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Record 1974/104

SHALLOW STRATIGRAPHIC DRILLING IN THE GRANITES-TANAMI REGION, NORTHERN TERRITORY AND WESTERN AUSTRALIA, 1971-73

by

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CONTENTS

SUMMARY

During reconnaissance geological mapping of The Granites - Tanami region, an area of mainly Precambrian rocks largely covered by superficial Cainozoic sediments, 152 shallow stratigraphic holes were drilled by BMR: 85 in the Tanami Sheet area, 29 in The Granites Sheet area, and 38 in the Lucas Sheet area. In addition Esso Australia drilled 6 holes in the Lucas Sheet area and 8 holes in the Billiluna Sheet area. None of the drill holes penetrated more than 98 m, and the average depth of the BMR holes was 31 m. The aims of the drilling were to identify bedrock beneath the Cainozoic cover, to determine the thickness and nature of the cover, to obtain information on weathering profiles, to investigate certain stratigraphic relationships, and to collect cuttings and cores for petrological and palaeontological examination.

In the Tanami Sheet area the drilling shows that the Coomarie dome has a core of granite which is covered by generally less than 5 m of Cainozoic sediments, mainly sand. The granite intrudes and has thermally metamorphosed rocks of the Archaean? Tanami complex, and is overlain by unmetamorphosed Gardiner Sandstone of the Carpentarian Birrindudu Group. Northeast of the dome superficial deposits, including laterite, overlie the Talbot Well Formation of the Birrindudu Group and the Cambrian Antrim Plateau Volcanics. In the southeast, east of the Black Hills, up to 5 m of Cainozoic cover overlies amphibolite of the Tanami complex, granite, and sediments that probably belong to the Cambrian Wiso Basin succession. In the southwest up to 10 m of Cainozoic sediments overlie metamorphic rocks of the Tanami complex. Locally the bedrock is weathered to depths of over 60 m, and lateritic weathering profiles over 20 m deep are commonly developed on metamorphic rocks of the Tanami complex and basalt of the Antrim Plateau Volcanics.

In The Granites Sheet area the drilling shows that lateritic weathering profiles are also developed on sediments of the probably Palaeozoic Lucas Formation. Cainozoic sediments, mainly clay, are locally over 90 m thick in drainage depressions. In places Cainozoic calcrete is at least 15 m thick. Basalt of the Antrim Plateau Volcanics is overlain unconformably to the west by sandstone of the probably Palaeozoic Pedestal Beds.

In the Lucas Sheet area, between the Kearney and Lewis Ranges, a Cainozoic basin contains over 90 m of unconsolidated sediments, mainly clay. These sediments overlie Adelaidean Murraba Formation. In the southeast, Cainozoic sand and calcrete generally less than 15 m thick overlie Lucas Formation.

In the Billiluna Sheet area drilling by Esso has given additional lithological information for some of the Proterozoic units, and indicates that the Lewis Range Sandstone is overlain by concealed Murraba Formation. Cainozoic alluvial sediments over 50 m thick are present along a westerly-trending drainage depression in the centre of the Sheet area.

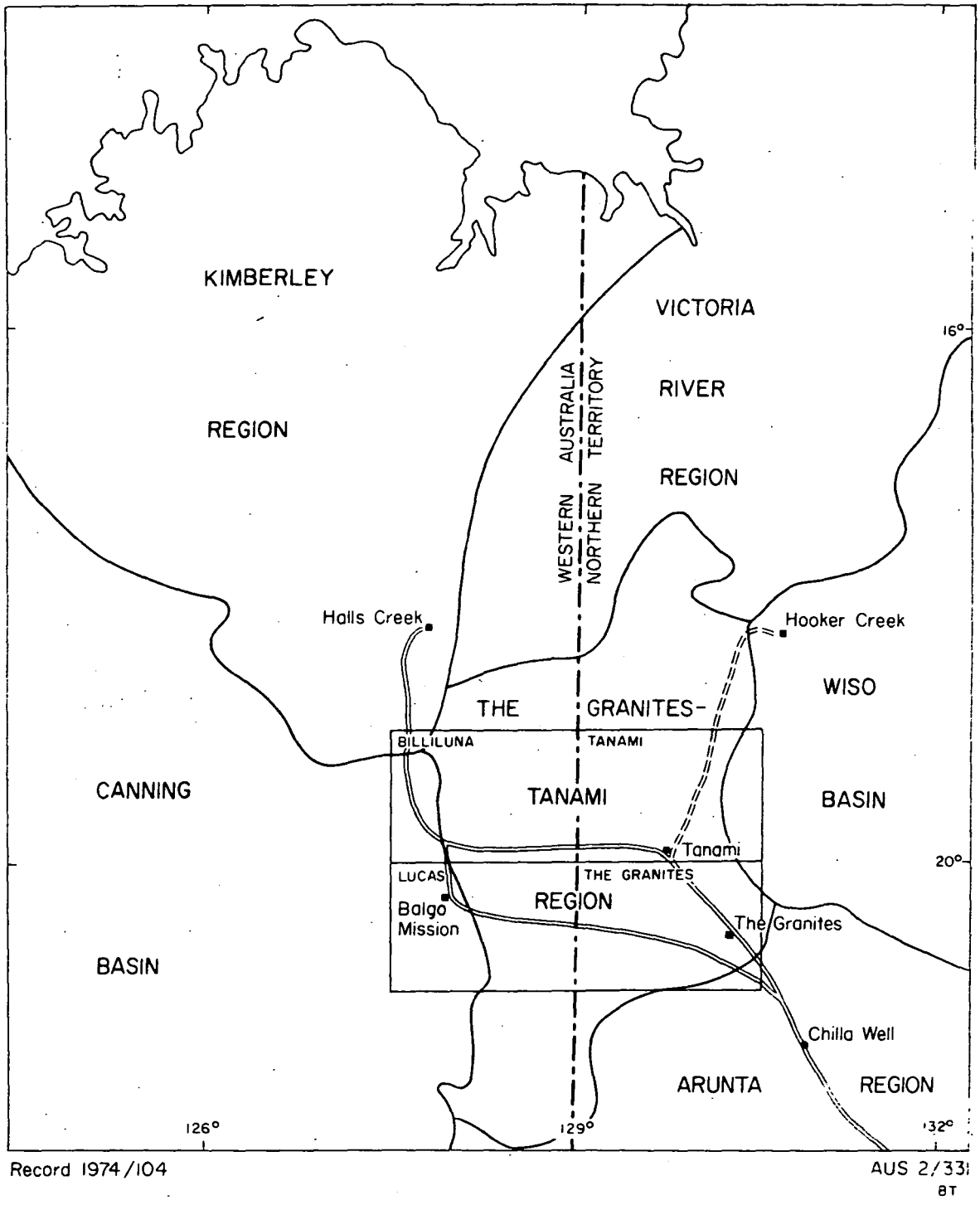


Fig. 1 Regional Setting

INTRODUCTION

A program of shallow stratigraphic drilling was carried out by BMR drilling crews during the 1971-73 geological survey of The Granites-Tanami region, an area in which Precambrian and Palaeozoic rocks are largely concealed by superficial Cainozoic sediments. The region straddles the Northern Territory/Western Australia border northwest of Alice Springs, and lies between the mainly Precambrian Kimberley, Victoria River, and Arunta regions to the northwest, north, and south, respectively, and between the Phanerozoic Wiso and Canning Basins to the east and west (Fig. 1).

The main aims of the drilling were:

1. To identify the bedrock beneath Cainozoic sediments.
2. To determine the thickness and nature of the Cainozoic cover.
3. To obtain information on weathering profiles.
4. To investigate certain stratigraphic relationships.
5. To collect cuttings and core samples for petrological and palaeontological investigations.

BMR drilling program

Because of difficulties of access and the limited time available, the BMR drilling was restricted to the Tanami and The Granites 1:250 000 Sheet areas in the Northern Territory and the Lucas 1:250 000 Sheet area in Western Australia. A total of 152 vertical holes were drilled, the average depth being 31 m and the maximum 93 m (Table 1). The drilling in the Tanami Sheet area was carried out in 1971, when 85 holes were completed between 26 August and 16 November by a crew led by E. Lodwick, with K. Huth as drilling assistant, using a Mayhew 1000 rotary mobile rig. In The Granites and Lucas Sheet areas drilling was undertaken in 1972 and 1973, using a Fox mobile rotary rig, by crews led by A. Zoska, with drilling assistants C. Iland in 1972 and K. Huth in 1973; 24 holes were drilled in 1972 between 23 August and 15 September, 12 in each Sheet area, and 43 holes were drilled in 1973 between 7 July and 15 October, 17 in The Granites and 26 in the Lucas Sheet area.

An essential feature of the BMR drilling program was that it was carried out with the minimum of supervision from the geologists of the regional mapping party. The positions of the holes to be drilled were shown on maps provided by the geologists, and in 1971 and 1972 were marked on the ground for the drilling crew. However, on only a few occasions was a geologist able to be on the drillsite during the actual drilling, and in all but a few cases the cuttings and core samples were collected by the drill crew without a geologist

TABLE 1: BMR STRATIGRAPHIC DRILLING IN THE GRANITES-TANAMI REGION

YEAR	SHEET AREA	HOLES	METRES DRILLED	MAX. DEPTH (m)	AV. DEPTH (m)	CORES	Total length (m)	Av. length
1971	TANAMI	85	2112	81	25	80	28	0.35
1972	LUCAS	12	395	61	33	6	10	1.7
	THE GRANITES	12	245	31	24	6	6.5	1.1
	TOTAL	24	640	61	28	12	16.5	1.4
1973	LUCAS	26	798	92	31	14	10.3	0.7
	THE GRANITES	17	1180	93	69	13	9.8	0.7
	TOTAL	43	1978	93	46	27	20.1	0.6
TOTAL		152	4730	93	31	119	64.4	0.6

being present. Most of the logging of the holes was carried out by the author at the BMR Cores and Cutting Laboratory, Fyshwick, Canberra.

The positions of the BMR stratigraphic holes are shown in Figures 2-5. The holes drilled in 1971 and 1972 are also shown on the preliminary editions of the Tanami and The Granites Sheets and the preliminary second edition of the Lucas Sheet. The holes were sited along lines, most of which follow existing tracks, ensuring relatively easy access for the drilling rig and water truck and decreasing the risk of vehicles getting bogged in soft sand. In most places the holes were drilled less than 20 m from the edge of the tracks. However, in the Tanami Sheet area three of the lines had to be placed well away from existing tracks; these were east-west and north-south across the Coomarie dome and east from the Black Hills (Fig. 2).

During the drilling of the holes, cuttings were taken at intervals of 5 feet (1.5 m) in 1971 and 10 feet (3 m) in 1972 and 1973. Cores generally less than 1 m long were collected in most holes where bedrock was reached; recovery rates were generally good, in many cases being 100 percent, although the cores collected were commonly fragmentary. The holes were drilled using 4½ inch (11.4 cm) bits, except for coring, which was generally carried out with 3 15/16 inch (10.0 cm) bits to give cores 2½ inches (6.3 cm) in diameter. On completion the holes were plugged and abandoned.

Additional subsurface information

In 1972 fourteen stratigraphic holes were drilled by the Metals Department of Esso Australia Ltd in the Lucas and Billiluna 1:250 000 Sheet areas, Western Australia, and information obtained from this drilling is discussed here. The descriptions of the rock types intersected in the Esso holes, but not the stratigraphic interpretations are taken from the Esso drilling logs.

Stratigraphic information from some of the bores in the Lucas and Billiluna Sheet areas, taken from water bore records provided by the Geological Survey of Western Australia is also discussed.

The positions of the Esso holes and the water bores are shown on the maps of the Lucas and Billiluna Sheet areas (Figs 9 and 12).

General geography

Access to the Tanami, The Granites, Lucas, and Billiluna Sheet areas is by a dirt road that links Alice Springs, 400 km to the southeast, with Halls Creek, 300 km to the north. The road, which is suitable only for four-wheel-drive vehicles bifurcates southeast of The Granites Sheet area (Fig. 1); the main branch leads northwest to Tanami and the other goes west to Balgo Mission. The two branches join again south of Billiluna homestead. Several tracks lead off from the roads.

Habitation in the Sheet areas is restricted to Balgo Mission and Balgo homestead in the Lucas Sheet area, Supplejack Downs homestead in the Tanami Sheet area, and Rabbit Flat motel and Mongrel Downs homestead in The Granites Sheet area. Halls Creek and Alice Springs are the nearest towns.

The area is semi-desert, and has a mean annual rainfall of less than 380 mm. Maximum daily temperatures over 38°C are normal in October, November, December, and March. Frosts are common in June, July and August, when maximum daily temperatures are commonly about 25°C. The vegetation consists mainly of spinifex and scattered small shrubs and low trees.

Most of the area is a flat to gently undulating sand-covered plain 330 to 400 m above sea level. The plain is crossed by east-west trending longitudinal sand dunes which are most numerous in the south. The dunes are mainly 5 to 15 m high, commonly many kilometres long, and are stationary. They form a major obstacle to cross-country travel, especially in a north-south direction. On the plain there are residual hills and ridges generally less than 70 m high, breakaways less than 10 m high, and broad depressions containing claypans, saltpans, and salt lakes.

Permanent water courses are lacking, permanent water holes are restricted to Sturt Creek in the western part of the Billiluna Sheet area, and the few semi-permanent rock holes present are confined to the low ranges. Underground water is tapped by several bores, and water for drilling was obtained from the following of these: bores at Tanami and Supplejack Downs in the Tanami Sheet area; bores at Rabbit Flat, The Granites, and Mongrel Downs, and Sangsters Bore in The Granites Sheet area, and Bloodwood, Middletons, Carrols, Raible, Pussycat, and Moody Bores in the Lucas Sheet area. Of the bores used all except Sangsters, Pussycat, and Middletons Bores provide potable water.

Synopsis of geology

The geology of the Tanami, The Granites, Lucas, and Billiluna Sheet areas is described in reports by Blake, Hodgson & Smith (1972) and Blake, Hodgson & Muhling (1973). Within these Sheet areas scattered outcrops of Precambrian and Palaeozoic rocks are separated by Cainozoic superficial sediments.

Outcrops of pre-Cainozoic rocks are shown in Figures 2, 6, 9 and 12 and the stratigraphy is summarized in Table 2.

The oldest rocks exposed are steeply dipping, tightly folded and cleaved, sedimentary and minor volcanic rocks belonging to the Tanami complex. These rocks have been regionally metamorphosed to lower greenschist facies. The two main units of the complex are the Killi Killi Beds and Mount Charles Beds. The Tanami complex is correlated with the Halls Creek Group of the Kimberley region, which is thought to be possibly Archaean (Gellatly, 1971). It is intruded and thermally metamorphosed by Lower Proterozoic granite, and is overlain unconformably by Pargee Sandstone and probably also by Supplejack Downs Sandstone and Mount Winnecke Formation: these formations are mainly steeply dipping, but uncleaved, and are probably Lower Proterozoic. The Lower Proterozoic and the older rocks make up The Granites-Tanami Block, which merges southwards with the Arunta Block.

The Granites-Tanami Block is overlain by unmetamorphosed sediments deposited in the Birrindudu Basin. These belong to the Carpentarian Birrindudu Group and the unconformably overlying Redcliff Pound Group which is probably Adelaidean. The Birrindudu Group is made up of the Gardiner Sandstone, Talbot Well Formation and Coomarie Sandstone, and is tentatively correlated with the Mount Parker Sandstone and Bungle Bungle Dolomite of the Kimberley region and the Limbunya Group of the Victoria River region. Glauconite from the Gardiner Sandstone has been dated at 1550-1620 m.y. The Redcliff Pound Group, tentatively correlated with the Wattie Group of the Victoria River region, comprises the Lewis Range and Muriel Range Sandstones, the Murraba Formation, and the Erica Range Sandstone.

In the Billiluna Sheet area there are several Proterozoic units which cannot be confidently assigned to either the Birrindudu or Redcliff Pound Groups. These include the Peterson Beds, which may be Adelaidean, Carpentarian or Lower Proterozoic; the Lake Willson and Pindar Beds, which may be the

stratigraphic equivalents respectively of the Carpentarian Talbot Well Formation and Coomarie Sandstone; and the Denison, Jawilga, and Boee Beds, which may be correlated with the Adelaidean Lewis Range Sandstone, Murraba Formation, and Erica Sandstone.

The Precambrian units are overlain unconformably by flat-lying basalt and associated sediments of the Cambrian Antrim Plateau Volcanics and by unfossiliferous sandstone and mudstone of the probably Palaeozoic Lucas Formation and Pedestal Beds. There are also minor outcrops of Mesozoic sediments. The Cainozoic superficial cover consists of laterite (the upper reddish-brown, iron-rich pisolitic zone of lateritic weathering profiles), silcrete and calcrete, which are probably Tertiary; Quaternary and Tertiary alluvium; and evaporitic sediments.

Between the deposition of the Tanami complex sediments and the end of the Precambrian the area was affected by at least four major periods of tectonic activity, each marked by a major unconformity. Since the beginning of the Cambrian the area has been relatively stable, and the Palaeozoic and younger rocks are generally flat-lying, occupying shallow depressions that may be tectonic or erosional.

The region appears to contain few mineral deposits of possible economic importance. Gold has been obtained from localities within the Tanami complex, most of the production, which amounts to about 500 kg, coming from mines at The Granites and Tanami between 1904 and 1960. Some minor traces of copper have also been found in the Tanami complex, and gossans are common locally but are not known to have any significant mineralization associated with them. Uranium and rare earth mineralization is present at the base of the Gardiner Sandstone in the Killi Killi Hills on the eastern edge of the Billiluna Sheet area, and some of the granite in the area shows appreciable radioactive anomalies.

RESULTS OF STRATIGRAPHIC DRILLING

In this part the geological setting of the drilling lines, the aims of the drilling, the geological information obtained, and details of the individual holes, including drilling logs, are described for each sheet area in turn, together with available water bore information

The rock types intersected in the drill holes and water bores are assigned, with various degrees of confidence, to rock units that crop out within The Granites-Tanami region. The positions of the drill holes and water bores are shown as Figures 2, 6, 9, and 12, and geological sections

TABLE 2. SUMMARY OF STRATIGRAPHY

	Rock unit and text-figure symbol	Max. thickness (m)	Lithology
CAINOZOIC	Cz	95+	Aeolian sand; alluvial sand, silt, clay; evaporites; laterite, silcrete, calcrete
	Czk	18	calcrete, chalcedony
UNDIVIDED PALAEOZOIC - MESOZOIC	M, Pz	?	Sandstone, siltstone, shale, conglomerate
PALAEOZOIC	Pedestal Beds Pzs	40	Quartzose sandstone; minor conglomerate, siltstone shale
	Lucas Formation Pzl	1000	Calcareous and non-calcareous sandstone, siltstone and mudstone; minor limestone and dolomite
CAMBRIAN	Unnamed Cambrian €	60+	Sandstone, mudstone, chert, limestone, dolomite (Wiso Basin)
	Antrim Plateau Volcanics € la	30+	Basalt lava; minor tuffaceous sandstone, quartzose sandstone, stromatolitic chert
MAJOR UNCONFORMITY			
PROTEROZOIC	Ek	?	Sedimentary rocks of the Kimberley region
	E	?	Sublithic and quartz arenite; minor conglomerate
ADELAIDEAN (REDCLIFF POUND GROUP)	Erica Sandstone Ere	700	Sublithic arenite, minor quartz arenite, siltstone, shale
	Murraba Formation Erb	400	Chert granule conglomerate, sublithic arenite, quartz arenite, siltstone, mudstone, shale, dolomite
	Lewis Range Sandstone Erl	1000	Quartz arenite; minor sublithic arenite, conglomerate, siltstone
	Muriel Range Sandstone Erm	450	Sublithic arenite, quartz arenite; minor siltstone, shale, conglomerate
ADELAIDEAN?	Boee Beds Eub	350	Sublithic arenite; minor conglomerate
	Jawilga Beds Euj	200?	Sublithic arenite, conglomerate, shale, mudstone
	Denison Beds Eud	200?	Quartz arenite; minor sublithic arenite
MAJOR UNCONFORMITY			

CARPENTARIAN?		Pindar Beds Bur	?	Quartz, sublithic, and lithic arenite
		Lake Willson Beds Buw	?	Chert, sublithic arenite, siltstone, shale
		Peterson Beds Bup	?	Sublithic quartz, and lithic arenite; greywacke, conglomerate, siltstone, mudstone
CARPENTARIAN	BIRRINDUDU GROUP	Coomarie Sandstone Bdk	2500	Lithic arenite; minor quartz arenite, siltstone, shale
		Talbot Well Formation Bdt	300	Stromatolitic chert, cherty sandstone, lithic arenite, siltstone, mudstone, limestone
		Gardiner Sandstone Bdg	3000	Sublithic arenite, quartz arenite, conglomerate, shale, siltstone
MAJOR UNCONFORMITY				
LOWER PROTEROZOIC		Unnamed granite Eg	-	Biotite and muscovite granite; minor gabbroic rocks, aplite, pegmatite, greisen
		Winnecke Granophyre Egw	-	Biotite granophyre, biotite adamellite intrusive acid porphyry
		Lewis Granite Egl	-	Muscovite and biotite adamellite; minor granodiorite, pegmatite, aplite
		Mount Winnecke Fm. Elw	4800	Lithic arenite, tuffaceous sandstone, siltstone and conglomerate, acid lava
		Supplejack Downs Sandstone Els	1300+	Sublithic arenite, quartz arenite; minor shale, siltstone
		Pargee Sandstone Elg	1500+	Sublithic arenite, lithic arenite, quartz arenite, conglomerate, greywacke
MAJOR UNCONFORMITY				
ARCHAEAN?	TANAMI COMPLEX	Killi Killi Beds Atk	1000+	Schistose to phyllitic greywacke, lithic arenite, siltstone, mudstone and shale; minor quartzite, banded chert, basalt, acid porphyry
		Mt Charles Beds Atc	1000+	Banded chert, silicified siltstone; schistose to phyllitic greywacke, siltstone, shale, and sublithic arenite; basalt and amphibolite; minor quartzite
		Nanny Goat Creek Beds Atw	1000+	Acid porphyry, basalt, tuff; greywacke lithic sandstone, phyllitic shale and siltstone
		Undivided At	?	Quartzite, schist, amphibolite
	HALLS CREEK GROUP (Kimberley Region)	Olympio Formation Aho	?	Schistose greywacke, schist, phyllite; minor quartzite, calcareous lenses

drawn along the drilling lines are shown in Figures 4, 5, 7, 8, 10, 11, and 13. The geological reference for these figures is given in Table 2 and Figure 3.

TANAMI SHEET AREA

In the Tanami Sheet area (Fig. 2) stratigraphic holes were drilled along east-west and north-south lines across the Coomarie dome, along or near the Tanami-Hooker Creek track between Coomarie Spring and Supplejack Downs and also west of the Black Hills, along an east-west line between the Black Hills and the western edge of the Wiso Basin, and along the Tanami-Billiluna road west of the Tanami Range. All but a few holes were put down at intervals of 2 miles (3.2 km).

Coomarie dome (Figs 4a, 4b)

The Coomarie dome is a structural feature northwest of Tanami which forms a broad elevated area up to 40 m high with very gently sloping sides. The dome is covered by Cainozoic superficial sediments and is almost completely encircled by low strike ridges, the Coomarie and Tanami Ranges, formed from outwardly dipping Carpentarian Gardiner Sandstone.

The aims of the drilling were to find out what lay beneath the Cainozoic cover, and to establish the relationship of the concealed bedrock to the encircling Gardiner Sandstone. Both aims were achieved: the drilling showed firstly that the core of the dome is formed of granite which in the south has intruded and thermally metamorphosed rocks of the Mount Charles Beds and secondly, that the granite is overlain to the west, north, and east by unmetamorphosed Gardiner Sandstone.

The granite was intersected in holes 4 to 13, 17 to 24, 26, 51 and 52. Gabbro was encountered in hole 25 and may belong to a dyke cutting the granite; such dykes have been found intruding similar granite in the Webb Sheet area, in the southwest of The Granites-Tanami region (Blake & Towner, 1974). The granite of the Coomarie dome is weathered to depths of 40 to 80 m below the present land surface: the upper 5 to 30 m is generally a zone of intense lateritization and silicification, below which, to the base of the weathering profile, the granite is commonly friable. Core samples indicate that the unweathered granite is mainly a pink medium-grained muscovite-biotite adamellite. Some is highly micaceous, and may be greisen, and some is cut by quartz veins. The granite is tentatively correlated with the Winnecke Granophyre to the northeast, which is dated at about 1800 m.y. (Blake et al.,

1972), and hence it is probably uppermost Lower Proterozoic.

Mount Charles Beds were intersected in two holes in the south, hole 27, which bottomed in weathered phyllitic tuff, and hole 68, which was drilled into fine-grained amphibolite. This amphibolite probably represents basalt that was thermally metamorphosed during the emplacement of the granite.

Seven of the stratigraphic holes penetrated Gardiner Sandstone beneath Cainozoic sediments up to 30 m thick. Of these holes, nos. 1, 2, and 50 in the east and 15 and 16 in the north intersected flat-lying to gently dipping shale, and holes 3 in the east and 14 in the west were drilled into sandstone. Sandstone was also encountered at the bottom of hole 50, thinly interbedded with shale; it contains grains of microcline, biotite and chlorite probably derived from nearby granite.

The Cainozoic sediments on the dome are generally less than 5 m thick and consist predominantly of iron-stained sand commonly accompanied by lateritic ironstone gravel. Locally the superficial sediments are thicker, as in hole 3, where 22 m of clay on Gardiner Sandstone underlies 8 m of calcrete and sand, in hole 13, which passed through 5 m of sand and 9 m of calcrete before encountering granite, and in hole 25, where 23 m of sand overlies gabbro. The surface sand is aeolian and Quaternary, but some of the underlying sand and clay, like the calcrete, is probably Tertiary.

Coomarie Spring to Supplejack Downs (Figs 5a, 5b)

A broad area of Quaternary sand and Tertiary calcrete and laterite extending from Coomarie Spring northeast to Supplejack Downs is crossed by the Tanami/Hooker Creek track. Along this track 16 stratigraphic holes were drilled to penetrate the underlying bedrock and determine thicknesses of Cainozoic sediments and lateritic weathering profiles. Information on the subsurface extent of the Cambrian Antrim Plateau Volcanics was obtained by drilling 6 additional holes: these were hole 44, put down 18 km north of Talbot Well, and holes 45-49, located along an east-west line 6 km north of Talbot Well.

