COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

REPORT No. 84

COPY B.

Completion Report, Stratigraphic Bore BMR 5 Giralia, Western Australia

BY

L. V. BASTIAN

Bureau of Mineral Resources

and

S. P. WILLMOTT

West Australian Petroleum Pty. Ltd

Issued under the Authority of the Hon. David Fairbairn, Minister for National Development

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MINISTER: THE HON. DAVID FAIRBAIRN, D.F.C., M.P.

SECRETARY: R. W. BOSWELL.

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COMPLETION REPORT

Stratigraphic Bore, BMR 5,
Giralia, Western Australia.

by

L.V. Bastian

(Bureau of Mineral Resources)

and

S.P. Willmott

(West Australian Petroleum Pty. Ltd.)

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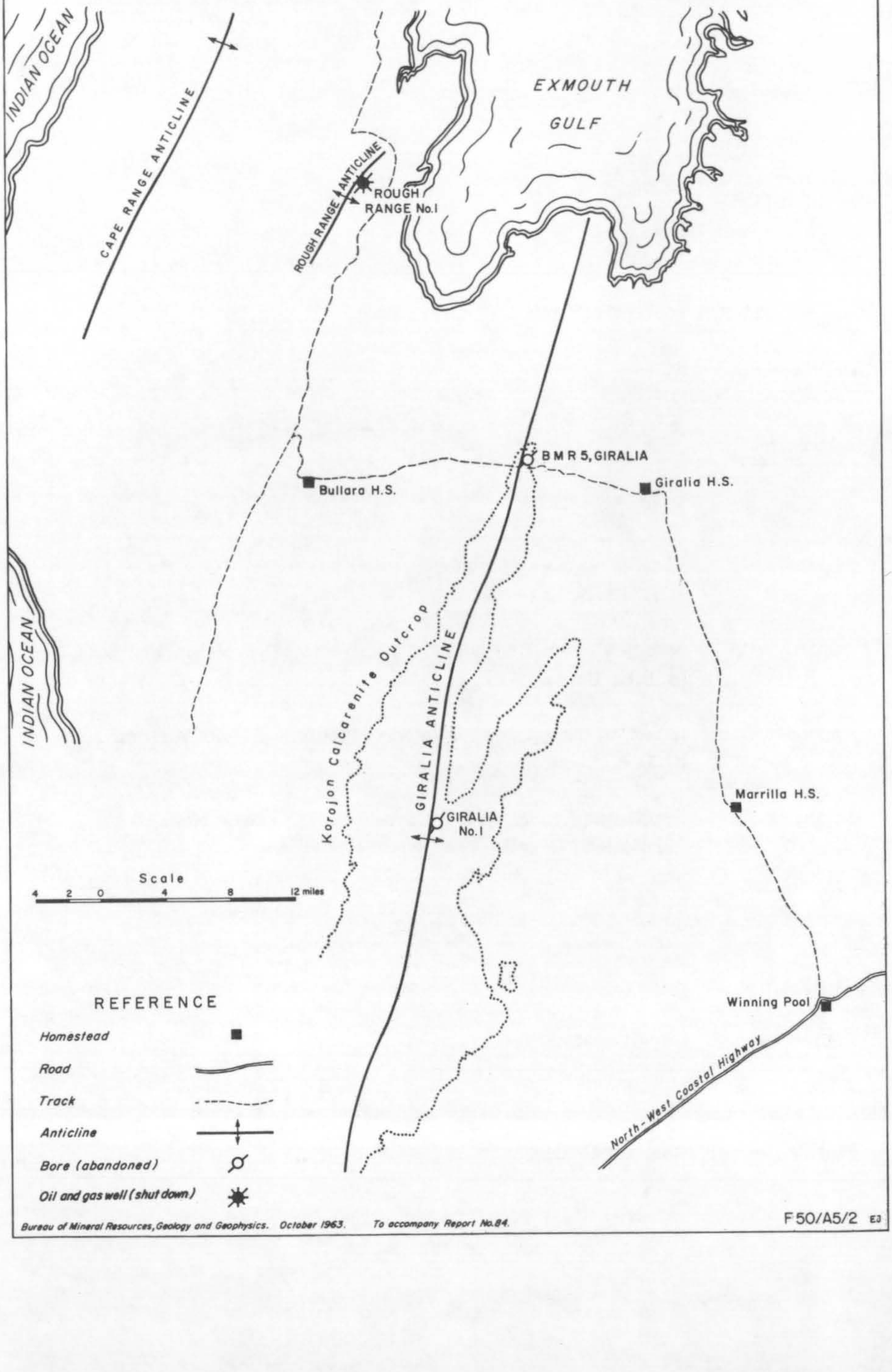

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SUMMARY

Stratigraphic Bore BMR 5 Giralia was located on the northern plunge of the axis of the Giralia Anticline.

