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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS:

1965/216

SEDIMENTARY BASINS SECTION - SUMMARY OF ACTIVITIES, 1965.

The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

SEDIMENTARY BASINS SECTION

SUMMARY OF ACTIVITIES, 1965.

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SEDIMENTARY BASINS SECTION

SUMMARY OF ACTIVITIES, 1965

RECORDS 1965/216

CONTENTS

Accompanied by nine Figures.

AUSTRALIA

GEOLOGICAL MAPPING, DRILLING AND PHOTOGEOLOGY 1965

Reference

- Mapping completed, 1965
- Bandanna project (stratigraphic study)
- Scout Holes 1965
- Photogeology completed 1965

To accompany Records. 1965/216

Bureau of Mineral Resources, Geology & Geophysics. October, 1965

SEDIMENTARY BASINS SECTION

SUMMARY OF ACTIVITIES, 1965.

SUMMARY

Regional mapping parties completed twelve 1:250,000 Sheets and mapped parts of several others. Mapping was completed on the Bonaparte Gulf and Georgina Basins and continued in the Great Artesian Basin; regional surveys began in the Wiso and Yarrol Basins, and good progress was made in each. The Amadeus Basin parties spent the year in report writing and map compilation, and similar work occupied some members of the Bowen, Georgina and Great Artesian Basin parties for most of the year.

Helicopter transport was used extensively and successfully by the Wiso party, and both the Bonaparte Gulf and Helen Springs parties used helicopters for brief reconnaissance surveys.

Contract scout drilling supplemented the mapping of each of the Great Artesian Basin, Helen Springs and Wiso parties.

The Photogeological Group completed eighteen 1:250,000 Sheets during the year.

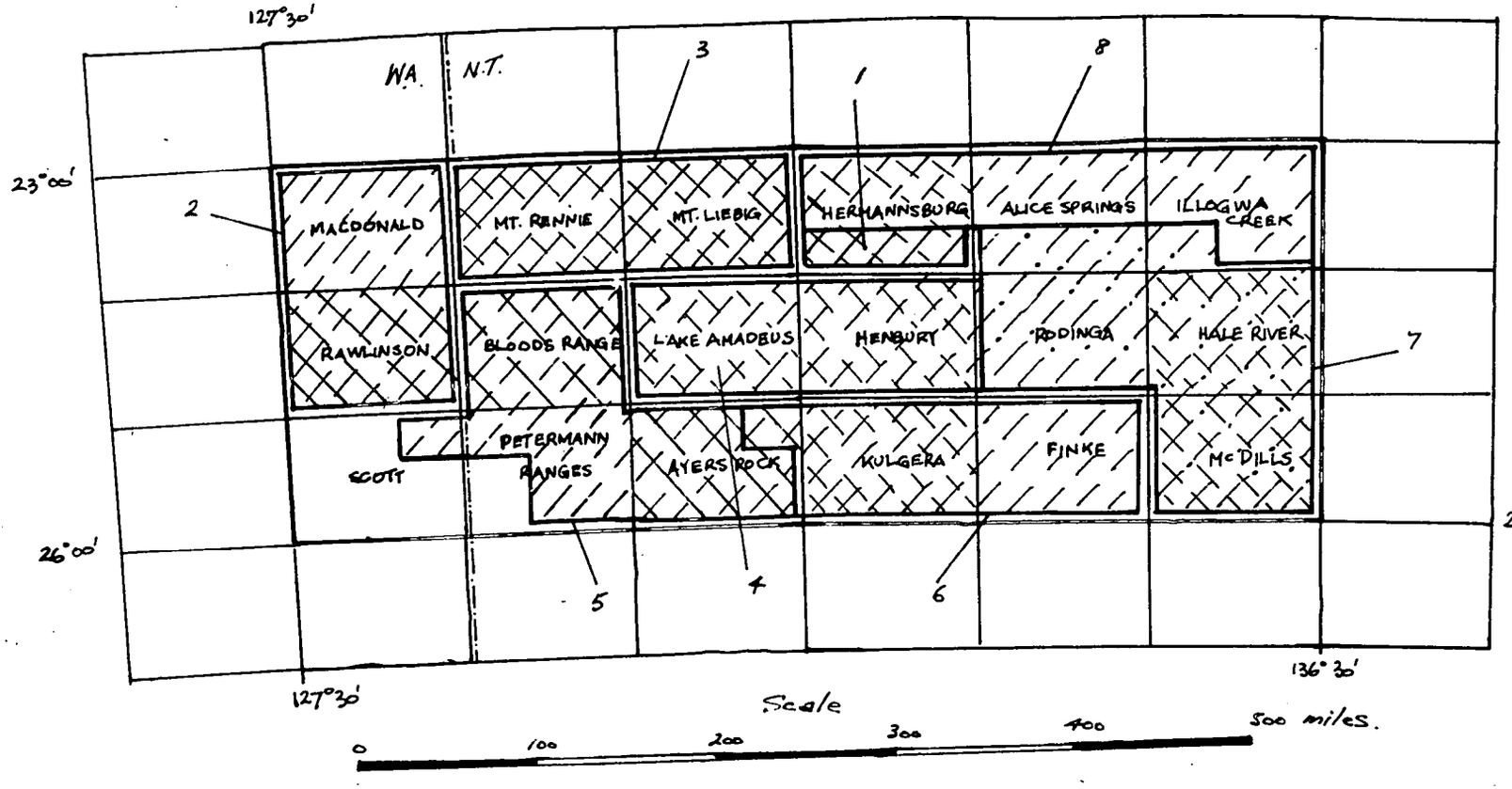
The Palaeontological Groups continued their programmes of research and of routine examinations, and slightly-decreased requests for assistance from private enterprise allowed more time for study of BMR collections and for research.

AMADEUS BASIN

Fig. 1.

Amadeus Basin Progress Report. 1964 - 1965.

Index to reports and explanatory note series.



Report series

1. Southern half of the Hermannsburg Sheet area. (Report No. 61)
2. Rawlinson - Macdonald area. (Report No. 65)
3. N.W. part of the Amadeus Basin (Report No. 85)
4. Central part of the Amadeus (Report No. 86) Basin.
5. S.W. margin of the Amadeus (Report No 87) Basin
6. S.E. part of the Amadeus (Report No. 88) Basin.
7. N.E. part of the Amadeus (Record 1965/108) Basin.
8. N.E margin of the Amadeus (Report No. 103) Basin.

Reports published

Reports in press

Explanatory Notes in press

Explanatory Notes in draft form.

Report in record form.

To accompany BMR Record 1965/216

Amadeus Basin Parties

by
A.T. Wells

PERSONNEL: A.T. Wells, P.J. Cook, L.C. Ranford (resigned September 1965), A.J. Stewart (resigned August 1965), D.J. Forman (on leave of absence from September 1965), and T. Quinlan (part-time).

GEOLOGY:

The regional reconnaissance mapping of the Amadeus Basin was completed in 1964. Most of 1965 was spent in reporting the results of the regional surveys. The attached diagram (Fig.1) shows the present status of the Records, Reports and Explanatory Notes series covering the Amadeus Basin.

Planning of a bulletin on the geology of the Amadeus Basin was completed and brief introductory chapters were outlined in draft form. A brief synopsis of the definition of the basin, structure and structural history, mineral deposits and older Precambrian is drafted. The Cambrian palaeogeography and stratigraphy have been dealt with in more detail and are also in draft form. Palaeogeographic maps and isopach and facies maps have been drawn up for the Cambrian Pertaoorrta Group.

Work on the palaeogeography and sedimentation in the Cambrian-Ordovician Larapinta Group is proceeding.

Drafting of the regional geological map of the Amadeus Basin at 1:500,000 scale has commenced. The map will be reproduced in two sheets.

MISCELLANEOUS:

(1) A.T. Wells spent eight weeks overseas in July and August. The time was spent in the study of salt basins which included the Mesozoic Parras Basin and Sierra Madre Orientale in Coahuila and Nuevo Leon, Northern Mexico, Pennsylvanian salt anticlines of the Paradox Basin in Utah, Colorado and Arizona, U.S.A., and the Tertiary salt in the central and southern Iranian basins.

(2) P.J. Cook spent January-March, 1965 in Antarctica carrying out 1:250,000 scale geological reconnaissance mapping and oceanographic work. The month following the Antarctic field season was occupied with writing sections of the record "Geological work in Antarctica, January to March, 1965", and in carrying out detailed textural analyses of samples of recent marine glacial sediments collected from the continental shelf of Antarctica.

(3) P.J. Cook did two weeks reconnaissance field-work in the Ngalia Basin in order to give some geological control to the photogeological maps then in preparation for the Ngalia Basin. The field work confirmed that the thickness of sediments in the Ngalia Basin is about 11,000 feet and that it is possible to trace sedimentary units westward from Yuendumu to Vaughn Springs.

(4) Detailed sedimentological studies on the Ordovician Stairway Sandstone, including palaeogeographic, palaeocurrent textural and thin section work was undertaken by P.J. Cook.

This work has shown that the main current directions during deposition of the Stairway Sandstone were from south-east to north-west, and that the sediments were derived from a predominantly plutonic provenance. The environment of deposition of phosphorites in the Stairway Sandstone is now understood more clearly, and winnowing was probably the most important single process effecting their concentration. This work will be included in a record in January, 1966.

(5) T. Quinlan completed a draft report on the Alice Springs Town and Inner Farm Basin, attended an Arid Zone Conference in Alice Springs in September 1965 and began a Public Service Board course in automatic data processing in Melbourne during September 1965. He has also been engaged in compiling programmes for computer work concerning several facets of the Sedimentary Basins Section's work, and examining aspects of data storage and retrieval of geological information of all types.

BONAPARTE GULF BASIN

Bonaparte Gulf Basin Party

by

J.J. Veevers

PERSONNEL: J.J. Veevers, J. Roberts. J.M. Dickins joined the party in mapping the Port Keats/Cape Scott area.

DURATION OF FIELD WORK: 27th May to 20th September, 1965.

AREA MAPPED: (a) further detail in southern part of basin, following up field-work in 1963 in this area.

(b) a reconnaissance using helicopter, of PORT KEATS/CAPE SCOTT, N.T.

GEOLOGY:

The Cambrian and Ordovician geology of the Basin was completed in 1963 (Kaulback and Veevers, Record 1965/49), and in 1965 field-work was concentrated on the Upper Devonian and Lower Carboniferous rocks in the southern part of the Basin, and on the Permian and Mesozoic in the north-eastern part.

Six subdivisions of the Cockatoo Sandstone were mapped; in ascending order they are :-

(1),a boulder conglomerate and red-brown sandstone (< 350 feet thick) that extends north of a line joining Church Steeple Peak and Nigli Gap to Alligator Spring; (2),a widespread cross-bedded quartz sandstone (>1000 feet thick); (3),sandy dolomite and marl, passing northwards into limestone, with pelecypods, brachiopods, and plants; the thickness exceeds 200 feet. (4),thin-bedded red quartz sandstone, with worm-trails; (5),is a repetition in lithology and thickness of (2); (6),poorly exposed quartz sandstone, dolomite and marl, that pass upwards transitionally into the Famennian limestone at Ninbing.

The unnamed Fammennian limestone at Ninbing is a reef complex almost identical in facies with some of the Upper Devonian reef complexes of the northern Canning Basin. Four facies have been recognized: the reef itself, of recrystallized limestone and dolomite containing calcareous algae; the back-reef, of well-bedded limestone (oncolitic, oolitic, and birdseye limestones); the fore-reef, of reef-derived calcarenite and calcirudite; and the inter-reef, of platy calcarenite and calcilutite. A note on the reefs by P.E. Playford (W.A.G.S.), Veevers and Roberts is being submitted for publication to the Australian Journal of Science.

Detailed studies of the Burt Range Formation, Enga Sandstone, and Septimus Limestone reveal a complex facies variation in lateral equivalents; most of the variation is attributable to contemporaneous relief along the Cockatoo Fault system.

The Border Creek Sandstone was found unconformably to overlie the Point Spring Sandstone in the Weaber Range. A similar unconformity was found between the conglomerate capping the Burt Range and the underlying sandstone.

The exposed stratigraphical sequence in PORT KEATS/ CAPE SCOTT, in ascending order, is as follows:-

(1) Lower Permian sandstone and siltstone (Table Hill, Docherty Hills); (2) feldspathic quartz sandstone (Karrandippi Hills); (3) grey fossiliferous limestone and brown quartz sandstone, which contains the Fossil Head fauna; (4) sandstone and siltstone with plant and marine invertebrate fossils (Upper Permian); (5) siltstone and shale with ?Conchostraca (?Triassic); all unconformably overlain by (6) Cretaceous conglomerate and siltstone.

A report on the marine geology of the Timor Sea by Tj. H. van Andel (Scripps Institution of Oceanography) and Veevers was completed, and is now being edited.

Drilling by Australian Aquitaine Petroleum Pty Ltd in the Port Keats area (Kulshill No.1 Well) has revealed the occurrence of about 5000 feet of Permian sediments, and a thickness exceeding 5000 feet of Lower Carboniferous dark siltstone of equivalent facies and age to the rocks of A.O.D. Bonaparte Nos. 1 and 2 Wells.

BOWEN BASIN

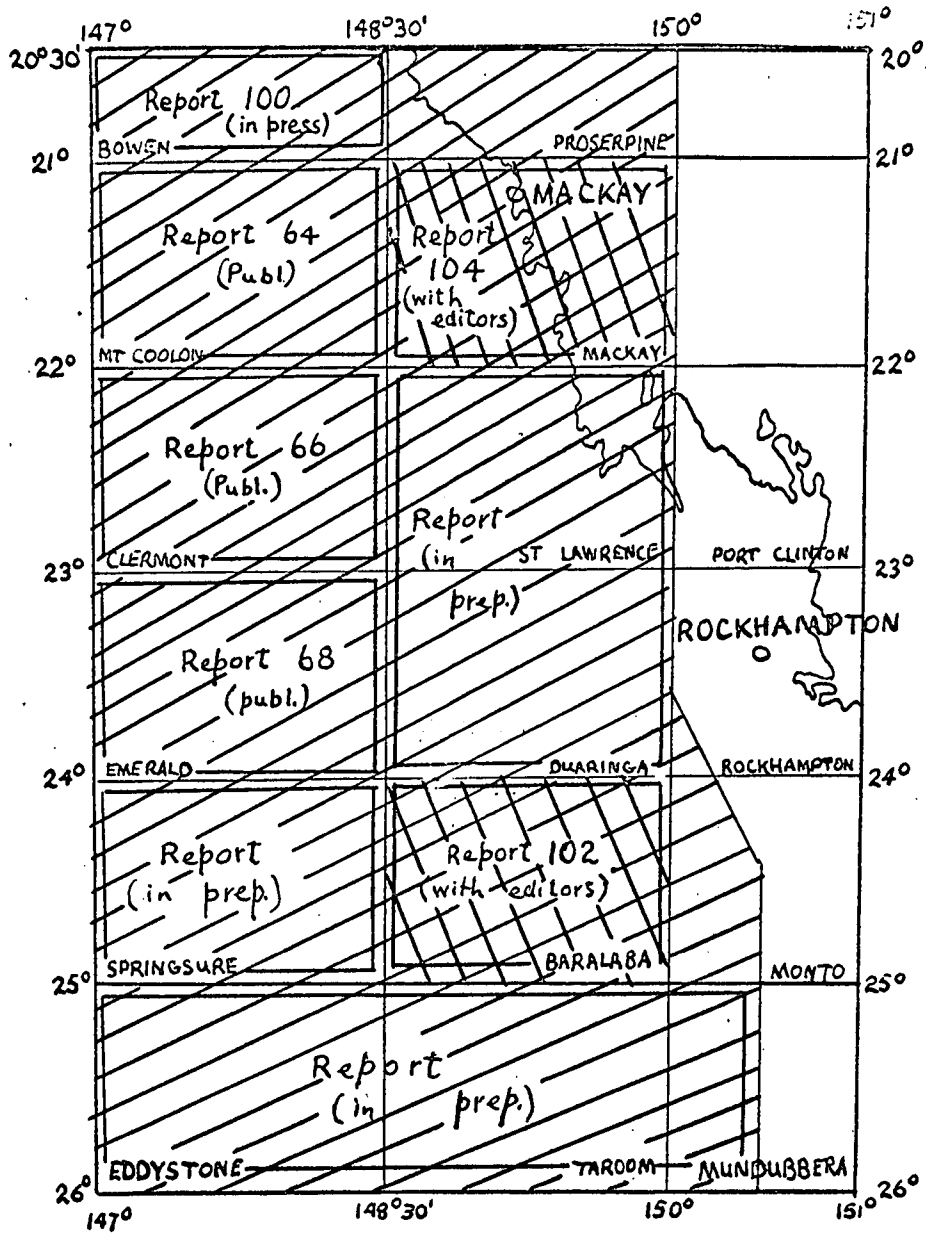


Fig. 1.

