles south-west of McArthur River Homestead. In the latter area the shale has also been proved to be pyritic at depth. Poor outcrop and probable faulting east of the H.Y.C. make the extent of the ore-bearing rocks uncertain. The Member appears to be restricted to the McArthur River Homestead area, but the possibility of other similar horizons elsewhere within the Amelia Limestone cannot be ignored. The ore is considered to be syngenetic in origin.

Pyrite is common as scattered crystals in the limestone. Barite has been found in one place in the Mallapunyah Fault zone, and manganese ore locally in small amounts in the Batten Formation.

Iron

Ironstones of probable economic importance have been found elsewhere in the Gulf of Carpentaria region - in the Roper River area (Dunn 1961(a), Dunn 1961(b)) and in the South Nicholson Basin, (Smith and Roberts 1960, Carter and Zimmerman 1960). In the Bauhinia Downs Sheet area ferruginous fine conglomerate, sandstone and shale occur at the top of the Abner Sandstone in the Roper Group and ferruginous sandstone and shale are also found in the Mallapunyah Formation at the base of the McArthur Group. These occurrences are probably uneconomic. Coarse-grained siderite bands occur in the McArthur Group - mainly in the Mallapunyah Formation and the Amelia Limestone - but are not persistent and are too small to be economically important.

Water

Most of the lower parts of the Sheet area are suitable for cattle raising and since the rainfall is 20-30 inches per year sufficient surface water is available for stock needs. Only one bore (at O.T. Downs Homestead) has been sunk for water. Bores were sunk at Borroloola in the early days of the field in the hope of finding coal in the Cretaceous rocks, which were then considered Carboniferous in age.

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TABLE I.

STRATIGRAPHY OF THE BAUHINIA DOWNS SHEET AREA

ERA	PERIOD	NAME	SYMBOL	THICKNESS IN FEET	ROCK TYPES	TOPOGRAPHY	DISTRIBUTION	REMARKS
CAINOZOIC	QUATERNARY		Cza	Usually thin - under 50	Sand & recent alluvium	Flat spinifex & grass-covered plains	Widespread	
			Czb	50 maximum about	Black soil. Alluvial.	Flat grass-covered plains with gilgais	Restricted to McArthur River area in Mt Lynott-McArthur River Hstd. area.	Mainly transported, possibly partly residual
			Czs	Thin	Black soil	Flat grass-covered plains with gilgais	Mainly Balbirini Creek-Golliger Creek and south of Lansen Ck.	Overlying the Golliger Beds. Residual
			Czl	Thin	Lateritic soil including pisolitic ironstone rubble	Flat low country with covering Mesozoic caps	Mainly Limmen Plateau and Tawallah Range.	
	TERTIARY?	Golliger Beds	Tg	Thin, possibly 50 or less	Massive limestone		Low outcrops. Usually only black soil cover	Contains gastropods. Probably lacustrine.
						UNCONFORMITY		
MESOZOIC	CRETACEOUS?		M	300 about	White medium-grained quartz sandstone, yellow fine-grained sandstone, some siltstone, conglomerate	Flat-topped hills to 300 feet high. Caps on U. Proterozoic sediments	Widespread, isolated outcrops	Marine and freshwater fossils. Probable Lower Cretaceous age.
						UNCONFORMITY		
PALAEOZOIC	CAMBRIAN?	Top Springs Limestone	Ct	Not known	Massive cavernous limestone, laminated cherty limestone	Flat lying with large boulders	Extreme south of Sheet area	Possibly part of sequence underlying the Barkly Tableland
						UNCONFORMITY		
		Bukalara Sandstone	Cb	1-200. 1000 in Abner Range	Jointed medium to coarse-grained friable quartz sandstone quartz greywacke	Flat-lying plateau to 200 feet with high gorges	Bukalara Range, within the Abner Range and extreme north-west corner of Sheet.	
						UNCONFORMITY		
	UPPER ROPER	Cobanbirini Formation	Pucb	West Centre East about 4000	Flaggy siltstone, medium-grained quartz sandstone	Poor outcrop. Sandstone forms low ridges to 50 feet high	Universal	Nowhere fully exposed. Probably equivalent to the Maiwok Sub-group.
		Bessie Creek Sandstone	Pube	1200 about 580 140	Strongly jointed medium-grained quartz sandstone	Ridges to 300 feet high. Isolated pillars, 50 feet high, formed by jointing.	Universal	
		Corcoran Formation	Puco	about 1170 800 60	Flaggy brown siltstone, medium-grained quartz sandstone, ferruginous sandstone	Poor outcrop, Sandstone forms low ridges.	Universal	

PROTEROZOIC

(Table I Cont.) Page 2.