The bore penetrated a Cretaceous succession to 1570 feet. It started in Korojon Calcarenite, entered the Toolonga Calcilutite at 115 feet, the Gearle Siltstone at 264 feet, the Windalia Radiolarite at approximately 1030 feet, the Muderong Shale at 1285 feet, and the Birdrong Formation at 1509 feet. From 1570 to 1580 feet a section containing Jurassic spores was recorded, and below 1580 feet the hole passed through a Permian succession belonging to a part of the Byro Group down to the total depth of 2070 feet.

The unconformity between the Mesozoic and Permian rocks proved to be more than a thousand feet shallower than was expected from the interpretation of the seismic reflection cross-section. There was possibly little Jurassic sedimentation beneath the Giralia structure; the Jurassic spores in the interval 1570 to 1580 feet may be from a fossil soil horizon on the Permian rock.

No occurrences of hydrocarbon were recorded.

INTRODUCTION

BMR 5 (Giralia) was drilled in 1958 for the Bureau of Mineral Resources. No completion report was prepared by the well-site geologist, and the material was re-examined by L.V. Bastian in 1962. This report is based on a preliminary report made by Willmott (1959) in the capacity of observer for West Australian Petroleum Pty Ltd (WAPET) at the well-site. The Bureau is indebted to WAPET for permission to include a palynological note by Mr B.E. Balme which appeared as an appendix to Willmott's report. Only minor alterations to the preliminary report were found necessary, as later work supported the main conclusions.

BMR 5 was drilled by Oil Drilling and Exploration (WA) Pty Ltd under contract to the Bureau of Mineral Resources. The hole was located at Shotpoint 3 of S.S.L. Line B-I across the northern plunge of the Giralia Anticline (Pl. 1).

As a result of seismic work carried out by the Bureau of Mineral Resources and later by Seismograph Services of London, it was predicted that an unconformity lay at a shallow depth beneath the surface anticline, and that the Giralia Anticline was underlain by a Palaeozoic syncline with its axis about half a mile west of the axis of the anticline. The well was drilled to investigate the stratigraphic succession down to the suspected unconformity and to investigate the nature of the unconformity.

Estimates on the depth of the unconformity varied considerably. Watson (1952) stated that the surface anticline persisted to a maximum depth of 2000 feet, and placed the unconformity at 1500 feet over the crestal area. Chamberlain et al. (1952) considered that the anticline existed to a depth of approximately 3000 feet. Condon et al. (1956) considered (mainly on the basis of measured surface sections) that the depth of the Permian-Mesozoic unconformity was not likely to be more than 2000 feet, and sections of the Cretaceous formations exposed on the Giralia Anticline measured by them suggested that the base of the Cretaceous should occur at about 1300 feet. A Jurassic section was expected from about 1300 feet to the unconformity.

BORE HISTORY

Drill-hole Data

Location:	30 yards north of the road connecting Giralia and Bullara Homesteads, 8.2 miles from Giralia.
Geographic Co-ordinates:	Latitude 22°39'31"S. Longitude 114°14'45"E.
Grid Co-ordinates:	1,173,400 N. 202,800 E.
Map Sheet:	SF 50-9, Yanrey, 1:250,000 Series.

Elevation:

Rotary Table:	248 feet approx.
Ground:	243 feet approx.

Date Spudded:	26th June 1958.	
Date Completed:	31st July 1958.	
Total Depth (R.T.):	2070 feet	
Hole Profile:	Surface to 96 feet:	8 1/2 inch
	96 feet to 2070 feet:	5 5/8 inch
Casing Run:	88 feet of 7 inch 29.9 lb/ft casing set at 93 feet.	
Plug Depths:	1397 and 110 feet	
Status:	Abandoned	
Drilling Contractor:	Oil Drilling & Exploration Ltd.	
Personnel:		
Toolpusher:	A. Madge	
Well-site Geologists:	J.M. Pulley (B.M.R.), S.P. Willmott (WAPET)	
E-Log Operator:	N.D. Jackson	

Drilling History

BMR 5 was drilled by a Failing 2500 Holemaster truck-mounted rig. It was spudded on 26th June 1958, and on the same day 7-inch casing was set and cemented at 93 feet after electric and radioactive logs were run. Mechanical trouble caused drilling to be suspended while the rig motor was overhauled in Perth. Drilling was resumed on July 12th, and continued with only one major interruption: 12 hours were spent in the recovery of three stands of drill-collar lost during a trip at 1312 feet. Drilling was completed on July 30th, and plugs were set at 1397 feet and 110 feet on the following day.