BOWEN BASIN

Showing 1:250,000 Sheet areas.

50 0 50 100 MILES

SCALE.

Geological map of Bowen Basin.

Geological compilation and explanatory notes for colour edition.

To accompany BMR Record 1965/216.

Bowen Basin Regional Survey

by

E.J. Malone

E.J. Malone, F. Olgers and R.G. Mollan continued map compilation, report writing and preparation of 1:250,000 colour editions and explanatory notes arising out of the Bowen Basin survey. No regional mapping parties operated in the Bowen Basin during 1965. Olgers spent 5 weeks and Malone 4 weeks with the North Yarrol Party, during which times both were mainly occupied remapping areas in the Bowen Basin.

Publications and Map Compilation

The following reports were published during 1965:

'Geology of the Mount Coolon 1:250,000 Sheet area, Queensland', Report No. 64,

'Geology of the Clermont 1:250,000 Sheet area, Queensland', Report No. 66,

'Geology of the Emerald 1:250,000 Sheet area, Queensland', Report No. 68, and

'Subdivision and Correlation of the Permian Middle Bowen Beds, Queensland', Report No. 70.

One report, 'Geology of the southern half of the Bowen 1:250,000 Sheet area, Queensland', Report No. 100, was sent to the printer and two others, 'Geology of the Baralaba 1:250,000 Sheet area, Queensland', Report No. 102, and 'Geology of the Mackay 1:250,000 Sheet area, Queensland', Report No. 104, were returned to the editors for final editing during the year.

Final geological compilations and explanatory notes for colour editions of BARALABA and MACKAY were forwarded to the map editors.

The preliminary edition of the geological map of the Bowen Basin, at a scale of 1:500,000 was printed during September, 1965.

Three reports describing the geology of SPRINGSURE, DUARINGA and ST. LAWRENCE, and EDDYSTONE, TAROOM and western part of MUNDUBBERA, were revised for publication during 1965. DUARINGA and ST. LAWRENCE were recompiled as a result of the 1964 season work and are being slightly amended as a result of fieldwork during 1965.

The present status of map compilation and reports resulting from the Bowen Basin regional survey are illustrated on Figure 1.

A geological map at a scale of 1:1,000,000 was compiled for the Resources, Information and Development Branch Fitzroy Series; this map covers the Fitzroy River Basin which includes the Bowen Basin.

Laboratory examination of samples from the Upper Permian Black Alley Shale indicated the presence of commercial grade bentonite in the Bowen Basin. A record describing the results of the laboratory tests and the stratigraphic position

of the material was written by J.E. Thompson and P.G. Duff, placed on open file and distributed to interested companies.

Bandanna Project

by

A.R. Jensen & M. Arman

The Bandanna Party spent four months in the Bowen Basin examining the Upper Permian sequence and, in particular, the Upper Bowen Coal Measures. The aim of the survey was to gather information on the stratigraphy and palaeogeography of the coal measures. The Bowen Basin is over three hundred miles long, and one hundred miles wide at the southern margin, and stratigraphic sections and sedimentary structures indicating current directions were measured in each of four areas: the south-east or Moura-Cracow area; the south-west or Reid's Dome area; the central or Blackwater area; and the north or Nebo-Exmoor-Collinsville area. The results outlined here are only tentative. The data gathered to date require study and further field work, petrology, and palynology.

Tentative lithological correlations are given in Table 1, and Figure 1 shows the probable current directions measured in the various units. The sequence has been divided into a number of units designated by the letters C to G. This is intended to be a continuation of the system of nomenclature used in correlation within the Middle Bowen sequence (Dickins, Malone, & Jensen, 1964).

Field observations suggest that an Upper Permian delta advanced east and south-eastwards from the north-west side of the basin (Unit C3), and that the sea gradually withdrew towards the south where there was active vulcanism (Units C4 and D). Subsequent steady subsidence and fluvial sedimentation along the eastern side of the basin was probably accompanied by uplift of provenance areas to the south-east (Unit E). The rate of subsidence decreased with consequent accumulation of humulithic deposits (Unit F2); at this time fine volcanic ash (Unit F1), was spread widely throughout the region. The centre of the basin during the deposition of Unit F2 was possibly just south of the Blackwater area: palaeocurrent directions are towards the north in the Cracowand Reid's Dome areas, and towards the south in the northern and central areas. This may be significant in the search for economic deposits of coal. A more arid climate probably accompanied the deposition of the Lower Rewan or Sagittarius Sandstone (Unit G1). On the more stable south-western side of the basin, fluvial sedimentation advanced northwards. On the tectonically active eastern margin palaeocurrent directions are towards the south and south-east.

REFERENCE

DICKINS, J.M., MALONE, E.J., and JENSEN, A.R., 1964. Subdivision and correlation of the Permian Middle Bowen Beds, Queensland. Bur.Min.Resour.Aust. Rep. 70

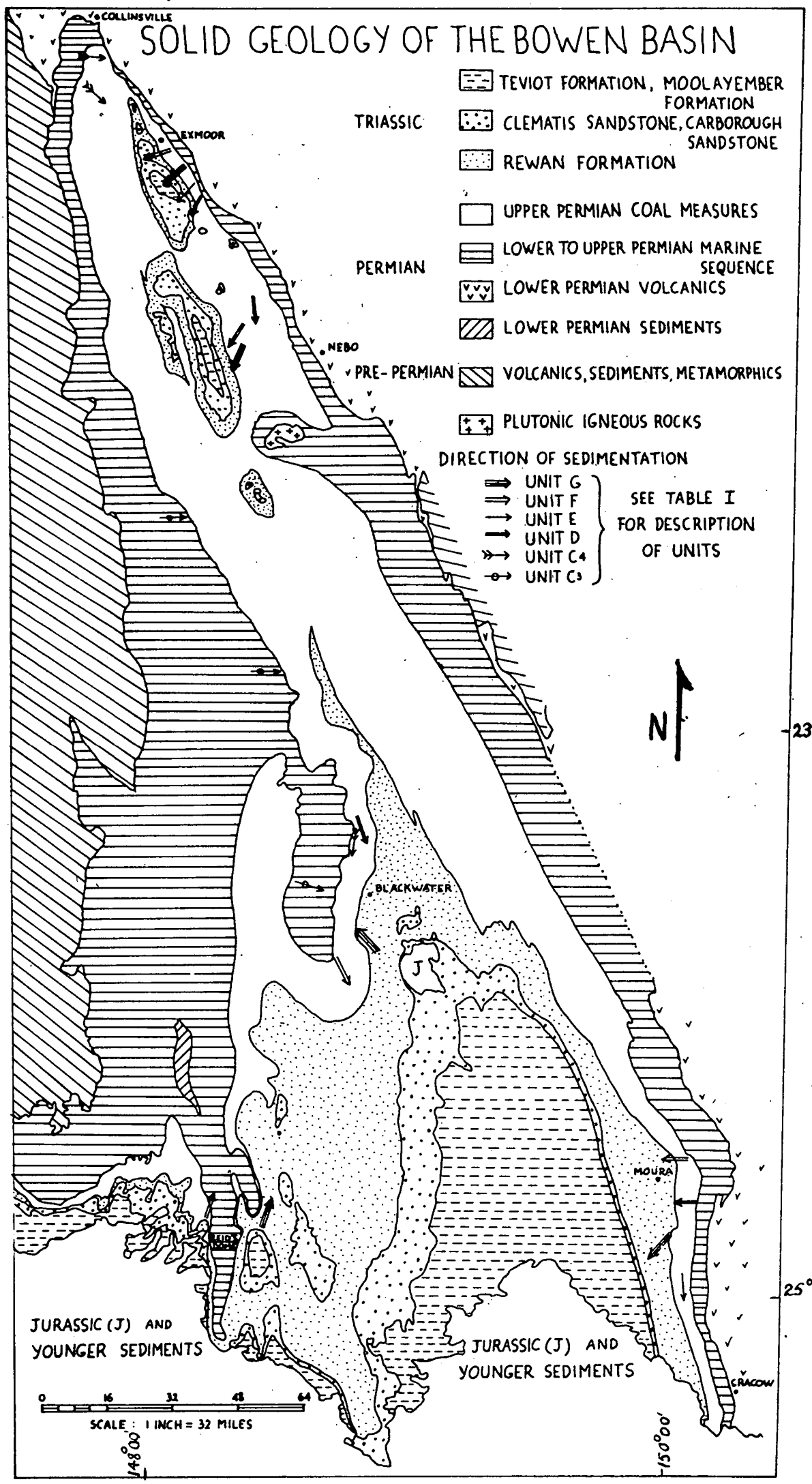

SOLID GEOLOGY OF THE BOWEN BASIN
COLLINSVILLE
EXMOOR
NEBO
BLACKWATER
MOURA
CRACOW
TRIASSIC
PERMIAN
PRE-PERMIAN
TEVIOT FORMATION, MOOLAYEMBER FORMATION
CLEMATIS SANDSTONE, CARBOROUGH SANDSTONE
REWAN FORMATION
UPPER PERMIAN COAL MEASURES
LOWER TO UPPER PERMIAN MARINE SEQUENCE
LOWER PERMIAN VOLCANICS
LOWER PERMIAN SEDIMENTS
VOLCANICS, SEDIMENTS, METAMORPHICS
PLUTONIC IGNEOUS ROCKS
DIRECTION OF SEDIMENTATION
UNIT G
UNIT F
UNIT E
UNIT D
UNIT C4
UNIT C3
SEE TABLE I FOR DESCRIPTION OF UNITS
N
23°00'
25°00'
148°00'
150°00'
JURASSIC (J) AND YOUNGER SEDIMENTS
JURASSIC (J) AND YOUNGER SEDIMENTS
0 16 32 48 64
SCALE : 1 INCH = 32 MILES

TABLE 1

SUMMARY OF PALAEOCURRENT DATA AND TENTATIVE CORRELATIONS

UNIT	GENERAL CHARACTER	LOCAL NOMENCLATURE		PALAEOCURRENT DATA	
		AREA	FORMATION	DIRECTION	NO. OF READINGS
G1	Sublabile and lithic green sandstone with red-brown mudstone	Moura-Cracow	Rewan Formation	255°±5°	50
		Reid's Dome	Lower Rewan Formation	15°±30°	211
		Blackwater	Sagittarius Sandstone	330°±25°	101
		Nebo		210°±25°	81
		Exmoor		230°±25°	82
F2	Coal; minor cherty tuff, sublabile clayey sandstone, brown limestone, conglomerate	Moura-Cracow	Baralaba Coal	270°±35°	145
		Reid's Dome	Upper Bandanna Formation	15°±35°	303
		Blackwater	Rangal Coal Measures	160°±35°	158
		Nebo	Elphinstone Coal Measures	220°±30°	199
		Exmoor			
F1	Tuff, characteristically hard grey white chert with fossil plant impressions. Silicified fossil wood common. Coal. Conglomerate Biotitic lithic sandstone	Moura-Cracow	Kaloola Member of Gyranda Formation		
		Reid's Dome	Unnamed siliceous tuff and fossil wood horizon		
		Blackwater	Base of Rangal Coal Measures; silicified wood horizon		
		Nebo	Top of Fort Cooper Formation		
		Exmoor		250°±20°	126
E2	Lithic sandstone, conglomerate sandstone, coal and minor tuff	Moura-Cracow	Gyranda Formation	170°±25°	77
		Nebo	Part of Fort Cooper Coal Measures		
			Unnamed unit 1500' thick	225°±15°	193

UNIT	GENERAL CHARACTER	LOCAL NOMENCLATURE		PALAEOCURRENT DATA	
		AREA	FORMATION	DIRECTION	NO. OF READINGS
E1	Carbonaceous sandstone, mudstone, coal, minor lithic sandstone, siltstone, limestone	Moura-Cracow	?Banana Formation		
		Nebo	Unnamed unit 1100' thick		
D	Tuff and tuffaceous fine arenaceous sediments, cherty mudstone Characteristically evenly bedded. Cross bedding rare	Moura-Cracow	Mount Steel Formation	$265^{\circ}\pm20^{\circ}$	18
		Reid's Dome	Black Alley Shale		
		Blackwater	Burngrove Formation	$165^{\circ}\pm45^{\circ}$	72
		Nebo	Unnamed unit, 1600' thick	$175^{\circ}\pm40^{\circ}$	107
		Exmoor	Unnamed unit 1300' thick	$210^{\circ}\pm40^{\circ}$	47
C4	Very calcareous mudstone and sublabile sandstone-calcareous concretions common; conglomerate; coal; limestone	Moura-Cracow	Flat Top Formation		
		Blackwater	Fairhill Coal Measures	$185^{\circ}\pm40^{\circ}$	103
		Collinsville	Unnamed unit 1600' thick at Exmoor	$100^{\circ}\pm75^{\circ}$	107
				$135^{\circ}\pm40^{\circ}$	220
C3	Dark coloured micaceous siltstone and mudstone and grading to paraconglomerate in north; quartzose sandstone; coal	Moura-Cracow	Top of Barfield or Flat Top Formation		
		Blackwater	German Creek Coal Measures	$110^{\circ}\pm35^{\circ}$	349
		German Creek	German Creek Coal Measures	$90^{\circ}\pm20^{\circ}$	45
		Nebo (Cherwell Range)	Passage Beds	$100^{\circ}\pm50^{\circ}$	147
		Exmoor	Top of Blenheim Formation		

GEORGINA BASIN

Georgina Basin Regional Survey

by

K.G. Smith

Various authors continued report writing and map compilation for areas previously mapped, and the Helen Springs field party, led by M.A. Randal, completed the mapping of the north-western part of the Georgina Basin. R.A.H. Nichols and M.C. Brown continued systematic petrological examination of cores and cuttings from wells and scout holes which penetrated carbonate sequences.