	Abner Sandstone	Bue	1385 about	725	220	Strongly jointed medium-grained quartz sandstone. Minor siltstone, ferruginous sandstone, fine conglomerate.	Ridges to 300 feet high. Isolated pillars, 50 feet high, formed by jointing.	Universal
GROUP	Hodgson Sandstone Member	Bueh	725 about	-	-	Strongly jointed medium-grained quartz sandstone	Ridges to 200 feet high	Members only required recognised in West
	Jalboi Member	Buej	230 about	-	-	Purple ferruginous sandstone. Occasional shale bands.	Less resistant than other two members.	Jalboi Member present only in the west.
	Arnold Sandstone Member	Buea	350 about	-	-	Strongly jointed medium-grained quartz sandstone	Ridges to 200 feet high	
	Crawford ~~Sandstone~~ Formation	Bur	700 about	740 Three Knobs 450 Abner Range	430	Glauconitic quartz sandstone, quartz greywacke. Siltstone.	Sandstone ridges to 100 feet high. Scarp slope in Abner Range	Universal
	Mainoru Formation	Buu	1830 about	1780 thinning east to about 800		Flaggy purple & green micaceous siltstone & shale fine-grained glauconitic sandstone, quartz greywacke	Very poor outcrop - low rounded hills. Mainly soil cover	Universal
	Kilgour Sandstone Member	Buuk	about 200 in the Abner Range			Fine to medium-grained sandstone, siltstone.	Dip & scarp ridge to 150 feet high	Mainly in the Abner area
	Limmen Sandstone	Buj	1400 to 3800	380 Three Knobs 0-100 Abner Range & further east		Fine to medium-grained quartz sandstone. Flaggy micaceous siltstone conglomerate	Resistant ridge to 200 feet high	Universal distribution
								Conglomerate base in south-west. Poorly outcropping siltstone at base in places.
						UNCONFORMITY		
	Emmerugga Limestone	Ruf	2700			Massive algal limestone. Also chert breccia, limestone breccia, limestone conglomerate, sandstone, siltstone.	Rough low hills to 100 feet high	Widespread irregular distribution. Not present in the north-east.
MCART	Billengarrah Member	Rufb	Variable. To 4000. Maximum in Three Knobs area			Chert, fine to medium-grained sandstone, siltstone, limestone.	Low hills, occasional strike ridges to 100 feet.	Widespread irregular distribution	Distribution slightly more local in east.
	Stott Beds	Rust	2500 about			Oolitic chert, minor limestone	Poor outcrop low rounded hills	Batten Creek area only on east side of Tawallah-Abner line.	Probably equivalent to the Amos Formation and the Emmerugga Limestone.