Lithological Logging

Ditch samples were collected from surface to total depth at 5-foot intervals during both drilling and coring.

The programme called for 10 feet of core in each 100 feet drilled. Altogether 22 cores were cut, using a Reed 'Kor-King' core barrel with 4 3/4-inch soft-formation core heads and a hard-formation core head. A total of 205 feet of formation was cored, of which 126 feet (61.5%) was recovered. Details of cores cut are listed in Appendix A.

Electric Logging

Several logging runs were made with a 2000-foot Widco Logging Unit and a 4000-foot Logging Unit. Several runs of a Gamma Ray Log were also made on the Widco 2000-foot Logging Unit. All runs have been combined into one log recording gamma ray, self-potential, and single-point resistivity curves (Dyson & Jackson, 1958). These authors noted the presence of minor irregularities, or 'hunting', on the self-potential and resistivity curves, superimposed upon the principal features of the log, and also that a reversal of S.P. polarity occurs below 750 feet, possibly caused by a drilling mud more saline than the pore solutions. The S.P., resistivity, and gamma ray curves from Dyson & Jackson's report are used as a base for the accompanying Composite Log (Pl. 1).

Electric Log Data : BMR 2000-foot and 4000-foot
Widco Logging Units

Run Number	1.	2.	4.	5.
Date	27th June 1958	23rd July 1958	29th July 1958	30th July 1958
Interval	20 - 96 feet	93 - 1313 feet	98 - 2009 feet	93 - 2070 feet
Mud-Nature	Clay base	Lime base	Lime base	Lime base
Mud-Resistivity			0.5 - 0.8	0.9 at 72°F
Mud-Weight			77lb/cu.ft.	77lb/cu.ft.
Mud-Viscosity			55 secs.	55 secs.
Mud-Water Loss			30 cc/30 min.	30 cc/30 min.
Mud pH			12.6	8.2

Run 3: logged 25th July, to depth 1090 feet. No further information.

Gamma Ray Log: Run 1, 30th July 1958. 20 feet - 2070 feet.

Drilling Time and Gas Log

Drilling time records were kept for five-foot intervals during both drilling and coring.

No continuous gas detection equipment was used on the well. A portable JW Gas Detector was used to test the mud returns for gas at regular intervals and at soft drilling breaks. No signs of gas were recorded with this instrument nor in any flame test on cores.

Formation Tests

No formation tests were conducted in this well.

Deviation Records

Hole deviation was recorded at several intervals, and the results are incorporated in the Composite Log.

Calcilog

A calcilog is incorporated in the Composite Log. Details of the method of calcilogging are given in Bastian (1962, p. 5). Tests were carried out at 10-foot intervals on those poor in carbonate.

GEOLOGY

After cores and cuttings had been studied by the well-site geologists, all available material from the bore was re-examined in the B.M.R. Laboratory at Canberra. The study suffered from the disadvantage that some of the distinctive lithological characters can be seen only when the cores are coming from the hole still wet. Willmott (1959) states this was particularly so for the change of formation at about 1030 feet.

Previous work

Raggatt (1936) noted the existence of the Giralia Anticline, and used the Divisions 'Winning Series' and 'Cardabia Series' for the Cretaceous rocks exposed in this region. Condon et al. (1956) described the Giralia and Marilla Anticlines in detail, and noted that they were asymmetrical anticlines with steeper flanks to the east. The amended divisions Winning Group and Cardabia Group were used, and they did not record Toolonga Calcilutite (the lowest unit of the Cardabia Group) on the surface in the Giralia Anticline. In McWhae et al. (1958) Korojon Calcarenite is described as thickening to the north at the expense of Toolonga Calcilutite, which is thin or absent on the Giralia Anticline.