The following 1:250,000 Sheets and their accompanying Explanatory Notes were prepared for publication:

ALROY	by	M.A. Randal
AVON DOWNS	"	" "
BRUNETTE DOWNS	"	" "
RANKEN	"	" "
ELKEDRA	"	K.G. Smith
SANDOVER RIVER	"	R.A.H. Nichols

Drafting of the Georgina Basin 1:500,000 scale maps was completed, and printing of Preliminary Editions of all four sheets of this map is in progress.

The following Reports are in progress:

'The Regional Geology of the Georgina Basin', by K.G. Smith.
'The Occurrence of Groundwater on the Barkly Tableland', by M.A. Randal.
'Well Completion Reports, BMR 11,12 and 13', by D.J. Guppy, K.G. Smith and R.A.H. Nichols, assisted by staff of the Petroleum Technology Section.

The Completion Report for stratigraphic well BMR 12 (Cockroach) was finalized and issued as Records 1965/60, by R.A.H. Nichols and M.D. Bell (Petroleum Technology Section).

R.A.H. Nichols completed the petrological examination of cores from BMR Grg9A (on URANDANGI), where the Palaeozoic carbonate sequence consists of medium-crysalline dolomite, and pelletal intraclastic dolarenite and dolomite. The distribution logs of pellets, intraclasts and ooliths show slight resemblances to those of Grg4 (on ELKEDRA) and Grg14 (on SANDOVER RIVER), but low core recovery in Grg9A hinders correlation between the three scout holes.

M.C. Brown examined cores and cuttings from surface to 990 feet in Amalgamated Petroleum's Lake Nash No.1 Well, (on AVON DOWNS), and found that skeletal remains of organisms are more abundant than previous work indicated: this applies particularly to the interval 790-955 feet, which contains abundant Biconulites and sponge spicules, and some echinoderm ossicles.

Helen Springs Party

by

M. A. Randal

PERSONNEL: M. A. Randal (Party Leader); M. C. Brown; H. F. Doutch from 26th July onwards.

DURATION OF SURVEY: 7th June 1965 to 13th October 1965.

AREA MAPPED: Helen Springs and Beetaloo. These areas occupy the western part of the Barkly Tableland. Brief visits were made to the adjoining areas of TENNANT CREEK and DALY WATERS, and to the eastern part of the Barkly Tableland; the latter visits were mainly in connection with the groundwater study initiated in 1962.

HELICOPTER SURVEY:

One helicopter was chartered for 8 days during which 26 hours were flown. The helicopter was used successfully for (1) mapping Cambrian outcrops in the western parts of the areas; (2) mapping outcrops and recent culture in the downs country in the eastern parts of the areas; and (3) mapping parts of the Ashburton Range where vehicle movement is slow and difficult.

SCOUT DRILLING:

A total of 1236 feet, including coring, was drilled by contract, ~~and~~ from 27th July to 9th August, and cost £5910. The programme involved seven holes - one on BEETALOO (B1) and six on HELEN SPRINGS (HS1-HS6). The results are listed below:

Scout-hole B1 is at the approximate centre of ~~the~~ BEETALOO, and HS1 and HS6 are located along a rough line from near Eva Downs Homestead in the east to near Muckety Homestead in the west.

Scout-hole B1

Total depth 251 feet. Total footage cored 20', Recovered 15½ feet. This hole penetrated about 16 feet of alluvium, 84 feet of probable Mesozoic siltstone, sandstone, and claystone, and at 100 feet passed into chert and slightly calcareous siltstone, and at 170 feet into strongly calcareous siltstone and fine sandstone. The bottom-hole core consisted of porous calcareous pelletal limestone. The calcareous section is probably Cambrian in age.

Scout-hole HS1

Total depth 176'9". Total footage cored 11'9". Recovered 4'1". The section in this hole consisted of 15 feet of chalcedonic and silicified fossiliferous limestones of the Tertiary Brunette Limestone, underlain by 120 feet of grey, white and buff clay of probable Tertiary age. This was underlain to the total depth by calcareous siltstone, silty limestone, and dolomitic limestone, presumably of Cambrian age. Water was encountered at 155 feet.

Scout-hole HS2

Total depth 132 feet. Total footage cored 10'. Recovered 9'3". After passing through 25 feet of superficial material, the drill penetrated 107 feet of silty clay, siltstone, calcareous siltstone, calcareous clay and calcilutite similar to the rocks of the Cambrian Anthony Lagoon Beds on BRUNETTE DOWNS.

Scout-hole HS3

Total depth 225 feet. Total footage cored 3'. Recovered 1'. The section encountered in this hole consisted of 4 feet of superficial deposits underlain by 146 feet of Cambrian siltstone and clayey siltstone, and 75 feet of Cambrian white and red siltstone and chert with dolomite at the base. The rocks are similar to the Cambrian Anthony Lagoon Beds. Aquifers were encountered at 110 feet and 180 feet, both in siltstone. The lower aquifer produced an estimated 800 gph.

Scout-hole HS4

Total depth 222 feet. No coring.
This hole penetrated 184 feet of unconsolidated silt, sand, and clay, distinct, however, from the overlying 16 feet of grey pedocalcic soil. Chert bands with probably carbonate textures occurred in the interval 200 feet to 222 feet, and are similar to Cambrian cherts found elsewhere. One aquifer occurred at 205 feet.

Scout-hole HS5

Total depth 129 feet. No coring.
The section penetrated in this hole consisted of unconsolidated sand with silt to 70 feet, boulders of silicified sandstone to 80 feet, and sand and clayey sandstone to the total depth. The rocks below 70 feet are similar to probable Mesozoic sediments found elsewhere in the area.

Scout-hole HS6

Total depth 102 feet. Total footage cored 5 feet. Recovered 1'5". In this hole the drill penetrated white silty clay, claystone and siltstone to 70 feet, and thence loose sand to the total depth. Biconulites sp. was recovered in the cored interval 35-40 feet. The loose sand probably represents leached and friable sandstone of Upper Proterozoic or Lower Cambrian age which has been mapped elsewhere in the area beneath the Lower Cambrian Helen Springs Volcanics. Water was encountered in this hole at 66 feet.

GEOLOGY

HELEN SPRINGS and BEETALOO 1:250,000 contain rocks of Precambrian, Cambrian, Mesozoic and Tertiary ages, but much of the area is covered by superficial Cainozoic deposits. The various units mapped are presumably separated by unconformities but these are ill-defined because of poor outcrop and the lack of exposed contacts.

Precambrian

The Precambrian Ashburton Sandstone crops out in a 20-30 mile wide belt trending north-north-west from near Banka Banka Homestead in the south to Elliott township in the north. The rocks form the Ashburton and Whittington Ranges and are continuous with outcrops in the northern part of TENNANT CREEK.

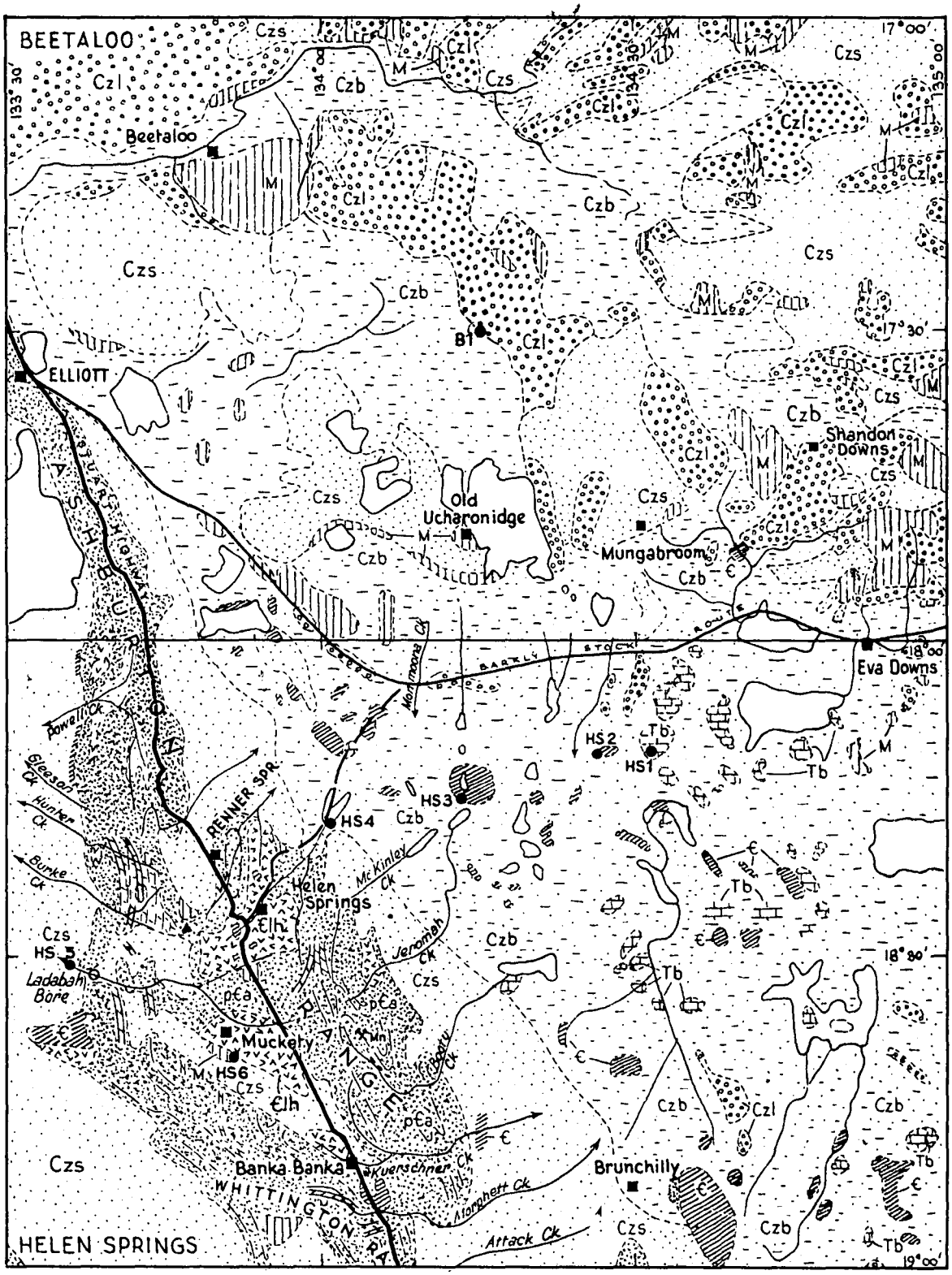
The sequence consists of arenaceous sediments ranging from fine-grained sandstone to grits, and pebbly sandstone. The arenites, which are extensively but selectively silicified apparently form the bulk of the unit, but interbeds of siltstone, dolomite, and leached and silicified carbonates probably total several thousand feet of section. West of Renner Springs the Ashburton Sandstone consists of about 10,000 feet of alternating sandstone and siltstone in a ratio of about 2:1. The exposed top of the section in this area is cut by a transgressive dolerite sill; and the base is underlain by carbonates, leached carbonates, and chert of unknown thickness. About 8000 feet of section is exposed in an anticline and a syncline about the headwaters of Bootu Creek, and consists of alternating siltstone, fine-grained flaggy sandstone, and massive medium-grained sandstone. In the Whittington Range the Ashburton Sandstone contains mainly sandstones of varying grainsize and texture including glauconitic sandstone, but siltstone and leached carbonate rocks are present; small dolerite dykes have been mapped in this area. Correlations between these three main areas of exposure are hampered by extensive folding and the prevalence of strike and near-strike faults. Algae and stromatolites have been found in chert and silicified limestone in the headwaters of Morphett Creek and west of Renner Springs.

Manganese mineralization occurs in very fine-grained sandstone and siltstone, particularly in the Bootu Creek area where a mine has been sporadically worked by the Renner Springs Manganese Company.

Lower Cambrian

Heavily lateritized and kaolinized basalt occurs around Helen Springs Homestead and was named the Helen Springs Volcanics and assigned to the Lower Cambrian by earlier workers. Similar outcrops have been mapped in discrete areas about Muckety and Banka Banka Homesteads, in the headwaters of Jeromah Creek, and south of Ladabah Bore. The spatial relationships of the Volcanics to other units suggests a Lower Cambrian age for them; samples with a minimum of alteration have been obtained and may be suitable for radioactive age determinations.

In several localities the Volcanics are underlain by a flaggy porous medium-grained sandstone of unknown age. The sandstone may be Upper Proterozoic in age, but at present has been regarded as the basal unit of the Helen Springs Volcanics. The thickness of the Volcanics is unknown but is at least 60 feet around Helen Springs Homestead; bore logs suggest it is 150 feet in the Muckety area.


BEETALOO
Beetaloo
ELLIOTT
B1
Old Ucharonidge
Mungabroom
Shandon Downs
Eva Downs
Brunchilly
Banka Banka
Muckety
Helen Springs
HELEN SPRINGS
ASHBURTON
WHITTINGTON
PYNGE
RENNER SPR
Powell Ck
Gleeson Ck
Hunker Ck
Burke Ck
McKinley Ck
Jeromah Ck
Ladabah Bore
Molloy Ck
Attack Ck
HS1
HS2
HS3
HS4
HS5
HS6
Czs
Czb
Czl
M
Tb
pCa
€lh
€
17°00'
17°30'
18°00'
18°30'
19°00'
133°30'
134°00'
135°00'
0
20
40 Miles
Sand & sandy soil
Black clayey soil
Lateritized & silicified sandstone, & pisolitic ironstone gravel
Brunette Limestone - nodular and chalcedonic lst., minor sandstone
Fine grained sandstone & siltstone
Fossiliferous chert, limestone & sandstone
Basalt & tuffaceous sediments
'Ashburton Sandstone' - sandstone siltstone, carbonate, leached carbonate, chert

Middle Cambrian

Fossiliferous Middle Cambrian rocks, similar to the Gum Ridge Formation near Tennant Creek, occur near Banka Banka Homestead, on the western flank of the Ashburton Range, between Kuerschner and Bootu Creeks, near Helen Springs and Muckety Homesteads, and east of Brunchilly Homestead. The rocks consist of fossilerous chert, siliceous shale, some sandstone, and silicified and leached carbonate rocks. They contain trilobites, brachiopods, Biconulites, and gastropods. The presence of Middle Cambrian rocks at Banka Banka has been known for many years, but the other occurrences listed above are new.

Apparently unfossiliferous limestone, dolomitic limestone, quartz sandstone, and calcareous quartz sandstone have been mapped in the eastern part of HELEN SPRINGS; these rocks occur as scattered boulders and [illegible] slabs in grass-covered black soil plains and are the continuation of the Anthony Lagoon Beds which have previously been mapped in the central part of the Barkly Tableland. No siltstone occurs in outcrop but has been found in several of the scout-holes.

Chert and sandstone rubble also occur in this area and in the southern part of BEETALOO and are similar to Cambrian rocks elsewhere on the Barkly Tableland.