The first four holes northeast of Coomarie Spring, nos 28-31, intersected chert, limestone, mudstone, and sandstone considered to be part of the Carpentarian Talbot Well Formation, beneath up to 14 m of Cainozoic sand and lateritic ironstone. The Talbot Well Formation here occupies the southern part of a broad structural basin. Further to the northeast, hole 32 penetrated quartzose sandstone which may be either the basal part of the

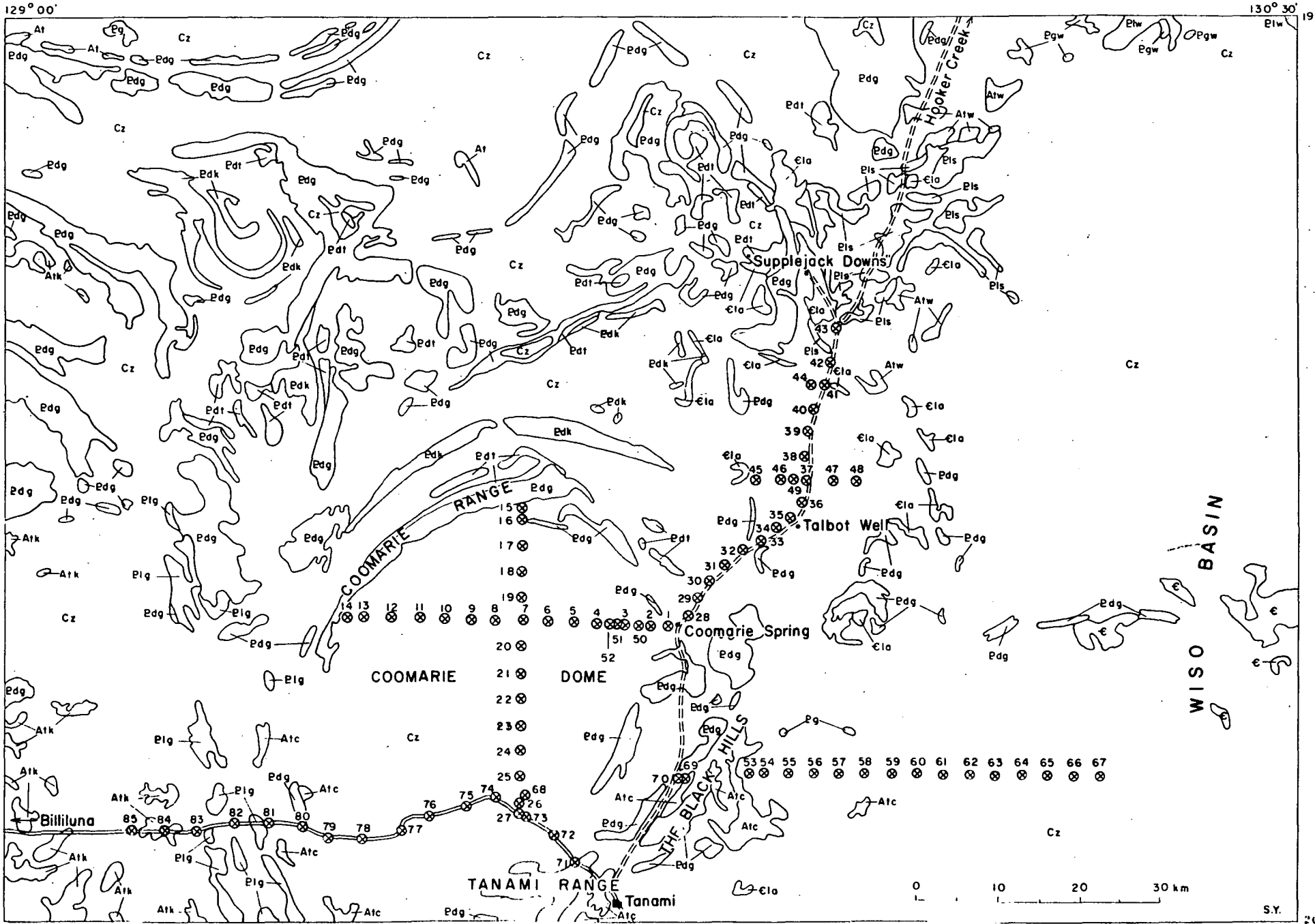


Fig 2 Tanami sheet area, N.T., showing outcrops of pre-Cainozoic rocks and positions of stratigraphic holes (for reference see Table 2 and Fig 3)

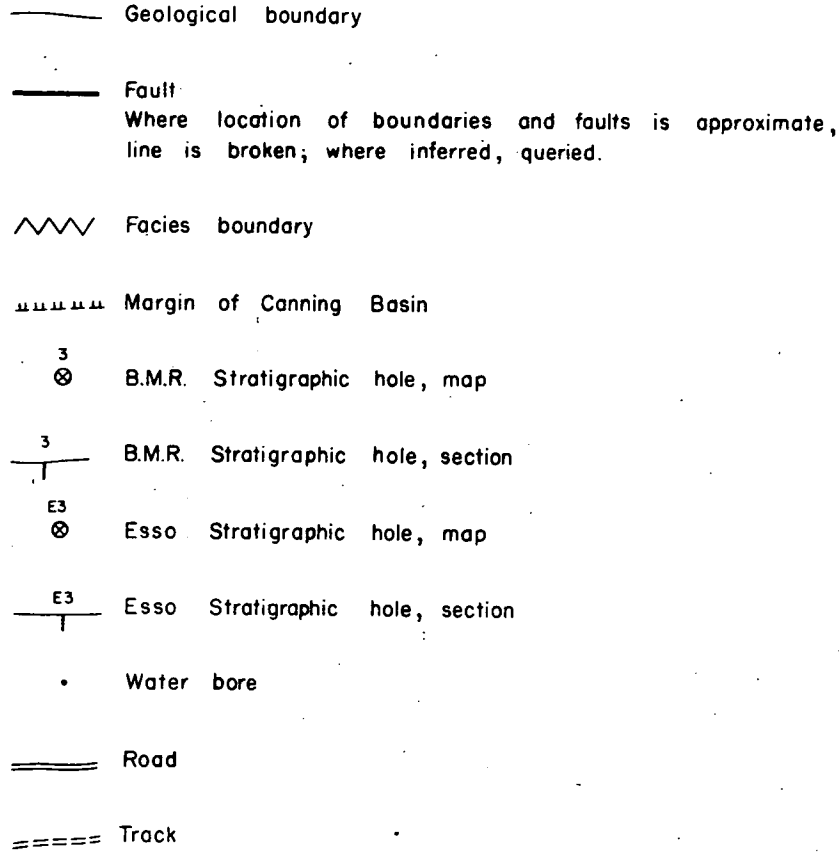
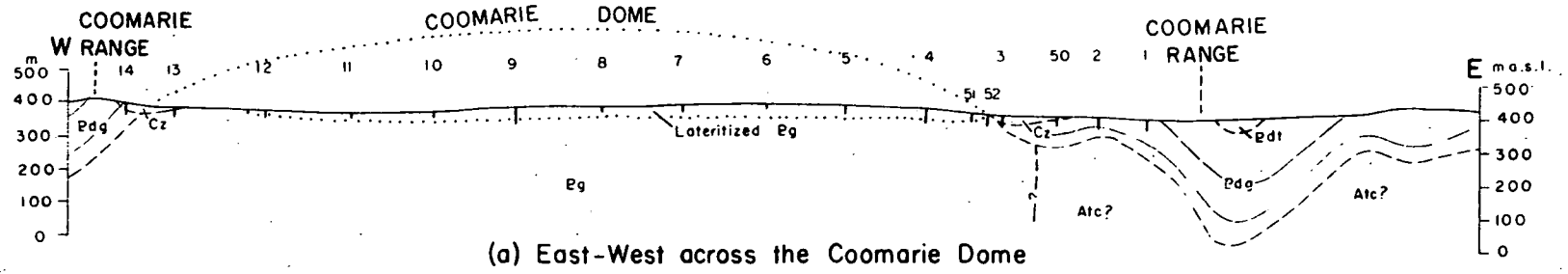
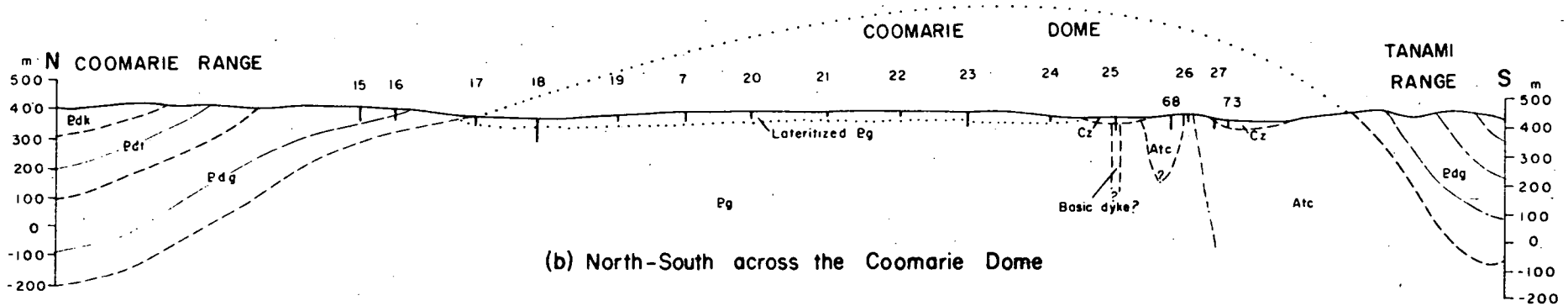


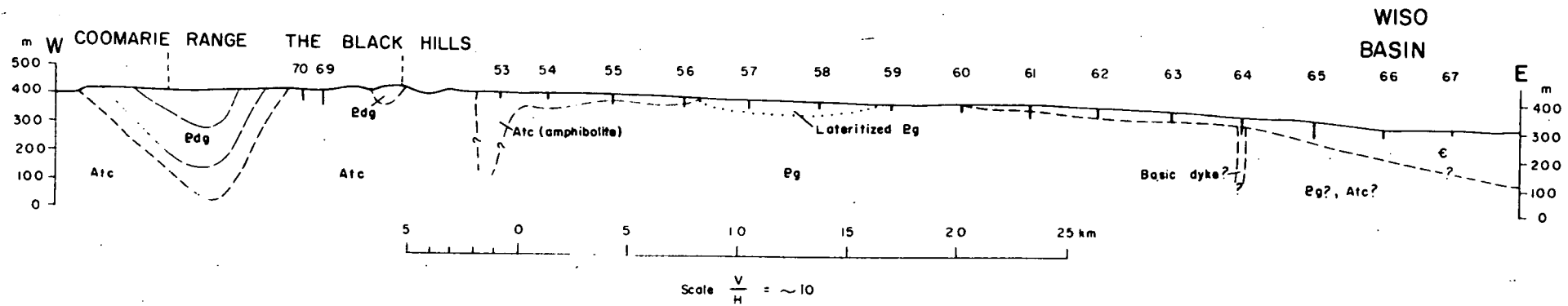
Fig. 3 Part of reference for Figs. 2 and 4-13



(a) East-West across the Coomarie Dome



(b) North-South across the Coomarie Dome



(c) From the Coomarie Range East across the Black Hills to the Wiso Basin

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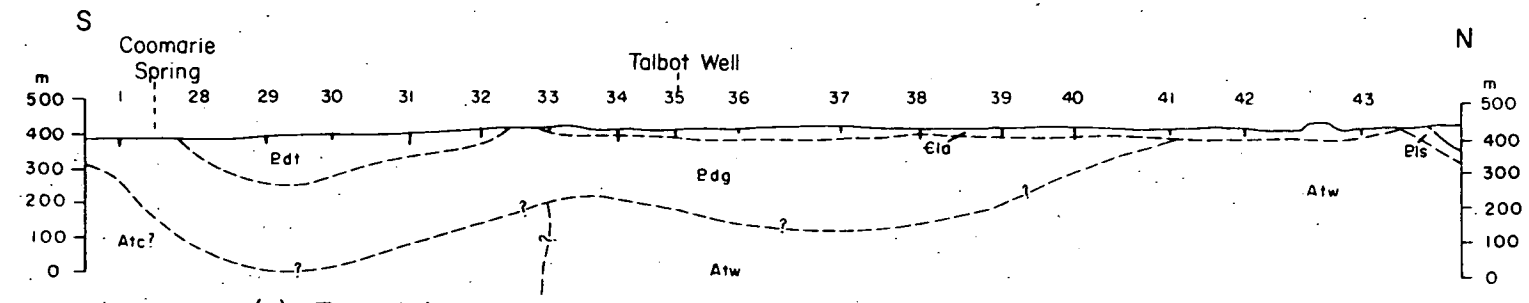
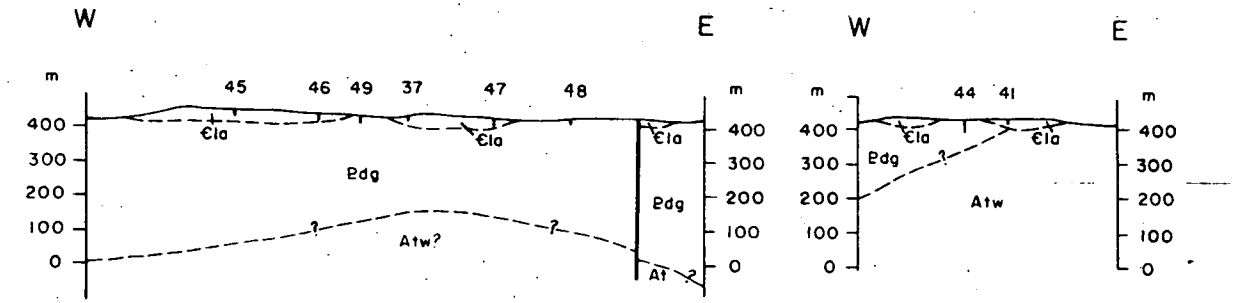
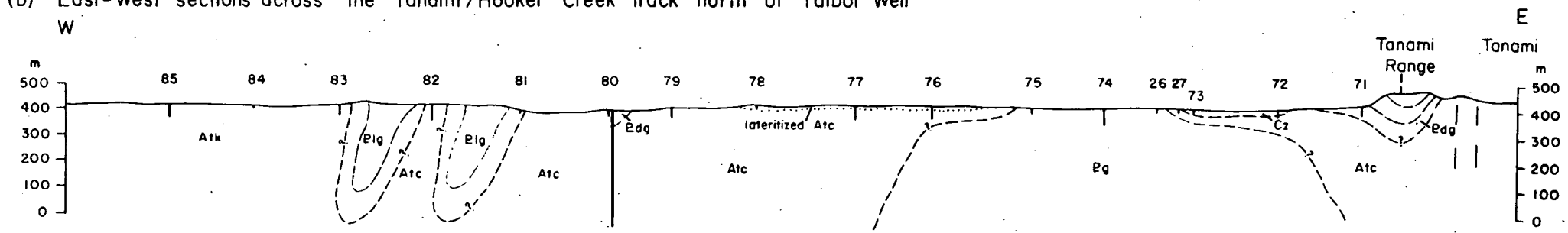
Fig.4 Geological sections along drilling lines, Tanami sheet area (for reference see Table 2 and Fig.3)



(a) Tanami / Hooker Creek track northeast and north from Coomarie Spring



(b) East-West sections across the Tanami/Hooker Creek track north of Talbot Well



(c) Tanami / Bililliuna road west from Tanami

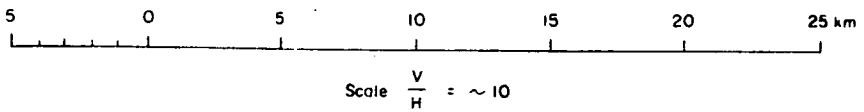


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Fig. 5 Geological sections along drilling lines, Tanami sheet area

(For reference see Table 2 and Fig 3)

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Talbot Well Formation or the upper part of the Gardiner Sandstone, and hole 33 bottomed at 3.7 m in breccia consisting of fragments of buff to maroon altered rock, possibly basalt, in a matrix of quartzose sandstone: this breccia may represent the base of the Antrim Plateau Volcanics, overlying sandstone and conglomerate of the Gardiner Sandstone, outcrops of which are present a few metres to the south.

All holes northeast and north of hole 33, except nos 44, 48, and 49, intersected basalt of the Antrim Plateau Volcanics. The basalt is overlain by up to 9 m of Cainozoic sand and lateritic ironstone, much of which is probably the upper part of a lateritic weathering profile developed on the basalt. Mottled maroon, reddish-brown, and white, soft lateritized basalt, in some holes over 15 m thick, underlies the ironstone and passes down into dark grey to greyish-maroon unweathered basalt. Three of the holes, nos 34, 38 and 40, passed through the basalt and bottomed in shale and sandstone of the Gardiner Sandstone. Hole 44, west of hole 42, penetrated gently dipping weathered shale underlying 6 m of Cainozoic sediments; the shale is probably part of the Gardiner Sandstone, although it may belong to the Lower Proterozoic Supplejack Downs Sandstone. Hole 49, situated in a depression west of the Tanami/Hooker Creek track, north of Talbot Well, penetrated 14 m of shale, probably part of the Gardiner Sandstone, beneath 11 m of Cainozoic sediments. Hole 48, east of the track, was drilled into similar shale that is lateritized to a depth of 14 m.

The Black Hills to the Wiso Basin (Fig. 4c)

Fifteen holes, nos 53 to 67, were drilled along an east-west line crossing the extensive sand plain between the Black Hills in the west and the most westerly outcrops of possibly Cambrian sedimentary rocks of the Wiso Basin succession in the east. As well as getting information on both the thickness of the Cainozoic cover and the type of bedrock present, it was also hoped to collect samples of sedimentary rocks suitable for palaeontological examination.

Two holes, nos 69 and 70, were drilled west of hole 53, on the narrow sand plain between the Black Hills and the Coomarie Range. The main purpose of these holes was to see if the rock underlying the sand differed significantly from that forming the nearest ridge of the Black Hills.

Along the line east of the Black Hills, the Cainozoic sediments intersected consist mainly of sand, with some lateritic ironstone. They are 2 to 6 m thick except in hole 66, where 3 m of sand overlies 8 m of clay. Sedimentary rocks of probably Cambrian age, consisting of limestone, dolomite, mudstone and clayey sandstone, were intersected in holes 61 to 67 and possibly also in hole 60, in which the limestone present may be Cambrian or Tertiary. Three of the holes, nos 60, 61 and 64, passed through these sedimentary rocks into basement; holes 60 and 61 bottomed in weathered granite and hole 64 bottomed in hornblende gabbro. Hole 62 bottomed in breccia consisting predominantly of the clay mineral palygorskite; the breccia may be part of the Wiso Basin succession or part of a Precambrian weathering profile developed on granite or other basement rocks. Core samples and cuttings of the sedimentary rocks have been examined by palaeontologists at BMR, but no fossils have been found, hence their inferred Cambrian age cannot be confirmed.

In the four holes closest to the Black Hills, nos 53 to 56, the Cainozoic sediments overlie Mount Charles Beds, which consist of basalt that has been intruded and thermally metamorphosed to amphibolite by granite. The granite underlies amphibolite in holes 55 and 56, and lies immediately beneath Cainozoic sediments in holes 57 and 58 to the east. The granite is lateritized or disaggregated from 4 m to more than 40 m below the present land surface.

The two holes on the west side of the Black Hills, nos 69 and 70, penetrated 48 m and 30 m respectively of weathered phyllitic shale, siltstone and greywacke of the Mount Charles Beds below 1 m and 5 m of Cainozoic sediments. No chert was intersected, but otherwise the beds are similar to those forming a ridge less than 1 km to the east.

Tanami/Billiluna road west of the Tanami Range (Fig 5c)

Along the Tanami/Billiluna road from the Tanami Range westward to the edge of the Tanami Sheet area outcrops of bedrock are restricted to ridges formed of Lower Proterozoic Pargee Sandstone 50 km west of Tanami and low mounds of much weathered phyllitic rocks belonging to the Killi Killi Beds, part of the Archaean? Tanami complex, to the west. Elsewhere the road crosses low rises capped by laterite and areas of sand plain. To establish the depth of lateritic weathering profiles on the low rises, the bedrock on which the profiles are developed, and the bedrock underlying the sand plain, 15 holes ranging in depth from 5.5 m to 62 m were drilled.

In the east, hole 71 penetrated flat-lying shale, siltstone and thin-bedded sandstone of the Gardiner Sandstone. The next hole drilled, hole 72, bottomed at 31 m in little weathered amphibolite beneath 16 m of much weathered amphibolite and 15 m of Cainozoic sand and lateritic ironstone; hole 73, only 5 m deep, passed through 2 m of sand into 3 m of Tertiary calcrete; hole 74 intersected 53 m of weathered granite, underlying 9 m of sand and lateritic ironstone; and hole 75 was terminated at 5.5 m in cemented coarse sand derived from granite. Between holes 73 and 74 are holes 26 and 27, at the southern end of the north-south drilling line crossing the Coomarie dome: hole 26 passed through 5 m of sand and 1 m of calcrete before penetrating 9 m of lateritised granite, and hole 27 bottomed at 11 m in weathered phyllitic tuff, part of the Mount Charles Beds, after passing through 6 m of superficial sediments.

Holes 76 to 79 were drilled into a low rise capped by laterite 5 to 8 m thick developed on Mount Charles Beds. Hole 76 penetrated highly weathered amphibolite before being cored at 42 m, in little weathered amphibolite, and the other three holes bottomed in weathered phyllitic rocks. Similar rocks of the Mount Charles Beds were also penetrated in holes 80 and 82, beneath 5 to 6 m of superficial sediments. Hole 81 terminated at 3.7 m in silicified quartz arenite of the Pargee Sandstone. The remaining three holes intersected Killi Killi Beds: hole 83 penetrated 28 m of weathered phyllite beneath 12 m of sand, hole 84 passed into silicified quartz arenite at 8 m beneath sand, and hole 85 penetrated 38 m of weathered greywacke covered by 1 m of sand.

The amphibolite intersected in holes 72 and 76 probably represents basic volcanics which were thermally metamorphosed during the emplacement of the Lower Proterozoic granite.

Conclusions

The stratigraphic drilling in the Tanami Sheet area shows that the core of the Coomarie dome is formed of granite which is covered by generally less than 5 m of sand and lateritic ironstone. The granite intrudes Mount Charles Beds, and is overlain by Gardiner Sandstone.

Northeast of Coomarie Spring up to 14 m of Cainozoic sand and lateritic ironstone overlies Talbot Well Formation, which occupies a broad structural basin. Laterite cappings on low rises between the basin and Supplejack Downs are mainly developed on basalt of the Antrim Plateau Volcanics. The basalt is

lateritized to depths of over 20 m in places, and it overlies Gardiner Sandstone, which here consists mainly of shale. It probably represents lava that flowed along the floor of a broad valley eroded in relatively unresistant shale.

East of the Black Hills the Cainozoic cover is generally less than 5 m thick, and consists of aeolian sand, lateritic ironstone, calcrete, and clay. It overlies weathered rocks of the Mount Charles Beds, granite, and sedimentary rocks inferred to be part of the Cambrian Wiso Basin succession. Basalt of the Mount Charles Beds has been intruded and thermally metamorphosed to amphibolite by the granite, which is overlain to the east by poorly consolidated, deeply weathered, and unfossiliferous Wiso Basin sediments.

West of the Tanami Range lateritic ironstone 5 to 8 m thick is developed on fine-grained phyllitic rocks and amphibolite which in places are weathered to depths of over 60 m. On the sand plain between laterite rises and rock outcrops the Cainozoic cover is generally less than 10 m thick, and overlies mainly readily eroded phyllitic rocks of the Mount Charles and Killi Killi Beds.

Details of stratigraphic holes

BMR Tanami 1

Location:	lat. 19° 40'36"S, long. 129° 46'18"E; alt., 390 m; claypan on E. side of Coomarie dome, 34 km N of Tanami.
Drilling data:	commenced and completed, 30 August 1971; depth, 35.6 m; drilled with air and water.
Cuttings:	0-5 m, dark reddish-brown weathered shale; Carpentarian Gardiner Sandstone. 5-30.5 m, maroon and pale grey mottled shale.
Core:	30.5-30.7 m, 100% recovery; maroon and pale greenish-grey banded and mottled shale dipping at 18°; Gardiner Sandstone.

BMR Tanami 2

Location:	lat. 19° 40'36"S, long. 129°45'00"E; alt., 395 m; E side of Coomarie dome, 34 km N of Tanami.

BMR Tanami 2 (cont.)

Drilling data:	commenced and completed, 30 August, 1971; depth, 35.6 m; drilled with air and water.
Cuttings:	0-6 m, reddish-brown sand, some mottling; Cainozoic 6-18 m, reddish-brown weathered shale; Carpentarian Gardiner Sandstone. 18-35.4 m, deep maroon shale.
Core:	35.4-35.6 m, 100% recovery; maroon and pale greenish-grey banded and mottled shale, flat-lying; Gardiner Sandstone.

BMR Tanami 3

Location:	lat. 19°40'30"S, long. 129°43'30"E; alt., 400 m; E side of Coomarie dome, 34 km N of Tanami.
Drilling data:	commenced, 27 August 1971; completed, 28 August 1971; depth, 33 m; drilled with air 0-4 m, water 4-33 m.
Cuttings:	0-3.7 m, reddish-brown sand; Cainozoic.
Core:	3.7-4.0 m, 100% recovery; limestone and chalcedony; Cainozoic calcrete
Cuttings:	4.0-8 m. coarse sand; Cainozoic. 8-30 m, pale brown sandy clay; Cainozoic. 30-32.9 m, maroon sandstone; Carpentarian Gardiner Sandstone
Core:	32.9-33.0 m, 100% recovery; greyish-maroon, poorly sorted sandstone, thin-section - sublithic arenite consisting of subangular clasts mainly of quartz but also of quartzite and fine-grained possibly volcanic rocks, with a quartz overgrowth cement and some iron-stained sericitic matrix; Gardiner Sandstone.

BMR Tanami 4

Location:	lat. 19°40'30"S, long. 129°41'30"E; alt., 415 m; Coomarie dome, 34 km N of Tanami.
Drilling data:	commenced and completed, 27 August 1971; depth, 32.3 m; drilled with air and water.

BMR Tanami 4 (cont.)

Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-20 m, bleached lateritized granite; Lower Proterozoic unnamed granite. 20-29 m, maroon lateritized granite 29-30 m, brown clay = weathered granite 30-32.0, disaggregated granite
Core:	32.0-32.3 m, 100% recovery; reddish-brown medium-grained weathered micaceous granite; unnamed granite.

BMR Tanami 5

Location:	lat. 19°40'24"S, long. 129°39'36"E; alt., 420 m; Coomarie dome, 34 km N of Tanami.
Drilling data:	commenced and completed, 26 August 1971; depth, 7.1 m; drilled with air.
Cuttings:	0-3 m, reddish-brown sand and lateritic ironstone; Cainozoic. 3-5 m, pale reddish-brown lateritized granite; Lower Proterozoic unnamed granite. 5-6.7 m, pale yellowish-brown lateritized granite
Core:	6.7-7.1 m, 100% recovery; mottled reddish-brown to white medium-grained lateritized granite; unnamed granite.

BMR Tanami 6

Location:	lat. 19°40'24"S, long. 129°37'42"E; alt., 420 m; Coomarie dome, 35 km NNW of Tanami.
Drilling data:	commenced and completed, 26 August 1971; depth, 5.8 m; drilled with air.
Cuttings:	0-3 m, reddish-brown sand and lateritic ironstone; Cainozoic. 3-5.5 m, reddish-brown to white mottled lateritized granite; Lower Proterozoic unnamed granite.
Core:	5.5-5.8 m, 100% recovery; reddish-brown to white mottled silicified and lateritized medium-grained granite; unnamed granite.