Formations

BMR 5 spudded in the Korojon Calcarenite and penetrated the usual Cretaceous sequence of the Carnarvon Basin. A thin (10-foot) bed of Jurassic siltstone separated the Cretaceous Birdrong Formation from the Permian Byro Group.

The following formation tops were recognised by means of electric logs and lithology (ages and stratigraphic correlations are taken from McWhae et al. (1958) and Belford (1958)).

Age	Formation	Depth R.T. (in feet)	Height relative to sea level (in feet)	Thickness (in feet)
Cretaceous	Korojon Calcarenite	5	+ 243	110+
	Toolonga Calcilutite	115	+ 133	149
	Gearle Siltstone (Upper)	264	- 16	106
	Gearle Siltstone (Lower)	370 app.	- 122	660
	Windalia Radiolarite	1030 app.	- 782	255
	Muderong Shale	1285	- 1037	224
	Birdrong Formation	1509	- 1261	61
Jurassic	?	1570	- 1322	10
Permian	Byro Group	1580	- 1332	490+
	T.D.	2070	- 1822	

Cretaceous

Korojon Calcarenite (Campanian to lower Maestrichtian) (5 feet - 115 feet). The outcropping formation consists of fine-grained cream to yellow and yellow-brown clayey calcarenite, with some glauconite, and is generally rich in Inoceramus fragments and foraminifera. The base of the formation is placed where yellow calcilutite with Inoceramus gives way quite sharply to green calcilutite without Inoceramus. A sharp electric log break at 115 feet corresponds to the distinctive lithological break noted in the samples.

The Korojon Calcarenite is widely distributed both in outcrop and in the subsurface in the north-western portion of the Carnarvon Basin. The age of the formation has been determined on previous samples from outcrop and bores as upper Campanian to Maestrichtian (Belford, 1958). The age is accepted here since the lithological correlation is undoubted.

Toolonga Calcilutite (Santonian to Campanian) (115 feet - 264 feet). This formation consists of green to bluish-green very clayey calcilutite with dark green lenticles, grading to marlstone; it also contains lenses and stringers of pyrite or marcasite. The calcilog shows a range from about 50% to 75% calcite, with the percentage dropping off rather unevenly downwards. Scattered foraminifera and belemnite fragments occur throughout the formation. The boundaries of the formation are well marked on both lithological and electric log characteristics, and the latter reflect strongly the gradual increase in clay content within the unit itself.

The Toolonga Calcilutite is widely distributed over the western portion of the Carnarvon Basin from the Murchison River to Cape Range, and east to Yanrey No. 1 and BMR 5. As noted above, the formation was not mapped in surface exposures in the Giralia Anticline, probably owing to paucity of exposures, although it may have been included in the Korojon Calcarenite or, more probably, in the Gearle Siltstone.

The age of the formation has been determined from previous bores and from outcrops near the mouth of the Murchison River. The accepted dating (Belford, 1958) is Santonian to lower Campanian.

Gearle Siltstone (Albian to Turonian) (264 feet - 1030 feet approx.). This formation consists of two rather distinct rock-types and can be subdivided into upper and lower members. The upper member consists of a dark grey to light grey slightly silty calcareous claystone, with abundant aggregates of pyrite. Foraminifera were commonly present.

Samples from the vicinity of the change to the lower unit were not later available to the authors; Willmott (1959) notes however that on ditch samples the claystone gives way to the underlying bentonitic shale at about 365 feet. The electric log shows no marked change at this point.

The upper unit is similar to the unit identified in the Rough Range wells, since it consists of a non-bentonitic dark claystone; it is not as calcareous in this well as it is in Rough Range wells. This upper unit has been identified in the Rough Range wells, Yanrey No. 1, Warroora No. 1, and BMR 5. It does not occur in the Cape Range wells and has not been identified in wells south of Carnarvon.

The lower division of the Gearle Siltstone occurs between about 365 feet and 1030 feet. The rock is a rather fissile dark grey to black bentonitic claystone with glauconitic beds and lenses, in part grading into a very fine silty claystone. Samples show the characteristic finely mottled appearance of a bentonitic shale; the proportion of bentonite ranges from 5% to 15%. Sporadic sideritic beds (generally 5%-10% siderite, but in parts much richer) are present in this unit; they are well marked by sharp peaks of resistivity and slow drilling rates in hard rock. The strongest beds are at 723 feet, 983 feet, and 986 feet. Core 10 contains one of the sideritic beds (Dallwitz, Appendix B), which is cut by a vein of calcite. (The formation contains foraminifera throughout.)