HUR	Amos Formation		Bus	1150	Calcareous siltstone, calcareous sandstone, algal limestone	Limestone as low ridges to 6 feet. Siltstone, sandstone mainly as rubble.	Mainly west of the Tawallah-Abner line. Some north of Abner Range.	In west rhythmically alternating. Numerous halite pseudomorphs. Siderite-bearing cherts form local markers.
GROUP	Batten Formation	Smyth Conglomerate Member	Busy	600	Pebble to cobble conglomerate, quartz and feldspathic sandstone	Resistant ridge to 200 feet high.	Restricted to east side of Tawallah-Abner line in Batten Creek area.	
		Looking Glass Member	Bulo	260-650	Chert, chert breccia	Slightly less resistant than other two members.	Restricted to east of Tawallah-Abner line. Not present east of Abner Range	
		Stretton Sandstone Member	Busn	100-800	Fine to medium-grained, occasionally cross-bedded sandstone	Resistant ridge to 200 feet high	Universal distribution east of Tawallah-Abner line.	Thickens north-eastwards
	Leila Sandstone		Buq	Generally about 60. Thickens to 500 south-west.	Medium-coarse grained, cross-bedded calcareous sandstone	Low rough ridge to 30 feet high	Restricted to west side of Tawallah-Abner line. Not present in extreme north.	
	Yalco Formation		Buya	450. Thickens in north-east.	Thinly laminated white siltstone, shale, chert.	Resistant ridge to 200 feet high.	Universal distribution east of Tawallah-Abner line.	
	Lynott Formation		Buly	2200	Calcareous siltstone, silty limestone, calcareous sandstone, limestone, quartz sandstone, limestone breccia.	Low hills, higher in south-east to 100 feet.	Universal distribution east of Tawallah-Abner line.	Limestone more abundant in the south-east. Grain size decreases to north-east.
	Donnegan Lens		Budo	about 350	Medium-grained quartz sandstone, calcareous sandstone.	Low hills to 30 feet high.	Restricted to the east of the Tawallah-Abner line in the Batten Creek area.	
	Top Crossing Limestone		Butc		Massive limestone	Rough ridges to 200 feet high	Restricted distribution along north-striking Tawallah-Abner hinge line.	Few algae. Probable reef limestone.
	Tooganinie Formation		Buto	2250	Algal limestone, calcareous siltstone, calcareous sandstone.	Limestone ridges to 6 feet high. Siltstone & sandstone mainly as rubble.	Restricted to west side of Tawallah-Abner line.	Rhythmically alternating. Siltstone predominates towards the top. Numerous halite pseudomorphs.
	Tatoola Sandstone		Bud	460	Fine to medium-grained sandstone commonly feldspathic and ferruginous. Minor limestone and siltstone.	Dip & scarp ridge to 100 feet high. Modified double ridge where limestone & siltstone present	Restricted to west of the Tawallah-Abner line.	Ferruginous matter fills gypsum & calcite pseudomorphs. Limestone mainly in the north, siltstone in south.
	Amelia Limestone		Buam	About 6000 max. 770 north of Leila First Crossing.	Massive algal limestone. Sandstone, siltstone, chert, chert breccia, limestone breccia. Some siderite bedshigh	Rough hills to 100 feet high. Chert breccia commonly forms resistant ridge to 300 feet	Wide distribution	Thickest in the east of the area, under 1000 feet west of Tawallah-Abner line. Chert breccias mainly in the east of the area.

Table I (Cont.) Page 4.

	Barney Creek Member	Bubr	1200	Green chert, limestone breccia, ferruginous calcareous shale, flaggy limestone	Poor outcrop. Low hills. Crops out best in creeks. Restricted to H.Y.C. McArthur River area		Ore-bearing: Ore restricted to ferruginous, calcareous shale at depth.
	Mallapunyah Formation	Baml	2500	Ferruginous sandstone, siltstone, limestone. Some siderite beds.	Sandstone forms resistant hills. Elsewhere low rounded hills.	Wide distribution	Usually pink to purple. Thins eastwards. More sandy to the west of Tawallah-Abner Line.
TAWALLAH GROUP	Tawallah 9 (to be named)	But9		Flaggy medium-grained white to grey quartz sandstone. Some calcareous sandstone	Low resistant ridges.	Only occurs on west side of Tawallah Range.	
	Nathan Sandstone	Butn		White to purple ripple-marked medium-grained quartz sandstone. Conglomerate. Intermediate to basic lavas and pyroclastics.	Usually resistant ridges to 400 feet high.	Wide distribution	Pyroclastics are lapilli tuff. Microgabbro intrusive? associated with volcanics.
	Rosie Creek Formation	Butr	To be measured about 13,000 feet	Flaggy limestone, ferruginous sandstone, siltstone. Local intermediate to basic lavas	Variable. Thin resistant ridges Tawallah Range. Low hills elsewhere	Wide distribution	Volcanics only around Mallapunyah Homestead.
	Yiyintyi Formation	Buty		Medium-grained ripple marked white-light pink quartz sandstone. Ferruginous sandstone, ferruginous siltstone, local conglomerate Vescicular intermediate to basic lavas.	Quartz sandstone forms resistant ridges to 400 feet high. Ferruginous sandstone, less resistant ridges. Volcanics low rounded hills.	Mainly in Tawallah Range and north-north-east of Leila First Crossing. Top exposed also around Mallapunyah Homestead and Sawtooth Range.	
	Warramunna Volcanic Member	Butp	about 800 feet	Vescicular intermediate to basic lavas	Poor outcrop. Low rounded hills.	Only crops out in Tawallah Range.	
				UNCONFORMITY?			
	Scrutton Volcanics	But5		Acid to basic lavas. Minor intrusives. Sandstone, siltstone, arkose lenses.	Low rough hills to 50 feet high. Sandstone & arkose lenses more resistant.	Only crops out in the Tawallah Range	Intrusives - medium to coarse-grained quartz gabbro.
		Bs		Intermediate intrusive dykes. Usually microsyenite.		Along the Emu Fault line. Also small dykes in east Tawallah Range.	Always adjacent to major faults.