BMR Tanami 7

Location:	lat. 19°40'18"S, long. 129°35'54"E; alt., 415 m; Coomarie dome, 36 km NNW of Tanami.
Drilling data:	commenced and completed, 26 August 1971; depth, 5 m; drilled with air.
Cuttings:	0-3 m, reddish-brown sand and lateritic ironstone; Cainozoic. 3-4.9 m, lateritized granite; Lower Proterozoic unnamed granite.
Core:	4.9-5.0 m, 100% recovery; mottled and silicified lateritized granite; unnamed granite.

BMR Tanami 8

Location:	lat. 19°40'18"S, long. 129°34'12"E; alt., 405 m; Coomarie dome, 37 km NNW of Tanami.
Drilling data:	commenced and completed, 2 September 1971; depth, 12.2 m; drilled with air.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-11.6 m, lateritized granite; Lower Proterozoic unnamed granite.
Core:	11.6-12.2 m, 80% recovery; pale yellowish-brown lateritized medium-grained granite; unnamed granite

BMR Tanami 9

Location:	lat. 19°40'18"S, long. 129°32'34"E; alt., 400 m; Coomarie dome, 38 km NNW of Tanami.
Drilling data:	commenced and completed, 1 September 1971; depth, 51.8 m; drilled with air and water.
Cuttings:	0-3 m, reddish-brown sand; Cainozoic 3-6 m, lateritic ironstone; Cainozoic. 6-9 m, partly silicified lateritized granite; Lower Proterozoic unnamed granite. 9-35 m, clayey lateritized granite. 35-48.7 m, friable (disaggregated) granite.
Core:	48.7-51.8 m, 100% recovery; pale medium-grained, friable, micaceous granite; unnamed granite.

BMR Tanami 10

Location:	lat. 19°40'12"S, long. 129°30'30"E; alt., 390 m; Coomarie dome, 40 km NW of Tanami.
Drilling data:	commenced and completed, 1 September 1971; depth, 8.5 m; drilled with air.
Cuttings:	0-8.2 m, lateritic sand and ironstone; Cainozoic
Core:	8.2-8.5 m, lateritized granite; Lower Proterozoic unnamed granite.

BMR Tanami 11

Location:	lat. 19°40'06"S, long. 129°28'48"E; alt., 390 m; Coomarie dome, 43 km NW of Tanami.
Drilling data:	commenced and completed, 1 September 1971; depth, 7.9 m; drilled with air.
Cuttings:	0-3.0 m, reddish-brown sand; Cainozoic. 3-7.6 m, pale brown disaggregated granite; Lower Proterozoic unnamed granite.
Core:	7.6-7.9 m, 100% recovery; mottled maroon to white lateritized granite; unnamed granite.

BMR Tanami 12

Location:	lat. 19°40'06"S, long. 129°26'54"E; alt., 390 m; Coomarie dome, 45 km NW of Tanami.
Drilling data:	commenced 31 August 1971; completed 1 September 1971; depth, 29.4 m; drilled with air and water.
Cuttings:	0-2 m, reddish-brown sand; Cainozoic. 2-29.3 m, pale brown disaggregated granite; Lower Proterozoic unnamed granite.
Core:	29.3-29.4 m, 100% recovery; medium-grained granite, thin section - quartz, feldspar replaced by clay, iron-stained partly altered biotite and minor muscovite; unnamed granite.

BMR Tanami 13

Location:	lat. 19°40'00"S, long. 129°25'00"E; alt., 395 m; W side Coomarie dome, 47 km NW of Tanami.
Drilling data:	commenced and completed, 31 August 1971; depth, 43.6m; drilled with air and water.
Cuttings:	0-5 m, reddish-brown sand; Cainozoic. 5-14 m, limestone; Cainozoic calcrete 14-43.3 m, micaceous sand and sandy clay, disaggregated granite; Lower Proterozoic unnamed granite.
Core:	43.3-43.6 m, 100% recovery; medium-grained granite with quartz, altered feldspar and mica, also some vein quartz and greisen; unnamed granite.

BMR Tanami 14

Location:	lat. 19°40'00"S, long. 129°23'48"E; alt., 400 m; W side Coomarie dome, 48 km NW of Tanami.
Drilling data:	commenced and completed, 31 August 1971; depth, 14.9 m; drilled with air and water.
Cuttings:	0-12 m, iron-stained sand and gravel; Cainozoic. 12-14.6 m, weakly cemented iron-stained sand; Cainozoic.
Core:	14.6-14.9 m, 100% recovery; white, medium-grained, poorly sorted sublithic arenite containing maroon shale fragments; Carpentarian Gardiner Sandstone.

BMR Tanami 15

Location:	lat. 19°32'30"S, long. 129°35'54"E; alt., 415 m ; N side Coomarie dome, 50 km NNW of Tanami.
Drilling data:	commenced and completed, 2 September 1971; depth, 415 m; drilled with air.
Cuttings:	0-6 m, reddish-brown sand and lateritic ironstone; Cainozoic. 6-9 m, bleached weathered shale; Carpentarian Gardiner Sandstone 9-25.9 m, maroon shale.
Core:	25.9-26.2 m, maroon and pale greenish-grey banded shale, flat-lying; Gardiner Sandstone.

BMR Tanami 16

Location:	lat. 19°33'24"S, long. 129°35'54"E; alt., 420 m; N side Coomarie dome, 49 km NNW of Tanami.
Drilling data:	commenced, 2 September 1971; completed, 6 September 1971; depth, 80.8 m; drilled with water and air.
Cuttings:	0-5 m, reddish-brown lateritized shale; Carpentarian Gardiner Sandstone. 5-29.6 m, pale grey and maroon shale.
Core:	29.6-29.9 m, 90% recovery; maroon and pale grey, mottled and banded, partly micaceous shale, siltstone and fine sandstone, flat-lying, some joints with gypsum.
Cuttings:	29.9-81 m, maroon and pale grey shale; Gardiner Sandstone.

BMR Tanami 17

Location:	lat. 19°35'12"S, long. 129°35'54"E; alt., 400 m; Coomarie dome, 45 km NNW of Tanami.
Drilling data:	commenced and completed 7 September 1971; depth 11.3 m; drilled with air.
Cuttings:	0-3 m, reddish-brown sand and lateritic ironstone: Cainozoic 3-11.0 m, pale brown, lateritized granite; Lower Proterozoic unnamed granite.
Core:	11.0-11.3 m; 100% recovery; mottled maroon to white lateritized medium-grained granite, unnamed granite.

BMR Tanami 18

Location:	lat. 19°36'54"S, long. 129°35'54"E; alt., 395 m; Coomarie dome, 43 km NNW of Tanami.
Drilling data:	commenced and completed 7 September 1971; depth, 80.8 m; drilled with air and water.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-79.2 m, disaggregated (friable) granite, generally pale yellowish-brown, 4/3 x background radioactivity at 56 m; Lower Proterozoic unnamed granite.
Core:	79.2-80.8 m, 80% recovery; weathered medium-grained biotite granite; unnamed granite.

BMR Tanami 19

Location:	lat. 19°38'42"S, long. 129°35'54"E; alt., 405 m; Coomarie dome, 40 km NNW of Tanami.
Drilling data:	commenced and completed, 8 September 1971; depth, 9.8 m; drilled with air.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-9.4 m, pale brown lateritized granite; Lower Proterozoic unnamed granite.
Core:	9.4-9.8 m, 100% recovery; silicified and lateritized granite; unnamed granite.

BMR Tanami 20

Location:	lat. 19°42'00"S, long. 129°35'54"E; alt., 425 m; Coomarie dome, 34 km NNW of Tanami.
Drilling data:	commenced and completed, 8 September 1971; depth, 7.0 m; drilled with air.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-6.7 m, pale yellowish-brown lateritized granite; Lower Proterozoic unnamed granite.
Core:	6.7-7.0 m, 100% recovery; silicified lateritized granite; unnamed granite.

BMR Tanami 21

Location:	lat. 19°43'48"S, long. 129°35'54"E; alt., 430 m; Coomarie dome, 30 km NNW of Tanami.
Drilling data:	commenced and completed, 8 September 1971; depth, 7.0 m; drilled with air.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-6.7 m, yellowish-brown laterite; Cainozoic
Core:	6.7-7.0 m, 100% recovery; lateritized granite breccia; Lower Proterozoic unnamed granite.

BMR Tanami 22

Location:	lat. 19°45'30"S, long. 129°35'54"E; alt., 430 m; Coomarie dome, 28 km NW of Tanami.
Drilling data:	commenced and completed, 8 September 1971; depth, 12.2 m; drilled with air.
Cuttings:	0-6 m, reddish-brown sand and lateritic ironstone; Cainozoic. 6-9 m, yellowish-brown sand and lateritic ironsone; Cainozoic. 9-11.9 m, yellowish-brown lateritized granite; Lower Proterozoic unnamed granite.
Core:	11.9-12.2 m, 100% recovery; silicified lateritized medium-grained granite, unnamed granite.

BMR Tanami 23

Location:	lat. 19°47'12"S, long. 129°35'54"E; alt., 430 m; Coomarie dome, 25 km NW of Tanami.
Drilling data:	commenced and completed, 10 September 1971; depth, 52.1 m; drilled with air and water.
Cuttings:	0-9 m, reddish-brown sand and lateritic ironstone; Cainozoic. 9-20 m, bleached clayey and disaggregated granite; Lower Proterozoic unnamed granite. 20-51.8 m, yellowish-brown friable granite.
Core:	51.8-52.1 m, 100% recovery; quartz-veined greisenized granite; unnamed granite.

BMR Tanami 24

Location:	lat. 19°49'06"S, long. 129°35'54"E; alt., 420 m; Coomarie dome, 22 km NW Tanami.
Drilling data:	commenced and completed, 10 September 1971; depth, 11.0 m; drilled with air.
Cuttings:	0-4 m, reddish-brown sand and lateritic ironstone; Cainozoic 4-10.7 m, lateritized granite; Lower Proterozoic unnamed granite.
Core:	10.7-11.0 m, 100% recovery; maroon lateritized medium-grained granite; unnamed granite.

BMR Tanami 25

Location:	lat. 19°50'42"S, long. 129°35'54"E; alt., 415 m; Coomarie dome, 19 km NW of Tanami.
Drilling data:	commenced, 9 September 1971; completed 10 September 1971; depth, 48.8 m; drilled with air and water.
Cuttings:	0-8 m, reddish-brown sand and lateritic ironstone; Cainozoic. 8-23 m, reddish-brown, medium to fine-grained sand; Cainozoic. 23-29 m, pale olive-brown weathered gabbro; Lower Proterozoic unnamed granite. 29-30.5 m, olive green weathered gabbro.
Core:	30.5-30.8 m, 100% recovery; greenish-yellow altered gabbro.
Cuttings:	30.8-48.5 m, gabbro.
Core:	48.5-48.8 m, 100% recovery; medium-grained gabbro, thin section - zoned plagioclase largely altered to sericite, brown hornblende, colourless augite and orthopyroxene, minor brown biotite and opaque minerals; may be a basic dyke cutting unnamed granite.

BMR Tanami 26

Location:	lat. 19°52'30"S, long. 129°35'54"E; alt., 420 m; S side Coomarie dome, 17 km NW of Tanami.
Drilling data:	commenced and completed, 9 September 1971; depth, 15.5 m; drilled with air and water.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-6 m, maroon limestone; Cainozoic calcrete. 6-15.2 m, yellowish-brown weathered granite; Lower Proterozoic unnamed granite.
Core:	15.2-15.5 m, 100% recovery; silicified and lateritized medium-grained pink granite; unnamed granite.

BMR Tanami 27

Location:	lat. 19°53'06"S, long. 129°35'54"E; alt., 410 m; S side Coomarie dome, 16 km NW of Tanami.

BMR Tanami 27 (cont.)

Drilling data:	commenced and completed, 9 September 1971; depth, 11.3 m; drilled with air.
Cuttings:	0-3 m, reddish-brown sand; Cainozoic. 3-6 m, pale brown sand; Cainozoic. 6-11.0 m, reddish-brown to maroon lateritized 'tuff'; Archean? Mount Charles Beds.
Core:	11.0-11.3 m, 100% recovery; reddish-brown to maroon lateritized fine phyllitic 'tuff', cleavage dipping about 40°; Mount Charles Beds.

BMR Tanami 28

Location:	lat. 19°40'00"S, long. 129°47'36"E; alt., 395 m; 36 km NNE of Tanami.
Drilling data:	commenced and completed, 14 September 1971; depth, 10.75 m; drilled with air.
Cuttings:	0-6 m, reddish-brown sand and lateritic ironstone; Cainozoic. 6-10.7 m, chert; Carpentarian Talbot Well Formation.
Core:	10.7-10.75 m; 100% recovery; streaky maroon and pale grey chert and fine sandstone, brecciated; Talbot Well Formation.

BMR Tanami 29

Location:	lat. 19°38'42"S, long. 129°48'30"E; alt., 400 m; 39 km NNE of Tanami.
Drilling data:	commenced and completed, 14 September 1971; depth, 12.2 m; drilled with air.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-8 m, yellow-brown sand and lateritic ironstone; Cainozoic. 8-11.6 m, white limestone; probably Carpentarian Talbot Well Formation.
Core:	11.6-12.2 m; 100% recovery; friable white limestone; Talbot Well Formation.

BMR Tanami 30

Location:	lat. 19°37'30"S, long. 129°49'12"E; alt., 405 m; 41 km NNE Tanami.
Drilling data:	commenced and completed, 14 September 1971; depth, 9.2 m; drilled with air to 9.1 m, water 9.1-9.2 m.
Cuttings:	0-3 m, reddish-brown sand and lateritic ironstone: Cainozoic. 3-6 m, yellowish-brown sand and lateritic ironstone, Cainozoic. 6-9.1 m, chert; Carpentarian Talbot Well Formation.
Core:	9.1-9.2 m, 100% recovery, diamond bit; breccia of pale grey chert and maroon mudstone; Talbot Well Formation.

BMR Tanami 31

Location:	lat. 19°36'30"S, long. 129°50'18"E; alt., 410 m; 44 km NNE of Tanami.
Drilling data:	commenced and completed, 15 September 1971; depth, 27 m; drilled with air.
Cuttings:	0-9 m, reddish-brown sand and lateritic ironstone, Cainozoic. 9-14 m, yellowish-brown sand and lateritic ironstone, Cainozoic. 14-20 m, pale grey, partly iron-stained mudstone; Carpentarian Talbot Well Formation, 20-26.5 m, white sandstone.
Core:	26.5-27.0 m; 80% recovery; white to pale yellowish, well sorted, medium-grained quartz arenite; flat-lying; some limestone bands about 2 cm thick; Talbot Well Formation.

BMR Tanami 32

Location:	lat. 19°35'24"S, long. 129°51'30"E; alt., 420 m; 46 km NNE of Tanami, 8 km WSW of Talbot Well.
Drilling data:	commenced and completed, 15 September 1971; depth, 4.7 m; drilled with air and water.
Cuttings:	0-4.6 m, reddish-brown sand and lateritic ironstone; Cainozoic.

BMR Tanami 32 (cont.)

Core:	4.6-4.7 m; 100% recovery; diamond bit; maroon to pale grey, medium-grained silicified quartz arenite; Carpentarian Gardiner Sandstone or Talbot Well Formation.

BMR Tanami 33

Location:	lat. 19°34'42"S, long. 129°52'54"E; alt., 430 m; 5 km WSW of Talbot Well.
Drilling data:	commenced and completed, 15 September 1971; depth, 3.72 m; drilled with air and water.
Cuttings:	0-3.7 m, reddish-brown sand and lateritic ironstone; Cainozoic.
Core:	3.7-3.72 m, 100% recovery; lateritized breccia containing fragments of maroon and buff 'basalt' in quartzose sandstone matrix; probably base of Lower Cambrian Antrim Plateau Volcanics.

BMR Tanami 34

Location:	lat. 19°33'54"S, long. 129°54'00"E; alt., 425 m; 3 km WSW of Talbot Well.
Drilling data:	commenced and completed, 15 September 1971; depth, 15.8 m; drilled with air and water.
Cuttings:	0-8 m, reddish-brown sand and lateritic ironstone; Cainozoic. 8-9 m, reddish-brown lateritized basalt; Lower Cambrian Antrim Plateau Volcanics. 9-15.5 m, chocolate to reddish-brown banded weathered mudstone; probably Carpentarian Gardiner Formation.
Core:	15.5-15.8 m, 100% recovery; maroon weathered sandstone, thin section - fine-grained iron-stained lithic arenite containing clasts of quartz, subordinate feldspar, rock fragments, and accessory tourmaline, muscovite and opaque minerals, with quartz overgrowth cement; some micaceous bedding planes, flat-lying; probably Gardiner Formation.

BMR Tanami 35

Location:	lat. 19°33'12"S, long. 129°55'06"E; alt., 420 m; 1 km NW Talbot Well.
Drilling data:	commenced and completed, 16 September 1971; depth, 21.3 m; drilled with air 0-21.0 m, water 21.0-21.3 m.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-8 m, mottled maroon to white lateritized basalt; Lower Cambrian Antrim Plateau Volcanics. 8-21.0 m, bleached lateritized basalt.
Core:	21.0-21.3 m, 100% recovery; soft streaky and mottled maroon lateritized basalt; Antrim Plateau Volcanics.

BMR Tanami 36

Location:	lat. 19°32'06"S, long. 129°55'48"E; alt., 420 m; 3 km N of Talbot Well.
Drilling data:	commenced and completed, 16 September 1971; depth, 11.0 m; drilled with air.
Cuttings:	0-4.6 m, reddish-brown lateritic ironstone; Cainozoic.
Core:	4.6-4.9 m, 100% recovery; lateritic breccia with lateritized basalt fragments; Lower Cambrian Antrim Plateau Volcanics.
Cuttings:	4.9-10.7 m, maroon lateritized basalt. 10.7-11 m, grey basalt, Antrim Plateau Volcanics.

BMR Tanami 37

Location:	lat. 19°30'42"S, long. 129°56'06"E; alt., 425 m; 6 km N of Talbot Well.
Drilling data:	commenced and completed, 16 September 1971; depth, 11.6 m; drilled with air.
Cuttings:	0-4.6 m, reddish-brown lateritic ironstone; Cainozoic.
Core:	4.6-4.9 m, 100% recovery; lateritic breccia with fragments of lateritized basalt; Lower Cambrian Antrim Plateau Volcanics.

BMR Tanami 37 (cont.)

Cuttings: 4.9-11 m, maroon basalt.
11-11.6 m, grey basalt; Antrim Plateau Volcanics.

BMR Tanami 38

Location: lat. 19°29'12"S, long. 129°56'00"E; alt., 425 m; 9 km N of Talbot Well.

Drilling data: commenced and completed, 16 September 1971; depth, 29.2 m; drilled with water.

Cuttings: 0-9 m, reddish-brown lateritic ironstone; Cainozoic.
9-14 m, mottled reddish-brown and white lateritized basalt; Lower Cambrian Antrim Plateau Volcanics.
14-26 m, grey and maroon basalt; Antrim Plateau Volcanics.
26-29.0 m, pale grey and maroon soft mudstone; probably Carpentarian Gardiner Sandstone.

Core: 29.0-29.2 m, 80% recovery; vertical contact between flat-lying dark maroon shale and pale pinkish medium-grained lithic arenite, possibly filling a joint; probably Gardiner Sandstone.

BMR Tanami 39

Location: lat. 19°27'42"S, long. 129°56'18"E; alt., 425 m; 12 km N of Talbot Well.

Drilling data: commenced and completed, 17 September 1971; depth, 9.8 m; drilled with air.

Cuttings: 0-3 m, reddish-brown lateritic ironstone; Cainozoic.
3-9.5 m, mottled maroon and white lateritized basalt; Lower Cambrian Antrim Plateau Volcanics.

Core: 9.5-9.8 m, 100% recovery; greyish maroon basalt; Antrim Plateau Volcanics.

BMR Tanami 40

Location: lat. 19°26'06"S, long. 129°56'36"E; alt., 425 m; 15 km N of Talbot Well.

Drilling data: commenced and completed, 17 September 1971; depth, 38.6 m; drilled with water.

BMR Tanami 40 (cont.)

Cuttings:	0-5 m, reddish-brown lateritic ironstone; Cainozoic. 5-14 m, mottled maroon and white lateritized basalt; Lower Cambrian Antrim Plateau Volcanics. 14-21 m, red soft lateritized basalt. 21-26 m, grey basalt; Antrim Plateau Volcanics. 26-38.1 m, maroon and grey shaly mudstone; Carpentarian Gardiner Sandstone.
Core:	38.1-38.5 m, 100% recovery; maroon and pale grey banded shaly mudstone, flat-lying; Gardiner Sandstone.

BMR Tanami 41

Location:	lat. 19°24'30"S, long. 129°57'18"E; alt., 425 m; 18 km N of Talbot Well.
Drilling data:	commenced and completed, 17 September 1971; depth, 9.4 m; drilled with air.
Cuttings:	0-5 m, reddish-brown lateritic ironstone; Cainozoic. 5-8 m, pale maroon soft lateritized basalt; Lower Cambrian Antrim Plateau Volcanics. 8-9.1 m, grey basalt.
Core:	9.1-9.4 m, 100% recovery; dark greyish maroon basalt; Antrim Plateau Volcanics.

BMR Tanami 42

Location:	lat. 19°22'54"S, long. 129°57'48"E; alt., 425 m; 26 km N of Talbot Well.
Drilling Data:	commenced and completed, 20 September 1971; depth, 9.4 m; drilled with air.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-8 m, maroon lateritized basalt; Lower Cambrian Antrim Plateau Volcanics. 8-9.1 m, grey basalt.
Core:	9.1-9.4 m, 100% recovery; greyish-maroon basalt; Antrim Plateau Volcanics.

BMR Tanami 43

Location:	lat. 19°20'42"S, long. 129°58'24"E; alt., 430 m; 25 km N of Talbot Well.
Drilling data:	commenced and completed, 20 September 1971; depth, 12.5 m; drilled with air.
Cuttings:	0-2 m, reddish-brown sand and lateritic ironstone; Cainozoic. 2-12.2 m, grey basalt; Lower Cambrian Antrim Plateau Volcanics.
Core:	12.2-12.5 m, 100% recovery; dark greyish-maroon amygdaloidal basalt, with calcite in amygdales and veins; Antrim Plateau Volcanics.

BMR Tanami 44

Location:	lat. 19°24'30"S, long. 129°56'24"E; alt., 425 m; 18 km N of Talbot Well.
Drilling data:	commenced and completed, 20 September 1971; depth, 35.1 m; drilled with air 0-34.7 m, water 34.7-35.1 m.
Cuttings:	0-6 m, reddish-brown sand and lateritic ironstone; Cainozoic. 6-9 m, bleached lateritic shale; probably Carpentarian Gardiner Sandstone. 9-34.7 m, chocolate to reddish-brown soft shale.
Core:	34.7-35.1 m, 100% recovery; banded and mottled pale greenish grey and maroon shaly shale dipping about 5°; probably Gardiner Sandstone.

BMR Tanami 45

Location:	lat. 19°30'42"S, long. 129°52'30"E; alt., 450 m; 8 km NW of Talbot Well.
Drilling data:	commenced and completed, 21 September 1971; depth, 7.9 m; drilled with air 0-7.6 m, water 7.6-7.9 m.
Cuttings:	0-5 m, reddish-brown lateritic ironstone; Cainozoic. 5-7.6 m, maroon lateritized basalt; Lower Cambrian Antrim Plateau Volcanics.
Core:	7.6-7.9 m, 100% recovery; dark maroon basalt; Antrim Plateau Volcanics.

BMR Tanami 46

Location:	lat. 19°30'42"S, long. 129°54'18"E; alt., 440 m; 6 km NNW Talbot Well.
Drilling data:	commenced and completed, 22 September 1971; depth, 13.4 m; drilled with air.
Cuttings:	0-13.1 m, reddish-brown lateritized basalt; Lower Cambrian Antrim Plateau Volcanics.
Core:	13.1-13.4 m, 100% recovery; dark greyish-maroon basalt, thin section - normally zoned labradorite laths, augite and opaque minerals; Antrim Plateau Volcanics.

BMR Tanami 47

Locations:	lat. 19°30'42"S, long. 129°57'54"E; alt., 420 m; 7 km NE of Talbot Well.
Drilling data:	commenced and completed, 21 September 1971; depth, 24.7 m; drilled with air.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-24.4 m, maroon and white mottled soft lateritized basalt; Lower Cambrian Antrim Plateau Volcanics.
Core:	24.4-24.7 m, 100% recovery; greyish-maroon manganese-stained basalt; Antrim Plateau Volcanics.

BMR Tanami 48

Location:	lat. 19°30'48"S, long. 129°59'42"E; alt., 420 m; 9 km NE of Talbot Well.
Drilling data:	commenced and completed, 21 September 1971; depth, 16.8 m; drilled with air.
Cuttings:	0-12 m, reddish-brown lateritized shale; probably Carpentarian Gardiner Sandstone. 12-14 m, bleached shale. 14-16.5 m, maroon shale.
Core:	16.5-16.8 m, 100% recovery; maroon and pale grey shale and pale buff sandstone dipping about 10°, thin section - medium-grained silicified lithic arenite containing quartz, quartzite, mudstone and volcanic grains and accessory muscovite, zircon and tourmaline; Gardiner Sandstone.

BMR Tanami 49

Location:	lat. 19°30'42"S, long. 129°55'12"E; alt., 430 m; 6 km N of Talbot Well.
Drilling data:	commenced and completed, 22 September 1971; depth, 25.6 m; drilled with air and water.
Cuttings:	0-11 m, reddish-brown sand and lateritic ironstone; Cainozoic. 11-24 m, bleached lateritic shale; probably Carpentarian Gardiner Sandstone. 24-25.3 m, maroon mudstone.
Core:	25.3-25.6 m, 100% recovery; banded pale and dark maroon mudstone with some gypsum veins, flat-lying; probably Gardiner Sandstone.

BMR Tanami 50

Location:	lat. 19°40'36"S, long. 129°44'06"E; alt., 395 m; E side Coomarie dome, 34 km N of Tanami.
Drilling data:	commenced and completed, 22 September 1971; depth, 37.6 m; drilled with water.
Cuttings:	0-9 m, reddish-brown sand and lateritic ironstone; Cainozoic. 9-15 m, grey sticky clay; Cainozoic. 15-34 m, maroon, grey and chocolate shale; Carpentarian Gardiner Sandstone. 34-37.5 m. grey shale and medium-grained sandstone.
Core:	37.5-37.6 m, 100% recovery, diamond bit; maroon shale and thinly interbedded medium-grained sandstone, flat-lying, thin section - lithic arenite containing quartz, microcline, chlorite, green biotite, phyllite, muscovite, carbonate and tourmaline clasts with quartz and calcite cement, some gypsum on parting planes; Gardiner Sandstone.

BMR Tanami 51

Location:	lat. 19°40'30"S, long. 124°42'12"E; alt. 410 m; E side Coomarie dome, 34 km N of Tanami.
Drilling data:	commenced and completed, 23 September 1971; depth, 32.0 m; drilled with air and water.

BMR Tanami 51 (cont.)

Cuttings: 0-3 m, reddish-brown sand and lateritic ironstone; Cainozoic.
3-5 m, yellowish-brown lateritized granite with quartz and calcite veins; Lower Proterozoic unnamed granite.
5-8 m, yellowish-brown lateritized granite.
8-31.7 m, pale grey clayey weathered granite.