The lower boundary is placed rather arbitrarily at about 1030 feet on a fairly prominent bed on the gamma ray log. A lithologic change to medium grey rather calcareous claystone occurs near this point.

The Gearle Siltstone occurs below the surface over the western part of the Carnarvon Basin from Peron Peninsula to near Onslow, and its age is accepted as Albian to Turonian.

Windalia Radiolarite (Aptian to lower Albian) (approx. 1030 feet - approx 1285 feet). This formation consists of medium grey, slightly calcareous, pyritic, slightly micaceous claystone, rather fissile in parts; with minor medium grey glauconitic silty claystone grading to siltstone. Beds of siderite are present at 1080 feet, 1151 feet, and 1170 feet. The upper part of the formation contains abundant foraminifera and scattered large pelecypods. In part the shale is permeable. Its age is accepted as Aptian to lower Albian.

The lithological change to Windalia Radiolarite was not obvious on the dry specimens; but it was apparently quite obvious on the fresh wet samples at the well-site, the nature of the change being quite distinctive in bores throughout this region.

Muderong Shale (Aptian) (1285 feet - 1509 feet). This formation begins with a thick bed of green to green-grey and grey, very fine-grained to fine-grained, very glauconitic, very poorly sorted, silty and clayey sandstone, containing some pyrite and mica. The unit passes down into dark green and grey-green glauconitic, slightly micaceous siltstone with some pyrite and scattered very fine grains of quartz. A feature of the formation is the abundance of glauconite. There is a thin (1-foot) transition zone into the underlying Birdrong Formation.

The unit is well shown on all logs, with a higher natural radioactivity than the Gearle Siltstone, and a rise in S.P. and resistivity. No shale is present here, but the high glauconite content leaves little doubt of its equivalence with Muderong Shale.

The age of the formation is accepted as Aptian on previously recorded palaeontological data.

Birdrong Formation (Neocomian to Aptian) (1509 feet - 1570 feet). This formation consists of greenish-grey medium-grained, very friable glauconitic sandstone, with sub-rounded to rounded grains. It is poorly sorted with abundant finely divided mica in a silty matrix. The age of the formation appears to be Neocomian to Aptian.

No signs of hydrocarbons were observed. The reversed S.P. curve suggests fairly fresh water saturation.

Jurrassic

Upper Jurassic (1570 feet - 1580 feet). Upper Jurassic spores were found in in Core 16 (1574 feet - 1580 feet). The core consists of light grey, permeable, micaceous, fine siltstone, with abundant black vitreous specks. Interlaminated with this siltstone is fine-grained and very fine-grained, poorly sorted, kaolinitic, white sandstone passing into kaolinitic coarse siltstone.

Interpretation of the electric logs and gamma-ray log restricts the Jurassic lithology to a 10-foot bed. The underlying beds are the sub-greywacke, sandstone, and siltstone of the Permian Byro Group. A prominent feature of the gamma ray log is the very high radioactive count of this bed, which is considerably higher than that recorded in any other shale or siltstone in the well. Such a concentration of radioactivity often indicates a fossil soil horizon.

The laminae and lenses of sandstone and siltstone in the core are lithologically identical with similar lenses in the underlying Permian rocks. The siltstone is also similar, apart from its light coloration and permeability. Thus, on lithological grounds this Jurassic lithology could be interpreted as the weathered surface of the underlying rocks.

The Jurassic sequence can be interpreted in two ways:

(a) a very thin Jurassic sequence was deposited, and with possible losses due to post-Jurassic, pre-Birdrong erosion, only a very thin veneer has been left at the location;

(b) the thin section containing a Jurassic spore assemblage represents a fossil residual soil horizon. In this case there was probably no Jurassic deposition. Under wet conditions an abundant vegetation could have been supported in Jurassic times and the resulting spores washed into the immediately underlying weathered rocks. Balme (Appendix C) states that the Jurassic microflora is not diverse, which would be expected of a flora growing in situ. The variation in electric log character could be caused by weathering of the old Permian surface.

Nevertheless no open joints or fractures are apparent which could have permitted spores to enter, and although Willmott (1959, p. 7) initially preferred the second alternative, the first interpretation is still possible.