CORRELATIONS BETWEEN EXPOSURES OF THE TAWALLAH GROUP

TABLE 2

		Tawallah Range West	Tawallah Range East	Sawtooth Range	Range N.N.E. of Leila First Crossing	Around Mallapunyah Homestead	East of McArthur River Homestead	West of Sheet - Lansen Creek
	But 9	Flaggy white to grey medium grained sandstone, calcareous in places	Not present	Not present	Not present	Not present	Not present	Not present
NATHAN	SANDSTONE	Purple massive to thickly flaggy sandstone, ripple marked. Some siltstone and volcanics. Poss. intrusives	White to purple quartz sandstone and ferruginous sandstone.	White-light pink quartz sandstone. Conglomerate	White to purple ripple-marked quartz sandstone.	White-light pink (purple at base) ripple-marked quartz sandstone.	White-light pink ripple-marked quartz sandstone.	White-light pink ripple-marked quartz sandstone, occasionally pebbly.
ROSIE CREEK	FORMATION	Flaggy limestone sandstone, siltstone. Some chert.	Ferruginous siltstone, sandstone.	Ferruginous sandstone, quartz greywacke. Minor siltstone.	Flaggy fine-grained grey sandstone. Conglomerate. Some siltstone.	Intermediate-acid volcanics. Subsidiary siltstone, quartz greywacke, limestone.	Flaggy brown quartz greywacke, quartz sandstone. Pink limestone.	Not exposed
YIYINTYI	FORMATION	White-pink ripple-marked quartz sandstone, siltstone. Intermediate to basic lavas (Warramunna Member)	White-pink ripple-marked quartz sandstone, ferruginous sandstone, siltstone. Intermediate to basic lavas (Warramunna Member)	Only top exposed. Pebble to cobble conglomerate.	Partly exposed. White to pink ripple-marked quartz sandstone. Intermediate to basic volcanics. Warramunna Member)	Only top exposed - white ripple-marked quartz sandstone.	Not exposed	Not exposed
SCRUTTON	VOLCANICS	Acid-basic volcanics with minor intrusives. Sandstone, arkose lenses.	Acid-basic volcanics. Siltstone, sandstone lenses	Not exposed	Not exposed	Not exposed	Not exposed	Not exposed

McARTHUR RIVER MINERAL DEPOSITS.