Core: 31.7-32.0 m, 100% recovery reddish-brown lateritized medium to fine-grained granite, unnamed granite.

BMR Tanami 52

Location: lat. 19°40'30"S, long. 129°42'42"E; alt., 405 m; E side Coomarie dome, 34 km N of Tanami.

Drilling data: commenced and completed, 23 September 1971; depth, 43.6 m; drilled with air and water.

Cuttings: 0-2 m, reddish-brown sand; Cainozoic.
2-11 m, reddish-brown lateritized granite; Lower Proterozoic unnamed granite.
11-43.3 m, friable weathered granite.

Core: 43.3-43.6 m, 100% recovery; fine to medium-grained pink leucocratic granite cut by vein of pegmatitic quartz, pink feldspar and muscovite; unnamed granite.

BMR Tanami 53

Location: lat. 19°50'12"S, long. 129°52'06"E; alt., 425 m; E of the Black Hills, 23 km NE of Tanami.

Drilling data: commenced and completed, 5 October 1971; depth, 7.6 m; drilled with water; no core.

Cuttings: 0-2 m, reddish-brown sand and lateritic ironstone; Cainozoic.
2-7.6 m, dark grey fine amphibolite; Archaean? Mount Charles Beds.

BMR Tanami 54

Location: lat. 19°50'24"S, long. 129°53'06"E; alt., 420 m; E of the Black Hills, 24 km NE of Tanami.

BMR Tanami 54 (cont.)

Drilling data:	commenced and completed, 5 October 1971; depth, 17.1 m; drilled with water.
Cuttings:	0-3 m, reddish-brown sand and lateritic ironstone; Cainozoic. 3-16.8 m, dark grey amphibolite, bleached altered granite, and maroon leucocratic granite; Archaean? Mount Charles Beds and Lower Proterozoic unnamed granite.
Core:	16.8-17.1 m, 100% recovery; dark grey amphibolite, bleached altered granite, and maroon fine aplitic granite, thin section of aplitic granite - fine-grained adamellite consisting of quartz, sodic plagioclase, orthoclase, muscovite, chloritized biotite, and minor iron oxide and calcite; Mount Charles Beds and unnamed granite.

BMR Tanami 55

Location:	lat. 19°50'24"S, long. 129°54'54"E; alt., 415 m; E of the Black Hills, 27 km NE of Tanami.
Drilling data:	commenced and completed, 4 October 1971; depth, 42.8 m; drilled with air.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-12 m, maroon lateritized basalt; Archaean? Mount Charles Beds. 12-21 m, reddish-brown and purple lateritized basalt or amphibolite Mount Charles Beds. 21-42.7 m, disaggregated friable pinkish granite; Lower Proterozoic unnamed granite.
Core:	42.7-42.8 m, 100% recovery; vein quartz and medium to coarse friable granite; unnamed granite.

BMR Tanami 56

Location:	lat. 19°50'24"S, long. 129°56'42"E; alt., 405 m; E of the Black Hills, 30 km NE of Tanami.
Drilling data:	commenced and completed, 4 October 1971; depth, 25.0 m; drilled with air.

BMR Tanami 56 (cont.)

Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-9 m, yellowish-brown soft lateritic basalt; Archaean? Mount Charles Beds. 9-21 m, dark grey amphibolite; Mount Charles Beds. 21-24.7 m, maroon and white mottled granite; Lower Proterozoic unnamed granite.
Core:	24.7-25.0 m, 100% recovery; pink medium-grained leucocratic weathered granite; unnamed granite.

BMR Tanami 57

Location:	lat. 19°50'30"S, long. 129°58'30"E; alt., 400 m; E of the Black Hills, 32 km ENE of Tanami.
Drilling data:	commenced and completed, 4 October 1971; depth, 30.8 m; drilled with air.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-9 m, pale yellowish lateritized granite; Lower Proterozoic unnamed granite. 9-24 m, reddish-brown lateritized granite. 24-30.5 m, reddish-brown to white mottled lateritized granite.
Core:	30.5-30.8, 100% recovery; maroon and white mottled lateritized granite, medium-grained; unnamed granite.

BMR Tanami 58

Location:	lat. 19°50'30"S, long. 130°00'06"E; alt., 395 m; E of the Black Hills, 35 km ENE of Tanami.
Drilling data:	commenced and completed, 2 October 1971; depth, 7.9 m; drilled with air.
Cuttings:	0-3 m, reddish-brown sand and lateritic ironstone; Cainozoic. 3-7.6 m, maroon lateritized granite; Lower Proterozoic unnamed granite.
Core:	7.6-7.9 m, 100% recovery; maroon and white mottled lateritized granite; unnamed granite.

BMR Tanami 59

Location:	lat. 19°50'30"S, long. 130°02'18"E; alt., 390 m; E of the Black Hills, 38 km ENE of Tanami.
Drilling data:	commenced and completed, 28 September 1971; depth, 4.6 m; drilled with air.
Cuttings:	0-3 m, reddish-brown sand and lateritic ironstone; Cainozoic. 3-4.3 m, weathered granite; Lower Proterozoic unnamed granite.
Core:	4.3-4.6 m, 100% recovery; medium-grained biotite granite containing feldspar phenocrysts up to 1 cm across; biotite is altered to chlorite; unnamed granite.

BMR Tanami 60

Location:	lat. 19°50'30"S, long. 130°04'06"E; alt., 390 m; E of the Black Hills, 41 km ENE of Tanami.
Drilling data:	commenced and completed, 28 September 1971; depth, 20.4 m; drilled with air.
Cuttings:	0-3 m, reddish-brown sand; Cainozoic. 3-5 m, white limestone; probably Cainozoic calcrete but possibly Cambrian. 5-20.1 m, weathered granite; Lower Proterozoic unnamed granite.
Core:	20.1-20.4 m, 100% recovery; pale pink porphyritic medium to fine-grained granite, thin section - phenocrysts about 5 mm across of microcline and sodic plagioclase in groundmass of quartz, microcline, brown biotite and accessory apatite, epidote, sphene and zircon; unnamed granite.

BMR Tanami 61

Location:	lat. 19°50'30"S, long. 130°05'54"E; alt., 380 m; W side Wiso Basin, 44 km ENE of Tanami.
Drilling data:	commenced and completed, 28 September 1971; depth, 39.7 m; drilled with air and water.

BMR Tanami 61 (cont.)

Cuttings:	0-4 m, reddish-brown sand; Cainozoic. 4-6 m, pale brown sand; Cainozoic. 6-15 m, chocolate brown mudstone; Cambrian? 15-16 m, chert; Cambrian? 16-39.6 m, disaggregated granite; Lower Proterozoic unnamed granite.
Core:	39.6-39.7 m, 50% recovery; medium-grained weathered granite; unnamed granite.

BMR Tanami 62

Location:	lat. 19°50'30"S, long. 130°07'47"E; alt., 370 m; W side Wiso Basin, 46 km ENE of Tanami.
Drilling data:	commenced and completed, 29 September 1971; depth, 36.7 m; drilled with air 0-21 m, water 21-36.7 m.
Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-21.3 m, pale yellowish-brown mudstone; Cambrian?
Core:	21.3-21.6 m; 100% recovery; pale brown cellular clayey sandstone; Cambrian?
Cuttings:	21.6-36.6 m, pale reddish-brown mudstone and sandstone; Cambrian?
Core:	36.6-36.7 m, 100% recovery; diamond bit; breccia of angular brown fragments in hard pinkish matrix, 5/3 x background radioactive anomaly, thin section - rounded to angular grains up to 4 mm across of quartz, opaque minerals, and minor tourmaline, zircon, quartzite and microcline in abundant matrix of palygorskite (confirmed by X.R.D. determination); Cambrian or altered Lower Proterozoic unnamed granite.

BMR Tanami 63

Location:	lat. 19°50'30"S, long. 130°09'42"E; alt., 360 m; W side Wiso Basin, 150 km ENE of Tanami.
Drilling data:	commenced, 29 September 1971; completed, 30 September 1971; depth, 62.8 m; drilled with air 0-34 m, water 34-62.8 m.

BMR Tanami 63 (cont.)

Cuttings:	0-5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5-26 m, pale brown mudstone; Cambrian? 26-62.5 m, brown weathered greisenized granite; Lower Proterozoic unnamed granite.
Core:	62.5-62.8 m, 100% recovery; pink medium to fine-grained greisenized granite, thin section - mosaic of quartz, muscovite, seritic aggregates (after feldspar), and accessory biotite, iron oxide, apatite, and tourmaline; unnamed granite.

BMR Tanami 64

Location:	lat. 19°50'24"S, long. 130°11'18"E; alt., 350 m; W side Wiso Basin 53 km ENE of Tanami.
Drilling data:	commenced, 30 September 1971; completed, 1 October 1971; depth, 53.9 m; drilled with air 0-26 m, water 26-53.9 m.
Cuttings:	0 - 3 m, reddish-brown sand; Cainozoic. 3 - 24 m, pale buff limestone; Cambrian? 24-53.3 m, maroon weathered gabbro; Lower Proterozoic unnamed granite.
Core:	53.3-53.9, 100% recovery; medium grained hornblende gabbro, thin section - plagioclase largely altered to sericite and clay, brown hornblende partly replaced by pale green amphibole, and accessory brown biotite, apatite, opaque minerals and interstitial quartz; may be basic dyke cutting unnamed granite.

BMR Tanami 65

Location:	lat. 19°50'24"S, long. 130°13'12"E; alt., 330 m; W side Wiso Basin, 56 km ENE of Tanami.
Drilling data:	commenced and completed, 6 October 1971; depth, 67.4 m; drilled with water.
Cuttings:	0 - 2 m, reddish-brown sand; Cainozoic. 2 - 21 m, maroon limestone; Cainozoic calcrete or Cambrian? 21 - 67.1 m, pale buff clayey mudstone; Cambrian?
Core:	67.1 - 67.4 m, 100% recovery; white to iron-stained friable sandy dolomite; Cambrian?

BMR Tanami 66

Location:	lat. 19°50'24"S, long. 130°15'00"E,; alt., 315 m; W side Wiso Basin, 59 km ENE of Tanami.
Drilling data:	commenced and completed, 7 October 1971; depth, 31.1 m; drilled with mud.
Cuttings:	0 - 3 m, reddish-brown sand; Cainozoic. 3 - 11 m, pale grey clay; Cainozoic. 11 - 12 m, maroon mudstone; Cambrian? 12 - 30.8 m, pale grey clayey mudstone; Cambrian?
Core:	30.8 - 31.1 m, 100% recovery; white to brown mottled friable clayey sandstone (X.R.D. determination); Cambrian?

BMR Tanami 67

Location:	lat. 19°50'24"S, long. 130°16'48"E; alt., 315 m; W side of Wiso Basin, 62 km ENE of Tanami.
Drilling data:	commenced and completed, 7 October 1971; depth, 47 m; drilled with air 0 - 4.6 m, water 4.6 - 4.7 m.
Cuttings:	0 - 4.6 m, reddish-brown sand; Cainozoic.
Core:	4.6 - 4.7 m, 100% recovery; diamond bit; white cellular very fine-grained dolomite with some quartz (confirmed by X.R.D. determination); Cambrian?

BMR Tanami 68

Location:	lat. 19°52'18"S, long. 129°35'36"E; alt., 420 m; S side of Coomarie dome, 17 km NW of Tanami.
Drilling data:	commenced and completed, 14 October 1971; depth, 43.9 m; drilled with air 0 - 43.6 m, water 43.6 - 43.9 m.
Cuttings:	0 - 15 m, yellowish-brown weathered amphibolite; Archaean? Mount Charles Beds.
Core:	43.6 - 43.9 m, 100% recovery; diamond bit; dark grey fine-grained amphibolite, some iron-staining, thin section - aggregate of green to bluish-green amphibole with minor quartz, altered feldspar, and opaque granules; probably metamorphosed basalt, Mount Charles Beds.

BMR Tanami 69

Location:	lat. 19°50'24"S, long. 129°47'30"E; alt., 420 m; W side of the Black Hills, 17 km NNE of Tanami.
Drilling data:	commenced and completed, 5 October 1971; depth, 49.1 m; drilled with air.
Cuttings:	0 - 1 m, reddish-brown sand, some chert fragments; Cainozoic. 1 - 48.8 m, brown weathered phyllitic shale and fine-grained micaceous greywacke; Archaean? Mount Charles Beds.
Core:	48.8 - 49.1 m, 100% recovery; purple phyllitic shale and fine-grained micaceous greywacke, thin section - greywacke consists of quartz (less than 50%), muscovite and minor tourmaline in abundant iron-stained sericitic matrix; Mount Charles Beds.

BMR Tanami 70

Location:	lat. 19°50'30"S, long. 129°46'54"E; alt., 420 m; W side of the Black Hills, 17 km NNE of Tanami.
Drilling data:	commenced and completed, 5 October 1971; depth, 35.7 m; drilled with air.
Cuttings:	0 - 5 m, reddish-brown sand; Cainozoic. 5 - 35.1 m, maroon phyllite; Archaean? Mount Charles Beds.
Core:	35.1 - 35.7 m, 50% recovery; contorted phyllitic shale, siltstone and fine greywacke; dips 45° to 70°; Mount Charles Beds.

BMR Tanami 71

Location:	lat. 19°56'06"S, long. 129°39'48"E; alt., 430 m; N side Tanami Range, 7 km NW of Tanami.
Drilling data:	commenced, 13 October 1971; completed, 14 October 1971; depth, 44.6 m; drilled with air 0 - 7.6 m, water 7.6 - 44.6 m.
Cuttings:	0 - 2 m, reddish-brown sand and lateritic ironstone; Cainozoic. 2 - 7.6 m, maroon shale; Carpentarian Gardiner Sandstone.

BMR Tanami 71 (cont.)

Core:	7.6 - 7.9 m, 100% recovery; thin-bedded maroon and pale greenish-grey shale, siltstone, and sandstone (sublithic arenite); flat-lying; Gardiner Sandstone.
Cuttings:	7.9 - 44.2 m, maroon shale.
Core:	44.2 - 44.6 m, 100% recovery; flat-lying maroon micaceous shale; Gardiner Sandstone.

BMR Tanami 72

Location:	lat. 19°54'24"S, long. 129°38'24"E; alt., 410 m; Billiluna road SE of Coomarie dome, 11 km NW of Tanami.
Drilling data:	commenced, 12 October 1971; completed, 13 October 1971; depth, 31.4; drilled with water.
Cuttings:	0 - 15 m, reddish-brown sand and lateritic ironstone; Cainozoic. 15 - 31.1 m, brown weathered amphibolite; Archaean Mount Charles Beds.
Core:	31.1 - 31.4 m, 100% recovery; dark bluish grey amphibolite, thin section - feathery mosaic of pale green amphibole, with swallow-tailed microlites of plagioclase and granules of iron oxide and leucoxene; metamorphosed basalt of the Mount Charles Beds.

BMR Tanami 73

Location:	lat. 19°53'00"S, long. 129°36'24"E; alt., 405 m; Billiluna road S of Coomarie dome, 15 km NW of Tanami.
Drilling data:	commenced and completed, 12 October 1971; depth, 4.9 m; drilled with air.
Cuttings:	0 - 2 m, reddish-brown sand; Cainozoic. 2 - 4.6 m, pale buff limestone; Cainozoic calcrete.
Core:	4.6 - 4.9 m, 100% recovery; pale buff limestone; Cainozoic calcrete.

BMR Tanami 74

Location:	lat. 19°51'54"S, long. 129°34'24"E; alt., 405 m; Billiluna road S of Coomarie dome, 19 km NW of Tanami.

BMR Tanami 74 (cont.)

Drilling data:	commenced, 11 October 1971; completed, 12 October 1971; depth, 62.5 m; drilled with water.
Cuttings:	0 - 9 m, reddish-brown sand and lateritic ironstone; Cainozoic. 9 - 62.2 m, weathered highly sericitic altered granite; Lower Proterozoic unnamed granite.
Core:	62.2 - 62.5 m, 100% recovery; pale mauve and pink sericitic altered granite cut by quartz veinlets, thin section - granite consists of quartz, sericitized feldspar, some of which forms euhedral phenocrysts up to 5 mm across, and mica replaced by sericite and iron oxide; unnamed granite.

BMR Tanami 75

Location:	lat. 19°52'30"S, long. 129°32'06"E; alt., 410 m; Billiluna road S of Coomarie dome, 22 km NW of Tanami.
Drilling data:	commenced and completed, 11 October 1971; depth, 5.5 m; drilled with air.
Cuttings:	0 - 5.2 m, reddish-brown sand; Cainozoic.
Core:	5.2 - 5.5 m, 100% recovery; cemented ferruginous medium to coarse quartzose sand; Cainozoic, locally derived from granite.

BMR Tanami 76

Location:	lat. 19°52'48"S, long. 129°29'24"E; alt., 415 m; Billiluna road 25 km WNW of Tanami.
Drilling data:	commenced and completed, 11 October 1971; depth, 42.4 m; drilled with air.
Cuttings:	0 - 8 m, reddish-brown sand and lateritic ironstone; Cainozoic. 8 - 42.1 m; soft weathered amphibolite; Archaean? Mount Charles Beds.
Core:	42.1 - 42.4 m, 100% recovery; grey partly iron-stained medium to fine-grained amphibolite, thin section - metamorphosed basalt consisting of bluish-green amphibole, plagioclase altered to clay, opaque granules, and some intersitial quartz; Mount Charles Beds.

BMR Tanami 77

Location:	lat. 19°54'12"S, long. 129°27'12"E; alt., 425 m; Billiluna road S of Coomarie dome, 28 km WNW of Tanami.
Drilling data:	commenced and completed, 14 October 1971; depth, 56.7 m; drilled with air.
Cuttings:	0 - 8 m, reddish-brown sand and lateritic ironstone; Cainozoic. 8 - 27 m, yellowish-brown weathered phyllite; Archaean? Mount Charles Beds. 27 - 56.4 m, reddish-brown weathered phyllite.
Core:	56.4 - 56.7 m, 100% recovery; buff and grey weathered phyllite; Mount Charles Beds.

BMR Tanami 78

Location:	lat. 19°54'30"S, long. 129°24'54"E; alt., 415 m; Billiluna road 32 km WNW of Tanami.
Drilling data:	commenced and completed, 14 October 1971; depth, 5.5 m; drilled with air 0 - 5.2 m, water 5.2 - 5.5 m.
Cuttings:	0 - 5.2 m, lateritic ironstone; Cainozoic.
Core:	5.2 - 5.5 m, 100% recovery; breccia consisting of angular fragments of yellowish-brown phyllite in brown ironstone cement; Archaean? Mount Charles Beds.

BMR Tanami 79

Location:	lat. 19°54'24"S, long. 129°22'42"E; alt., 410 m; Billiluna road 36 km WNW of Tanami.
Drilling data:	commenced, 14 October 1971; completed, 15 October 1971; depth, 36.9 m; drilled with air.
Cuttings:	0 - 5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5 - 36.6 m, yellowish-brown weathered phyllitic tuff, becomes darker and purplish with depth; Archaean? Mount Charles Beds.
Core:	36.6 - 36.9 m, 100% recovery; maroon phyllitic sandy tuff; Mount Charles Beds.

BMR Tanami 80

Location:	lat. 19°53'36"S, long. 129°20'48"E; alt., 400 m; Billiluna road 40 km WNW of Tanami.
Drilling data:	commenced and completed, 16 October 1971; depth, 17.1 m; drilled with air.
Cuttings:	0 - 6 m, reddish-brown sand and lateritic ironstone; Cainozoic. 6 - 16.8 m, brown weathered phyllitic tuff; Archaean? Mount Charles Beds.
Core:	16.8 - 17.1 m, 100% recovery; maroon phyllitic fine-grained sandy tuff, thin section - mainly sericite and iron oxide, with about 5% quartz grains; Mount Charles Beds.

BMR Tanami 81

Location:	lat. 19°53'18"S, long. 129°18'24"E; alt., 395 m; Billiluna road 44 km W of Tanami.
Drilling data:	commenced and completed, 16 October 1971; depth, 3.8 m; drilled with air, 0 - 3.7 m, water 3.7 - 3.8 m.
Cuttings:	0 - 3.7 m, reddish-brown sand and lateritic ironstone; Cainozoic.
Core:	3.7 - 3.8 m, 100% recovery; diamond bit; lateritic breccia and pinkish medium-grained sandstone (quartz arenite); Lower Proterozoic Pargee Sandstone.

BMR Tanami 82

Location:	lat. 19°53'24"S, long. 129°15'54"E; alt., 410 m; Billiluna road 48 km W of Tanami.
Drilling data:	commenced and completed, 15 October 1971; depth, 58 m; drilled with water; no core.
Cuttings:	0 - 5 m, reddish-brown sand and lateritic ironstone; Cainozoic. 5 - 35 m, yellowish-brown weathered phyllitic tuff; Archaean? Mount Charles Beds. 35 - 58 m, grey phyllite and phyllitic sandy tuff; Mount Charles Beds.

BMR Tanami 83

Location:	lat. 19°54'00"S, long. 129°13'12"E; alt., 410 m; Billiluna road 52 km W of Tanami.

BMR Tanami 83 (cont.)

Drilling data: commenced and completed, 15 October 1971; depth, 40 m; drilled with water; no core.

Cuttings: 0 - 12 m, reddish-brown sand; Cainozoic.
12 - 21 m, pale yellowish-brown weathered phyllite; Archaean? Killi Killi Beds.
21 - 38 m, reddish-brown weathered phyllite.
38 - 40 m, maroon to reddish-brown soft weathered phyllite; Killi Killi Beds.

BMR Tanami 84

Location: lat. 19°53'42"S, long. 129°10'54"E; alt., 415 m; Billiluna road 56 km W of Tanami.

Drilling data: commenced and completed, 15 October 1971; depth, 9.3 m; drilled with air 0 - 9.1 m, water 9.1 - 9.3 m.

Cuttings: 0 - 8 m, reddish-brown sand; Cainozoic.
8 - 9.1 m, maroon sandstone; Archaean? Killi Killi Beds.

Core: 9.1 - 9.3 m; 100% recovery; diamond bit; maroon medium-grained silicified sandstone, thin section - quartz arenite containing grains of quartz (over 90% of rock), quartzite, siltstone, and zircon, cemented by quartz; Killi Killi Beds.

BMR Tanami 85

Location: lat. 19°54'00"S, long. 129°08'36"E; alt., 410 m; Billiluna road 60 km W of Tanami.

Drilling data: commenced and completed, 15 October 1971; depth, 36.9 m; drilled with air.

Cuttings: 0 - 1 m, reddish-brown sand; Cainozoic.
1 - 36.6 m, reddish-brown to maroon weathered greywacke; Archaean? Killi Killi Beds.

Core: 36.6 - 36.9 m, 100% recovery; maroon to brown fine-grained phyllitic (and possibly tuffaceous) greywacke, thin section - consists of quartz grains (about 10% of rock), muscovite, sericite-iron oxide aggregates and minor tourmaline in sericitic matrix; Killi Killi Beds.

THE GRANITES SHEET AREA

Stratigraphic holes in The Granites Sheet area (Fig. 6) were drilled along or close to the road connecting Balgo Mission to the west with Chilla Well to the east, passing by Pommies Knob. Mongrel Downs, and Sangsters Bore; along the road connecting Tanami to the north with Chilla Well, passing through Rabbit Flat and The Granites; along the track between Mongrel Downs and Rabbit Flat; and along the track between Pommies Knob and Macfarlanes Peak Bore to the northeast. Most of the drilling was undertaken to find out the thickness of the Cainozoic cover and the identity of the underlying bedrock. However, some holes in the west were drilled to obtain, for palaeontological examination, cores of unweathered sediments of the Lucas Formation, thought to be Palaeozoic, and two holes were drilled to establish the relationship of the Pedestal Beds, also thought to be Palaeozoic, to the Cambrian Antrim Plateau Volcanics.

Balgo Mission/Chilla Well road (Figs 7a, 7b, 7c)

Fourteen stratigraphic holes were drilled along the section of the Balgo Mission/Chilla Well road that crosses The Granites Sheet area. The four most westerly holes, nos 29, 1, 2, and 3, penetrated mudstone, siltstone, and sandstone of the Lucas Formation. Hole 29 passed through less than 1 m of superficial sand and 42 m of weathered Lucas Formation before being cored at 43 m in unweathered mudstone of the same formation. In hole 1, drilled on the flat top of a low rise capped by laterite, 6 m of sand and lateritic ironstone overlies 9 m of lateritized soft mottled clayey sandstone and mudstone. Holes 2 and 3 penetrated 27 and 22 m respectively of Lucas Formation, the upper 3 m of which was slightly weathered; in both these holes the Lucas Formation is covered by a few centimetres of sand. Cores from holes 2 and 3 have been examined for microfossils, but yielded only a possible unidentifiable spore and some minute spheres of uncertain affinities, indicating however, that the Lucas Formation may be Palaeozoic rather than Proterozoic.