Permian

Byro Group (upper Artinskian) (1580 feet - 2070 feet). The group begins with very fine and fine-grained light grey micaceous sub-greywacke with laminae of dark grey siltstone and white fine-grained, rather feldspathic sandstone with some carbonaceous beds. The bedding in many places throughout the section shows marked slumping and cross-bedding. Almost imperceptibly, this rock passes into dark grey, very micaceous siltstone with laminae of white, fine-grained, calcareous sandstone and coarse siltstone; and then to dark grey sandy siltstone with laminae of feldspathic fine-grained sandstone and calcareous sandstone. The rocks become more fissile downwards, and within the lowest 100 feet consist of dark grey shale with minor laminae of white calcareous sandstone and siltstone, and black micaceous siltstone.

A slight increase in the carbonate content is shown by the Calcilog for this unit as a whole, but it never exceeds 10%. Reactions in the Calcimeter continued for longer than in higher units, and probably are caused by reactions upon siderite, which appears in nodules and as cement. Cores 20, 21, and 22 show rapid and sharp changes of types of sediment, and carry evidence of strong disturbance, such as sand lenses broken and rolled out into balls by strong agitation, and twisted cross-bedding. Numbers of vertical burrows are also present, and, with the evidence above, suggest a shallow-water environment.

The unit can be correlated readily with the Byro Group on lithology and age-dating from fossils. However, what part of the Byro Group is represented is not clear, as no distinctive changes of lithology can be recognized.

Balme determined the age of the unit as Artinskian, probably upper Artinskian. This dating is accepted.

Foraminifera were observed by Crespin (Appendix E). Spores, pollen grains, and microplankton were found by Balme (Appendix C), and Evans (Appendix D) notes the presence of rare microplanktonic hystrichospheres in Cores 18 to 22.

Structure

BMR 5 Giralia was located on the northern plunge of the surface axis of the Giralia Anticline. Dips throughout the Cretaceous were flat, and dips throughout the Permian averaged 4^{o}. The evidence gained from this bore does not change the structural interpretation of the Giralia Anticline, namely that the surface anticline overlies a post-Permian, pre-Cretaceous fault-controlled syncline.

Hydrocarbon Shows

No hydrocarbon was noted throughout the drilling of the bore.

CONTRIBUTIONS TO GEOLOGICAL KNOWLEDGE

The contributions t geological knowledge made by this bore may be summarized as follows:

(a) The seismic unconformity indicated at about 2700 feet is not the Permian-Mesozoic unconformity, since this was encountered at 1570 feet in a zone without seismic reflections.

(b) Probably little or no sedimentation took place in this area during Jurassic times. The thick Jurassic sedimentation of Cape Range (12,000 feet) and the paralic sedimentation of Rough Range (2500 feet) therefore probably did not extend as far east as the Giralia Anticline.

(c) The Gearle Siltstone (766 feet approx.) is thicker than in other parts of the Giralia Anticline, where it varies between 450 feet and 535 feet (McWhae et al., 1958).

(d) Muderong Shale was defined (Condon, 1954) as 'the formation of bentonitic shale, claystone and siltstone conformable between the Birdrong Formation below and the Windalia Radiolarite above'. In McWhae et al. (1958) it is described as containing greensand as well. The formation here is mainly sandy siltstone, although the high glauconitic content leaves little doubt of its litholigical continuity with the formation elsewhere.

(e) Windalia Radiolarite also differs from its defined lithology, and, although lithological continuity with true radiolarite is accepted, the interval is better considered here as a subdivision of the Gearle Siltstone.

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APPENDIX A

List of Cores

Core No.	Type of Corehead	Depth (in feet)	Footage Cored	Recovery (in feet)	Lithology
1	SF	100- 110	10	9	Calcilutite with <u>Inoceramus</u>
2	SF	193- 203	10	71/2	Calcilutite, green
3	SF	295- 305	10	8	Calcareous claystone
4	SF	397- 405	8	4	Silty claystone, rather fissile
5	SF	500- 507	7	6	Silty shale
6	SF	604- 611	7	5	Fine siltstone
7	SF	705- 715	10	51/2	Claystone
8	SF	810- 820	10	1	Claystone
9	SF	892- 902	10	9	Claystone, rather fissile
10	HF	985- 995	10	1	Sideritic claystone with calcite vein
11	SF	1096-1106	10	6	Calcareous claystone
12	SF	1200-1210	10	11/4	Calcareous claystone
13	SF	1302-1312	10	3	Greensand
14	SF	1400-1409	9	1/4	Glauconitic coarse silt-stone
15	SF	1505-1515	10	31/2	Glauconitic siltstone
16	SF	1574-1580	6	41/2	Fissile siltstone and sub-greywacke
17	SF	1608-1618	10	7	Subgreywacke
18	SF	1690-1700	10	10	Siltstone and subgreywacke
19	SF	1794-1802	8	71/2	Siltstone and fine sandstone
20	SF	1896-1906	10	10	Siltstone
21	SF	1999-2009	10	10	Black shale
22	SF	2060-2070	10	7	Black shale