TABLE 3

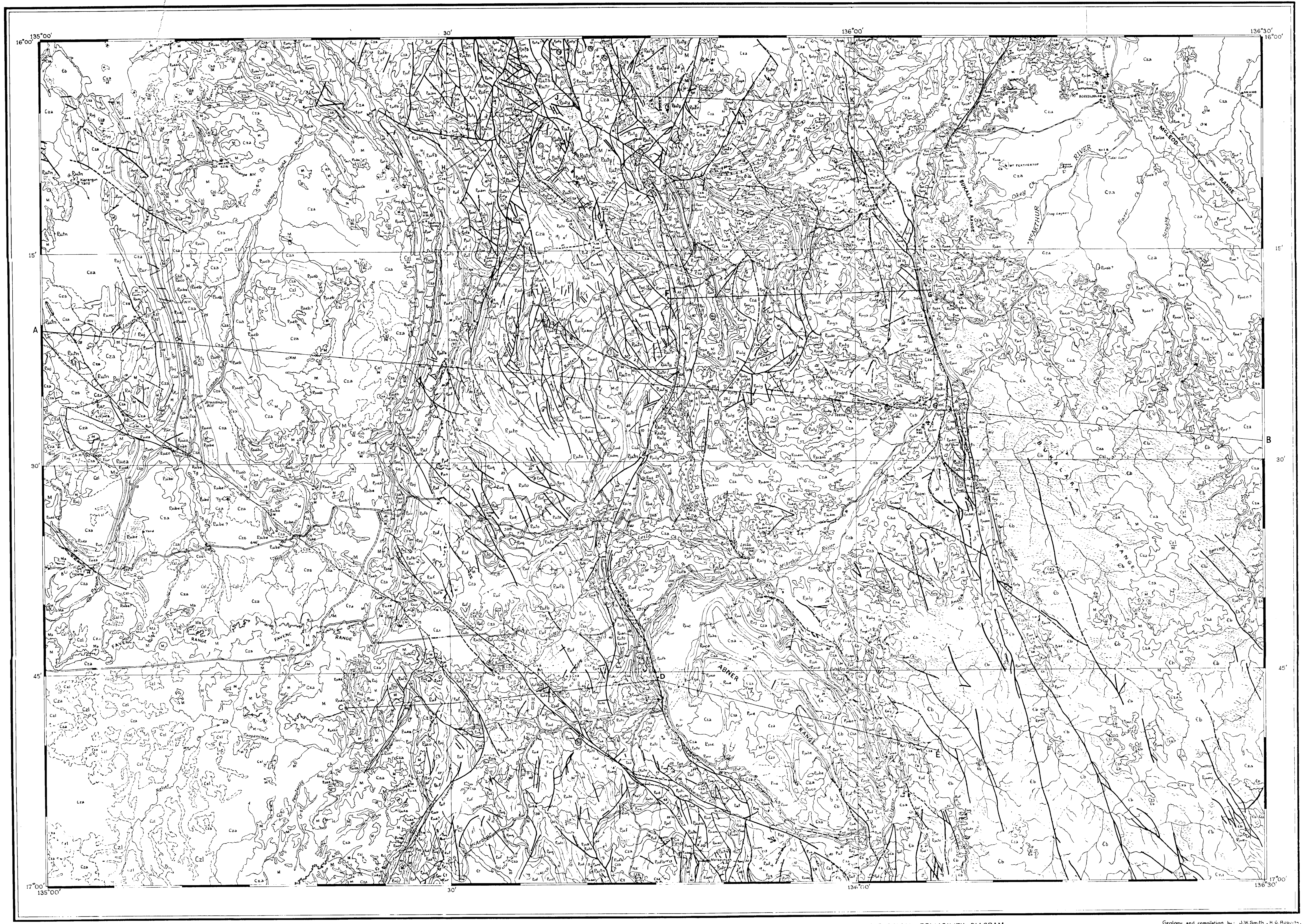
DEPOSIT	MINERALS	OCCURRENCE	STRUCTURE OF HOST ROCK
COOLEY	Galena, minor malachite and hydrozincite.	Small veins and vughs in massive, grey to brown Amelia Limestone.	Steeply dipping - adjacent to Emu Fault.
COOKS	Galena, hydrozincite, cerussite, smithsonite, amorphous lead carbonate.	Ore minerals as vughs within gossan. On surface ferruginous chert within Amelia Limestone.	Junction of two major faults.
COXS	Hydrozincite, galena, smithsonite.	Veins and vughs within Amelia Limestone.	Flat-lying.
TURNBULL	Malachite, galena, cerussite.	Vughs in massive Amelia Limestone below contact with a massive chert breccia within Amelia Limestone.	Steeply dipping east.
SQUIB	Malachite, cuprite, chalcocite.	Veins and stringer in Amelia Limestone below contact with a chert breccia within Amelia Limestone. Similar stratigraphic position to Turnbull.	As above
H.Y.C.	Sphalerite, pyrite, galena. Altered on surface to hemimorphite, hydrozincite and smithsonite.	Disseminated sphalerite confined to pyritic shales at depth. Supergene enrichment at surface with migration to Limestone breccias. Within the Barney Creek Member of the Amelia Limestone.	Steeply dipping beds on eastern limb of north-pitching anticline. Inferred fault about 600 yards to the east.
BARNEYS	Galena	Disseminated crystals and veins within brown, massive Amelia Limestone.	Moderately dipping beds on western limb of H.Y.C. anticline.
W. FOLD	Cerussite, and lead oxide Minor hydrozincite and ankerite	Disseminated low grade mineralisation in ferruginous shale. Same horizon as H.Y.C.	Tightly folded overturned synclinal structure. Fault across northern end of outcrop.
BALD HILLS	Galena Minor sphalerite	Veins, vughs and disseminated crystals of galena in ferruginous gossan and limestone of the Amelia Limestone.	Moderate dip to south.
TEENA	Cerussite. Anglesite.	Disseminated low-grade mineralisation in chert breccia and silicified shales of the Barney Creek Member.	Low dips to east.
REWARD	Cerussite, anglesite, pyromorphite and lead oxides. Argentite and cerargyrite.	High grade disseminated mineralisation in highly silicified chert breccia overlying pyritic shale of Barney Creek Member.	Low dips to south. Small faults in vicinity.