Holes 6 and 26, between Ferdies Bore and Mongrel Downs, were drilled to establish the stratigraphic relationship of the Pedestal Beds to the Cambrian Antrim Plateau Volcanics. Hole 6, drilled in 1972, encountered maroon weathered basalt underlying a few centimetres of Cainozoic sand; it was continued to a depth of 17 m, the lower 8 m being through unweathered basalt. Hole 26, drilled in 1973, passed through 21 m of friable flaggy siltstone and fine sandstone belonging to the Pedestal Beds and continued 5 m into porphyritic basalt: the upper 3 m of basalt is slightly weathered

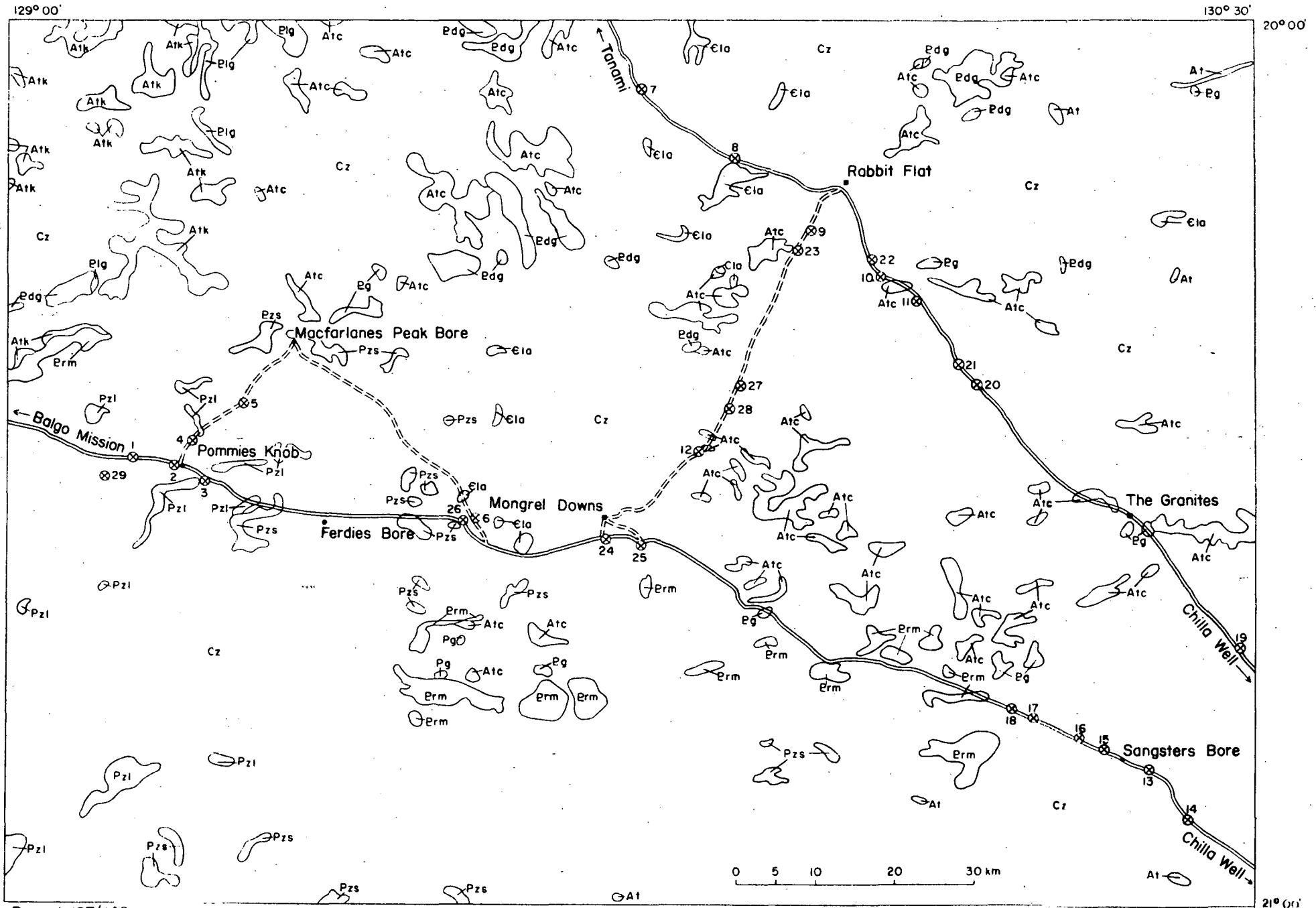
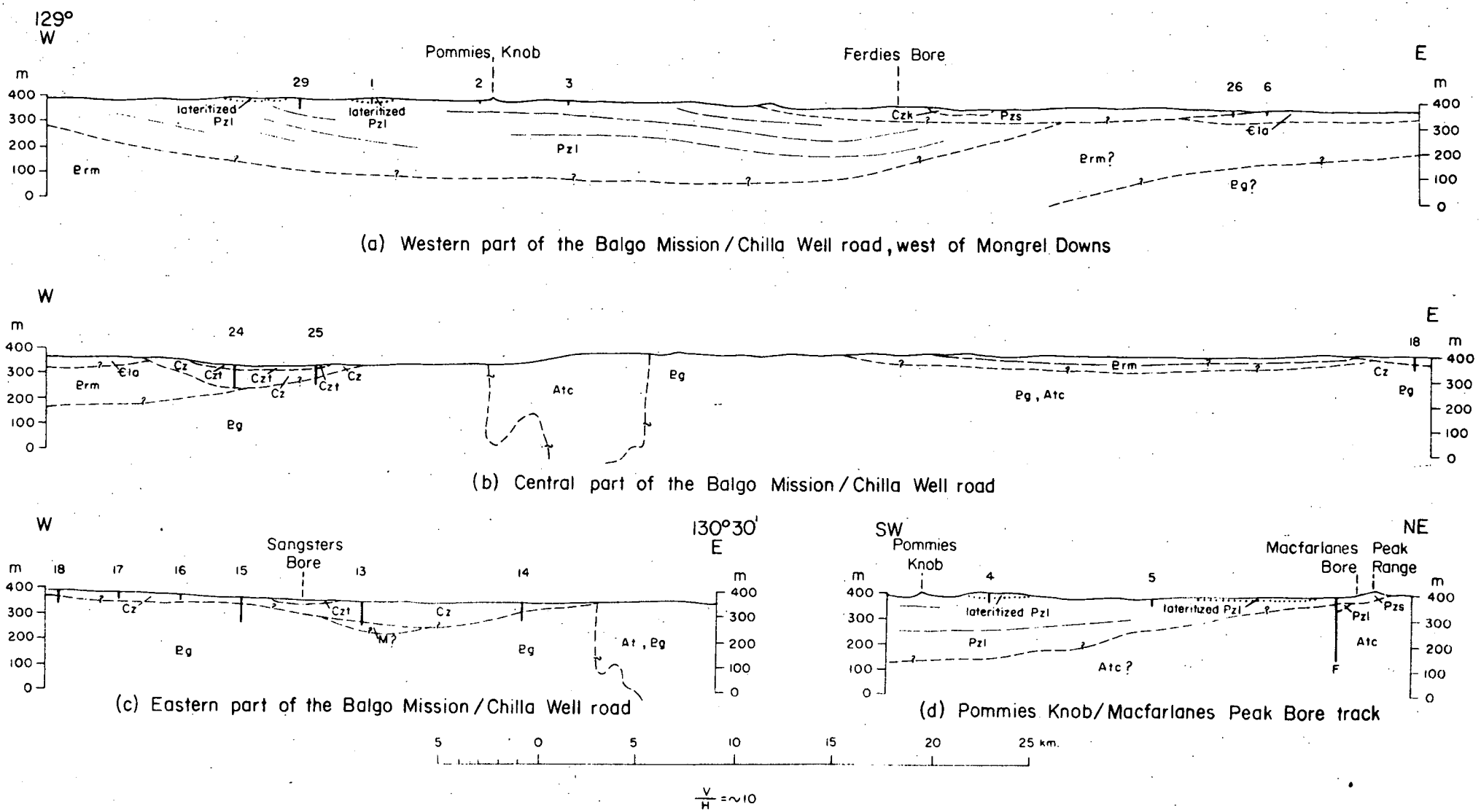


Fig. 6 The Granites sheet area, showing outcrops of pre-Cainozoic rocks and positions of stratigraphic holes.

(For reference see Table 2 and Fig. 3)



(a) Western part of the Balgo Mission / Chilla Well road, west of Mongrel Downs

(b) Central part of the Balgo Mission / Chilla Well road

(c) Eastern part of the Balgo Mission / Chilla Well road

(d) Pommies Knob / Macfarlanes Peak Bore track

Fig. 7 Geological sections along drilling lines, The Granites sheet area
(For reference see Table 2 and Fig. 3)

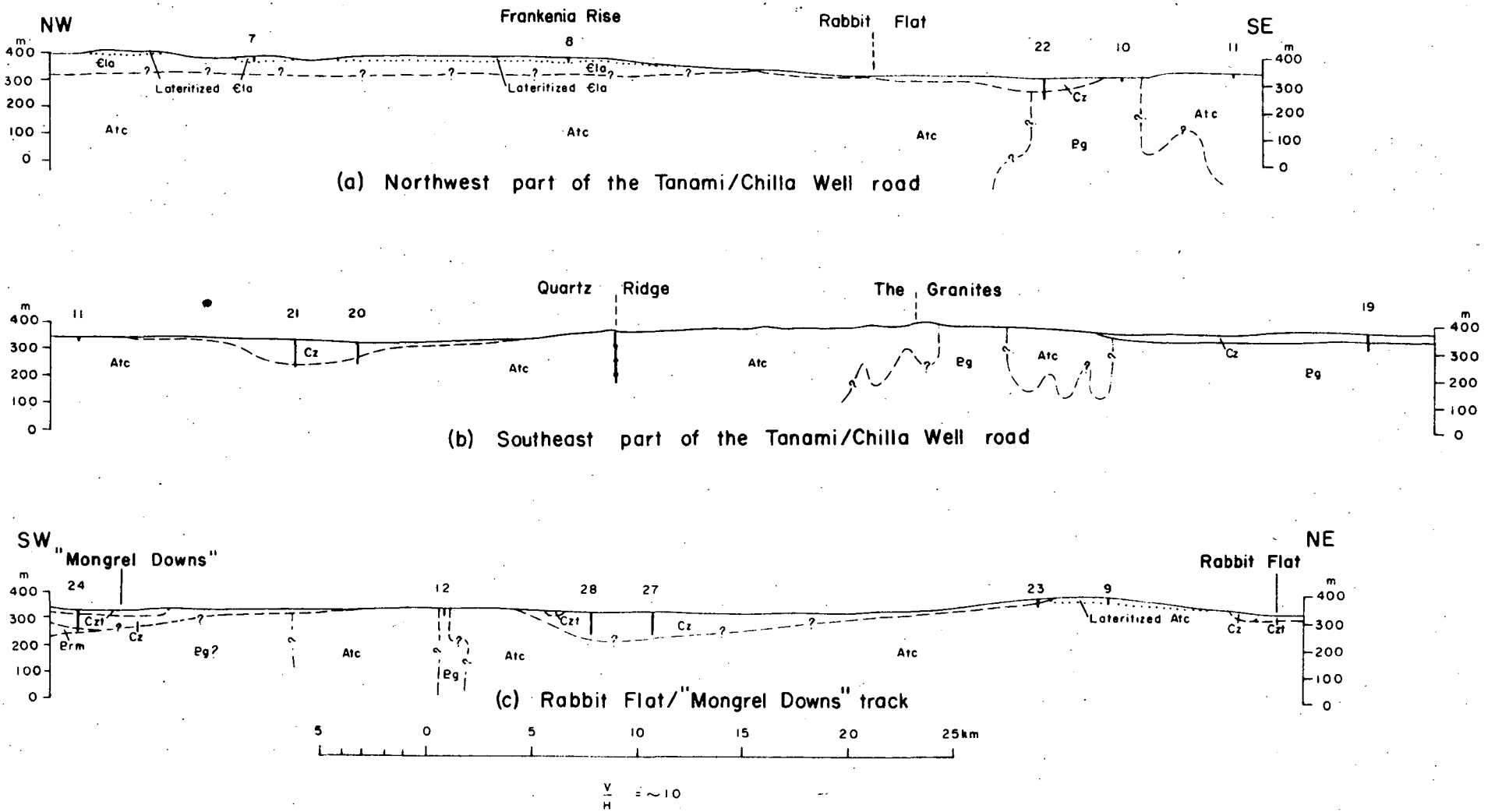


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Fig.8 Geological sections along drilling lines, The Granites sheet area

(for reference see Table 2 and Fig.3)

and the immediately overlying sandstone is friable and shows no signs of thermal metamorphism, indicating that the basalt does not intrude the sandstone. The Pedestal Beds are therefore younger than the Antrim Plateau Volcanics.

Two holes, 24 and 25, were drilled through Cainozoic calcrete cropping out south of Mongrel Downs. Hole 24 passed through 18 m of calcrete and 61 m of clay before encountering quartz arenite of the Muriel Range Sandstone, the basal unit of the Adelaidean Redcliff Pound Group which crops out about 5 km to the southeast. In hole 25, calcrete 12 m thick overlies 55 m of clay, beneath which is granite; the granite is strongly weathered to a depth of 85 m and was cored at 91 m.

The remaining 6 holes along the road to the east, nos 13 to 18, are near Sangsters Bore. Three of these, holes 14, 15 and 18, intersected granite at depths of 34 m, 21 m and 37 m respectively, beneath mainly clayey Cainozoic sediments. The upper 20 to 40 m of the granite is weathered. Hole 13 passed through 91 m of Cainozoic sediments, mainly clay, before being cored in friable sandstone that could be Tertiary, Mesozoic, or Palaeozoic. Holes 16 and 17 were stopped at 30 m in unconsolidated Cainozoic sand.

Tanami/Chilla Well road (Figs 8a, 8b)

Eight holes were drilled along the Tanami/Chilla Well road. Two of these, holes 7 and 8, were put down west of Rabbit Flat on low rises capped by laterite. Hole 7 passed through sand and lateritic ironstone before being cored at 5 m in a breccia formed of lateritized basalt fragments. Hole 8 was cored at 24 m in weathered basalt after penetrating 9 m of sand and lateritic ironstone and 15 m of lateritized basalt. The two holes confirm that the laterite rises here are developed on basalt of the Antrim Plateau Volcanics, and that lateritic weathering profiles at least 20 m thick are present in places.

Between Rabbit Flat and The Granites, 5 holes were drilled. From northwest to southeast these are hole 22, cored at 88 m in unweathered granite after passing through 12 m of Cainozoic clay and 76 m of high weathered quartz-veined granite; hole 10, which penetrated 3 m of granite beneath 6 m of Cainozoic sand; hole 11, drilled 12 m through weathered phyllitic greywacke of the Mount Charles Beds overlain by less than 1 m of sand; and holes 21 and 20, which passed into Mount Charles Beds beneath 91 m and 61 m respectively of Cainozoic sediments, mainly clay.

Southeast of The Granites, hole 19, the eighth hole drilled along the Tanami/Chilla Well road, passed through 27 m of Cainozoic sand into granite and was cored at 58 m.

Mongrel Downs/Rabbit Flat track (Fig. 8)

Of the five holes drilled along the track between Mongrel Downs and Rabbit Flat, two holes 27 and 28, were drilled to 91 m in a broad depression filled with Cainozoic sediments. Both these holes failed to reach bedrock; hole 27 bottomed in coarse quartz sand underlying 88 m of clay, and hole 28 intersected only clay. The other three holes, nos 12, 23, and 9, were drilled into low basement rises. Hole 12 passed through 3 m of sand and lateritic ironstone and penetrated 20 m into weathered granite. In hole 23, 30 m of lateritic ironstone was found to overlie at least 20 m of weathered phyllitic rocks of the Mount Charles Beds, and in hole 9 similar weathered phyllitic rocks were encountered to a depth of 24 m, the bottom of the hole.

Pommies Knob/Macfarlanes Peak Bore track (Fig. 7d)

Along this track holes 4 and 5 were drilled 30 m into sediments of the Lucas Formation. Hole 4, situated on a low flat-topped rise capped by laterite, passed through 18 m of lateritized Lucas Formation and 6 m of iron-stained (slightly weathered) sediments before reaching unweathered siltstone and mudstone. In hole 5, located in a broad shallow depression, lateritized sediments are absent, and unweathered siltstone and mudstone were reached at 12 m, below slightly iron-stained but otherwise similar rocks.

Conclusions

The drilling confirms that low rises capped by laterite are developed on basalt on the Antrim Plateau Volcanics, on sedimentary rocks of the Lucas Formation, on granite, and on low-grade metamorphic rocks of the Tanami complex. In places the lateritic weathering profiles are over 20 m thick.

Cainozoic sediments appear to be thickest along present drainage lines, where they consist mainly of clay: locally they are over 90 m thick. Granite and metamorphic rocks underlying the Cainozoic sediments show evidence of weathering even where the sediments are thickest. Some of the Cainozoic calcrete south of Mongrel Downs is at least 18 m thick.

The Pedestal Beds overlie and are younger than basalt of the Antrim Plateau Volcanics. Apart from a possible spore and some minute spheres of uncertain affinities, no fossils have been found in the Lucas Formation.

Details of stratigraphic holes

BMR The Granites 1

Location:	lat. 20°29'45"S, long. 129°08'50"E; alt., 400 m: Mongrel Downs/Balgo Mission road 6 km W of Pommies Knob.
Drilling data:	commenced and completed, 7 September 1972; depth, 15 m; drilled with air; no core.
Cuttings:	0 - 6 m, reddish-brown sand and lateritic ironstone; Cainozoic. 6 - 9 m, white to yellow mottled lateritized clayey lithic sandstone; Palaeozoic Lucas Formation. 9 - 15 m, mottled lateritized mudstone; Lucas Formation.

BMR The Granites 2

Location:	lat. 20°30'15"S, long. 129°12'00"E; alt., 395 m; Mongrel Downs/Balgo Mission road 0.5 km W of Pommies Knob.
Drilling data:	commenced and completed, 7 September 1972; depth, 27.4 m; drilled with air.
Cuttings:	0 - 3 m, brown and grey slightly weathered mudstone, siltstone and fine sandstone; Palaeozoic Lucas Formation. 3 - 25.6 m, pale grey micaceous siltstone, fine sandstone and white mudstone.
Core:	25.6 - 27.4 m, 100% recovery; flat-lying, laminated pale grey micaceous siltstone, fine lithic sandstone and white mudstone; non calcareous; examined for microfossils but none found; Lucas Formation.

BMR The Granites 3

Location:	lat. 20°31'30"S, long. 129°14'15"E; alt., 385 m: Mongrel Downs/Balgo Mission road 6 km SE of Pommies Knob.
Drilling data:	commenced and completed, 12 September 1972; depth, 22.6 m; drilled with air.
Cuttings:	0 - 3 m, weathered (ironstained) mudstone; Palaeozoic Lucas Formation. 3 - 21.3 m, ironstained grey mudstone.
Core:	21.3 - 22.6 m, 100% reocvery; flat-lying laminated grey micaceous fine lithic sandstone, siltstone and mudstone; non calcareous; examined for microfossils, but none found; Lucas Formation.

BMR The Granites 4

Location:	lat. 20°28'45"S, long. 129°13'15"E; alt., 395 m; Pommies Knob/Macfarlanes Peak Bore track ¼ km NE of Pommies Knob.
Drilling data:	commenced and completed, 11 September 1972; depth, 30.8 m; drilled with air.
Cuttings:	0-18 m, lateritized sandstone, siltstone and mudstone; Palaeozoic Lucas Formation. 18 - 24 m, ironstained fine sandstone and siltstone. 24 - 30.5 m, grey sandstone, siltstone and mudstone.
Core:	30.5 - 30.8 m, 100% recovery; flat-lying laminated grey micaceous siltstone and mudstone; Lucas Formation.

BMR The Granites 5

Location:	lat. 20°26'00"S, long. 129°17'00"E; alt., 395 m; Pommies Knob/Macfarlanes Peak Bore track 12 km NE of Pommies Knob.
Drilling data:	commenced and completed, 11 September 1972; depth, 30 m; drilled with air; no core.

BMR The Granites 5 (cont.)

Cuttings: 0 - 12 m, slightly ironstained grey sandstone and siltstone; Palaeozoic Lucas Formation.
12 - 30 m, grey siltstone and mudstone; Lucas Formation.

BMR The Granites 6

Location: lat. 20°34'10"S, long. 129°50'00"E; alt., 375 m; on track 3.5 km NNW of Wild Potato Bore, 16 km W of 'Mongrel Downs'.

Drilling data: commenced and completed, 12 September 1972; depth, 17.7 m; drilled with air.

Cuttings: 0 - 9 m, maroon weathered basalt; Lower Cambrian Antrim Plateau Volcanics.
9 - 17.4 m, grey basalt.

Core: 17.4 - 17.7 m, 100% recovery; dark greyish-maroon basalt containing white, largely altered feldspar phenocrysts up to 5 mm across; Antrim Plateau Volcanics.

BMR The Granites 7

Location: lat. 20°04'40"S, long. 129°46'00"E; alt., 390 m; The Granites/Tanami road 29 km WNW of Rabbit Flat.

Drilling data: commenced and completed, 13 September 1972; depth, 5.2 m; drilled with air.

Cuttings: 0 - 4.9 m, reddish-brown sand and lateritic ironstone; Cainozoic.

Core: 4.9 - 5.2 m, 100% recovery; lateritic breccia with fragments of brown and maroon lateritized 'basalt'; Lower Cambrian Antrim Plateau Volcanics.

BMR The Granites 8

Location: lat. 20°09'20"S, long. 129°52'40"E; alt., 415 m; Frankenia Rise, The Granites/Tanami road 15 km W of Rabbit Flat.

Drilling data: commenced and completed, 13 September 1972; depth, 24.7 m; drilled with air.

BMR The Granites 8 (cont.)

Cuttings:	0 - 9 m, reddish-brown sand and lateritic ironstone; Cainozoic. 9 - 24 m, reddish-brown lateritized basalt; Lower Cambrian Antrim Plateau Volcanics.
Core:	24.4 - 24.7 m, 100% recovery; yellowish-brown weathered basalt; Antrim Plateau Volcanics.

BMR The Granites 9

Location:	lat. 20° 14'15"S, long. 129°58'10"E; alt., 385 m; Rabbit Flat/Mongrel Downs track 8 km SW of Rabbit Flat.
Drilling data:	commenced and completed, 14 September 1972; depth, 24 m; drilled with air; no core.
Cuttings:	0 - 24 m, reddish-brown weathered friable phyllitic siltstone; Archaean? Mount Charles Beds.

BMR The Granites 10

Location:	lat. 20°17'20"S, long. 130°03'20"E, alt., 340 m; The Granites/Tanami road 13 km SSE of Rabbit Flat.
Drilling data:	commenced and completed, 13 September 1972; depth, 9.6 m; drilled with air.
Cuttings:	0 - 6 m, yellowish coarse sand; Cainozoic. 6 - 9.1 m, reddish-brown disaggregated granite; Lower Proterozoic unnamed granite.
Core:	9.1 - 9.6 m, 100% recovery; weathered medium-grained granite with pink altered feldspar and chloritized biotite; unnamed granite.

BMR The Granites 11

Location:	lat. 20°19'00"S, long. 130°06'00"E., alt., 355 m; The Granites/Tanami road 18 km SSW of Rabbit Flat.
Drilling data:	commenced and completed, 13 September 1972; depth, 15 m; drilled with air; no core.
Cuttings:	0 - 12 m, reddish-brown weathered micaceous phyllitic greywacke; Archaean? Mount Charles Beds.

BMR The Granites 12

Location: lat. 20° 29'30"S, long. 129°50'10"E; alt., 350 m; Rabbit Flat/Mongrel Downs track 15 km NE of 'Mongrel Downs'.

Drilling data: commenced and completed, 14 September 1972: depth, 22.9 m; drilled with air.

Cuttings: 0 - 3 m, reddish-brown sand and lateritic ironstone; Cainozoic.
3 - 21.3 m, reddish-brown weathered granite; Lower Proterozoic unnamed granite.

Core: 21.3 - 22.9 m, 10% recovery; friable pink medium-grained granite; unnamed granite.

BMR The Granites 13

Location: lat. 20°51'00"S, long. 130°22'30"E; alt., 355 m; Chilla Well/Mongrel Downs road 3 km ESE of Sangsters Bore.

Drilling data: commenced, 7 July 1973; completed, 10 July 1973; depth, 92.7 m; drilled with mud.

Cuttings: 0 - 3 m, reddish-brown sand and calcrete; Cainozoic.
3 - 6 m, partly cemented brown sand.
6 - 9 m, brown clayey sand.
9 - 18 m, mottled grey and brown clay.
18 - 21 m, brown clay.
21 - 61 m, pale brownish-grey clay.
61 - 64 m, dark grey and white mottled clay.
64 - 70 m, dark grey clay.
70 - 73 m, dark maroon clay.
73 - 91.4 m, pale maroon and dark grey clay; Cainozoic.

Core: 91.4 - 92.7 m; recovery 50%; pale grey, medium to very coarse friable clayey quartzose sandstone; Tertiary Mesozoic or Palaeozoic.

BMR The Granites 14

Location: lat. 20°54'15"S, long. 130°25'10"E; alt., 355 m; Chilla Well/Mongrel Downs road 11 km SE of Sangsters Bore.

BMR The Granites 14 (cont.)

Drilling data: commenced, 11 July 1973; completed, 12 July 1973; depth, 75.3 m; drilled with mud.

Cuttings:
0 - 3 m, brown sand; Cainozoic.
3 - 6 m, yellowish-brown sandy clay.
6 - 12 m, mottled pale green and yellowish-brown clay.
12 - 24 m, mottled yellowish-brown clayey sand.
24 - 34 m, brownish-yellow sandy and silty clay; Cainozoic.
34 - 58 m, pink and grey micaceous granite; Lower Proterozoic unnamed granite.
58 - 74.4 m, grey micaceous granite.

Core: 74.4 - 75.3 m, 100% recovery; foliated biotite-rich and feldspathic banded granite; bands up to 15 cm thick and dip about 45°; thin section - medium- grained biotite adamellite with slightly strained quartz, fresh microcline, turbid sodic plagioclase showing alterations to clay and sericite, intensely pleochroic brown biotite with some alteration to chlorite, and accessory muscovite, zircon and apatite; unnamed granite.

BMR The Granites 15

Location: lat. 20°49'30"S, long. 130°19'15"E; alt., 365 m; Chilla Well/Mongrel Downs road 3 km WNW of Sangsters Bore.

Drilling data: commenced, 12 July 1973; completed, 13 July 1973; depth, 92.0 m; drilled with mud.

Cuttings:
0 - 3 m, reddish-brown sand and lateritic ironstone; Cainozoic.
3 - 9 m, brown sand with iron oxide cement.
9 - 15 m, brown clayey sand.
15 - 21 m, reddish-brown sandy clay, some ironstone pisolites; Cainozoic.
21 - 27 m, maroon weathered granite; Lower Proterozoic unnamed granite.
27 - 37 m, mottled clayey weathered granite.
37 - 49 m, hard ironstained weathered granite.
49 - 52 m, clayey micaceous granite.
52 - 58 m, clayey altered granite.
58 - 61 m, white vein quartz.
61 - 91.4 m, medium to fine micaceous granite or greisen

BMR The Granites 15 (cont.)

Core: 91.4 - 92.0 m, 80% recovery; leucocratic, pale yellowish, medium to coarse-grained foliated biotite granite, thin section - alkali granite consisting of strained and granulated quartz, partly turbid microcline and subordinate sodic plagioclase, brown biotite, and accessory iron oxide, zircon, allanite, and epidote; unnamed granite.

BMR The Granites 16

Location: lat. 20°48'45"S, long. 130°17'30"E; alt., 375 m; Chilla Well/Mongrel Downs road 6 km WNW of Sangsters Bore.

Drilling data: commenced and completed, 21 July 1973; depth, 30 m; drilled with air; no core.

Cuttings: 0 - 3 m, dark reddish-brown sand with ironstone pisolites; Cainozoic.
3 - 6 m, pisolitic brown sand.
6 - 12 m, orange-brown sand with clayey aggregates.
12 - 15 m, greyish-brown clayey sand.
15 - 30 m, reddish-brown clayey sand, some ironstone pisolites; Cainozoic,

BMR The Granites 17

Location: lat. 20° 48'10"S, long. 130°16'00"E; alt., 385 m; Chilla Well/Mongrel Downs road 10 km WNW of Sangsters Bore.

Drilling data: commenced and completed, 21 July 1973; depth, 30 m; drilled with mud; no core.

Cuttings: 0 - 3 m, dark reddish-brown sand, some ironstone pisolites; Cainozoic.
3 - 6 m, as above, but paler.
6 - 30 m, brown sand, some ironstone pisolites; Cainozoic.

BMR The Granites 18

Location:	lat. 20°47'30"S, long. 130°14'00"E; alt., 395 m; Chilla Well/Mongrel Downs road 13 km WNW of Sangsters Bore.
Drilling data:	commenced and completed, 23 July 1973; depth, 62.2 m; drilled with mud.
Cuttings:	0 - 9 m, reddish-brown sand with some ironstone pisolites, paler below 3 m; Cainozoic. 9 - 18 m, reddish-brown and pale grey mottled clayey sand. 18 - 37 m, reddish-brown sand, pisolitic between 21 - 24 m; Cainozoic. 37 - 43 m, mottled weathered granite; Lower Proterozoic unnamed granite. 43 - 58 m, disaggregated granite with pinkish altered feldspar. 58 - 61.0 m, medium-grained micaceous granite.
Core:	61.0 - 62.2 m, 100% recovery; foliated medium to fine-grained biotite granite with feldspar phenocrysts, thin section - adamellite containing anhedral megacrysts of little altered microcline and turbid plagioclase (andesine, An_{40}) in a groundmass of strained and granulated quartz, microcline and brown to greenish-brown biotite, with accessory zircon; unnamed granite.