Mesozoic

Outcrops of quartz sandstone, grit, siltstone, and claystone have been mapped in the eastern and northern part of BEETALOO, and in the area south of Eva Downs Homestead. Well-sorted fine-grained sandstone with plant fragments, and poorly sorted coarse pebbly and cobble sandstone occurs between Old Ucharonidge Homestead and Elliott township. Plant fossils have been found in probable Mesozoic rocks south-west of Banka Banka. Probable Mesozoic sandstone, pebbly sandstone and siltstone with plant impressions occur about Renner Springs. The thickness of the Mesozoic rocks is unknown but water-bore logs on Beetaloo station suggest it is at least 300 feet, but it is only about 100 feet south-west of Banka Banka Homestead.

The Mesozoic rocks are extensively lateritized and north of Eva Downs Homestead they are manganiferous.

Tertiary

Outcrops of chalcedonic limestone and silicified limestone are widespread in the eastern part of the area between Eva Downs and Brunchilly Homesteads. The rocks are similar to and are continuous with the Tertiary Brunette Limestone which has been previously mapped in the central part of the Barkly Tableland. The thickness of the limestone is at least 15 feet in HS1 where it is underlain by 120 feet of grey, white, and buff soapy clay which also may be Tertiary in age.

Superficial deposits

Considerable amounts of black soil, sand, sandy soil, lateritic material, and pisolitic ironstone gravel occur throughout the two Sheet areas.

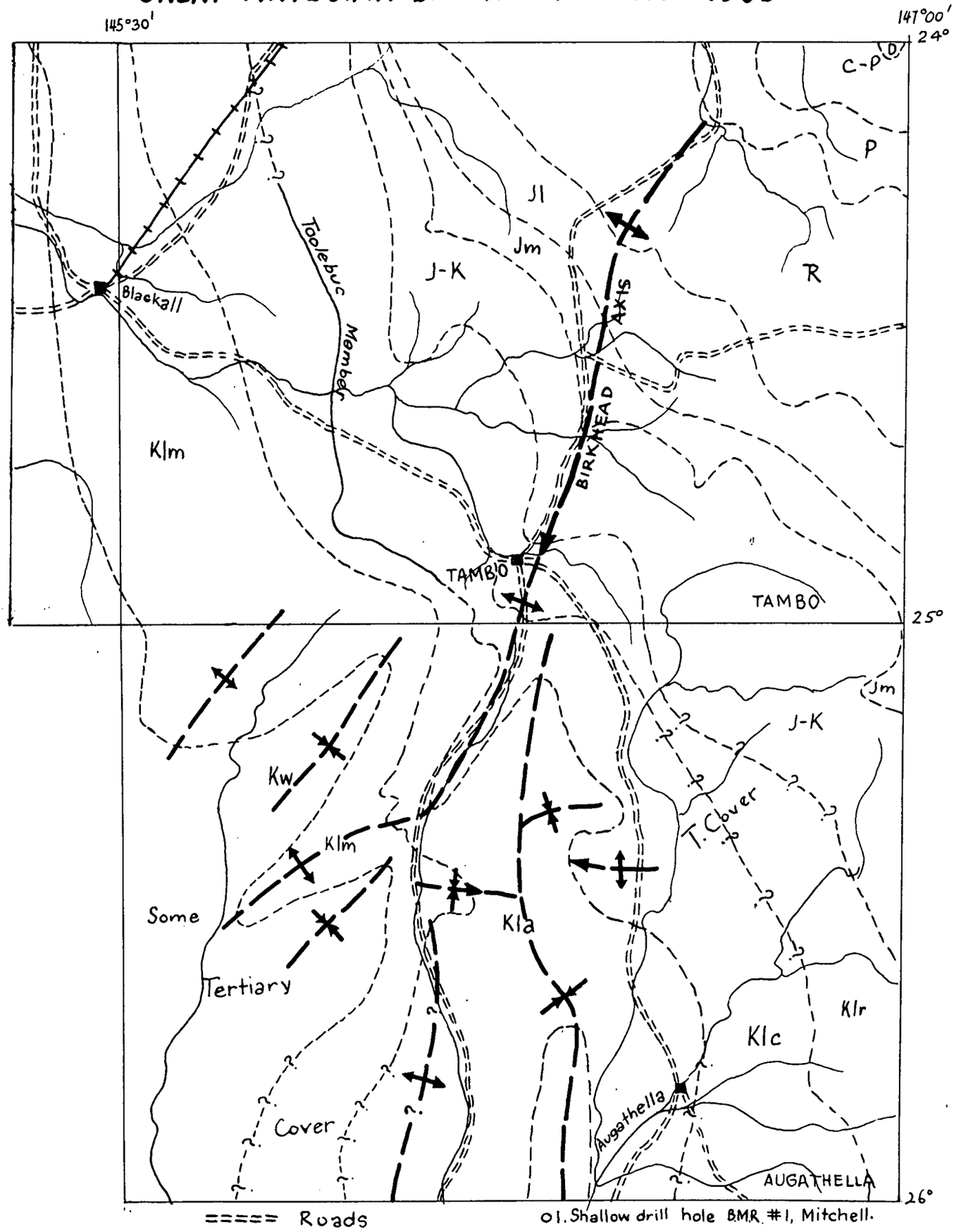
MISCELLANEOUS

Water-bore records for the two Sheet areas were examined in the Water Resources Branch, Darwin, and additional information obtained from pastoralists and drillers. One hundred and fifty samples of bore and surface waters were obtained for chemical analyses. The information is to be used to extend the study of the groundwater of the Barkly Tableland initiated in 1962. Samples of laterite and lateritized rocks also were collected for chemical analyses.

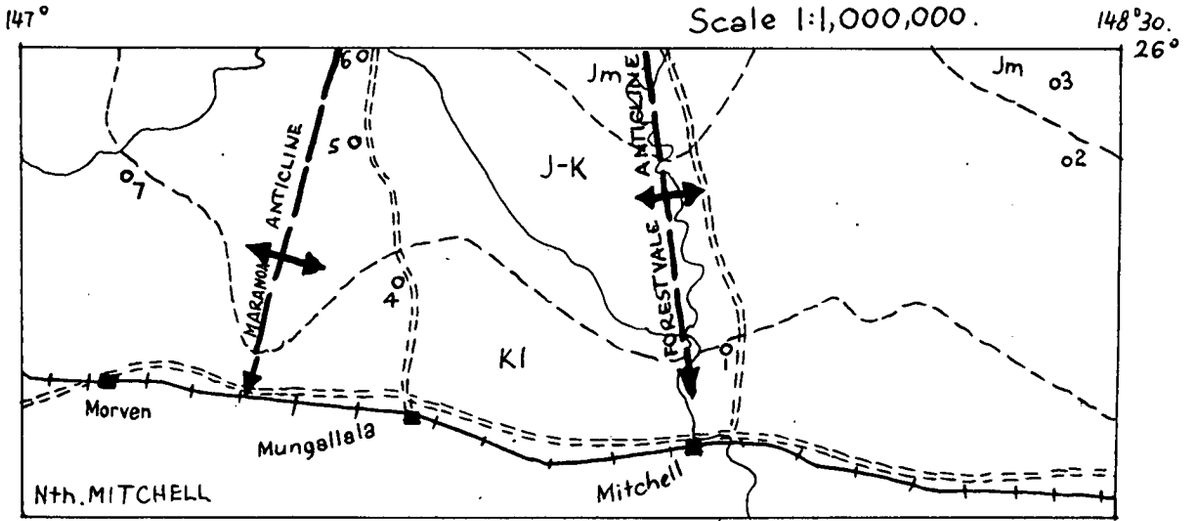
GREAT ARTESIAN BASIN

GREAT ARTESIAN BASIN MAPPING - 1965

Fig. 1



Scale 1:1,000,000.



To accompany Record 1965/216

Great Artesian Basin

(1) FIELD WORK: by N.F.Exon

PERSONNEL N.F. Exon (Party Leader), M.C. Galloway, D.J. Casey (G.S.Q.) E.H. Feeken (Draftsman) and R.R. Vine (20th June to 2nd July).

The party arrived in the area on 10th June and operated from a base near Augathella until 3rd September when the base camp was moved to the Mitchell area.

BLACKALL, AUGATHELLA and the northern half of MITCHELL were mapped. Mapping of TAMBO, which was commenced in 1964, was completed. The party left the area for Brisbane on 11th October.

Scout drilling

Seven scout holes on MITCHELL were drilled and gamma-ray logged. These gave information on lithologies and formation boundaries and provided samples for spore analysis. They ranged from 200 to 400 feet in depth and a total of 200 feet of core was cut. Their locations are shown in Fig.1. A further six or eight holes will be drilled on TAMBO with a Bureau Carey rig in November.

Geology

The year's mapping has allowed correlation of the Eromanga Basin in the north and the Bowen Basin sequence in the east - see Fig.2.

Structurally, most of the area consists of gentle south-west-trending structures superimposed on a regional south-west dip. Anticlines are commonly drape structures over basement highs. Faulting is generally absent. The pre-Jurassic sequence of the north-eastern part of TAMBO is more strongly folded and faulted than the younger sediments. Major unconformities are at the base of the Jurassic Precipice Sandstone and the Permian Colinlea Sandstone.

The Maranoa Anticline (Nebine Ridge) and Birkhead Axis control most of the lateral facies changes.

The Permian and pre-Permian units of the Bowen and Drummond Basins generally continue across TAMBO. The Peawaddy Formation sands up and becomes identical with the underlying Colinlea Sandstone which itself becomes more labile westwards.

The Triassic Bowen Basin units also continue across the area. The upper part of the Rewan Formation is more quartzose north of the Birkhead Axis where it is mapped as the Dunda Beds. The characteristic red and green mudstones of the Rewan Formation are still present. The Clematis Sandstone thins to fifty feet across the Axis.

On the eastern part of TAMBO the lower Jurassic Boxvale Sandstone lies directly on the Precipice Sandstone. Here, both these quartzoes units are about 200 feet thick and consist of a lower medium-grained fluviatile and an upper fine-grained to silty lacustrine part. Both units thin westwards, losing the fluviatile sediments first, and pinch out near the boundary of TAMBO. The Hutton Sandstone maintains its thickness, the upper part becoming quite silty westwards.

The Injune Creek Beds of the Type Area contain the Westbourne Formation at the top. On the western part of MITCHELL the feldspar-rich Adori Sandstone separates these two units, thickens to 250 feet on the southern part of TAMBO, and thins again northwards. The 300 feet thick Westbourne Formation thins rapidly northwards on TAMBO.

The quartzose to sublabile Gubberamunda Sandstone, the silty Orallo Formation and the non-marine members of the Blythesdale Formation thin westwards, and by facies change, become unrecognizable west of the Maranoa Anticline. Here the outcropping sediment is largely clayey quartzose to feldspathic sandstone, with siltstone abundant in the subsurface. These sediments are equated to the 250 feet thick clayey feldspar-rich Hooray Sandstone on TAMBO which comprises a very fine grained lower part of an upper pebbly part.

The marine Minmi Member of the Blythesdale Formation, which is typified by glauconitic sandstone on ROMA becomes more silty westwards but sporadic glauconitic sandstone outcrops occur in the northern part of TAMBO.

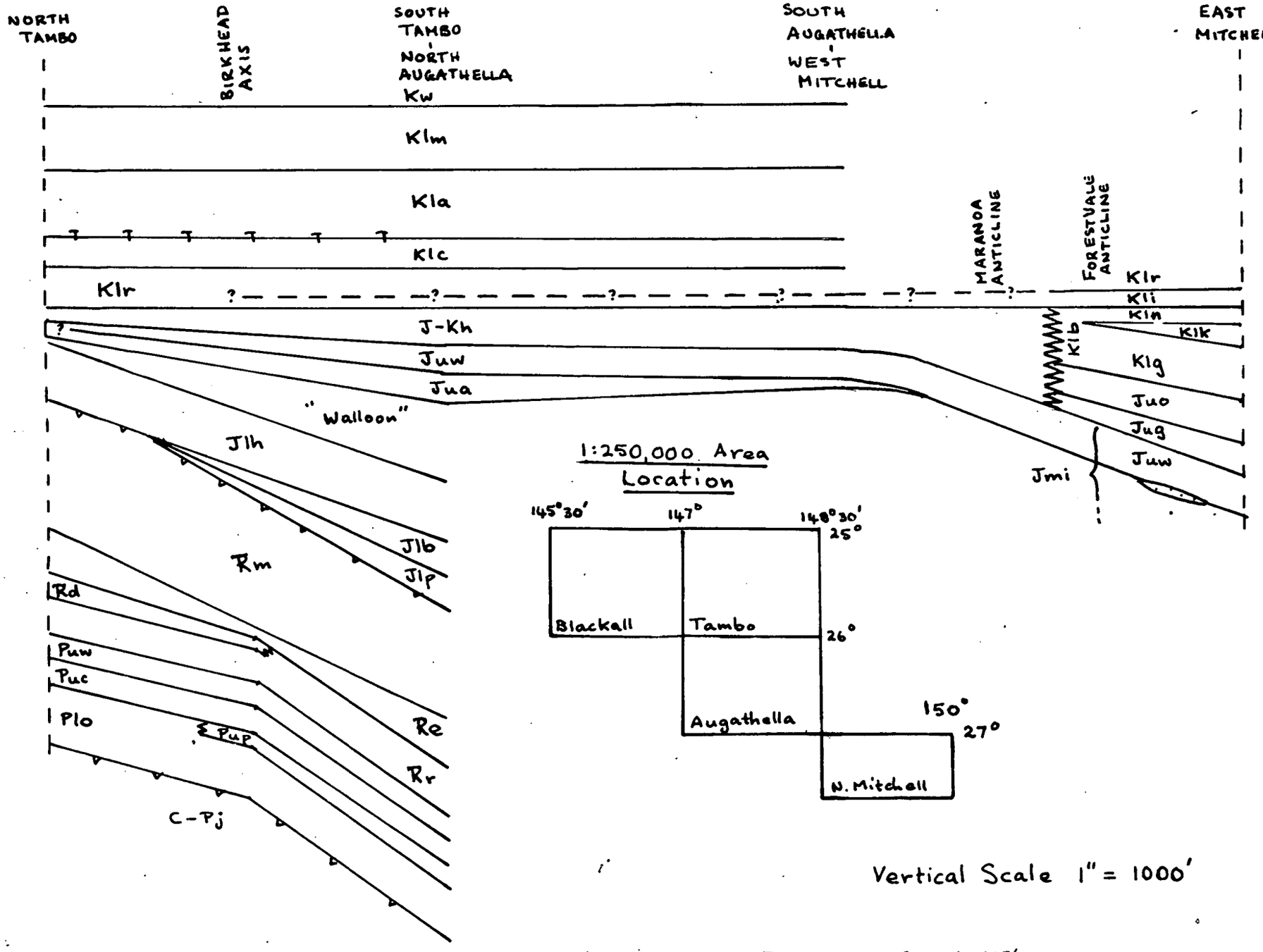
The Cretaceous northern Eromanga Basin sequence persists southwards with relatively little change. The Toolebuc Member loses its distinctive character on the northern boundary of AUGATHELLA. The grey mudstone sequence of the Aptian Roma Formation corresponds to the Doncaster Member of the Wilgunya Formation further north. The overlying Coreena Member is largely siltstone and the Allaru Member, mudstone. The silty arenaceous Mackunda Formation thins southwards and becomes poorly fossiliferous. It has a transitional boundary with the lithologically similar but non-marine Winton Formation. On MITCHELL only the Roma Formation was mapped above the Blythesdale and Hooray sequences.