APPENDIX B

Petrology of Samples from Core 10, BMR 5, Giralia

by

W.B. Dallwitz

The first specimen, from the upper part of the core, is a fine-grained, somewhat porous, dark grey rock containing a vein of coarse yellow calcite, which is separated from the dark grey rock by a pale buff vein about 1 mm wide. A vein of the pale buff mineral also traverses the dark grey rock at right angles to its junction with the calcite vein.

The dark grey rock consists almost entirely of rudely spherical masses of buff-coloured siderite (or other iron-bearing carbonate) whose size ranges from 0.04mm to 0.16 mm, the average being about 0.11 mm. Some of these carabonate bodies have a suggestion of a spherulitic or part-spherulitic structure and all show irregular or wavy extinction. Where the spheres are contiguous they tend to be polygonal in outline, but most are separated by thin films or small pockets of brown, almost isotropic material containing minute grains of hydrated iron oxide and scattered flakes of a green, chloritic mineral. The brown material is probably clay, but may possibly be chamosite.

Pyrite occurs as accessory grains throughout the rock, which is probably best described as a clay ironstone.

The vein separating the clay ironstone from the yellow calcite consists of an iron-bearing carbonate which is very much less deeply coloured than that in the spherules. The vein has a pronounced comb structure, and crystals with sharply-pointed terminations project into the calcite.

The second specimen, from the lower part of the core, is a clay ironstone similar to that just described, but is notably more friable and porous. The component 'spherules' are slightly smaller, and their shapes are highly irregular. A few minute grains of quartz are scattered through the slide. The material which is interstitial between the carbonate bodes is generally much lighter than that in the previously described specimen; it appears to be largely chloritic, and may be chamosite.

APPENDIX C

by

B.E. Balme

SAMPLES SUBMITTED BY WEST AUSTRALIAN PETROLEUM PTY LIMITED

Sample A. BMR 5 Giralia, Core 16, 1574 feet - 1580 feet.

Grey siltstone.

Assemblage

Araucariacites australis

Pityosporites spp.

Classopollis torosus

Cyathidites minor

Cicatricosisporites cooksoni

Zonalepollenites dampieri

Z. trilobatus

Osmundacidites comaumensis

Remarks

The microflora is not a diverse one, but is almost certainly of upper Jurassic age.

Sample B. BMR 5 Giralia, Core 18, 1690 feet - 1700 feet.

Black and grey claystone.

Assemblage

Marsupipollenites triradiatus

Granulatisporites trisinus

Lueckisporites limpidus

L. amplus

L. fusus

Cirratriradites spp.

Leiotriletes directus

Acanthotriletes tereteangulatus

Apiculatisporites levis

Florinites eremus

Nuskoisporites spp.

Marsupipollenites scutatus

The microflora also contained a number of undescribed forms as well as fairly plentiful spinose hystrichospherids.

Remarks

Despite the diversity of this assemblage it is not easy to date it precisely. It is undoubtedly post-Sakmarian and from the abundance of the genera Marsupipollenites and Lueckisporites appears to be younger than the Poole Sandstone in the Fitzroy Basin. On the other hand it contains none of the forms that characterize the Liveringa Formation in the Fitzroy Basin or the Upper Permian coals of N.S.W.

An Artinskian, probably upper Artinskian, age is suggested.

Sample C. BMR 5 Giralia, Core 22, 2060 feet - 2070 feet.

Black shale.

Remarks

The assemblage in this sample is basically similar to that in sample B. Differences do exist, but it is not possible to assess their stratigraphical significance, if any, at the present time. Sample C is thought to be Artinskian, also perhaps upper Artinskian.