BAUHINIA DOWNS

NORTHERN TERRITORY

AUSTRALIA 1:253,440

4 MILE GEOLOGICAL SERIES SHEET E53-3



Reference

Geological boundaries

- Established boundary, position accurate
- Established boundary, position approximate
- Inferred boundary

Strike and dip of beds

- Measured
- Overturned
- Horizontal
- Vertical
- Trend of bedding, showing direction of dip

Faults

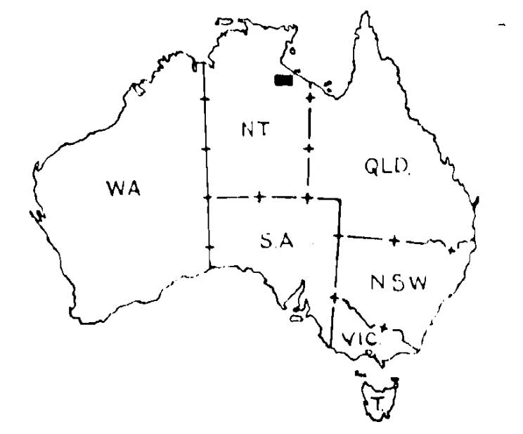
- Established fault, position accurate
- Established fault, position approximate
- Established fault, concealed
- Inferred or indefinite fault
- Joint pattern
- Macrofossil locality
- Plant fossil locality
- Fossil wood locality
- Mine
- Prospect

Ba	Barite	Circle around mineral symbol denotes unexploited deposit
Cu	Copper	
Fe	Iron	
Pb	Lead	
Zn	Zinc	

- Road
- Vehicle track
- Fence
- Homestead
- Yard
- Bore
- WH Waterhole
- Spring
- Swamp
- Airfield
- •618' Spot height in feet (Datum: mean sea level)
- Astro station