Tertiary sediments are relatively thin and of limited extent.

Palaeontologist R.W. Day visited the party and numerous collections of marine Cretaceous fossils were made on TAMBO, AUGUTHELLA and MITCHELL.

FIG. 2.

GENERALISED NW-SE STRATIGRAPHY



1:250,000 Area Location

Vertical Scale 1" = 1000'

REFERENCE

T = Toolebuc Mmbr.		
Kw	Winton Fm.	Kw
Klm	Mackunda Fm.	Klm
Kla	Allaru Mmbr.	Kl
Klc	Coreena Mmbr.	
Klr	Roma Fm.	
Klb	Blythesdale Fm.	J-K
Kli	Minmi Mmbr	
Kln	Nullawurt Mmbr	
Klk	Kingull Mmbr	
Klg	Mooga Mmbr	
J-Kh	Hooray Sst.	
Juo	Orallo Fm	
Jug	Gubberamunda Sst	
Juw	Westbourne Siltst.	
Jua	Adori Sst.	
Jmi	Injune Creek Beds	Jm
Jlh	Hutton Sandst.	Jl
Jlb	Boxvale Sst.	
Jlp	Precipice Sst	
Rm	Moolayember Fm	R
Re	Clematis Sst.	
Rd	Dunda Beds	
Rr	Rewan Fm.	
Puw	Blackwater Gp.	P
Puc	Black Alley Sh.	
Pup	Peawaddy Fm	
Plo	Colinlea Sst	
C-Pj	Joe Joe Fm.	C-P

To accompany Record 1965/216

The gamma ray logging of stratigraphic and water bores by Amoseas, in conjunction with spore evidence, assisted greatly in the east-west correlation based on the Westbourne ~~Siltstone~~ Formation.

Great Artesian Basin

(2) REPORT WRITING AND MAP PRODUCTION: by R.R. Vine

The progress in report preparation and map production is listed below:

(i) B.M.R. Report - "The geology of the northern Eromanga Basin" - in progress

(ii) BMR Records

(a) "Geology of the Longreach area and eastern margin of the Eromanga Basin" - nearly completed.

(b) "Shallow stratigraphic drilling, northern Eromanga Basin, 1963-1964" - nearly completed.

(iii) Miscellaneous Publications

"Nomenclature of the Rolling Downs Group, northern Eromanga Basin" - published in the Queensland Government Mining Journal.

(iv) Explanatory Notes:

1:250,000 Sheet areas:	JULIA CREEK McKINLAY MACKUNDA BRIGHTON DOWNS	Published
	MANEROO WINTON	Completed and submitted for editing
	MANUKA -	Map being fair drawn, Notes completed.

(v) Preliminary Editions

1:250,000 Sheet areas:	MANEROO LONGREACH	Printed
	JERICHO GALILEE	Printed
	BUCHANAN -	compiled on uncontrolled base but not printed

(JERICHO, GALILEE and BUCHANAN exclude Drummond Basin area)

1:1,000,000 Northern Eromanga Basin - compilation nearly completed.

(3) GAMMA-RAY LOGGING by R.R. Vine

Geological aspects of a programme of gamma-ray logging of water bores in the north-eastern part of the Eromanga Basin were supervised by R. Vine. Preliminary interpretations were made of the logs received. The logging done to date has indicated that:-

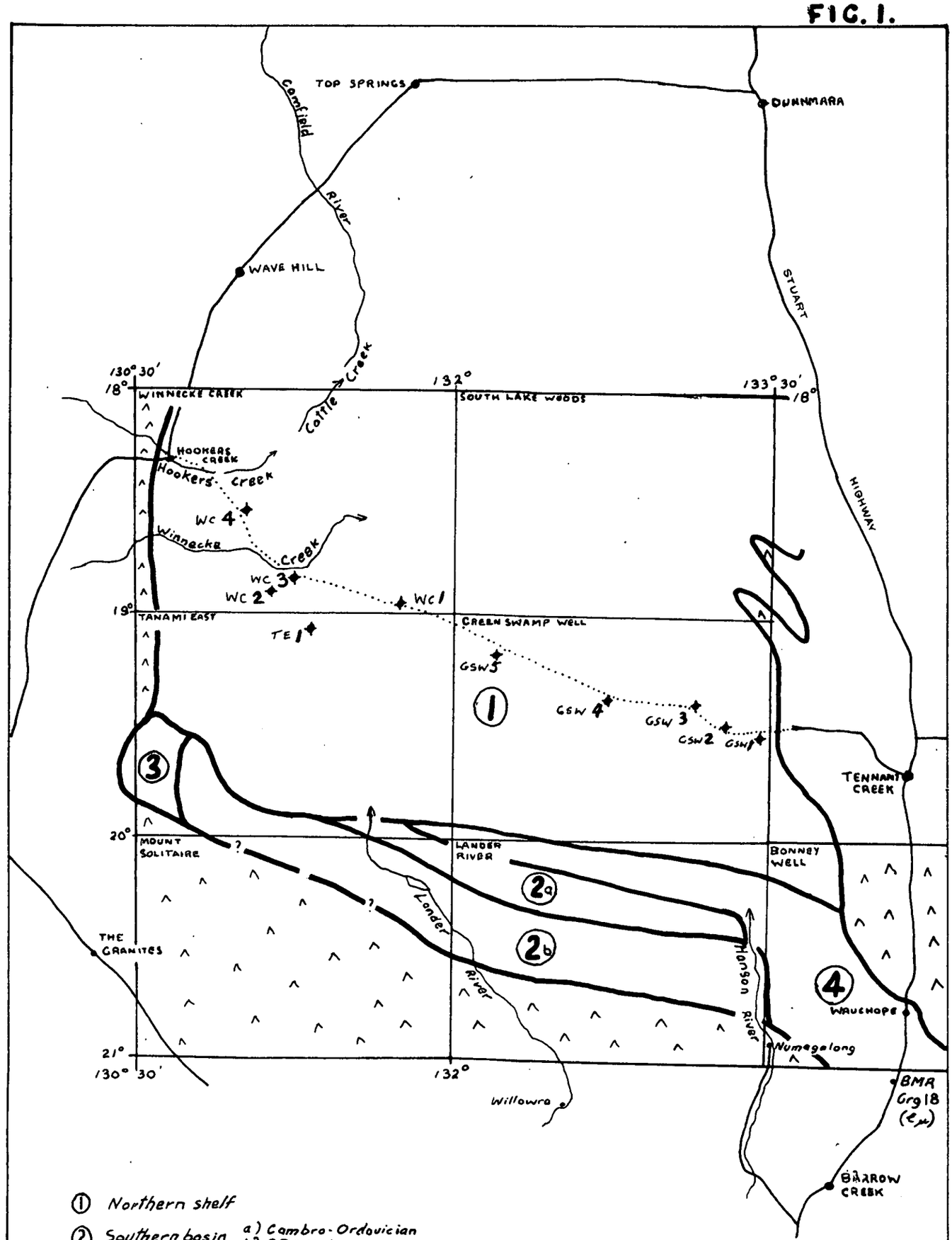
(i) Most drillers' logs of water bores are reliable and the contours of the base of the Wilgunya Formation constructed from information on drillers logs have required only minor amendment. Several doubtful interpretations based on drillers' logs have been validated by the gamma-ray log correlations.

(ii) Named stratigraphic units can be identified readily on the logs but detailed correlation has not yet been attempted. Lateral lithological changes within units are evident from preliminary interpretation of the logs; in some units facies variations are accompanied by thickness variations.

(iii) Movement on many faults or monoclines indicated by surface mapping have been intermittent during Mesozoic sedimentation with the result that the sedimentary succession is thicker on the structurally lower side of such features.

WISO BASIN

FIG. 1.



① Northern shelf

② Southern basin a) Cambro-Ordovician b) ? Devonian

③ Western marginal area

④ Area of complete sand cover - geology unknown

^ Basement

✦ Wiso scout holes

SCALE:

50 0 50 100 Miles

WISO BASIN

Area mapped 1965

To accompany B.M.R. Record No. 1965/216

Wiso Party

by

E.N. Milligan

PERSONNEL: K.G. Smith, H.F. Doutch, E.N. Milligan, R.A.H. Nichols.

DURATION OF FIELD SEASON: 3rd May, 1965 - 8 th September, 1965.

AREA MAPPED: WINNECKE CREEK, SOUTH LAKE WOODS, TANAMI EAST, GREEN SWAMP WELL and LANDER RIVER were completed and the northern part of MOUNT SOLITAIRE, the eastern margin of TANAMI and the western margins of TENNANT CREEK and BONNEY WELL. This work completed the mapping of most of the Wiso Basin but the northern part has yet to be mapped.

HELICOPTER SURVEY: One helicopter was chartered for 33 days, at a cost of £5,320; the field mapping was done during this time.

SCOUT DRILLING: Ten holes were drilled, for an aggregate footage (drilling and coring) of 2915 feet. The work was done by contract and cost £12,850, which included positioning and depositioning charges. The drilling results are summarized in Table 1.

GEOLOGY: A. Wiso Basin:

(1) Northern shelf area:

Merrina Beds. At least 800 feet of essentially flat-lying dolomitic claystone, siltstone and sandstone and rare dolomite overlying conformably (and perhaps intertonguing with) dolomite whose thickness exceeds 100 feet ~~thick~~. (In the extreme north this dolomite is identified with the Montejinni Limestone mapped by Traves (1955)). A Middle Cambrian fauna is present in the dolomite.

(2) Southern basin area:

(a) Siltstone, sandstone, dololutite, quartzose dolomite and bioclastic dolarenite have an estimated surface thickness of 750 feet in this area. The dip is low and to the south and south-west. A definite Lower to Middle Ordovician fauna is present; Upper Cambrian rocks may be present.

Phosphate pellets occur in some of the clastic carbonate rocks; a sample of pellet calcareous dolomite from a small outcrop 100 miles north-west of Wauchope contained 10% collophane.

(b) ?Devonian thick-bedded cross-bedded quartz sandstone crops out sporadically and unconformably overlies the Ordovician sequence in the east, and a Palaeozoic sequence in the western marginal area.

(3) Western marginal area:

An unknown thickness of dololutite, calcareous quartzose medium crystalline dolomite and limestone and dolomitic siltstone with halite casts dips gently east under the ?Devonian sandstone. The age of these rocks is unknown, but may be Middle Cambrian.

(4) Area of total sand cover:

The Palaeozoic geology of this area is unknown, B.M.R. Grg.18 (drilled 1962) encountered Upper Cambrian micaceous dolarenite and siltstone at 305 feet.

B. Basement Rocks:

The western and southern margins of the Basin were reasonably defined, but sand cover prevented delineation of part of the eastern boundary.

1. Western margin: Antrim Plateau Volcanics to the north, Winnecke Sandstone and older Proterozoic volcanics in the centre and low grade schists and metaquartzites to the south.

2. Southern margin: Low grade schists and metaquartzites in the west, metaquartzite, schists, gneisses and amphibolite similar to Arunta Complex types, with quartz dykes pegmatite veins and granite in the centre and east.

3. Eastern margin: Warramunga Group with intrusive rocks and Hatches Creek Group in the centre, Ashburton Sandstone to the north.

MISCELLANEOUS

Approximately 11.3 grammes of dark grey dolomite from 210-230 feet in G.S.W.1. were treated in toluene for twenty-four hours; 0.01 grammes of hydrocarbons were extracted.

TABLE 1

HOLE No.	T.D.	CORED	RECOVERY	PALAEOZOIC SEQUENCE #
G.S.W.1.	305'	147-147'9"	0'7"	90-270' dolomite, 270' - 305' sandstone (?Proterozoic)
2.	227'6"	222-227'6"	5'0"	2-197'0" dolomitic siltstone and sandstone, 197' - 227'6" dolomite
3.	300'0"	290-300'	9'9"	280-300' dolomitic siltstone and sandstone
4.	589'4"	300-300'2"	0'2"	150-585'5" dolomitic siltstone and sandstone, 585'5" - 589'4" dolomite
		360-370'	10'0"	
		585-589'4"	4'4"	
5.	295'0"	287-295'0"	0'7"	10-295' dolomitic siltstone and sandstone
W.C. 1.	173'6"	170-173'6"	3'6"	10-150' dolomitic siltstone and sandstone, 150-173'6" dolomite
2.	273'6"	227-237'6"	7'6"	40-210' dolomitic claystone, siltstone and fine grained sandstone, 210-237'6" dolomite
3.	162'0"			30-162' claystone, siltstone and sandstone
4.	177'0"	175-177'	1'3"	90-162' claystone, siltstone and sandstone, 162-177' dolomite
T.E. 1	412'0"	243'6" - 260'	16'3"	10-390' dolomitic claystone, siltstone and sandstone, 390-400' dolomite
		402-412'	10'0"	

Superficial cover:

G.S.W.1. 10' - 90' ?Tertiary white clay and sand.
G.S.W.3. 0' - 280' ?Tertiary red-brown sand.
G.S.W.4. 0' - 150' ?Tertiary white clay/claystone, silt/siltstone and sand/sandstone.