BMR The Granites 19

Location:	lat. 20°42'40"S, long. 130°28'50"E; alt., 375 m; Chilla Well/The Granites road 20 km NE of Sangsters Bore.
Drilling data:	commenced, 24 July 1973; completed, 25 July 1973; depth, 58.5 m; drilled with mud.
Cuttings:	0 - 18 m, reddish-brown coarse sand, mottled 6-9 m; Cainozoic. 18 - 21 m, bleached coarse sand, derived from granite. 21 - 27 m, mottled coarse sand; Cainozoic. 27 - 40 m, grey to white greisenized granite; Lower Proterozoic unnamed granite. 40 - 57.9 m, granite.

BMR The Granites 19 (cont.)

Core: 57.9 - 58.5 m, 100% recovery; pale pink leucocratic medium to fine-grained aphyric biotite granite, thin section - adamellite made up of strained quartz, microcline, turbid sodic plagioclase, brown biotite, subordinate muscovite and accessory opaques; unnamed granite.

BMR The Granites 20

Location: lat. 20°24'50"S, long. 130° 10'00"E; alt., 340 m; The Granites/Tanami road 28 km NW of The Granites.

Drilling data: commenced, 30 July 1973; completed, 1 August 1973; depth, 88.1 m; drilled with mud.

Cuttings: 0 - 9 m, reddish-brown sand, paler with some clay below 3 m; Cainozoic.
9 - 12 m, yellowish clay.
12 - 15 m, mottled grey and pale brown clay.
15 - 49 m, mottled grey clay.
49 - 61 m, greenish-grey clay; Cainozoic.
61 - 86.9 m, grey clayey phyllite; Archaean? Mount Charles Beds.

Core: 86.9 - 88.1 m, 100% recovery; phyllitic medium-grained greywacke cut by streaky pink veinlets, thin section - greywacke consists of quartz and lithic grains, most with poorly defined boundaries, in an abundant matrix of sericite, alkali feldspar or zeolite, chlorite, quartz, and iron oxide, and is cut by quartz and zeolite veinlets; Mount Charles Beds.

BMR The Granites 21

Location: lat. 20°23'15"S, long. 130°08'50"E; alt., 345 m; The Granites/Tanami road 31 km NW of The Granites.

Drilling data: commenced, 1 August 1973; completed, 3 August 1973; depth, 92.0 m; drilled with mud.

Cuttings: 0 - 3 m, reddish- brown clayey sand and fine gravel; Cainozoic.
3 - 9 m, mottled yellow and grey clay.
9 - 30 m, mottled grey and brown clay.
30 - 64 m, grey clay.

BMR The Granites 21 (cont.)

64 - 67 m, coarse quartz sand and clay.
67 - 91.4 m, grey clay, some yellow-brown mottles below 70 m; Cainozoic.

Core: 91.4 - 92.0 m, 100% recovery; yellow-brown weathered phyllitic fine-grained greywacke; Archaean? Mount Charles Beds.

BMR The Granites 22

Location: lat. 20°16'15"S, long. 130°02'30"E; alt., 335 m; The Granites/Tanami road 50 km NW of The Granites.

Drilling data: commenced, 13 August 1973; completed, 18 August 1973; depth, 88.8 m; drilled with water.

Cuttings: 0 - 3 m, reddish-brown clay; Cainozoic.
3 - 12 m, buff mudstone; probably Cainozoic.

Core: 12.2 - 12.4 m, 100% recovery; vein quartz; probably associated with Lower Proterozoic unnamed granite.

Cuttings: 12 - 24 m, vein quartz.
24 - 34 m, vein quartz and 'mudstone' (weathered granite?)
34 - 46 m, grey clay.
46 - 52 m, pale grey mudstone, with some grey clay
52 - 55 m and vein quartz 58 and 61 m; may be weathered granite.
61 - 88.4 m, brown sand, probably disaggregated granite; Lower Proterozoic unnamed granite.

Core: 88.4 - 88.4 m; 100% recovery; pink microgranite cut by gypsum veins; unnamed granite.

BMR The Granites 23

Location: lat. 20°15'30"S, long. 129°57'10"E; alt., 390 m; Rabbit Flat/Mongrel Downs track 45 km NE of 'Mongrel Downs'.

Drilling data: commenced and completed, 13 August 1973; depth, 50 m; drilled with air; no core.

Cuttings: 0 - 15 m, reddish-brown lateritic ironstone, pisolitic; Cainozoic.
15 - 21 m, yellowish-brown ironstone.
21 - 24 m, maroon ironstone.

BMR The Granites 23 (cont.)

24 - 30 m, yellowish-brown ironstone, Cainozoic.
30 - 50 m, yellowish-brown to reddish-maroon fine-grained phyllitic greywacke; Archaean? Mount Charles Beds.

BMR The Granites 24

Location: lat. 20°35'20"S, long. 129°43'00"E; alt., 350 m; Chilla Well/Mongrel Downs road, 2 km S of 'Mongrel Downs'.

Drilling data: commenced, 23 August 1973, completed, 24 August 1973; depth, 79.9 m; drilled with mud.

Cuttings: 0 - 6 m, maroon and white limestone; Cainozoic calcrete.
6 - 18 m, pale grey limestone; Cainozoic calcrete.
18 - 79.2 m, clay, buff 18 - 55 m, grey and maroon mottled 55 - 58 m, grey 58 - 79.2 m; Cainozoic.

Core: 79.2 - 79.9 m, 100% recovery; flat-lying, white, medium to fine-grained silicified sandstone thin section - highly porous quartz arenite containing subordinate chert, other lithic grains, tourmaline and zircon and with a patchy cement of quartz and brown opaline silica; Adelaidean Muriel Range Sandstone.

BMR The Granites 25

Location: lat. 20°35'45"S, long. 129°45'40"E; alt., 340 m; Chilla Well/Mongrel Downs road 6 km SE of 'Mongrel Downs'.

Drilling data: commenced, 24 August 1973; completed, 25 August 1973; depth, 86.2 m; drilled with mud.

Cuttings: 0 - 12 m, limestone and chert; Cainozoic calcrete.
12 - 15 m, yellow and grey mottled clay; Cainozoic.
15 - 49 m, clay, brown 15 - 18 m, brown and grey mottled 18 - 43 m, grey with quartz sand grains 43 - 49 m; Cainozoic.
49 - 55 m, grey mudstone; Cainozoic.
55 - 67 m, brown and grey mottled sandy clay; Cainozoic.
67 - 85.3 m, ironstained maroon granite; Lower Proterozoic unnamed granite.

BMR The Granites 25 (cont.)

Core: 85.3 - 86.2 m, 100% recovery; maroon to white mottled medium-grained biotite granite, thin section - slightly strained quartz, faintly turbid microcline, turbid sodic plagioclase, biotite altered to yellowish-green chlorite, and accessory iron oxide and sphene; unnamed granite.

BMR The Granites 26

Location: lat. 20°34'10;S, long. 129°32'35"E; alt., 375 m; Mongrel Downs/Balgo Mission road 18 km W of 'Mongrel Downs'.

Drilling data: commenced and completed, 31 August 1973; depth, 26.5 m; drilled with air.

Cuttings: 0 - 21 m, reddish-brown flaggy friable siltstone and fine sandstone; Palaeozoic Pedestal Beds.
21 - 25.9 m, basalt, greyish-maroon 21 - 24 m, grey 24 - 25.9 m; Lower Cambrian Antrim Plateau Volcanics.

Core: 25.9 - 26.4 m, 100% recovery; grey basalt, thin section - basalt containing small phenocrysts of altered plagioclase and olivine and irregular vesicles infilled with zeolites in groundmass of altered plagioclase and olivine, ophitic fresh colourless augite and intersertal brownish-green chlorite (?altered glass); Antrim Plateau Volcanics.

BMR The Granites 27

Location: lat. 20°25'00"S, long. 129°52'50"E; alt., 345 m; Rabbit Flat/Mongrel Downs road 26 km NE of 'Mongrel Downs'.

Drilling data: commenced, 4 September 1973; completed, 6 September 1973; depth, 91 m; drilled with mud; no core.

Cuttings: 0 - 3 m, reddish-brown sandy clay; Cainozoic.
3 - 88 m, clay, yellowish-brown 3 - 18 m, grey-brown 18 - 30 m, mottled pale grey and maroon 30 - 67 m, grey 67 - 88 m; Cainozoic.
88 - 91 m, coarse quartz sand; Cainozoic.

BMR The Granites 28

Location: lat. 20°26'30"S, long. 129°52'00"E; alt., 340 m; Rabbit Flat/Balgo Mission road 23 km NE of 'Mongrel Downs'.

BMR The Granites 28 (cont.)

Drilling data: commenced, 7 September 1973; completed, 8 September 1973; depth, 91 m; drilled with mud; no core.

Cuttings: 0 - 6 m, mottled pale grey and yellowish-brown clay: Cainozoic.
6 - 9 m, reddish-brown clay.
9 - 67 m, clay, yellowish-brown 9 - 12 m, pale grey and yellowish-brown 12 - 43 m, buff 43 - 67 m.
67 - 70 m, sandy clay.
70 - 91 m, pale grey clay; Cainozoic.

BMR The Granites 29

Location: lat. 20°31'00"S, long. 129°06'40"E; alt., 400 m; 1.5 km S of Mongrel Downs/Balgo Mission road 9 km W of Pommies Knob.

Drilling data: commenced and completed, 13 September 1973; depth, 43.4 m; drilled with air.

Cuttings: 0 - 18 m, ironstained soft weathered grey mudstone and micaceous siltstone; Palaeozoic Lucas Formation.
18 - 42.7 m, soft weathered grey mudstone and fine sandstone.

Core: 42.7 - 43.4 ; 100% recovery; laminated partly calcareous grey mudstone, dipping about 5°; Lucas Formation.

LUCAS SHEET AREA

In the Lucas Sheet area the BMR drilled 20 stratigraphic holes along the Balgo Mission/Mongrel Downs road east of the Kearney Range, and 18 holes along tracks in the east, south of Bloodwood Bore (Fig. 9). Six stratigraphic holes have also been drilled east of the Kearney Range by the Metals Department of Esso Australia Ltd; five of these holes are along the track connecting Taxs Bore with Balgo Mission, and the sixth is 20 km west of Bloodwood Bore. The drilling was undertaken to determine the types and thicknesses of unconsolidated sediments in the Cainozoic sedimentary basin between the Kearney and Lewis Ranges, to identify the bedrock underlying Cainozoic sediments, and to collect unweathered samples of Precambrian rocks and possibly fossiliferous samples of Lucas Formation.

Balgo Mission/Mongrel Downs road (Figs 10a,10b)

East of McGuires Gap, where it passes through the Kearney Range, the Balgo Mission/Mongrel Downs road crosses a broad plain covered by Quaternary and Tertiary sediments. The plain separates the Kearney Range from the Lewis Range. Both ranges are formed of Lewis Range Sandstone, part of the Adelaidean Redcliff Pound Group, and are the opposite limbs of a broad syncline. The road continues eastwards to The Granites Sheet area, crossing Cainozoic sediments overlying Lewis Granite, Killi Killi Beds and Lucas Formation.

The first eight holes east of the Kearney Range, nos 35, 12, 34, 33, 32, 38, 11, and 37, passed through unconsolidated Cainozoic sediments 9 to 24 m thick before penetrating beds that probably belong to the Murraba Formation. This formation is part of the Redcliff Pound Group and is conformable on the Lewis Range Sandstone. The Cainozoic sediments are much thicker in the next five holes to the east: holes 36 and 31 reached 91 m and 88 m respectively before penetrating Murraba Formation, and the other three, holes 10, 9, and 8, were stopped at 61 m, 37 m and 49 m respectively, before reaching bedrock. In Pussycat Bore, situated between holes 8 and 31, a good supply of water is obtained at 14 - 16.5 m, probably from Cainozoic chert, underlying 4 m of calcrete and 10 of sand. The Cainozoic sediments in the above holes consist mainly of Quaternary aeolian sand, up to 24 m but generally less than 6 m thick; calcrete, up to 12 m thick; and underlying clay, up to 85 m thick. Some of the clay is gypsiferous, some is calcareous, and some has associated dark grey chert that probably forms thin lenses and laminae. Samples of the clay have been examined for pollen and other microfossils but were found to be barren. The calcrete and clay are probably Tertiary rather than Quaternary. The Murraba Formation intersected in the drill holes consists of sandstone, partly

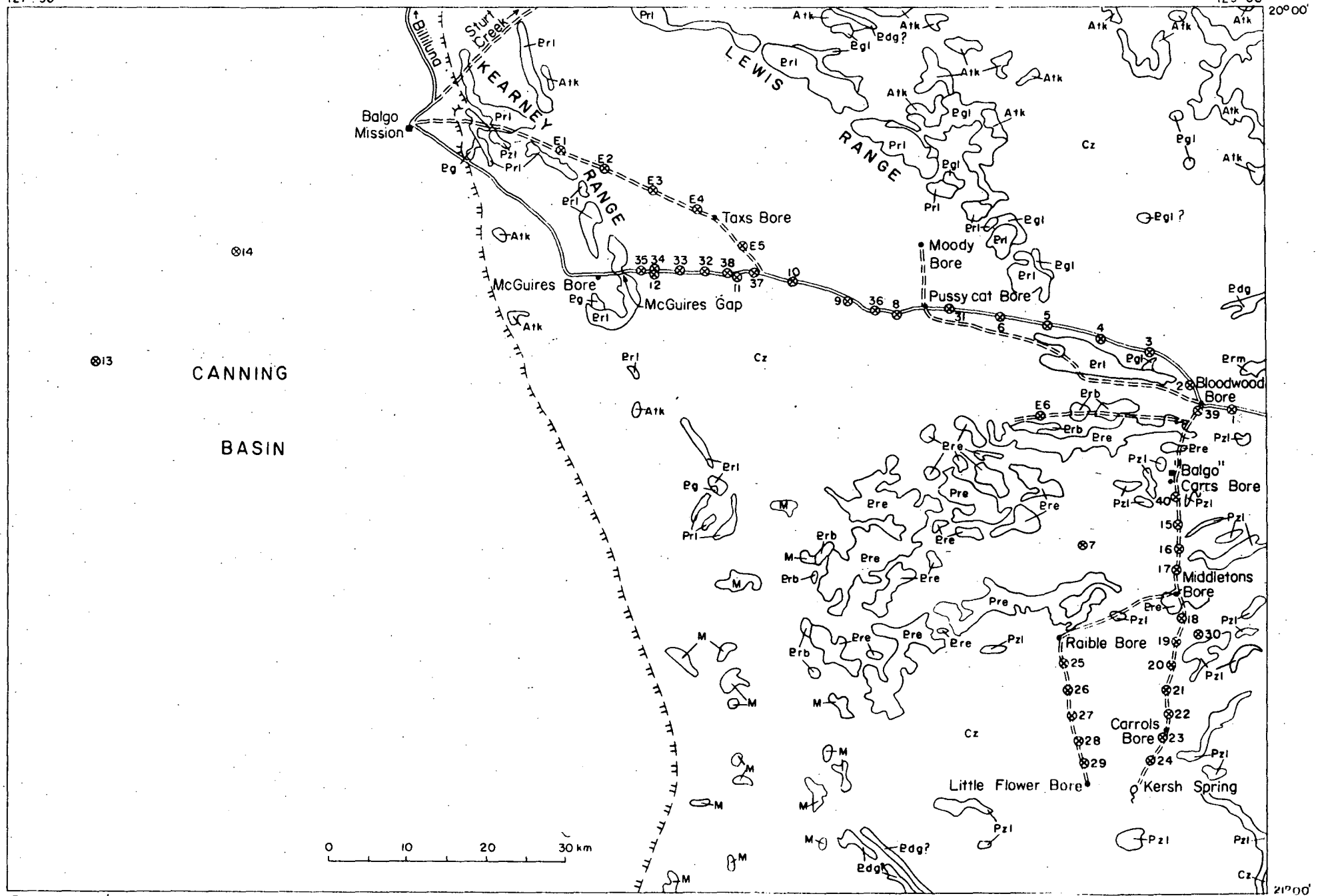
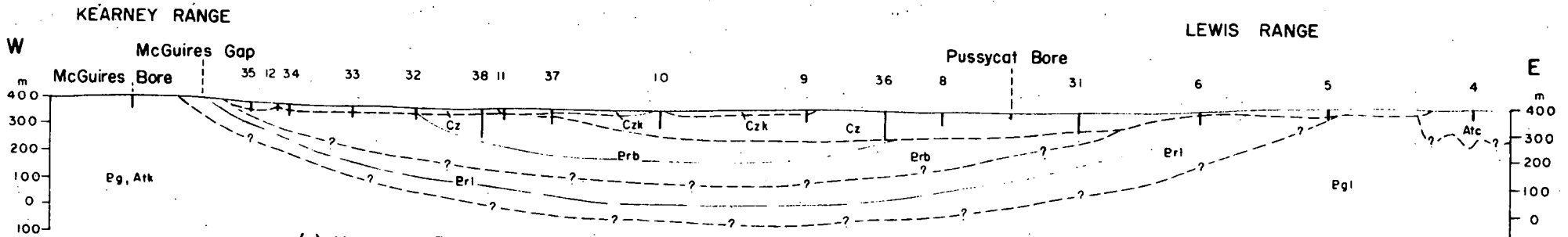
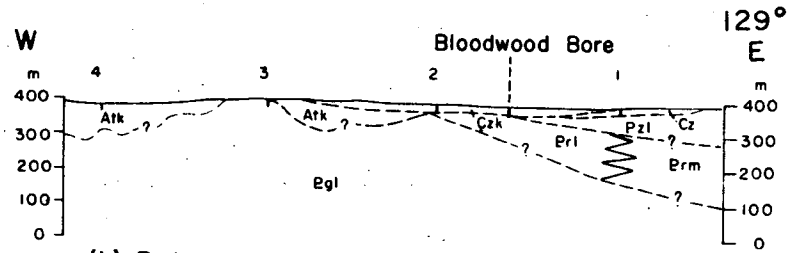


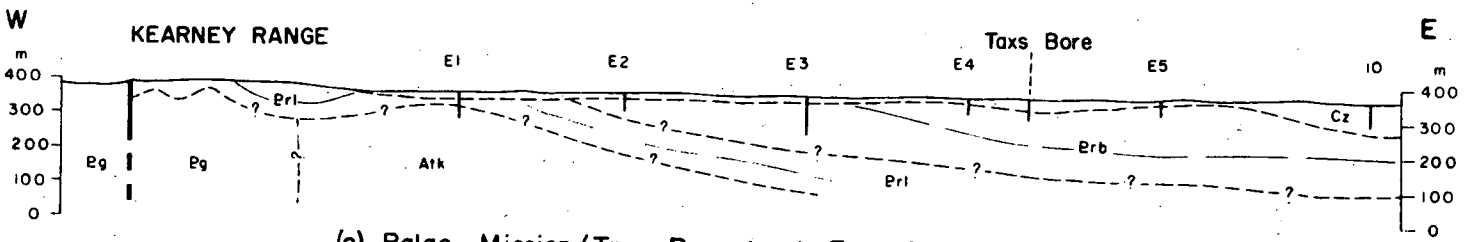
Fig 9 Lucas sheet area, W.A., showing outcrops of pre-Cainozoic rocks east of the Canning Basin and Positions of stratigraphic holes. (For reference see Table 2 and Fig 3).



(a) Kearney Range to the Lewis Range along the Balgo Mission/Mongrel Downs road



(b) Balgo Mission/Mongrel Downs road East of the Lewis Range



(c) Balgo Mission/Taxs Bore track East from the Kearney Range

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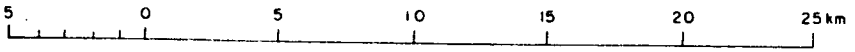


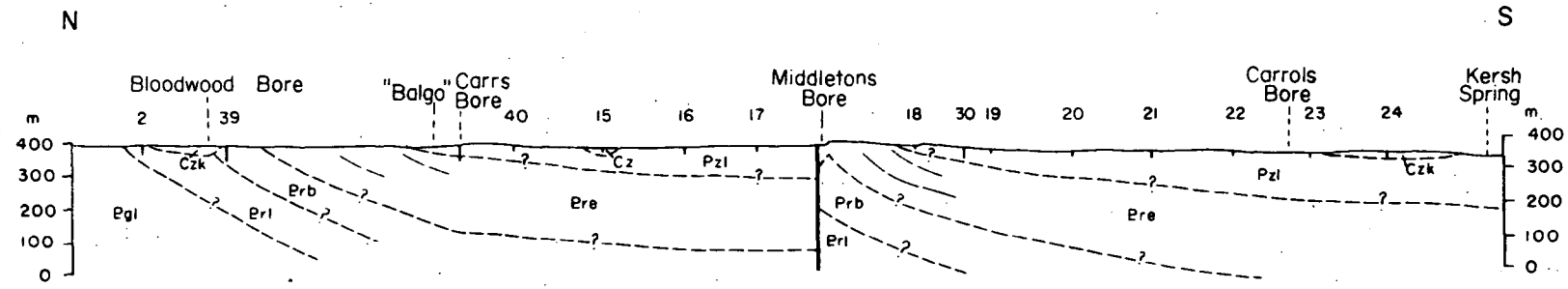
$\frac{V}{H} = N/O$

F52/A2/4

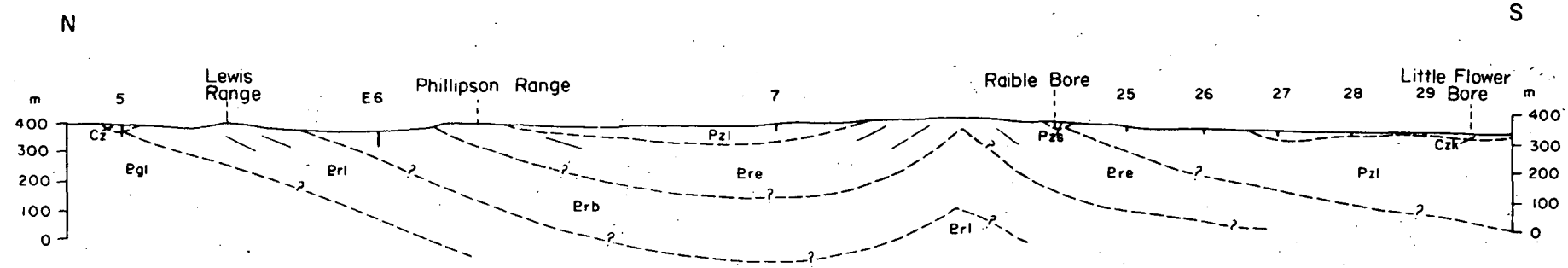
Fig.10 Geological sections along drilling lines, Lucas sheet area

(for reference see Table 2 and Fig.3)

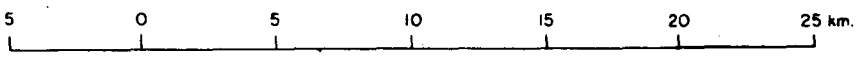
S.Y.



(a) Bloodwood Bore/Kersh Spring track



(b) Lewis Range to Little Flower Bore



$\frac{V}{H} = \sim 10$

Record 1974/104

F 52/A2/5
B.T.

Fig. 11 Geological sections along drilling lines, Lucas sheet area
(For reference see Table 2 and Fig. 3)

calcareous and gypsiferous shaly mudstone, limestone and dolomite; in some holes the sandstone and mudstone are weathered to depths of 70 m of more beneath the Cainozoic sediments.

Six holes were drilled further east along the road. Hole 6 penetrated 43 m of Lewis Range Sandstone beneath 3 m of sand; hole 5 passed through 24 m of sand and 9 m of Lewis Range Sandstone before penetrating 12 m into weathered Lewis Granite; holes 4 and 3 terminated respectively in weathered Killi Killi Beds and Lewis Granite at 6 m and 5 m below about 3 m of sand; hole 2 was cored at 15 m, 7 m into Lewis Range Sandstone underlying 8 m of calcrete; and hole 1 east of Bloodwood Bore passed through 3 m of sand and calcrete and 29 m of clay before intersecting mudstone of the Lucas Formation, which was cored at 32 m.

McGuire's Bore, close to the Balgo Mission/Mongrel Downs road west of the Kearney Range, was drilled several years ago 46 m into fine grained greisen or micaceous schist. About 4 km east of the bore granite is overlain by easterly dipping Lewis Range Sandstone.

Balgo Mission/Taxs Bore track (Fig. 10c)

Five holes ranging in depth from 50 to 101 m were drilled by Esso Australia Ltd from west to east along the Balgo Mission/Taxs Bore track east of the Kearney Range. In the first hole drilled, E1, grey to black slate probably belonging to the Killi Killi Beds was intersected between 43 and 76 m, underneath 19 m of Lewis Range Sandstone and 24 m of Cainozoic sediments, mainly sand. The four holes to the east, E2 and E5, and also Taxs Bore, were drilled through 6 to 18 m of Cainozoic sediments, mainly sand, calcrete and gypsiferous clay, into variably weathered sandstone, shale, limestone and chert assigned to the Murraba Formation.

South of Bloodwood Bore (Figs 11a, 11b)

Nineteen stratigraphic holes were drilled by the BMR south of Bloodwood Bore. Most of these are 15 m or less deep and were completed in Lucas Formation beneath Cainozoic sand, calcrete or laterite. Four deeper holes, nos 7, 17, 28 and 30, were also drilled into Lucas Formation. Of the other holes, hole 39, the most northerly, penetrated 52 m of shaly mudstone, siltstone and sandstone of the Murraba Formation beneath 6 m of sand and lateritic ironstone. Three holes were terminated in Cainozoic calcrete, holes 15 and 24 at 15 m and hole 27 at 18 m.

One hole, E6, was drilled by Esso Australia Ltd 20 km west of Bloodwood Bore (Figs 9, 11). It penetrated 42 m of Murraba Formation, mainly shale, beneath 3 m of Cainozoic sand and lateritic ironstone.

Drill logs are available for Bloodwood Bore, which terminated at 13 m in Cainozoic calcrete; Carrs Bore, which was drilled through 17 m of Lucas Formation into 29 m of Erica Sandstone; and Carrolls Bore, which penetrated 9 m of calcrete and 3 m of underlying Lucas Formation.

The Lucas Formation intersected in the drill holes consists of calcareous and non-calcareous mudstone, siltstone and highly lithic sandstone. These rocks are soft and weathered for 6 m to over 40 m beneath the overlying Cainozoic sediments. When fresh they are shades of grey and are less indurated than similar rock types of the Adelaidean Murraba Formation.