Reference

Era	Period	Group	Unit	Symbol	Lithology
CAINOZOIC				Cza	Soil and alluviam
				Czs	Residual black soil
				Czb	Alluvial black soil
				Czl	Laterite and laterite soil
	TERTIARY		Golliger Beds	Tg	Massive limestone
Unconformity					
MESOZOIC	LOWER CRETACEOUS (?)			M	Massive white quartz sandstone, yellow sandstone. Minor white claystone, porcellanite, pebbly sandstone
				Ma	Friable clayey sandstone
Unconformity					
PALAEOZOIC	LOWER TO MIDDLE CAMBRIAN		Top Springs Limestone	Ꞓt	Massive calcareous limestone, laminated cherty limestone
			Bukalara Sandstone	Ꞓb	Massive, jointed, medium to coarse grained quartz sandstone, quartz greywacke
Unconformity					
PRECAMBRIAN	UPPER PROTEROZOIC	ROPER GROUP	Undifferentiated	Ꝑμro	Undifferentiated
			Cobanbirini Formation	Ꝑμcb	Flaggy siltstone, medium grained quartz sandstone
			Bessie Creek Sandstone	Ꝑμbe	Jointed, medium grained quartz sandstone
			Corcoran Formation	Ꝑμco	Flaggy, brown siltstone, medium grained quartz sandstone, ferruginous sandstone
			Abner Sandstone	Ꝑμe	Jointed, medium grained quartz sandstone. Minor siltstone, ferruginous sandstone, fine conglomerate
			Hodgson Sandstone Member	Ꝑμeh	Strongly jointed, medium grained quartz sandstone
			Jalboi Member	Ꝑμej	Purple, ferruginous sandstone. Minor shale bands
			Arnold Sandstone Member	Ꝑμea	Strongly jointed, medium grained quartz sandstone
			Crawford Formation	Ꝑμr	Thickly flaggy glauconitic sandstone, quartz greywacke; Flaggy, purple micaceous siltstone
			Mainoru Formation	Ꝑμu	Flaggy, purple and green micaceous siltstone; fine grained glauconitic sandstone, quartz greywacke, shale
			Kilgour Sandstone Member	Ꝑμuk	Fine to medium grained sandstone, siltstone
			Limmen Sandstone	Ꝑμj	Fine to medium grained quartz sandstone, flaggy micaceous sandstone, conglomerate
Unconformity					
		McARTHUR GROUP	Undifferentiated	Ꝑμmc	
			Emmerugga Limestone	Ꝑμf	Massive algal limestone, dolomite. Minor chert breccia, limestone breccia, limestone conglomerate, calcareous sandstone and siltstone
			Billengarrah Member	Ꝑμfb	Chert, chert breccia, calcareous sandstone and siltstone, quartz sandstone, limestone
			Amos Formation	Ꝑμs	Calcareous siltstone and sandstone, algal limestone
			Stott Beds	Ꝑμst	Oolitic chert, minor limestone. Manganese bands
			Leila Sandstone	Ꝑμq	Medium to coarse grained, cross-bedded calcareous sandstone
			Batten Formation (Ꝑμbr)		
			Smyth Conglomerate Member	Ꝑμsy	Pebble to cobble conglomerate, quartz sandstone, feldspathic sandstone
			Looking Glass Member	Ꝑμlo	Chert, chert breccia, siltstone
			Stretton Sandstone Member	Ꝑμsn	Flaggy, fine to medium grained, white to pink quartz sandstone
			Top Crossing Limestone	Ꝑμtc	Massive limestone. Very minor flaggy limestone, calcareous siltstone
			Yalco Formation	Ꝑμya	Thinly laminated white siltstone, claystone chert. Minor sandstone
			Tooganinie Formation	Ꝑμto	Alternating algal limestone, calcareous siltstone, calcareous sandstone
			Lynott Formation	Ꝑμly	Calcareous siltstone, calcareous sandstone, cherty siltstone, limestone, dolomite, quartz sandstone
			Donnegan Lens	Ꝑμdo	Medium grained quartz sandstone, calcareous sandstone
			Tatoola Sandstone	Ꝑμd	Flaggy, fine to medium grained feldspathic and ferruginous sandstone. Minor calcareous sandstone, siltstone, limestone
			Amelia Limestone	Ꝑμam	Massive algal limestone, dolomite, calcareous sandstone, calcareous siltstone, chert breccia, limestone breccia, siderite bands
				△ △ △ △	Massive chert breccia
			Barney Creek Member	Ꝑμbr	Green chert, limestone breccia, ferruginous shale. Flaggy limestone and dolomite
			Mallapunyah Formation	Ꝑμml	Pink to purple, ferruginous sandstone, siltstone, limestone. Chert, siderite bands
				Ꝑμtg	Flaggy, white to grey, medium grained sandstone. Some calcareous sandstone
			Nathan Sandstone	Ꝑμtn	White to purple, ripple marked quartz sandstone. Local conglomerate and volcanics
			Rosie Creek Formation	Ꝑμtr	Flaggy limestone, ferruginous sandstone, siltstone. Local intermediate to basic volcanics
			[illegible] Formation	Ꝑμty	Medium grained, ripple marked, white-light pink quartz sandstone, ferruginous sandstone, ferruginous siltstone, local conglomerate. Vesicular intermediate to basic lavas
			Warramunga Volcanic Member	[illegible]	[illegible]
			Scrutton Volcanics	Ꝑμts	Acid to basic volcanics with minor intrusives
				[illegible]	[illegible]