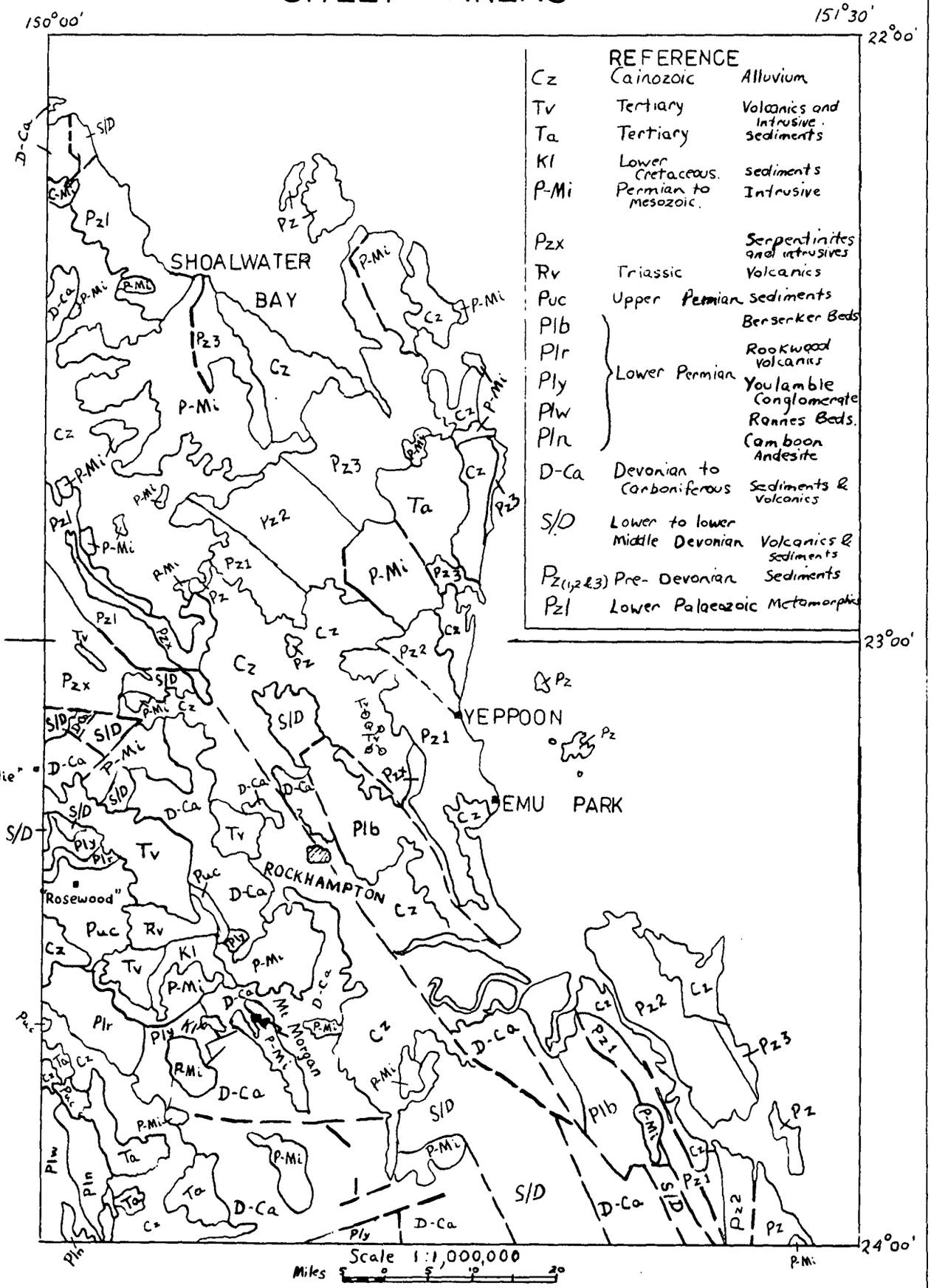
The remainder is Quaternary to Recent red-brown sand with laterite gravel.

Water: G.S.W.1: Struck at 119', 160' and 187 feet; 2000+gph.
G.S.W.2: Struck at 197 feet; 800 gph.
G.S.W.4: Struck at 21 to 23 feet and at 145 feet; 6000+gph (salt water at 145 feet).
G.S.W.5: Struck at 120 feet; 2000+gph.

YARROL BASIN

Fig. 1

GEOLOGICAL SKETCH MAP OF THE ROCKHAMPTON AND PORT CLINTON SHEET AREAS



Bureau of Mineral Resources,
Geology and Geophysics, October, 1965.

To accompany Record 1965/216

North Yarrol Party

by

A. G. Kirkegaard

PERSONNEL: A. G. Kirkegaard (G.S.Q.), Party Leader,
R. D. Shaw (B.M.R.) C. Murray (G.S.W.)

DURATION OF FIELD SEASON: 28th May to 8th October, 1965.

AREA MAPPED: ROCKHAMPTON and PORT CLINTON covering the northern part of the Yarrol Basin were mapped. The area adjoins the Bowen Basin to the west, where regional mapping is complete, and MONTO to the south, which has been regionally mapped by the Geological Survey of Queensland. Parts of ROCKHAMPTON had been mapped by various individual and company geologists before the 1965 season. The 1965 mapping has completed the regional coverage of both PORT CLINTON and ROCKHAMPTON to the stage where preliminary editions can be produced. Some of the problems extending from the Bowen Basin into the Rockhampton area have been resolved, and specific geological problems requiring more detailed mapping have been indicated.

GEOLOGY:

The distribution of the major rock units in ROCKHAMPTON and PORT CLINTON is shown in Figure 1 and the units are briefly described in Table 1.

Only fairly gross rock units could be mapped throughout the area. Most of the many previously named formations are found to lose their identity within a few miles of their type area. The rock types are generally similar throughout the section, and units which are distinctive in one area commonly become unrecognizable along strike owing to facies changes. This is particularly common in the Devonian-Carboniferous sequence.

Three unconformities were mapped. The oldest is exposed in the Craigilie Homestead area where the Upper Devonian-Carboniferous sequence unconformably overlies the Lower Devonian volcanics and limestone. The Youlambic Conglomerate unconformably overlies Lower Carboniferous rocks west of Mount Morgan. This conglomerate characteristically contains granite phenoclasts and probably indicates a basal Permian unconformity. Near Rosewood Homestead, conglomerate containing blocks of fossiliferous Carboniferous sediments unconformably overlies the Rookwood Volcanics. This unconformity is possibly at the base of the Upper Permian.

The stratigraphic position of a very thick undifferentiated Palaeozoic unit is not clear, but it appears to be older than the Devonian-Carboniferous sequence.

TABLE 1

TABLE OF ROCK UNITS

AGE	ROCK UNIT (or map symbol) AND THICKNESS	LITHOLOGY	REMARKS
Cainzoic	Cz	Includes river alluvium, coastal mud flats and sand dunes	
Tertiary	Ta Thickness unknown	Claystone, siltstone, sandstone, conglomerate, lignite, oil shale	Includes Tertiary sediments of Callide Valley, Waterpark Creek and the Narrows
Tertiary	Tv	Trachyte plugs, basalt, trachyte flows, trachyte tuff, dacite, rhyolite	
Lower Cretaceous	Kl ?1000 ft. (max.)	Quartz sandstone, grey siltstone, mudstone, coal	
Permian to Mesozoic	P-Mi	Granite, adamellite, granodiorite, diorite, gabbro, porphyry	
Palaeozoic	Pzx	Serpentinite, pyroxenite norite, gabbro	
Triassic	Rv Thickness unknown	Andesite flows, tuff, agglomerate	Overlies Dinner Creek Conglomerate with probable unconformity
Upper Permian	Puc 4000 ft. (approx.)	Conglomerate, lithic sandstone, siltstone, mudstone	Includes Dinner Creek Conglomerate, Boomer Formation. Some conglomerate beds contain fossiliferous carboniferous boulders. Unconformable on Upper Carboniferous and Rookwood Volcanics

AGE	ROCK UNIT (or map symbol) AND THICKNESS	LITHOLOGY	REMARKS
Lower Permian	Berserker Beds Plb Thickness unknown	Dacitic lapilli tuff, andesitic tuff, agglomerate rhyolite, crystal tuff, vitric tuff, siltstone	
Lower Permian	Rookwood Volcanics Plr 3000 ft. (approx.)	Spilitic pillow lava, agglomerate, siltstone, tuff, vitric tuff	
Lower Permian	Youlambie Conglomerate Ply 3000 ft. (approx.)	Conglomerate, feldspathic, lithic sandstone, siltstone, mudstone, spherulitic rhyolite	
Lower Permian	Rannes Beds Plw Thickness unknown	Siltstone, mudstone, slate, tuffaceous sandstone, conglomerate limestone	
Lower Permian	Camboon Andesite Pln Thickness unknown	Andesite, agglomerate crystal tuff, tuff, tuffaceous sandstone, siltstone	
Devonian to Carboniferous	D-Ca 20,000 ft. (max.)	Upper Devonian. Andesitic flows, tuff, agglomerate, lapilli tuff, dacite, rhyolite, vitric tuff, conglomerate, lithic sandstone, siltstone, limestone Lower Carboniferous. Grey siltstone with thin graded sandstone beds, feldspathic sandstone, conglomerate tuff, tuffaceous sandstone and conglomerate, oolitic limestone Upper Carboniferous. Siltstone with richly fossiliferous bands, feldspathic and lithic sandstone calcareous sandstone, conglomerate, limestone	Overlies lower Devonian with probable unconformity. Givetian to Visean sequence is conformable. Upper Carboniferous disconformably overlies Lower Carboniferous

AGE	ROCK UNIT (or map symbol) AND THICKNESS	LITHOLOGY	REMARKS
Lower to Lower Middle Devonian	S/D 10,000 ft. (min.)	Green andesitic flows, tuff, agglomerate, crystal tuff, volcanic conglomerate, tuffaceous sandstone, keratophyre, limestone	Rocks cleaved in most places
Palaeo-zoic	Pz ?90,000 ft. (max.)	Pz(1) Greywacke, black siltstone, chert, feldspathic sandstone, tuff. Pz(2) Black siltstone, chert. Pz(3) Quartz sandstone, feldspathic quartz sandstone, siltstone	Fossils not recorded. Probably pre-Devonian
Lower Palaeo-zoic	Pzl	Phyllite, quartz-mica schist, marble	

SEDIMENTARY PETROLOGY

Sedimentary Petrology

by

L.V. Bastian

PERSONNEL: L.V. Bastian - November 1964 to October 1965, M. Arman - November 1964 to May 1965, and A. Fehr, (I.F.P.), November 1964 to October 1965.

Sedimentary petrology was applied to the study of a wide range of surface and subsurface problems of the Bowen and Surat Basins.

Three Records, recording the results of some of these studies, were completed by L.V. Bastian - 1964/193 "Petrographic Notes on the Peawaddy Formation, Bowen Basin, Queensland"; 1965/120 "Petrological report on the Basement to Lower Jurassic sections of some subsidized wells in the Surat Basin"; 1965/148 "Petrographic notes on Permian Formations in the Mundubbera 1:250,000 Sheet area, Queensland".

The study of Upper Permian Peawaddy Formation revealed the widespread occurrence of feldspar grains and volcanic detritus, and abundant kaolinite in the lower half of the unit. The well report dealt with Cabawin No.1, Cabawin East No.1, Pickanjinnie No.1, Winnathoola No.1, Combarngo No.1 and Sunnybank No.1, and was the completion of work begun early in 1963 under the guidance of Dr. A. Fehr (I.F.P.). The resulting data proved very useful for correlation. Several widespread lithological markers were traced, notably a black claystone interval in the Middle to Upper Triassic, vitric tuffs in the Upper Permain and garnetiferous sediments in the Lower Jurassic, garnet being absent in the older sediments. Variations in proportions of quartz, feldspar and lithic components showed the resemblances between subsurface units and their suspected correlates in outcrop. Petrographic features noted for the Permian units on MUNDUBBERA should be very useful for later correlations. The main feature is in the high tuffaceous content of the units; vitric tuffs are very common and crystal tuffs fairly common; mudstones are very siliceous. This indicates much contemporaneous vulcanism, probably to the east of the area.

M. Arman completed Record 1964/92 "Petrography and correlation of some Permian formations in Planet Warrinilla North No.1, Queensland". He identified the Catherine Sandstone and Peawaddy Formation in the well and recognized distinctive characters of each unit.

A number of other Records are now prepared in draft form. L.V. Bastian completed work during the year on the following projects - (i) petrography of the Lower Permian units:Staircase Sandstone, Aldebaran Sandstone, Catherine Sandstone and Colinlea Sandstone; (ii) petrography of argillaceous units in the Springsure area - Joe Joe Formation, Orion Formation, Stanleigh Formation and Cattle Creek Formation; and (iii), petrography of Triassic units:Clematis Sandstone and Moolayember Formation. Work is almost completed on the Rewan Formation and the Jurassic Precipice Sandstone, Evergreen Formation and Boxvale Sandstone Member.

M. Arman has completed work on the BMR scout holes drilled in 1963 in the Bowen-Surat Basin and on petrographic comparison of Inderi No.1 and Coorocrah No.1 Wells. A report under the combined authorship of Arman and Bastian on the Wandoan No.1 Well is in draft form.

A. Fehr spent most of the period working on further correlation problems in the subsurface Surat Basin, examining material from Coomrith No.1, Flinton No.1, Wunger No.1, Minima No.1, Boomi No.1 and Weribone No.1 Wells. He produced further data substantiating the Triassic and Jurassic correlations used in earlier I.F.P. and B.M.R. Records. He then completed Alice No.1 Well in the Amadeus Basin.

MACROPALAEONTOLOGY

MACROPALAEONTOLOGY

GENERAL (prepared by J.M. Dickins)

Dr. A.A. Öpik retired on 31st December, 1964, and is now continuing his work on a contract basis. He is describing Cambrian trilobites from Australia and B.M.R. Bulletin 74 - Mindyallan trilobites from Queensland - is in press, and work on the Middle Cambrian Neipidae, organization and structure of Xystridura and the Dolichometopidae is well advanced. Also on a contract basis Dr. I. Crespin has continued her work on the catalogues of type specimens in Australia and completed an examination of New Guinea and Papua forams for the Petroleum Exploration Branch: Mr. R.W. Day of the Australian National University has continued his work on the Cretaceous molluscs from the Great Artesian Basin.

Outside palaeontologists working in collaboration with the B.M.R. include R.E. Wass of the Sydney University on the Permian Bryozoa from the Bowen Basin, R.N. Runnegar and Professor Dorothy Hill of the University of Queensland on Permian pelecypods and Devonian corals respectively and Dr. J.A. Talent of the Geological Survey of Victoria on Devonian faunas from the Ukalunda Beds of Central Queensland.

M. Plane of the B.M.R. has been on leave without pay working at the University of California, Museum of Palaeontology on a Pliocene vertebrate fauna from New Guinea.

Visitors have included Professors Preston Cloud Jnr., J. Frankel, W.M. Furnish, B.F. Glenister and I. Yin and Drs. Daily and P. Sutherland.

ANNUAL REPORT, 1965

by

J.M. Dickins

SUMMARY

J.M. Dickins continued preparation of reports on the Bowen Basin Regional Survey. In addition to fossils from the Bowen Basin he examined, and reported on fossils, of Permian age from Western Australia, Northern Territory and New England and examined Devonian fossils from Western Australia. He carried out field work with the Bonaparte Gulf Basin Party and visited India and Pakistan, to attend the 22nd International Geological Congress in New Delhi.

BOWEN BASIN REGIONAL SURVEY

The field work for this joint survey with the Geological Survey of Queensland was completed in 1964. Completion of maps and reports is now in progress. Explanatory Notes for BARALABA, MACKAY and EMERALD were read and commented upon and identifications of Permian fossils were included in the EDDYSTONE Explanatory Notes. A note was prepared for inclusion in the report

on J. MACKAY prior to editing and the palaeontological appendix for the Bowen South Report was revised. The Bowen South Report is now in press.

Arising from this work palaeontological notes were compiled for the Surat/Bowen Excursion Guide Book prepared by the Queensland Division of the Geological Society of Australia. A paper on Permian earth movements was prepared for Section C of the A.N.Z.A.A.S. Congress in Hobart. Together with E.J. Malone, preliminary work was begun on a bulletin summarizing and synthesizing the work on the Bowen Basin.

VISIT TO INDIA AND PAKISTAN

The visit was primarily to attend the 22nd International Geological Congress at New Delhi for which a paper on "The Correlation of the Permian Rocks of Eastern and Western Australia" was prepared. The opportunity was taken to visit the Geological Survey of India at Calcutta and the Geological Survey of Pakistan at Quetta. Field excursions were undertaken in Kashmir and in the Salt Range north of Lahore in West Pakistan. Arising from this visit a paper has been prepared in conjunction with S.C. Shah of the Geological Survey of India for publication by the Geological Society of Australia on some pelecypods from the Central Himalayas and their age.