Conclusions

The stratigraphic drilling in the Lucas Sheet area shows that there is a Cainozoic sedimentary basin between the Kearney and Lewis Ranges. The basin is deepest in the east, where the Cainozoic sediments, locally over 90 m thick, consist predominantly of unfossiliferous clay. Some of the clay is calcareous, some is gypsiferous, and some has associated dark grey chert. The clay overlies Murraba Formation and is overlain by either calcrete up to 12 m thick or aeolian sand generally less than 5 m thick. Cainozoic sand, mainly aeolian, predominates near the margins of the basin, overlying Murraba Formation in the west and Lewis Range Sandstone in the east. The Murraba Formation beneath the Cainozoic sediments consists of weathered sandstone, partly calcareous and partly gypsiferous mudstone, shale, limestone, and dolomite.

On the east side of the Lewis Range a thin veneer of sand and calcrete overlies schistose rocks of the Killi Killi Beds and Lewis Granite. East of Bloodwood Bore sand, calcrete, and clay overlie mudstone of the Lucas Formation.

South of Bloodwood Bore, Murraba Formation and Erica Sandstone of the Adelaidean Redcliff Pound Group and, more extensively, mudstone, siltstone and commonly calcareous sandstone of the Lucas Formation are overlain by Cainozoic sediments, mainly sand and calcrete, generally less than 15 m thick. The Lucas Formation is commonly weathered for several metres below the Cainozoic cover.

Details of BMR Stratigraphic holes

BMR Lucas 1

Location:	lat. 20°27'10"S, long. 128°57'50"E; alt., 390 m; Balgo Mission/Mongrel Downs road 4 km E of Bloodwood Bore.
Drilling data:	commenced and completed, 28 August 1972; depth, 32.8 m; drilled with mud.
Cuttings:	0 - 3 m, reddish-brown sand, lateritic ironstone and calcrete; Cainozoic. 3 - 32.3 m, clay, pale grey 3 - 12 m, pale grey and maroon 12 - 15 m, grey and brown 15 - 32.3 m; Cainozoic.
Core:	32.3 - 32.8 m; 100% recovery; porous grey mudstone; Palaeozoic Lucas Formation.

BMR Lucas 2

Location:	lat. 20°25'45"S, long. 128°54'50"E; alt., 395 m; Balgo Mission/Mongrel Downs road 3 km NW of Bloodwood Bore.
Drilling data:	commenced and completed, 28 August 1972; depth, 15.3 m; drilled with mud.
Cuttings:	0 - 3 m; reddish-brown sand, chert, limestone; Cainozoic calcrete. 3 - 6 m, limestone; Cainozoic calcrete. 6 - 8 m, limestone and chert, good water at 8.5 m; Cainozoic calcrete. 8 - 14 m, ironstained reddish-brown friable medium to coarse-grained sandstone; Adelaidean Lewis Range Sandstone. 14 - 15.2 m, silicified medium-grained sandstone - sublithic arenite, some ironstaining.
Core:	15.2 - 15.3 m, 100% recovery; flat-lying, pale greyish and maroon, silicified, poorly sorted, medium to coarse-grained sublithic arenite with some finer grained laminae; Lewis Range Sandstone.

BMR Lucas 3

Location:	lat. 20°23'30"S, long. 128°50'10"E; alt., 400 m; Balgo Mission/Mongrel Downs road 9 km NW of Bloodwood Bore.
Drilling data:	commenced and completed, 25 August 1972; depth, 5.3 m; drilled with air.
Cuttings:	0 - 3 m, reddish-brown sand; Cainozoic. 3 - 4.9 m, weathered disaggregated granite; Lower Proterozoic Lewis Granite.
Core:	4.9 - 5.3 m, 100% recovery; pale grey, partly kaolinized, leucocratic biotite granite, medium to fine-grained and non-porphyritic; Lewis Granite.

BMR Lucas 4

Location:	lat. 20°22'35"S, long. 128°48'30"E; alt., 395 m; Balgo Mission/Mongrel Downs road 15 km NW of Bloodwood Bore.
Drilling data:	commenced and completed, 25 August 1972; depth, 6.1 m; drilled with air.
Cuttings:	0 - 3 m, reddish-brown sand and schistose greywacke; Cainozoic sand and Archaean? Killi Killi Beds. 3 - 4.6 m; reddish-brown schistose greywacke; Killi Killi Beds.
Core:	4.6 - 6.1 m, pale maroon medium to fine-grained schistose greywacke; Killi Killi Beds.

BMR Lucas 5

Location:	lat. 20°21'40"S, long. 128°44'45"E; alt., 390 m; Balgo Mission/Mongrel Downs road 21 km WNW of Bloodwood Bore.
Drilling data:	commenced, 24 August 1972; completed, 25 August 1972; depth, 46.1 m; drilled with mud.

BMR Lucas 5 (cont.)

Cuttings:	0 - 3 m, reddish-brown sand, Cainozoic. 3 - 15 m, yellowish-brown clayey sand. 15 - 24 m, reddish-brown sand; Cainozoic. 24 - 33 m, pale brown poorly sorted friable clayey sandstone; Adelaidean Lewis Range Sandstone. 33 - 45.7 m, weathered granite; Lower Proterozoic Lewis Granite.
Core:	45.7 - 46.1 m, 100% recovery; pink medium-grained muscovite granite containing altered feldspar: Lewis Granite.

BMR Lucas 6

Location:	lat. 20°21'00"S, long. 128°41'20"E; alt., 375 m; Balgo Mission/Mongrel Downs road 9 km E of Pussycat Bore.
Drilling data:	commenced, 23 August 1972; completed, 24 August 1972; depth, 43.8 m; drilled with air 0 - 18 m, mud 18 - 43.8 m.
Cuttings:	0 - 3 m, reddish-brown sand; Cainozoic. 3 - 27 m, yellowish to reddish-brown friable sandstone; Adelaidean Lewis Range Sandstone. 27 - 39.8 m, white to pale grey clayey sandstone.
Core:	39.8 - 43.8 m, 100% recovery; pale grey, silicified, porous, medium-grained quartz arenite, flat-lying: Lewis Range Sandstone.

BMR Lucas 7

Location:	lat. 20°36'35"S, long. 128°47'10"E; alt., 395 m; 15 km SW of 'Balgo'.
Drilling data:	commenced and completed, 15 September 1972; depth, 43 m; drilled with air; no core.
Cuttings:	0 - 6 m, pale grey and yellow weathered fine sandstone; Palaeozoic Lucas Formation. 6 - 43 m, grey micaceous siltstone and mudstone; Lucas Formation.

BMR Lucas 8

Location:	lat. 20°20'55"S, long. 128°34'00"E; alt., 365 m; Balgo Mission/Mongrel Downs road 4 km W of Pussycat Bore.
Drilling data:	commenced and completed, 29 August 1972; depth, 49 m; drilled with air 0 - 11 m, mud 11 - 49 m; no core.
Cuttings:	0 - 3 m, reddish-brown sand; Cainozoic. 3 - 12 m, yellowish to grey gypsiferous sandy clay. 12 - 21 m, grey to brown sandy clay. 21 - 30 m, pale brown to grey clay. 30 - 49 m, grey clay; Cainozoic.

BMR Lucas 9

Location:	lat. 20°20'00"S, long. 128°30'30"E; alt., 365 m; Balgo Mission/Mongrel Downs road 10 km W of Pussycat Bore.
Drilling data:	commenced and completed, 30 August 1972; depth, 37 m; drilled with air 0 - 6 m, mud 6 - 37 m; no core.
Cuttings:	0 - 3 m, reddish-brown sand and calcrete; Cainozoic. 3 - 9 m, limestone; Cainozoic calcrete. 9 - 37 m, calcareous clay, pale buff 9 - 18 m, brown 18-27 m, pale brown and white 27 - 37 m; Cainozoic.

BMR Lucas 10

Location:	lat. 20°18'45"S, long. 128'20'40"E; alt., 365 m; Balgo Mission/Mongrel Downs road 17 km W of Pussycat Bore.
Drilling data:	commenced, 30 August 1972; completed, 5 September 1972; depth, 61 m; drilled with air 0 - 8 m, mud 8 - 61 m; no core.
Cuttings:	0 - 6 m, white sand with gypsum; Cainozoic. 6 - 15 m, white to pale grey clay. 15 - 18 m, white calcareous clay. 18 - 24 m, white calcareous clay, calcrete and dark grey chert.

BMR Lucas 10 (cont.)

24 - 37 m, pale brown calcareous clay.
37 - 61 m, dark grey chert, some calcareous clay; Cainozoic.

BMR Lucas 11

Location: lat. 20°18'20"S, long. 128°22'30"; alt., 365 m; Balgo Mission/Mongrel Downs road 14 km E of the Kearney Range.

Drilling data: commenced and completed, 6 September 1972; depth, 24.5 m; drilled with air.

Cuttings:
0 - 12 m, white limestone; Cainozoic calcrete.
12 - 15 m, reddish-brown sand.
15 - 24.4 m, white sandy mudstone; may be Adelaidean Murraba Formation.

Core: 24.4 - 24.5 m, 100% recovery; pale grey chert: possibly Murraba Formation.

BMR Lucas 12

Location: lat. 20°18'10"S, long. 128°16'40"E; alt., 380 m; Balgo Mission/Mongrel Downs road 3 km E of the Kearney Range.

Drilling data: commenced and completed, 6 September 1972; depth, 24 m; drilled with air; no core.

Cuttings:
0 - 6 m, reddish-brown sand; Cainozoic.
6 - 9 m, pale grey sandy clay, Cainozoic.
9 - 21 m, yellowish-brown friable clayey sandstone; probably Adelaidean Murraba Formation.
21-24 m, reddish-brown poorly sorted friable sandstone; probably Murraba Formation.

(Stratigraphic holes BMR Lucas 13 and BMR Lucas 14, drilled in June, 1973, are situated in the Canning Basin 54 km and 26 km respectively SW. of Balgo Mission).

BMR Lucas 15

Location: lat. 20°35'00"S, long. 128°54'10"E; alt., 380 km; Bloodwood Bore/Kersh Spring track, 6 km S of 'Balgo'.

Drilling data: commenced, 15 September 1973; completed, 17 September 1973; depth, 50 m; drilled with air; no core.

Cuttings: 0 - 3 m, reddish-brown sand, some iron oxide cement; Cainozoic.
3 - 6 m, yellowish-brown sand with iron oxide cement; Cainozoic.
6 - 15 m, white chert, limestone and minor sand; Cainozoic calcrete.

BMR Lucas 16

Location: lat. 20°36'45"S, long. 128°54'10"E; alt., 380 m; Bloodwood Bore/Kersh Spring track, 10 km S of 'Balgo'.

Drilling data: commenced and completed, 18 September 1973; depth. 15.8 m; drilled with air 0 - 15 m. water 15.2 - 15.8 m.

Cuttings: 0 - 3 m, limestone; Cainozoic calcrete.
3 - 12 m, soft buff mudstone and siltstone; Palaeozoic Lucas Formation.
12 - 15.2 m, pale grey mudstone.

Core: 15.2 - 15.8 m; flat-lying grey mudstone and siltstone, some calcite veins; Lucas Formation.

BMR Lucas 17

Location: lat. 20°38'10"S, long. 128°54'00"E; alt., 380 m; Bloodwood Bore/Kersh Spring track, 13 km S of 'Balgo'.

Drilling data: commenced and completed, 18 September 1973; depth, 25.0 m; drilled with air.

Cuttings: 0 - 3 m, orange-brown sand, some iron oxide cement; Cainozoic.
3 - 6 m, weathered pale brown and grey mudstone; Palaeozoic Lucas Formation.
6 - 12 m, pale maroon soft weathered siltstone and fine sandstone.

BMR Lucas 17 (cont.)

12 - 24.4 m, grey shaly mudstone and siltstone, unweathered below 15 m; Lucas Formation.

Core: 24.4 - 25.0 m; 100% recovery; grey micaceous shaly mudstone and siltstone; Lucas Formation.

BMR Lucas 18

Location: lat. 20°41'30"S, long. 128°54'20"E; alt., 375 m; Bloodwood Bore/Kersh Spring track, 19 km S of 'Balgo'.

Drilling data: commenced and completed, 19 September 1973; depth, 15 m; drilled with air; no core.

Cuttings: 0 - 3 m, limestone; Cainozoic calcrete.
3 - 12 m, reddish-brown soft weathered clayey sandstone; Palaeozoic Lucas Formation.
12 - 15 m, soft reddish-brown and white clayey sandstone and mudstone; Lucas Formation

BMR Lucas 19

Location: lat. 20°43'00"S, long. 128°53'50"E; alt., 375 m; Bloodwood Bore/Kersh Spring track, 6 km S of Middletons Bore.

Drilling data: commenced and completed, 19 September 1973; depth, 15 m; drilled with air; no core.

Cuttings: 0 - 3 m, reddish-brown sand and lateritic ironstone; Cainozoic.
3 - 6 m, brown sand and lateritic ironstone.
6 - 9 m, quartz sand cemented with iron oxide; Cainozoic.
9 - 15 m, soft buff mudstone; Palaeozoic Lucas Formation.

BMR Lucas 20

Location: lat. 20°44'40"S, long. 128°53'30"E; alt., 370 m; Bloodwood Bore/Kersh Spring track, 9 km S of Middleton Bore.

BMR Lucas 20 (cont.)

Drilling data: commenced and completed, 20 September 1973; depth, 15 m; drilled with air; no core.

Cuttings: 0 - 3 m; limestone; Cainozoic calcrete.
3 - 15 m, soft, grey to brown, weathered laminated mudstone and micaceous siltstone; Palaeozoic Lucas Formation.

BMR Lucas 21

Location: lat. 20°46'10"S, long. 128°53'15"E; alt., 365 m; Bloodwood Bore/Kersh Spring track, 12 km S of Middleton Bore.

Drilling data: commenced and completed, 20 September 1973; depth, 15 m; drilled with air; no core.

Cuttings: 0 - 6 m, ironstained limestone; Cainozoic calcrete.
6 - 9 m, soft weathered clayey lithic sandstone; Palaeozoic Lucas Formation.
6 - 15 m, soft pale grey and brown mudstone; Lucas Formation.

BMR Lucas 22

Location: lat. 20°47'50"S, long. 128°53'10"E; alt., 360 m; Bloodwood Bore/Kersh Spring track, 16 km S of Middleton Bore.

Drilling data: commenced and completed, 21 September 1973; depth, 15 m; drilled with air; no core.

Cuttings: 0 - 7 m, maroon ironstained limestone; Cainozoic calcrete.
7 - 15 m, pale grey mudstone, some water supply; Palaeozoic Lucas Formation.

BMR Lucas 23

Location: lat. 20°49'20"S, long. 128°53'00"E; alt., 360 m; Bloodwood Bore/Kersh Spring track, 1 km S of Carrols Bore.

BMR Lucas 23 (cont.)

Drilling data: commenced and completed 21 September 1973; depth, 15.5 m; drilled with air.

Cuttings: 0 - 6 m, dark-reddish brown cemented sand and limestone; Cainozoic calcrete.
6 - 12 m, sand, reddish-brown 6 - 9 m, yellowish-brown 9-12 m; Cainozoic.
12 - 15.2 m, pale grey mudstone; Palaeozoic Lucas Formation.

Core: 15.2 - 15.5 m, 100% recovery; pale greyish noncalcareous clayey siltstone and very fine sandstone; some water supply; Lucas Formation.

BMR Lucas 24

Location: lat. 20°50'50"S, long. 128°52'00"E; alt., 355 m; Bloodwood Bore/Kersh Spring track, 4 km SSW of Carrols Bore.

Drilling data: commenced and completed, 24 September 1973; depth, 15 m; drilled with air; no core.

Cuttings: 0 - 12 m, limestone, partly silicified 9 - 12 m; Cainozoic calcrete.
12 - 15 m, limestone and buff clay; Cainozoic calcrete.

BMR Lucas 25

Location: lat. 20°44'30"S, long. 128°45'45"E; alt., 365 m; Raible Bore/Little Flower Bore track, 3 km S of Raible Bore.

Drilling data: commenced and completed, 24 September 1973; depth, 13.1 m; drilled with air.

Cuttings: 0 - 6 m, soft greyish, highly lithic, medium-grained clayey sandstone, calcareous sandstone and siltstone; Palaeozoic Lucas Formation.
6 - 12.2 m; greyish-maroon friable siltstone and medium to fine-grained highly lithic sandstone; Lucas Formation.

Core: 12.2 - 13.0 m, 100% recovery; greyish to maroon, medium-grained, highly lithic, calcareous sandstone; Lucas Formation.

BMR Lucas 26

Location:	lat. 20°46'15"S, long. 128°46'00"E; alt., 360 m; Raible Bore/Little Flower Bore track, 6 km S of Raible Bore.
Drilling data:	commenced and completed, 25 September 1973; depth, 11.6 m; drilled with air.
Cuttings:	0 - 3 m; friable brown sandstone, some gypsum crystals; Palaeozoic Lucas Formation. 3 - 9 m; brown laminated to thin-bedded, highly lighic, medium to coarse-grained sandstone, siltstone and mudstone. 9 - 11.0 m, grey fine-grained lithic sandstone; Lucas Formation.
Core:	11.0 - 11.6 m, 100% recovery; compact fine-grained lithic sandstone, thin section - detrital quartz, feldspar, recrystallized limestone, chert, other lithic grains, tourmaline, muscovite, and chloritized biotite, with minor quartz and calcite cement; Lucas Formation.

BMR Lucas 27

Location:	lat. 20°47'50"S, long. 128°46'20"E; alt., 355 m; Raible Bore/Carrols Bore track, 10 km S of Raible Bore.
Drilling data:	commenced and completed, 25 September 1973; depth, 18.3 m; drilled with air; no core.
Cuttings:	0 - 6 m, ironstained limestone; Cainozoic calcrete. 6 - 15 m, white limestone. 15 - 18 m, ironstained limestone, good supply of water; Cainozoic calcrete.

BMR Lucas 28

Location:	lat. 20°49'40"S, long. 128°46'45"E; alt., 345 m; Raible Bore/Carrols Bore track, 13 km S of Raible Bore.
Drilling data:	commenced and completed, 25 September 1973; depth, 20.5 m; drilled with air.

BMR Lucas 28 (cont.)

Cuttings:	0 - 6 m, reddish-brown lateritic ironstone and limestone; Cainozoic calcrete 6 - 9 m, limestone and pale grey mudstone; Cainozoic calcrete and Palaeozoic Lucas Formation. 9 - 20.4 m, maroon to grey, soft, medium-grained, highly lithic sandstone and laminated maroon-brown mudstone; Lucas Formation.
Core:	20.4 - 20.5 m; 100% recovery; medium-grained porous lithic sandstone, thin section - detrital quartz, recrystallized limestone, mudstone, greywacke, other lithic grains, feldspar and tourmaline, with no cement or matrix; Lucas Formation.

BMR Lucas 29

Location:	lat. 20°51'15"S, long. 128°47'00"E; alt., 350 m; Raible Bore/Carrols Bore track, 2 km N of Little Flower Bore and 16 km S of Raible Bore.
Drilling data:	commenced and completed, 26 September, 1973; depth, 15 m; drilled with air.
Cuttings:	0 - 9 m limestone; Cainozoic calcrete. 9 - 15 m, reddish-brown soft clayey lithic sandstone; water supply; Palaeozoic Lucas Formation.

BMR Lucas 30

Location:	lat. 20°42'30"S, long. 128°55'30"E; alt., 375 m; on old track 4 km SSE of Middletons Bore, S of 'Balgo'.
Drilling data:	commenced and completed, 26 September 1973; depth, 33 m; drilled with air; no core.
Cuttings:	0 - 3 m, reddish-brown sand and lateritic ironstone; Cainozoic. 3 - 6 m, yellowish-brown sand and lateritic ironstone; Cainozoic. 6 - 30 m, soft pale grey and brown mudstone and siltstone; Palaeozoic Lucas Formation. 30 - 33 m, soft brown and grey micaceous siltstone; Lucas Formation.

BMR Lucas 31

Location:	lat. 20°20'40"S, long. 128°37'50"E; alt., 370 m; Balgo Mission/Mongrel Downs road, 3 km E of Pussycat Bore.
Drilling data:	commenced, 2 October 1973; completed, 4 October 1973; depth, 88.7 m; drilled with mud 0 - 76 m, water 76 - 88.7 m.
Cuttings:	0 - 3 m, reddish-brown sand and lateritic ironstone; Cainozoic. 3 - 6 m, yellowish-brown sand and lateritic ironstone. 6 - 21 m, yellowish brown and pale grey clay and silt. 21 - 88.4 m, white and grey chert and clay; Cainozoic.
Core:	88.4 - 88.6 m, 100% recovery; dark grey fine-grained limestone and buff calcareous mudstone; probably Adelaidean Murraba Formation.

BMR Lucas 32

Location:	lat. 20°18'00;S, long. 128°20'15"E; alt., 365 m; Balgo Mission/Mongrel Downs road, 30 km W of Pussycat Bore.
Drilling data:	commenced and completed, 5 October 1973; depth, 31.1 m; drilled with air.
Cuttings:	0 - 3 m, reddish-brown aeolian sand, some iron-oxide cement; Cainozoic. 3 - 6 m, pale yellowish-brown sand; Cainozoic. 6 - 12 m, limestone; Cainozoic calcrete. 12 - 24 m, soft pale grey and white, partly calcareous mudstone and hard pale grey mudstone; Adelaidean Murraba Formation. 24 - 30.5 m, hard buff siltstone.
Core:	30.5 - 31.1 m, 100% recovery; buff fine-grained dolomite, thin section - finely crystalline, porous, with some micaflakes and quartz; X.R.D. determination - dolomite, quartz, illite, and possibly microcline; Murraba Formation.

BMR Lucas 33

Location:	lat. 20°18'00"S, long. 128°18'30"E; alt., 370 m; Balgo Mission/Mongrel Downs road, 38 km W of Pussycat Bore.
Drilling data:	commenced and completed, 9 October 1973; depth, 32.3 m; drilled with air.
Cuttings:	0 - 3 m, reddish-brown aeolian sand; Cainozoic. 3 - 6 m, brown lateritic ironstone. 6 - 12 m, yellowish-brown sand; Cainozoic. 12 - 30.5 m, weathered brown and pale grey mudstone and siltstone; Adelaidean Murraba Formation.
Core:	30.5 - 32.3 m, 75% recovery; maroon and pale grey laminated mudstone and fine-grained clayey sandstone, some brecciated layers; Murraba Formation.

BMR Lucas 34

Location:	lat. 20°18'10"S, long. 128°16'45"E; alt., 380 m; Balgo Mission/Mongrel Downs road, 35 km W of Pussycat Bore.
Drilling data:	commenced and completed, 9 October 1973; depth, 30 m; drilled with air.
Cuttings:	0 - 3 m, reddish-brown sand; Cainozoic. 3 - 9 m, yellowish-brown sand, some iron-oxide cement. 9 - 15 m, orange-brown sand, some ironstone; Cainozoic. 15 - 30 m, friable sandstone, yellowish-brown 15 - 18 m, reddish-brown 18 - 30 m; Adelaidean Murraba Formation.

BMR Lucas 35

Location:	lat. 20°18'10"S, long. 128°15'45"E; alt., 385 m; Balgo Mission/Mongrel Downs road, 37 km W of Pussycat Bore.
Drilling data:	commenced and completed, 10 October 1973; depth, 32.0 m; drilled with air 0 - 30 m, water 30 - 32 m.
Cuttings:	0 - 6 m, reddish-brown aeolian sand; Cainozoic. 6 - 9 m, yellowish-brown aeolian sand, some ironstone concretions. 9 - 18 m, mottled clay, sand and ironstone gravel.

BMR Lucas 35 (cont.)

18 - 24 m, brown sand; Cainozoic.
24 - 30.5 m, white clayey sandstone; Adelaidean Murraba Formation.

Core: 30.5 - 32.0 m, 80% recovery; pale grey mudstone consisting of quartz, muscovite and kaolinite (X.R.D. determination); Murraba Formation.

BMR Lucas 36

Location: lat. 20°20'45"S, long. 128°32'30"E; alt., 365 m; Balgo Mission/Mongrel Downs road, 6 km W of Pussycat Bore.

Drilling data: commenced and completed, 11 October 1973; depth, 91.6 m; drilled with mud.

Cuttings:
0 - 3 m, reddish-brown coarse sand; Cainozoic.
3 - 6 m, pale brown coarse sand and clay.
6 - 15 m, pale grey and brown mottled clay, some gypsum.
15 - 34 m, pale grey and maroon mottled clay.
34 - 49 m, pale grey clay with gypsum.
49 - 58 m, white calcareous clay and mudstone.
58 - 91.4 m, pale and dark grey chert and white calcareous clay; Cainozoic.

Core: 91.4 - 91.6 m, 100% recovery; mottled grey limestone; Adelaidean Murraba Formation.

BMR Lucas 37

Location: lat. 20°18'10"S, long. 128°23'50"E; alt., 365 m; Balgo Mission/Mongrel Downs road, 24 km W of Pussycat Bore.

Drilling data: commenced, 12 October 1973; completed, 15 October 1973; depth, 51.9 m; drilled with mud.

Cuttings:
0 - 9 m, limestone; Cainozoic calcrete.
9 - 18 m, sandy clay, reddish-brown and grey 9-15 m, grey and brown 15 - 18 m.
18 - 21 m, white calcareous clay, Cainozoic.
21 - 24 m, white calcareous clay and mudstone; Adelaidean Murraba Formation.
24 - 51.8 m, grey mudstone; good supply of non salty water.

BMR Lucas 37 (cont.)

Core: 51.8 - 51.9 m, 100% recovery; dark and pale grey laminated mudstone, thin section - fine-grained dolomite; Murraba Formation.

BMR Lucas 38

Location: lat. 20°18'10"S, long. 128°22'00"E; alt., 365 m; Balgo Mission/Mongrel Downs road, 28 km W of Pussycat Bore.

Drilling data: commenced, 15 October 1973; completed, 17 October 1973; depth, 92.8 m; drilled with mud.

Cuttings:
0 - 3 m, limestone; Cainozoic calcrete.
3 - 6 m, gypsum; Cainozoic.
6 - 9 m, soft, pale buff, gypsiferous mudstone.
9 - 12 m, mottled lateritic sand and clay and grey chert; Cainozoic.
12 - 30 m, white clayey mudstone; Adelaidean Murraba Formation.
30 - 91.4 m, pale to dark grey and maroon mudstone; Murraba Formation.

Core: 91.4 - 92.8 m, 100% recovery; thin-bedded maroon mudstone, dipping 10° and veined by gypsum and its dehydration product bassanite (X.R.D. determination); Murraba Formation.

BMR Lucas 39

Location: lat. 20°27'30"S, long. 128°55'30"E; alt., 390 m; Bloodwood Bore/Kersh Spring track, 0.8 km S of Bloodwood Bore.

Drilling data: commenced and completed, 14 September 1973; depth, 58.2 m; drilled with mud.

Cuttings:
0 - 3 m, reddish-brown lateritic ironstone gravel; Cainozoic.
3 - 6 m, paler lateritic ironstone, some calcrete; Cainozoic.
6 - 27 m, reddish-brown soft weathered sandstone and mudstone; Adelaidean Murraba Formation.

BMR Lucas 39 (cont.)

27 - 55 m, grey and maroon soft weathered mudstone.
55 - 57.9 m, grey and maroon mudstone, siltstone and sandstone, Murraba Formation.

Core: 57.9 - 58.1 m, 100% recovery; flat-lying thin-bedded, grey and maroon mudstone, siltstone and highly lithic sandstone; Murraba Formation.