Compiled and published by the Bureau of Mineral Resources, Geology and Geophysics, Department of National Development. Topographic base compiled and drawn by the Division of National Mapping, Department of National Development. Aerial photography by the Royal Australian Air Force, complete vertical coverage at 1:50,000 scale. Transverse Mercator Projection.

INDEX TO ADJOINING SHEETS

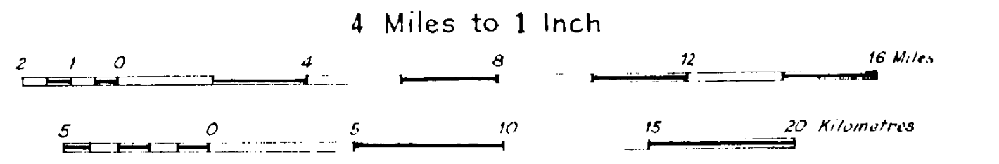
Showing Magnetic Declination

HODGSON DOWNS	MT YOUNG	PELLEW
TANUMBIRINI	BAUHINIA DOWNS	ROBINSON RIVER
BEETALOO	WALHALLOW	CALVERT HILLS

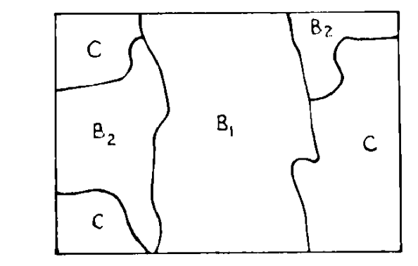
ANNUAL CHANGE 1' E

Scale

4 Miles to 1 Inch



GEOLOGICAL RELIABILITY DIAGRAM



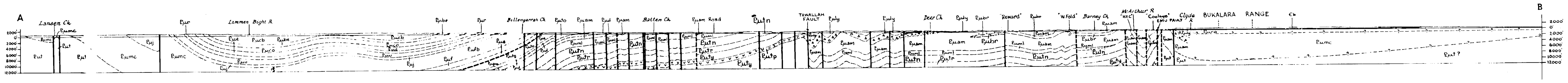
- B_1 Detailed reconnaissance - numerous traverses with air-photo interpretation
- B_2 Reconnaissance - some traverses with air-photo interpretation
- C Air-photo interpretation

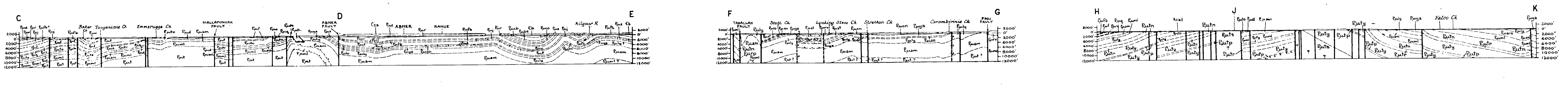
Geology and compilation by: J.W. Smith, H.G. Roberts, K.A. Plumb, A.W. Webb.

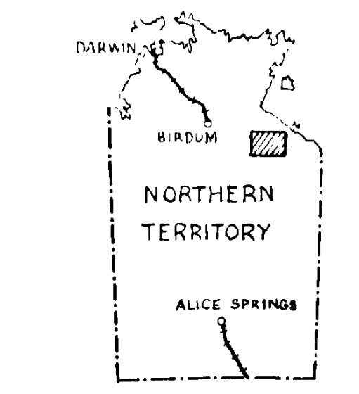
Drawn by: F.J. Roberts

SECTIONS

SCALE $\frac{V}{H} = 1$







BAUHINIA DOWNS
SHEET E53-3