EXAMINATION OF FOSSILS

In addition to material from the Bowen Basin, fossiliferous cores from Wapet's Yardarino No. 2 and Aquitaine Petroleum's shallow drilling in the Port Keats area, Northern Territory, were examined and reported upon. Examination of surface samples from the Devonian Cockatoo Sandstone of the Bonaparte Gulf Basin was continued and of Permian fossils from the New England area was completed and reported upon.

OTHER

Field work was undertaken with the Bonaparte Gulf Basin Party on PORT KEATS and CAPE SCOTT. On the surface Permian rocks unconformably overlie Precambrian and the Permian is overlain by probable Triassic. Cretaceous marine rocks are more widespread than was hitherto suspected.

ANNUAL REPORT

by

C.G. Gatehouse

During the year C.G. Gatehouse worked on palaeontological material for which the following papers are, or will be, the end products:

Paper published

Early Upper Cambrian fossils from the Comet Slate at Dundas, Tasmania. Tech. Rep. Dep. Min. Tas. 8 (1963), 50-51, 1964.

Paper in progress

Early Middle Cambrian ptychopariid trilobites from the Litchfield area, Daly River Basin, N.T.

Papers in manuscript

"Fossils and stratigraphy of the north-eastern part of the Georgina Basin, N.T." This is a record summarizing all the fossil collections made on BRUNETTE DOWNS, ALROY, RANKEN and AVON DOWNS.

A paper titled "First Record of lithistid sponges in the Cambrian of Australia" was prepared for publication early in the year, but recent discoveries have necessitated the inclusion of more localities and photographs in the manuscript.

Paper in progress

A joint paper with Dr. Öpik is being written on a collection of fossil material from ALROY (N.T.) area containing Eurostina Whitehouse 1939 and associated trilobites.

Notes on samples for oil companies were completed on:

1) Palaeontological report on core Nos. 4, 14 and 19 of Netting Fence No. 1 Well; core No. 14 is regarded as possibly the zone of Glyptagnostus reticulatis and core No. 19 is most probably middle Middle Cambrian.

2) Core No. 1 of The Brothers No. 1 Well contains no fossils.

3) No. 33 waterbore on Rocklands Station, CAMOOWEAL, Q'ld. contains Acrotreta Kutorga 1848 in the interval 400-410 feet which may be regarded as Cambrian in age.

4) Brunette Downs No. 1 Well in the Georgina Basin, N.T. core No. 2 (1009-1019 feet) contains Biconulites, Lingulella, and Acrotreta; the age of this core is therefore regarded as early Middle Cambrian.

Field Work

1) Five weeks were spent on field work in Western Australia and the Northern Territory. Gatehouse was attached to the Bonaparte Gulf Party which was working in the Point Spring area and later near the Daly River. He mapped part of the Litchfield area of the Daly River Basin where he collected Middle Cambrian fossils.

2) Several visitors were taken on conducted tours of the Yass-Taemas districts, N.S.W.

ANNUAL REPORT

by

S.K. Skwarko

S.K. Skwarko examined and described the following fossils: the Lower Cretaceous fauna from Stanwell; a single but well preserved specimen of Neotrigonia from New Guinea; Lower Cretaceous marine fauna from the Gibson Desert, Western Australia; and the Mesozoic molluscs from New Guinea. He prepared the following papers for publication:

1. Lower Cretaceous Trigoniinae from Stanwell, eastern Queensland.
2. The first report of Neotrigonia from New Guinea.
3. Lower Cretaceous marine fossils of the Great Artesian Basin type in the Gibson Desert, Western Australia.
4. The first Upper Triassic and ?Lower Jurassic marine Mollusca from New Guinea.
5. Lower Cretaceous Mollusca from the Sampa Beds near Wau, Territory of New Guinea.
6. Some Ordovician graptolites from the Canning Basin, Western Australia.

Skwarko travelled to Port Moresby, Melbourne and Perth to make arrangements to examine and describe their Jurassic fossil collections.

Discoveries which stem from Skwarko's work can be briefly summarised as follows:

1. Faunal similarity closer than hitherto suspected was shown to exist between areas of early Cretaceous sedimentation peripheral to the continent of Australia. These imply an isochronous or near-isochronous sedimentation in those areas.

2. The report of the Tertiary Trigoniid from New Guinea is the first for this interesting shell from outside Australia.

3. The fossil fauna in the Gibson Desert, Western Australia is closely similar to some faunas in the Great Artesian Basin Aptian sediments in eastern and southern Australia. This gives evidence of a considerably greater extent of the Aptian sea than has been hitherto realised. The nature of the fauna implies a good connecting route between the shallow sea of the Great Artesian Basin and the Gibson Desert sea.

4. The Triassic and the probably Lower Jurassic fossils from the Territory of New Guinea are the first marine fossils of those ages ever reported from this island. This discovery fills in a gap in the stratigraphical column in New Guinea.

5. Some Ordovician graptolites from Willara No. 1 Well in the Canning Basin are extremely well preserved. When digested in hydrofluoric acid, core samples have yielded some compressed graptolites which when bleached and mounted clearly showed their complex morphology in fine detail. Their preservation is far better than of any previously described from Australia and equals that of the best in the world.

ANNUAL REPORT

by

J. Gilbert-Tomlinson

SUMMARY

Knowledge of the course of geological history in northern Australia in Palaeozoic time was consolidated and further details were added.

The traditional views of widespread continental conditions in Australia in late Devonian time and of non-deposition and erosion during the Silurian Period were upheld, and new finds of Ordovician fossils support the view of thalassocratic conditions over the greater part of northern Australia during the Period. Discoveries of Cambrian fossils confirm the earlier estimates of the extent of the Cambrian seas, and, in one part of the Northern Territory, even extend the knowledge of the Lower Cambrian sea.

New palaeogeographic maps for Ordovician, Silurian, and late Devonian times were compiled.

With the conclusion of reconnaissance mapping in the Amadeus Basin, the opportunity has been taken to implement a programme of systematic description of the fossils, beginning with the late Devonian placoderm vertebrate Bothriolepis.

PRE-CARBONIFEROUS REGIONAL GEOLOGY OF NORTHERN AUSTRALIA

Devonian

Although no new finds of late Devonian macrofossils have been made, the concept of widespread continental conditions has been strengthened by the discovery of spores (by E.A. Hodgson) in a water bore at Mereenie in the Amadeus Basin.

A new palaeogeographic map of Australia in late Devonian time has been compiled.

Continental conditions may have existed in older Devonian time in the Georgina Basin.

Silurian

In spite of extensive geological reconnaissance, evidence for Silurian deposition remains equivocal, and early opinion on widespread conditions of non-deposition and erosion are generally borne out. Nevertheless, the possibility of a resumption of marine sedimentation in late Silurian or early Devonian time cannot be overlooked.

A new Silurian palaeogeographic map, embodying the most recent information, has been compiled.

Ordovician

Amadeus, Georgina, and Bonaparte Basins

Study of these areas has now reached the stage where detailed problems of palaeogeography and correlation are emerging.

In some respects the collections are inadequate, either because fossils that appear to be critical are too incomplete for determination and description, or because the sampling in some of the measured sections is not close enough to establish a detailed faunal succession.

The only solution is a deliberate search for evidence by a worker experienced in the faunas, and until this can be carried out some uncertainty will prevail.

The only notable discovery is an occurrence of heterostracan (jawless) vertebrates in the Nora Formation of the Georgina Basin.

An interesting development in the Amadeus Basin is the discovery that measurements of current bedding directions and isopachs suggest a depositional break near the end of lowermost Ordovician (Tremadocian) time. Such a break has already been postulated from a study of the fossils.

Other exposures in the Northern Territory

New finds of Ordovician fossils in the Northern Territory, near Claravale (Dr. A.A. Opik) and in the Wiso Basin, have greatly extended knowledge of the distribution of Ordovician seas. The faunal relationship of the Wiso Basin fossils is with the Georgina rather than the Amadeus Basin.

Canning Basin, W.A.

Drilling in the western part of the Canning Basin by West Australian Petroleum at Parda No. 1 and Willara No. 1 Wells confirms the predicted presence of Ordovician sediments at depth.

Parda No. 1, on the Broome Platform, penetrated about 2,000 feet of Middle and Late Lower Ordovician sediments before striking basement. Early Lower Ordovician sediments were not encountered. The same circumstance has been noted in other wells on the Platform, Thangoo No. 1A and Goldwyer No. 1, north of Parda.

Willara No. 1, a few miles south-west of Parda and off the Broome Platform, is chiefly remarkable for its great thickness of fine-grained late Lower and early Middle Ordovician sediments (over 6,000 feet). Tremadocian has not been positively identified at the time of writing.

Sediments from both wells contain a trilobite already known from the Georgina Basin. Graptolites are common in the Willara sequence and include a group (pendent Didymograpti or 'tuning-forks') not previously recorded from Western Australia.

Folded belts

Ordovician fossils have not yet been found in the folded belts of eastern Queensland. Their apparent absence is most probably to be explained by later tectonic deformation.

Palaeogeography

A new Ordovician palaeogeographic map has been compiled, and more detailed maps of the Lower Ordovician palaeogeography are in preparation. The spread of the Ordovician seas was even greater than at one time thought, and at present the main problem is to identify the source-areas of the sediments.

Cambrian

Upper Cambrian

Knowledge of the Cambrian faunas continues to grow, and with it the understanding of the stratigraphy, correlation, and palaeogeography.

Study of the Upper Cambrian fossils of the Cambridge Gulf area by Dr. Opik, for example, provides a framework for dating some of the Amadeus Basin sediments.

The early Upper Cambrian (Mindyallan) time now seems to have seen the widest extent of the Cambrian seas. New finds of fossils of the Stage are continually being made as geological exploration proceeds. Details are given in the current Bulletin on Mindyallan fossils by Dr. Opik.

Middle Cambrian

Geological exploration reveals new localities for the early Middle Cambrian Girvanella-Biconulites-Redlichia assemblage. Evidently the spread of the seas at this time was nearly as great as that of the Mindyallan time (except in the south of the continent).

Systematic description of the Middle Cambrian fossils is continuing and includes studies on trilobites from the Amadeus Basin. These will be the first Cambrian trilobites to be described from the Basin.

New discoveries include fossils from the Wiso Basin.

Lower Cambrian

Notable advances have been made in the field of Lower Cambrian palaeogeography by the discovery of fossils at two widely separated localities in the southern part of the Northern Territory.

The first is in the vicinity of the Yuendumu Native Reserve (MOUNT DORREEN, Ngalia Basin; Coll. by American Overseas Petroleum; det. A.A. Opik). Body fossils and track fossils are preserved in fine-grained micaceous brown sandstone.

The second locality is in Amerada McDills No. 1 Well (Great Artesian Basin, 12 miles north of Mount Etingambra (MCDILLS) at a depth of about 9,600 feet. Brachiopods are preserved in a folded sequence of dolomitic siltstone.

The local base of the Cambrian System in the Amadeus Basin is provisionally fixed within the Arumbera Sandstone as exposed in the eastern part of the Basin.

DIASTROPHISTIC TIME-SCALE

Co-ordination of the results of study in different fields of geological enquiry - palaeontology, sedimentation, and radioactive data - has produced a gratifying agreement among a variety of workers on the main course of geological events in Central Australia.

The resulting confidence in dating the central Australian Palaeozoic rocks is of more than local importance, as a major structural transformation from thalassocratic to geocratic conditions took place between the close of the Ordovician Period and late Devonian time.

An attempt can now be made to compare the succession of diastrophistic events in the largely epeiric central Australian region with that of the folded belts of south-eastern Australia, for which a preliminary tectonic scale has already been established.

This has been done in a current paper, now nearing completion, on the occurrence of the cosmopolitan late Devonian placoderm vertebrate Bothriolepis Eichwald in the Amadeus Basin.

A fair correspondence of events in the interval between late Ordovician and Middle Devonian time has been noted.

DETERMINATIONS AND REPORTS

Notes have been prepared on the following:

1. Local base of Cambrian System in the Amadeus Basin, N.T.

2. Lower Cambrian fossils in Amerada McDills No. 1 Well, N.T.

3. Early Middle Cambrian fossils in Wiso Basin, N.T.

4. Dating of Cambrian and Ordovician formations in the north-eastern Amadeus Basin, N.T.

5. Ordovician fossils in the Wiso Basin, N.T.

6. Ordovician fossils collected by geologists of Australian Aquitaine Petroleum in the south-eastern part of LAKE AMADEUS, Amadeus Basin, N.T.

7. Ordovician fossils in West Australian Petroleum Parda No. 1 and Willara No. 1 Wells, western Canning Basin, W.A.

8. Late Devonian placoderm Bothriolepis in Amadeus Basin (including study of palaeogeographic implications of the discovery). One of the specimens displays a structure not previously recorded for the genus. The material, however, is inadequate to decide whether the erection of a new taxon is justified.

9. Palaeozoic fossils from the Amadeus Basin, N.T. The report was completed in draft about the middle of 1964, but was withdrawn after the 1964 field season, when it became evident that the value of the work would be enhanced by the inclusion of a number of new discoveries made during the season. The revision has been delayed, but geologists concerned have been kept informed of the progress in the study of new collections.

10. Fossil Murray Cod (Maculloch*ella* macquariensis) from the well-known diatomite (Tertiary) deposits of the Warrumbungle Mountains, N.S.W.

11. Inconclusive bedding-plane markings in a Palaeozoic sandstone from the Tarago area, N.S.W. submitted by G.M. Burton.

MISCELLANEOUS

12. Prepared a talk on 'History of stratigraphic research in the Amadeus Basin, N.T.'

13. Compiled critical notes on central Australian geology in general and the Australian Ordovician in particular for Dr. K.S.W. Campbell (for a proposed text-book) and discussed stratigraphic and palaeogeographic problems with him.

14. Supplied data on possible time-span of the Ordovician Stairway Sandstone to K. Crook (A.N.U.).

MICROPALAEONTOLOGY

ACTIVITIES OF THE MICRO-PALAEONTOLOGICAL GROUP

by

G.R.J. Terpstra

Two thousand and eleven samples were washed, picked, and prepared for the study of their microfaunal content. A new process was introduced for disintegrating rock samples by treating them with hydrogen-peroxide. This treatment results in a quicker and more thorough breaking down of the rock. The remaining washed residues are considerably reduced, which facilitates the study of the microfaunas.

Four hundred and seventy four thin sections were made and seventy two polished rock surfaces prepared.

Three hundred and eighty-two samples (in weight, about 2728 lbs of rock) were treated with acetic and monochloracetic acid - using approximately 500 gallons of acid - in order to extract conodonts.

Three hundred and seventy six samples were processed for their spore and microplankton content.

The palynological section introduced a new system of cataloguing species, employing mounted photo-transparencies.