BMR Lucas 40

Location: lat. 20°33'15"S, long. 128°54'00"E; alt., 380 m; Bloodwood Bore/Kersh Spring track, 3 km S of 'Balgo'.

Drilling data: commenced and completed, 15 September 1973; depth, 15 m, drilled with air; no core.

Cuttings: 0 - 6 m, reddish-brown sand and lateritic ironstone; Cainozoic.
6 - 9 m, grey clayey mudstone; Palaeozoic Lucas Formation.
9 - 15 m, grey and brown laminated mudstone; Lucas Formation.

Details of ESSO Stratigraphic holes

Esso Lucas 1

Location: lat. 20°10'00"S, long. 128°13'00"E; alt., 375 m. Taxs Bore track, 19 km E of Balgo Mission.

Drilling data: commenced, 30 November 1972; completed, 1 December 1972; depth, 76 m.

Cuttings:
0 - 6 m, sand and laterite ironstone; Cainozoic.
6 - 24 m, loosely cemented sandstone and ironstone, minor gypsum and angular fragments of quartz; Cainozoic.
24 - 30 m, ferruginious quartzose sandstone; Adelaidean Lewis Range Sandstone.
30 - 34 m, fine-grained quartzose sandstone with some shaly bands.
34 - 43 m, white fine-grained quartzose sandstone; Lewis Range Sandstone.
43 - 76 m, grey to black slate; water at 52 m; Archaean? Killi Killi Beds.

Esso Lucas 2

Location: lat. 20°10'00"S, long. 128°13'30"E; alt., 375 m; Taxs Bore track, 25 km ESE of Balgo Mission.

Drilling data: commenced and completed, 2 December 1972; depth, 53 m.

Cuttings:
0 - 6 m, sand and laterite ironstone; Cainozoic.
6 - 15 m, lateritised sandstone; probably Adelaidean Murraba Formation.
15 - 18 m, pale to dark grey cherty shale.
18 - 27 m, silicified limestone, minor shale and chert.
27 - 30 m, fine-grained sandstone.
30 - 37 m, banded buff siliceous shale and black chert; water at 37 m, about 2 m^3 per hour.
37 - 40 m, siliceous shale with quartz bands.
40 - 53 m, black chert or quartzite, minor calcite; may be silicified grey shale or limestone; probably Adelaidean Murraba Formation.

Esso Lucas 3

Location: lat. 20°12'30"S, long. 128°16'30"E; alt., 370 m; Taxs Bore track, 32 km ESE of Balgo Mission.

Drilling data: commenced and completed, December 1972; depth, 101 m.

Cuttings:
0 - 6 m, sand and lateritic ironstone; Cainozoic.
6 - 12 m, pale brown gritty claystone; Cainozoic.
12 - 21 m, brown weathered sandstone, ironstained; probably Adelaidean Murraba Formation.
21 - 30 m, pale brown quartzose sandstone.
30 - 46 m, white shale with chert and sandstone bands; good water at 30 m, about 20 m^3 per hour.
46 - 64 m, black banded chert and minor shale bands.
64 - 82 m, grey shale with minor calcareous fragments; some sandstone at 76 m.
82 - 101 m, grey shale, chert and sandstone; probably Murraba Formation.

Esso Lucas 4

Location: lat. 20°14'00"S, long. 128°16'30"E; alt., 365 m; Taxs Bore track, 2 km WNW of Taxs Bore, 38 km ESE. of Balgo Mission.

Drilling data: commenced and completed, December 1972; depth, 60 m.

Cuttings:
0 - 3 m, limestone and lateritic ironstone; Cainozoic calcrete.
3 - 9 m, limestone; Cainozoic calcrete.
9 - 15 m, limestone and gritty claystone, good water at 12 m; probably Adelaidean Murraba Formation.
15 - 60 m, chert (silicified limestone?); probably Murraba Formation.

Esso Lucas 5

Location: lat. 20°16'30"S, long. 128°23'00"E; alt., 365 m; Taxs Bore track, 5 km SE of Taxs Bore.

Drilling data: commenced, 6 December 1972; completed. 13 December 1972; depth, 50 m.

Esso Lucas 5 (cont.)

Cuttings: 0 - 15 m, pale brown gypsiferous and talcose clay; Cainozoic.
15 - 18 m, gypsiferous clay, talc and chert; probably Cainozoic.
18 - 37 m, chert with grey talc, black to dark brown below 30 m, good water at 33 m, about 20 m^3 per hour; probably Adelaidean Murraba Formation.
37 - 50 m, banded chert and white talcose shale; probably Murraba Formation.

Esso Lucas 6

Location: lat. 20°27'45"S, long. 128°44'00"E; alt., 365 m; 20 km W of Bloodwood Bore.

Drilling data: commenced, 13 December 1972; completed. 14 December 1972; depth, 45 m.

Cuttings: 0 - 3 m, sand and lateritic ironstone; Cainozoic.
3 - 12 m, shale, some ironstone, chert and quartz; probably Adelaidean Murraba Formation.
12 - 18 m, interbedded sandstone and talcose 'shale'.
18 - 45 m, brown to buff partly talcose shale; Murraba Formation.

Water bore records

Name: Taxs Bore.

Location: lat. 20°14'30"S, long. 128°22'00"E; alt., 365 m; 13 km ENE of McGuires Gap, Kearney Range.

Bore data: depth, 55 m; supply, 3.3 m^3/h (730 gph) in 1964.

Log: 0 - 1.5 m, quartz boulders (chert?); Cainozoic calcrete?
1.5 - 9 m, quartz boulders and clay.
9 - 22 m, sandstone and clay; Cainozoic?
22 - 31 m, sandstone; Adelaidean Murraba Formation?
31 - 35 m, quartzite (quartzose sandstone?).
35 - 53 m, brown clay and gravel.
53 - 55 m, soft black clay; weathered Murraba Formation?

Name: McGuires Bore.

Location: lat. 20°18'20"S, long. 128°12'30"E; alt., 400 m; Balgo Mission/Mongrel Downs road, 4 km W of McGuires Gap.

Bore data: depth, 46 m; supply, 0.7 m^3/h (150 gph) in 1963, dry in 1972.

Log: 0 - 1 m, red soil; Cainozoic sand.
1 - 15 m, pale brown sandstone; Cainozoic or Devonian?
15 - 19 m, yellow and white clay; Cainozoic or weathered bedrock.
19 - 24 m, quartz and mica; greisenized Lower Proterozoic granite?
24 - 46 m, khaki micaceous 'shale'; greisenized granite or schist.

Name: Carrs Bore.

Location: lat. 20°32'15"S, long. 128°53'30"E; alt., 395 m; 1 km S of Balgo homestead.

Bore data: drilled 1970 by Gorey & Cole; depth, 46 m; supply, 17 m^3/h (4000 gph); water level at depth of 6 m; good drinking water.

Log: 0 - 9 m, sand and clay; Cainozoic or weathered Palaeozoic Lucas Formation.
9 - 17 m, clay, sandstone; Lucas Formation.
17 - 24 m, sandstone; probably Adelaidean Erica Sandstone.
24 - 40 m, shale, siltstone.
40 - 46 m, sandstone, siltstone; main aquifer; Erica Sandstone.

Name: Carrolls Bore.

Location: lat. 20°49'10"S, long. 128°53'00"E; alt., 360 m; 33 km S of Balgo homestead, on the Bloodwood Bore/Kersh Spring track.

Bore data: drilled 1970 by Gorey & Cole; depth, 17 m; supply, 10 m^3/h (2400 gph); water level at depth of 6 m; good drinking water.

Log: 0 - 9 m, limestone, clay; Cainozoic calcrete.
9 - 12 m, limestone, clay, sandstone; Palaeozoic Lucas Formation.

Name: Bloodwood Bore.

Location: lat. 20°27'10"S, long. 128°55'30"E; alt., 390 m; Balgo Mission/Mongrel Downs road SE of the Lewis Range.

Bore data: depth 13 m; supply, 5 m^3/h (1200 gph) 1963, 2 m^3/h (480 gph) 1966; good drinking water at 13 m.

Log: 0 - 5 m, limestone; Cainozoic calcrete.
5 - 10 m, brown and white stone; probably calcrete.
10 - 13 m, limestone; Cainozoic calcrete.

Name: Pussycat Bore.

Location: lat. 20°20'30"S, long. 128°36'00"E; alt., 370 m; Balgo Mission/Mongrel Downs road SW of the Lewis Range.

Bore data: depth, 16.5 m; supply, 5 m^3/h (1200 gph) in 1963; water suitable for stock.

Log: 0 - 10 m, yellow-brown sandstone; Cainozoic.
10 - 14 m, white limestone; Cainozoic calcrete.
14 - 16.5 m, clean quartz and very hard patch (probably chert), good water supply; Cainozoic.

BILLILUNA SHEET AREA

In 1972 Esso Australia Ltd drilled 7 stratigraphic holes from north to south along the Sturt Creek/Balgo Mission track and one hole on the Billiluna/Tanami road, east of the Peterson Range. Additional subsurface information is available from the logs of three water bores, two successful, drilled in 1964 in the northern part of the Petersen Range, south of Sturt Creek homestead and west of the Sturt Creek/Balgo Mission track. The positions of the Esso holes and the water bores are shown in Fig. 12.

Sturt Creek/Balgo Mission track (Fig. 13)

The most northerly hole drilled, EB1, penetrated 58 m of siltstone and shale regarded as part of the Lake Willson Beds. Sandstone and shale of the same unit were intersected between 24 m and 64 m in hole EB2, below 21 m of sandstone assigned to the Pindar Beds and 3 m of Cainozoic laterite. Holes EB3, EB4, and EB5 penetrated shale, sandstone mudstone and chert which probably belong to the Jawilga Beds: in holes EB4 and EB5 these underlie 24 m and 52 m respectively of mainly clayey Cainozoic sediments. The next hole, EB6, was drilled on the south side of a postulated major east-west fault. It passed through 3 m of calcrete and 52 m of Cainozoic clay before penetrating 46 m into shale of the Murraba Formation. The last hole along the track, EB7, was drilled through 3 m of sand and 18 m of Cainozoic calcrete into 55 m of Lewis Range Sandstone.

The most easterly of the three water bores west of the Sturt Creek/Balgo Mission track, SCC Bore, was drilled to a depth of 76 m, passing through 3 m of Cainozoic sand and laterite into siltstone and finally dolomite assigned to the Jawilga Beds. The other two bores, the SCA and SCE, respectively 91 m and 98 m deep, bottomed in siltstone and sandstone that probably belong to the Peterson Beds.

Billiluna/Tanami road (Fig 13)

Hole EB8 was drilled on the Billiluna/Tanami road in the sand plain between ridges of westerly dipping Lewis Range Sandstone to the east and contorted Peterson Beds, which may be Carpentarian, to the west. A major fault has been postulated between the outcrops of these two units (Blake et. al., 1973), just west of the stratigraphic hole. In the hole Cainozoic sediments 3 m thick were found to overlie partly calcareous sandstone, shale, chert and conglomerate which are probably part of the Murraba Formation.

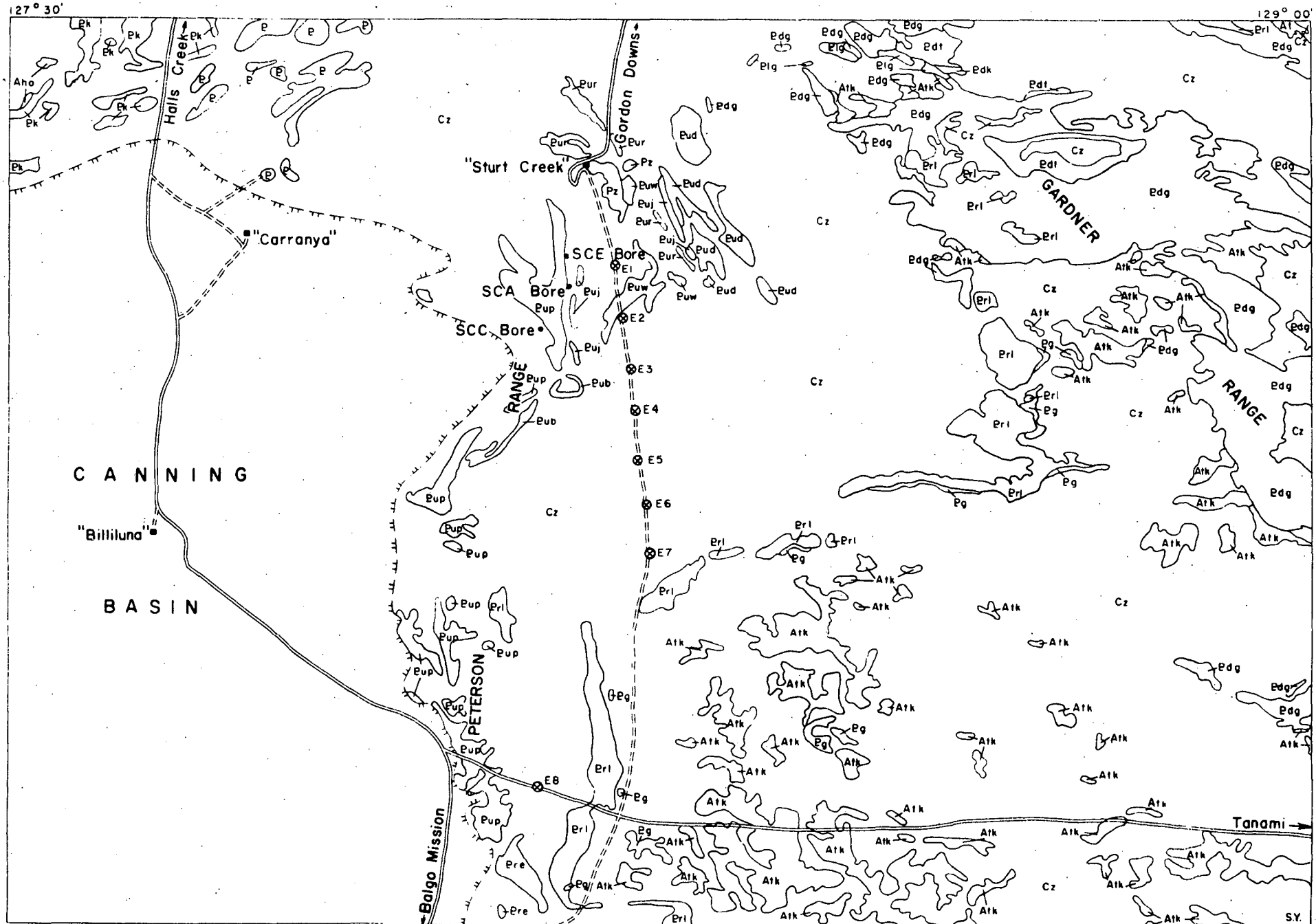


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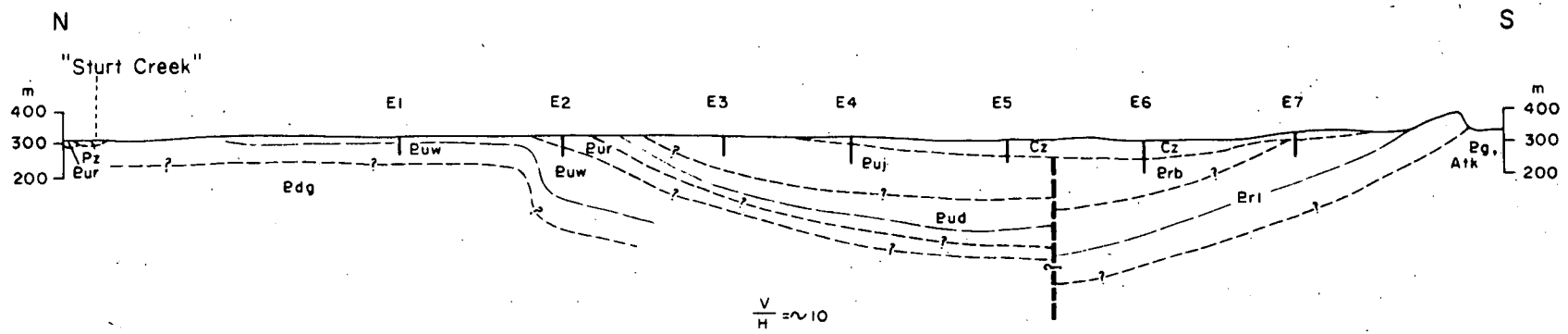
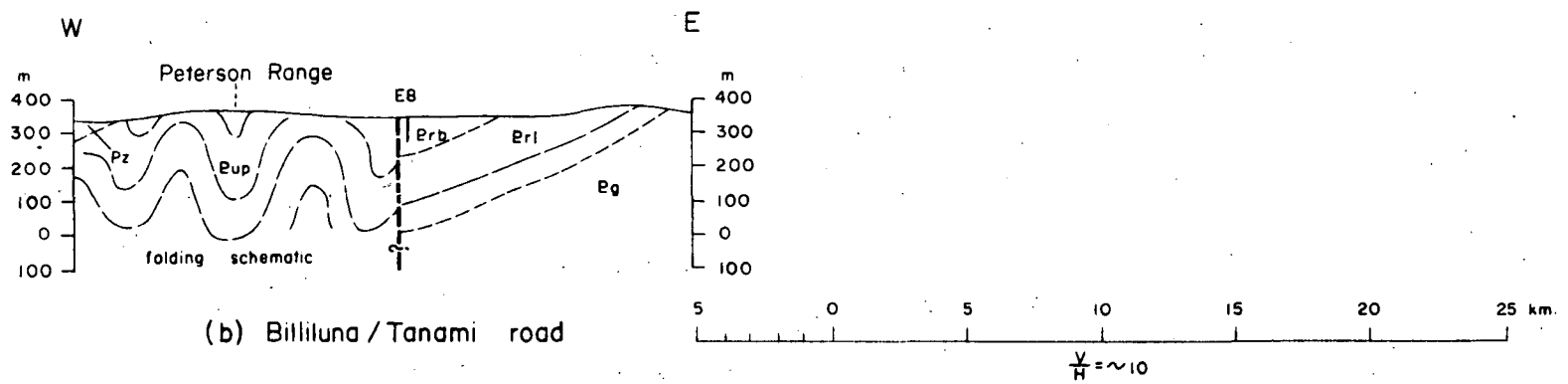
Fig.12 Billiuna sheet area, W.A., showing outcrops of pre-Cainozoic rocks E. of the Canning Basin and positions of stratigraphic holes (for reference see Fig.6)



(a) Sturt Creek / Balgo Mission track



(b) Billiluna / Tanami road

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Fig. 13 Geological sections along drilling lines, Billiluna sheet area.

E 52/A14/BT

(For reference see Table 2 and Fig.3)

Conclusions

The stratigraphic drilling by Esso Australia in the Sheet area shows firstly that the Lake Willson Beds include siltstone and shale as well as sandstone and chert, the two rock types of the unit exposed in outcrops. Secondly, the Lewis Range Sandstone is overlain to the north by shale and to the west by calcareous sandstone, shale, chert and conglomerate which are assigned to the Murraba Formation; these sedimentary rocks are similar to those of the Murraba Formation overlying the Lewis Range Sandstone in the Lucas Sheet area to the south (Blake et al., 1973). Thirdly, Cainozoic alluvial sediments over 50 m thick are present along the east-west trending drainage line in the centre of the Sheet area.

Details of Stratigraphic holes

Esso Billiluna 1

Location:	lat. 19°16'20"S, long. 128°12'00"E; alt., 325 m; Sturt Creek/Balgo Mission track, 13 km SSE of 'Sturt Creek'.
Drilling data:	commenced and completed, 18 November 1972; depth, 58 m.
Cuttings:	0 - 34 m, brown, slightly fissile siltstone, some calcite. 6 - 9 m; Proterozoic Lake Willson Beds. 34 - 58 m, blue-grey graphitic shale, Lake Willson Beds.

Esso Billiluna 2

Location:	lat. 19°20'00"S, long. 128°12'30"E; alt., 325 m; Sturt Creek/Balgo Mission track, 19 km SSE of Sturt Creek.
Drilling data:	commenced, 19 November 1972; completed, 20 November 1972; depth, 64 m.
Cuttings:	0 - 3 m, laterite; Cainozoic. 3 - 24 m, white, even-grained sugary sandstone; probably Proterozoic Pindar Beds. 30 - 40 m, sandstone and clay (weathered shale); probably Lake Willson Beds. 40 - 49 m, sandstone and red micaceous siltstone and shale. 49 - 64 m, red shale, micaceous and partly siliceous; probably Lake Willson Beds.

Esso Billiluna 3

Location:	lat. 19°23'20"S, long. 128°13'00"E; alt., 315 m; Sturt Creek/Balgo Mission track, 25 km S of 'Sturt Creek'.
Drilling data:	commenced and completed, 20 November 1972; depth, 64 m.

Esso Billiluna 3 (cont.)

Cuttings: 0 - 9 m, weathered brown silty shale, some gypsum; Proterozoic Jawilga Beds (may be equivalent to Adelaidean Murraba Formation).
9 - 37 m, brown silty shale; salty water at 28 m, about 50 m^3 per hour.
37 - 64 m, grey and bluish-grey shale; Jawilga Beds.

Esso Billiluna 4

Location: lat. 19°26'00"S, long. 128°13'10"E; alt., 310 m; Sturt Creek/Balgo Mission track, 31 km S of 'Sturt Creek'.

Drilling data: commenced 20 November 1972; completed, 21 November 1972; depth, 77 m.

Cuttings: 0 - 12 m, gypsiferous mudstone and clay; Cainozoic.
12 - 24 m, brown and grey clay, some sandstone and minor gypsum; brackish water at 23 m, about 50 m^3 per hour; Cainozoic.
24 - 40 m, grey to brown sandstone, minor mudstone; Proterozoic Jawilga Beds (may be equivalent to Adelaidean Murraba Formation).
40 - 52 m, Maroon to brown shale and mudstone.
52 - 55 m, 'opaque' quartz, gypsum and mudstone.
55 - 70 m, gravel with 'opaque' and black quartz (=chert) and sandstone fragments; probably chert granule conglomerate.
70 - 77 m, interbedded grey shale and black chert; Jawilga Beds.

Esso Billiluna 5

Location: lat. 19°29'10"S, long. 128°13'30"E; alt., 305 m; Sturt Creek/Balgo Mission track, 36 km S of 'Sturt Creek'.

Drilling data: commenced, 21 November 1972; completed, 22 November 1972; depth, 66 m.

Cuttings: 0 - 3 m, brown mudstone; Cainozoic.
3 - 40 m, pale brown gypsiferous clay, up to 60% gypsum.
40 - 46 m, clay with calcareous fragments and minor gypsum.
46 - 52 m, clay and sand, partly ferruginous; artesian brackish water at 47 m, about 70 m^3 per hour; Cainozoic.

Esso Billiluna 5 (cont.)

Cuttings: 52 - 66 m, interbedded sandstone and shale; Proterozoic Jawilga Beds?

Esso Billiluna 6

Location: lat. 19°32'15"S, long. 128°14'00"E; alt., 305 m; Sturt Creek/Balgo Mission track, 42 km S of 'Sturt Creek'.

Drilling data: commenced, 22 November 1972; completed, 23 November 1972; depth, 101 m.

Cuttings: 0 - 3 m, limestone; Cainozoic calcrete.
3 - 12 m, pale brown gypsiferous clay; Cainozoic.
12 - 55 m, pale brown clay, some gypsum; Cainozoic.
55 - 94 m, brown to grey clay with grey and purple shale fragments and some gypsum; weathered shale of the Adelaidean Murraba Formation.
94 - 101 m, grey shale and black cherty shale, minor gypsum; salt water at 94 m; Murraba Formation.

Esso Billiluna 7

Location: lat. 19°35'30"S, long. 128°14'30"E; alt., 320 m; Sturt Creek/Balgo Mission track, 48 km S of 'Sturt Creek'.

Drilling data: commenced, 24 November 1972; completed, 25 November 1972; depth, 76 m.

Cuttings: 0 - 3 m, reddish-brown lateritic sand; Cainozoic.
3 - 21 m, limestone; good water at 9 m, about 50 m^3 per hour; Cainozoic calcrete.
21 - 30 m, ironstone, quartz, some gypsum and medium-grained sandstone; weathered Adelaidean Lewis Range sandstone.
30 - 40 m, very fine-grained ferruginour sandstone.
40 - 76 m, mottled brown ferruginous and calcareous sandstone; good water; Lewis Range Sandstone.

Esso Billiluna 8

Location: lat. 19°51'00"S, long. 128°06'30"E; alt., 340 m; Billiluna/Tanami road, 57 km SE of Billiluna.

Esso Billiluna 8 (cont.)

Drilling data: commenced and completed, 28 November 1972; depth, 70 m.

Cuttings:

0 - 3 m, reddish-brown sand and lateritic ironstone; Cainozoic.
3 - 9 m, Sandstone: Adelaidean Murraba Formation or Erica Sandstone.
9 - 30 m, fine-grained ferruginous sandstone.
30 - 40 m, pale brown calcareous sandstone; Murraba Formation.
40 - 47 m, brown calcareous and siliceous shale.
47 - 55 m, banded chert and shale; good water at 52 m, about 2 m^3 per hour.

55 - 70 m, quartz conglomerate and sandstone; Murraba Formation.

Water bore records

Name: SCC Bore (also known as SCX3, S4 and Horse Plain).

Location: lat. 19°17'00"S, long. 128°08'45"E; alt., 350 m; 13.5 km S of Sturt Creek homestead.

Bore data: drilled 1964 by A. Donnachie; depth, 76 m; supply, about 2.5 m^3/h (570 gph); water level at depth of 37 m.

Log: 0 - 3.5 m, laterite and sand; Cainozoic.
3.5 - 7.6 m, brown partly lateritized siltstone; Adelaidean Jawilga Beds.
7.6 - 16 m, pale grey weathered siltstone.
16 - 39 m, laminated siltstone.
39 - 76 m, black dolomite, calcite veins; main aquifer
49 - 76 m; Jawilga Beds.

Name: SCA Bore (also known SCX1, SCK, S3).

Location: lat. 19°20'30"S, long. 128°07'00"E; alt., 315 m; 20 km SSW of Sturt Creek homestead.

Bore data: drilled 1964 by A. Donnachie; depth, 91 m; supply, 5.5 m^3/h (1200 gph); water level at depth of 37 m.

Log: 0 - 12 m, alluvial silt; Cainozoic.
12 - 53 m, sandstone, main aquifer 38 - 53 m; Precambrian Peterson Beds.
53 - 79 m, sandstone with clay.
79 - 91 m, silt; Peterson Beds?

Name: SCE Bore (also known as SCX5 and S13).

Location: uncertain, perhaps lat. 19°14'00"S, long. 128°08'30"E; alt., 350 m: 11 km S of Sturt Creek homestead.

Bore data: drilled 1964 by A. Donnachie; depth, 98 m; supply, 0.7 m^3/h (150 gph), unsuccessful; water level at depth of 91 m.

Log: 0 - 3 m, laterite; Cainozoic.
3 - 24 m, clay with angular quartz fragments; Cainozoic?
24 - 97.5 m, laminated siltstone with thin sandstone interbeds at 82 - 85 m; probably Precambrian Peterson Beds.
97.5 - 98 m, sandstone; Peterson Beds.

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