Foraminifera

G.R.J. Terpstra was engaged on the examination of surface samples collected by field parties from Queensland, Northern Territory, Papua and New Guinea, and on the study of cores and cuttings from water-bores and subsidized wells. Stratigraphic sequences of Permian, Cretaceous and Tertiary strata represented by these samples have been studied and reported on. Samples received from B.H.P. prospecting shaft (manganese deposits) and from outcrops at Groote Eylandt (N.T.) indicate a Lower Cretaceous age. A report was prepared on the results, which appeared as Appendix No.1 to a paper on the Manganese Deposits of Groote Eylandt, by W.C. Smith, P. Crohn and R.T. O'Brien, presented at the A.N.Z.A.A.S. Congress at Hobart. Limestone samples collected by A. Speight of C.S.I.R.O. at Bougainville Island (Solomon Islands) revealed larger Foraminifera indicating a Miocene (probably Middle to Lower-Miocene) age. Some samples from South New Ireland collected by D. French from outcrops of limestone contained Nummulites species indicating an Oligocene age. A preliminary study was carried out on core samples, submitted by P.J. Cook collected from the bottom of the sea in the Antarctic region (vicinity Mawson and Davis bases). The faunas present in these samples all are recent marine faunas. Limestone samples from outcrops in the Officer Basin (Eucla Basin) collected and submitted by Mr. P. Jackson of the Hunt Oil Company revealed microfaunas of lower Miocene age.

D.J. Belford continued work on Carboniferous foraminifera from Bonaparte Gulf Basin, Western Australia, particularly members of the families Tocernayellidae, Endothyridae and Ozawainellellidae. The problematical microfossil Draffania biloba Cummings has also

been identified from Visean beds in Western Australia. Paleocene and Miocene foraminifera from Papua-New Guinea were also examined. Reports giving the results of these investigations were in preparation.

A.R. Lloyd finalized the completion report for B.M.R. 13 which was issued as Record 1964/127.

An outline of the Tertiary geology of Northern Australia was written to accompany the description of non-marine Tertiary molluscs by Dr. D.F. McMichael of the Australian Museum, Sydney, which will be published in B.M.R. Bulletin 80. Much liaison work was carried out with Dr. McMichael during the preparation of these papers. The molluscs studied by Dr. McMichael were collected mainly by Dr. R.H. Tedford, of the University of California, and A.R. Lloyd in 1963, and additional material came from other B.M.R. parties.

A re-examination of the material from two bores 16 miles north of Alice Springs in which Dr. Crespin found Radiolaria (on which the Lower Cretaceous or Mesozoic ages in the Alice Springs area were based) revealed that the so-called Radiolaria are actually analcite crystals. There is therefore no evidence of Lower Cretaceous near Alice Springs and it is considered that the strata previously placed in the Mesozoic may be early Tertiary in age. Correspondence was also exchanged with Dr. Tedford and Mr. M.O. Woodburne, of the University of California, on the Tertiary of Northern Australia.

The occurrence of foraminifera with non-marine molluscs in the White Mountain Formation in the Ord River district of Western Australia, in the Brunette Limestone on the Barkly Tableland of the Northern Territory, and in the Austral Downs Limestone of western Queensland, was reported in a paper titled 'A Possible Miocene Marine Transgression in Northern Australia' to be published in B.M.R. Bulletin 80.

The report on Radiolaria from the Lower Cretaceous Bejah Beds in the Gibson Desert area of Western Australia, which was issued as Record 1963/30, was being prepared for publication when free, well-preserved samples of Radiolaria were received in a sample from the Lower Cretaceous Mullaman Beds at Lee Point near Darwin. The new material was studied and included in a paper 'Notes on a Lower Cretaceous Radiolarian Fauna from the Mullaman Beds, Darwin, Northern Territory', which is to be published in a B.M.R. publication in 1966. Discussions were held with Mr. L.C. Noakes on the Lee Point sample, which contained a high percentage of phosphate. (27%)

CONODONTS AND OSTRACODS - P.J. Jones

Examination of conodonts and ostracods extracted from surface and subsurface samples formed a major part of the year's activities. Particular emphasis was placed on the Upper Devonian and Lower Carboniferous of the Bonaparte Gulf Basin, and the Ordovician of the Georgina Basin.

The main results of these activities are outlined below.

Bonaparte Gulf Basin

1. Many of the conodonts found in measured sections of the Upper Devonian and Lower Carboniferous carbonate succession are conspecific with North Americans and

European forms, which allows the correlation of the succession with the classical sections of the northern hemisphere.

2. Upper Devonian and Lower Carboniferous ostracods have been used for local correlation, which, together with the conodont studies, provides a stratigraphical framework for the formations within the basin.

Georgina Basin

3. The presence of a Cambrian sequence below the Mesozoic unconformity encountered in The Brothers No.1 Well (BEDOURIE, QLD) was reported on the basis of a late Upper Cambrian conodont found in core No.3 (1413 feet), and early Middle Cambrian Biconulites in core No.10 (4157 feet).

4. The processing of samples from the Lower Ordovician (Tremadocian) Ninmaroo Formation, western Queensland has been completed, and all the insoluble residues have been picked for conodonts.

5. Examination of cuttings of the Middle Cambrian Ranken Limestone encountered in water-bores Gidyea No.1 and No.2 (RANKEN, N.T.) yielded a rich assemblage of sponge spicules; no conodonts were found.

Amadeus Basin

6. Ordovician conodonts were found in samples collected by J. Barrie from the upper part of the Stairway Sandstone in the (BLOODS RANGE, N.T.)

Wiso Basin

7. Ordovician conodonts were found in a dolomite sample collected by E.N. Milligan from MOUNT SOLITAIRE, N.T.

Canning Basin

8. Upper Ordovician conodonts were found in Parda No.1 Well (core No.1, 3892 feet) and Lower Ordovician (Arenigian) conodonts were found near the base of the section penetrated by Willara No.1 Well (core No.19; 13,796-12,806 feet).

Miscellaneous

Outcrop samples from the Mootwingee area, N.S.W. and numerous well samples (e.g., Etonvale No.1, Gumbardo No.1, Quilberry No.1, Blantyre No.1, Sahara No.1, and Browne No.1) have been examined with negative results.

Palynology - P.R. Evans and E.A. Hodgson

Requests by oil exploration companies for stratigraphic information from subsidized wells were fewer than in previous years and more time was available for problems connected with B.M.R. field surveys and shallow drilling, and for compilation of a series of reports outlining the palynological stratigraphic subdivisions of the Upper Palaeozoic and early Mesozoic of central Queensland. In spite of earlier conclusions, after revision, more subdivisions of this sequence are recognized, totalling so far: two in the Upper Carboniferous, ten in the Permian, seven, possibly nine, in the Triassic and six in the Jurassic. Cretaceous palynological sequences in the Otway Basin were studied as part of the Petroleum Exploration Branch Basin Study Group's project on that basin. Six divisions of the Lower Cretaceous spore sequence have been recognized.

Other investigations included:

1. Recognition of two acritarch (microplankton) horizons within what was previously thought to be one, in the Evergreen Formation in the Surat Basin.

2. Discovery of Lower Triassic acritarchs in Jericho No.1 Well, Eromanga Basin.

3. Discovery of Upper Jurassic acritarchs in Yongala No.1 Well, Eromanga Basin.

   Both the Triassic and Upper Jurassic acritarchs have been recorded previously from marine horizons in Western Australia only.

4. Determination of early Tertiary pollens in samples from the Minad McKenzie Seismic Survey, Bowen Basin, Queensland.

5. Determination of undifferentiated Tertiary pollens in Ampol's Proserpine No.1 Well, Queensland.

6. Discovery of Upper Mesozoic spores and pollens in Emu No.1 Well, Officer Basin.

7. Determination of Upper Devonian-Lower Carboniferous spores in Mid-Eastern Blantyre No.1 Well, Murray Basin, N.S.W.

8. Commencement of studies of Upper Jurassic spores and pollens in the Great Artesian Basin with a view to subdividing the stratigraphic sequence. Results already show that a revision of the Upper Jurassic nomenclature applied to the Eddystone area will be necessary.

9. Discovery of unicellular organic remains in ?Proterozoic of Brunette Downs No.1 Well, N.T.

10. Examination of samples from the following wells: Beryl No.1, Alba No.1, Dulbydilla No.1, Strathmore No.1, Donnybrook No.1, Tullymorgan No.1, Kelvin No.1, Wunger No.1, St.George No.1, Coomrith No.1, McIntyre No.1, Tulloch No.1, Heathfield No.1, Casterton No.1, Kalangadoo No.1, McDills No.1, Bungendore No.1, Boree No.1, Kulshill No.1, Westbourne No.1, Galilee No.1, Westgrove No.1, Boomi No.1, Boggo Creek No.1, Wuroi No.1,

Arcturus No.1, Rolleston No.1, Jericho Seismic Survey, Hulton No.1, Marchmont No.1, Saltern Creek No.1, Marduroo No.1.

P.R. Evans visited oil companies in Toowoomba and Brisbane during June.

PUBLICATIONS AND RECORDS BY THE MICROPALAEONTOLOGICAL GROUP

PUBLICATIONS

BELFORD, D.J., in press - Miocene and Pliocene smaller Foraminifera from Papua and New Guinea. Bull. 79.

BELFORD, D.J., in press - Permian foraminifera from B.M.R. Bores 6, 7, 8 and 9, Carnarvon and Byro Basins. W.A. Bull. 80.

LLOYD, A.R., in press - An outline of the Tertiary Geology of Northern Australia, Bull 80.

LLOYD, A.R., in press - A possible Miocene Marine Transgression in Northern Australia. Bull. 80.

JONES, P.J. and DRUCE, E.C., - International correlation of the Palaeozoic sediments of the Bonaparte Gulf Basin, north-western Australia. M.S. Nature

APPENDICES:

BELFORD, D.J., JONES, P.J., and ROBERTS, J., Lower Carboniferous fossils from A.O.D. Bonaparte No.2 Well. (Well Completion Report).

TERPSTRA, G.R.J., 1965 - Lower Cretaceous Foraminifera collected from Manganese deposits on Groote Eylandt (N.T.) Appendix I to "The Manganese Deposits of Groote Eylandt (N.T.) by W.C. Smith, P.W. Crohn and R.T. O'Brien, August 1965, A.N.Z.A.A.S. Congress, Hobart.

RECORDS

BELFORD, D.J., 1965 - Foraminifera from the Port Moresby area, Papua, 1965/102.

BELFORD, D.J., 1965 - Foraminifera from Wuroi No.1 Well. Papua 1965/103.

CRESPIN, Irene, and STANLEY, G.A.V., 1965 - Palaeontological investigations Papua and New Guinea, a revision of the list in B.M.R. Report 20 with additions to the end of 1964. 1965/186.

EVANS, P.R., 1964 - Lower Permian microfloras from the Crown Point Formation, Finke area, Northern Territory. 1964/196

EVANS, P.R., 1964 - A correlation of some deep wells in the north-eastern Eromanga Basin, central Queensland. 1964/197.

EVANS, P.R., 1964 - Recent advances in Mesozoic stratigraphic palynology in Australia. 1965/192. (Prepared for the Third Session, ECAFE Committee on Industry and Natural Resources, Tokyo).

EVANS, P.R. & HODGSON, E.A., 1965 - Palynological correlation of Planet Tooloombilla No.1, Crystal Brook No.1. & Warrong No.1, Eddystone 1:250,000 Sheet area. Surat Basin, Queensland. 1965/88.

HODGSON, E.A., 1964 - Devonian spores from the Pertnjara Formation, Amadeus Basin, Northern Territory. 1964/190.

LLOYD, A.R. and BELL, M. 1964 - Completion Report, B.M.R. No.13 well, Sandover, Northern Territory. 1964/127.

TERPSTRA, G.R.J., 1965 - Outcrops samples Bougainville Island, T.P.N.G. 1965/110.

TERPSTRA, G.R.J., 1965 - Report on samples from Water-bores G53/3-2, G53/1-110; G50/2-135, and G53/2-111, 1965/136

PHOTOGEOLOGY

REPORT OF PHOTOGEOLOGICAL GROUP

by

W.J. Perry

Personnel:

J.C. Rivereau (I.F.P.)
W.J. Perry

Movements:

Perry worked as a member of the Kimberley field party during July. In August Perry and Rivereau visited the Wiso party briefly and spent a few days in a reconnaissance of the Ngalia Trough with P. Cook checking the results of the photointerpretation of MOUNT DOREEN and NAPPERBY. Perry also accompanied Professor Folk and R.A. Nichols on a traverse through the Barkly Tableland and the Undilla 'Basin' and briefly visited the Helen Springs Party.

PHOTOGEOLOGICAL WORK COMPLETED 1965

(1:250,000 scale sheets except where otherwise indicated)

Kimberley Area, W.A.

CHARNLEY
YAMPI
PRINCE REGENT
CAMDEN SOUND
MONTAGUE SOUND
ASHTON
DRYSDALE
LONDONDERRY
MOUNT ELIZABETH

Wiso Basin, N.T.

WINNECKE CREEK) also produced at 1:50,000 scale
SOUTH LAKE WOODS)

TANAMI EAST)
GREEN SWAMP WELL) also produced at 1:46,500 scale
MOUNT SOLITAIRE)
LANDER RIVER)

Ngalia Trough, N.T.

LAKE MACKAY
MOUNT DOREEN
NAPPERBY

Drummond Basin, Q'ld.

BUCHANAN - (photo-interpretation on overlays was completed in 1963, but no compilation was made until a base map, scheduled for completion by R.A.S.C. in January 1964, became available in 1965).

Northern Territory

WAVE HILL
NEWCASTLE WATERS } in progress October, 1965.

MISCELLANEOUS

MISCELLANEOUS

by

B.K. Graham

(A) DATA FILING AND INDEXING.

1. All subsidy and well progress material held by the Sedimentary Section was packed and transferred to the new building. This material was indexed and arranged in cabinets and compactus unit in the room reserved for the purpose.

2. Subsidy applications and completion reports on wells and geophysical surveys were cirulated and filed as received. Summary cards were prepared for all well applications and reports.

3. Sedimentary Basins index cards were kept up to date as applications, reports and other references were received.

4. Material received from exploration companies and data from other sources such as scout reports were added to well progress files.

5. Punch cards prepared by other officers of the section on reports and applications were punched and filed.

6. Queries on wells and surveys from officers of the Geological and other Branches were answered, and data supplied on request.

(B) MAP COMPILATION

(1) Geological Map of the World: Australia and Oceania 1:5,000,000 scale. -

Compilation of Sheets 3, 4, and 5 was completed and forwarded for fair drawing. These Sheets cover an area enclosed by 156°E and 132°W, 0° and 24°N. Compilation of Sheet 8 was commenced (156°E to 180°E, 0° to 24°S.) Data on the historically active volcanic areas was added to the New Guinea area of Sheet 7. Correspondence was carried on with authorities in other countries regarding the geology of their Pacific possessions included in the map.

(2) Index Map to B.M.R. Records. 1:1,000,000 scale -

Compilation continued of a series of maps covering Australia and Papua - New Guinea at 1:1,000,000 scale, showing areas covered by individual B.M.R. Records and the type of work on which they reported.

(3) Index Maps for Pan Pacific Congres.

Maps were compiled showing the progress of geological and geophysical mapping in Australia and New Guinea for display by the Chief Geologist at the Congress.

(C) MISCELLANEOUS

(1) A check was made to determine what numbers were missing from the Chief Geologist's collection of B.M.R. Records, and wherever possible, replacement copies obtained from various sources.

(2) A bibliography was prepared of the principal references for the sedimentary basins of Australia, for the use of Dr. Sheldon of the United States Geological Survey.