APPENDIX D

Notes on the Spores and Microplankton of BMR 5 Giralia

by

P.R. Evans

Samples from cores 2 - 22 inclusive of BMR 5 have been processed for spores and microplankton. They have not yet been studied in detail but a preliminary examination has produced the following results:

Core 2	193- 203 feet	Upper Cretaceous (?Turonian-Santonian)
Core 3 to Core 12	295- 305 feet to 1200-1210 feet	Lower-Upper Cretaceous. The boundary between epochs cannot be defined at present. Microplankton are generally abundant, spores are not common.
Core 13 to Core 15	1302-1312 feet to 1505-1515 feet	Lower Cretaceous. Marine. Many spores; contains a microplankton assemblage typical of a lower division of the marine Cretaceous of the Great Artesian Basin, which includes the Roma Formation. This assemblage is so distinct that its zone could and probably will be named after a good marker, *Dingodinium cerviculum*.
Core 16	1574-1580 feet	Mesozoic; Upper Jurassic or Lower Cretaceous. No microplankton observed, spores only.
Core 17 to Core 22	1608-1618 feet to 2060-2070 feet	Permian. Undifferentiated. Rare microplanktonic hystrichospheres in cores 18 to 22 suggested brackish or marine origin.

APPENDIX E

PRELIMINARY NOTE ON THE FORAMINIFERA, CORES NOS. 15 to 22, BMR 5 GIRALIA

by

Irene Crespin

A note attached to Core No. 15 (1505-1515 feet) suggested that the bore may have entered the Permian at that depth. This was not confirmed by microfossil examination. The rock when washed was a dark grey micaceous siltstone with glauconite and contained Lower Cretaceous foraminifera.

The lithology of Core No. 16 at 1574-1584 feet was a grey unfossiliferous fine-grained silty sandstone. This lithology is frequently found at the base of the Mesozoic section.

It is suggested here that the bore penetrated the Permian in Core No. 17 at 1608-1618 feet, when the lithology changed to grey and dark grey, carbonaceous and micaceous sandy siltstone. This lithology persisted down to the last core received, Core No. 22 at 2060-2070 feet. No foraminifera were present in the small amount of rock available for examination from Core 17; it is quite probable that they will be found when further material arrives. Permian foraminifera were present in Cores No. 18, 19, 21, and 22, the last core containing a good assemblage of species. No foraminifera were found in Core No. 20 at 1896-1906 feet.

The following foraminifera were found in these cores:

Core 18 - 1690-1700 feet

Hyperammina sp.

Ammodiscus nitidus Parr

Core 19 - 1794-1802 feet

Rectoglandulina serocoldensis (Crespin)

Frondicularia sp.

Core 21 - 1999-2006 feet

Hyperammina sp.

Core 22 - 2060-2070 feet

Ammodiscus nitidus Parr

Frondicularia woodwardi Howchin

Flectospira prima Crespin & Belford

Giraliarella angulata Crespin

Glomospirella nyei Crespin

Hemigordius harltoni Cushman & Waters

Hyperammina callytharraensis Crespin

Hyperammina fusta Crespin

Hyperammina cf. elegantissima Plummer

Nodosaria raggatti Crespin

Nodosaria conico-densestriata Paalzow

Pelosina ampulla Crespin

Psammosphaera pusilla Parr

Reophax emaciatus Plummer

Spiroplectammina carnarvonensis Crespin

Thuramminoides sphaeroidalis Plummer

Trochammina subobtusa Parr

The assemblage in Core 22, with the calcareous imperforate forms Flectospira prima and Hemigordius harltoni, and the calcareous forms Nodosaria raggatti, N. conico-densestriata, and Frondicularia woodwardi, was found between the depths of 420 feet and 660 feet, the top horizon of Permian foraminifera in Giralia No. 1 Bore, 25 miles to the south. Flectospira prima was described from the depth of 560-570 feet in that bore and Hemigordius harltoni was recorded at 620-630 feet. Spiroplectammina carnarvonensis was described from 420-440 feet. The assemblage is regarded as the equivalent to that of the basal part of the Byro Group.

F. prima, H. harltoni, and N. raggatti are also characteristic of the Noonkanbah Formation of the Canning (and Fitzroy) Basin. So far indications are that they are restricted to beds younger than the Callytharra Formation.

Permian foraminifera were first recognised in the Giralia No. 1 Bore in Core 11 at 380-390 feet.

B.M.R. 5 GIRALIA

PLATE. I

COMPOSITE LOG

STATE: WESTERN AUSTRALIA BASIN: CARNAVON LOCALITY: GIRALIA

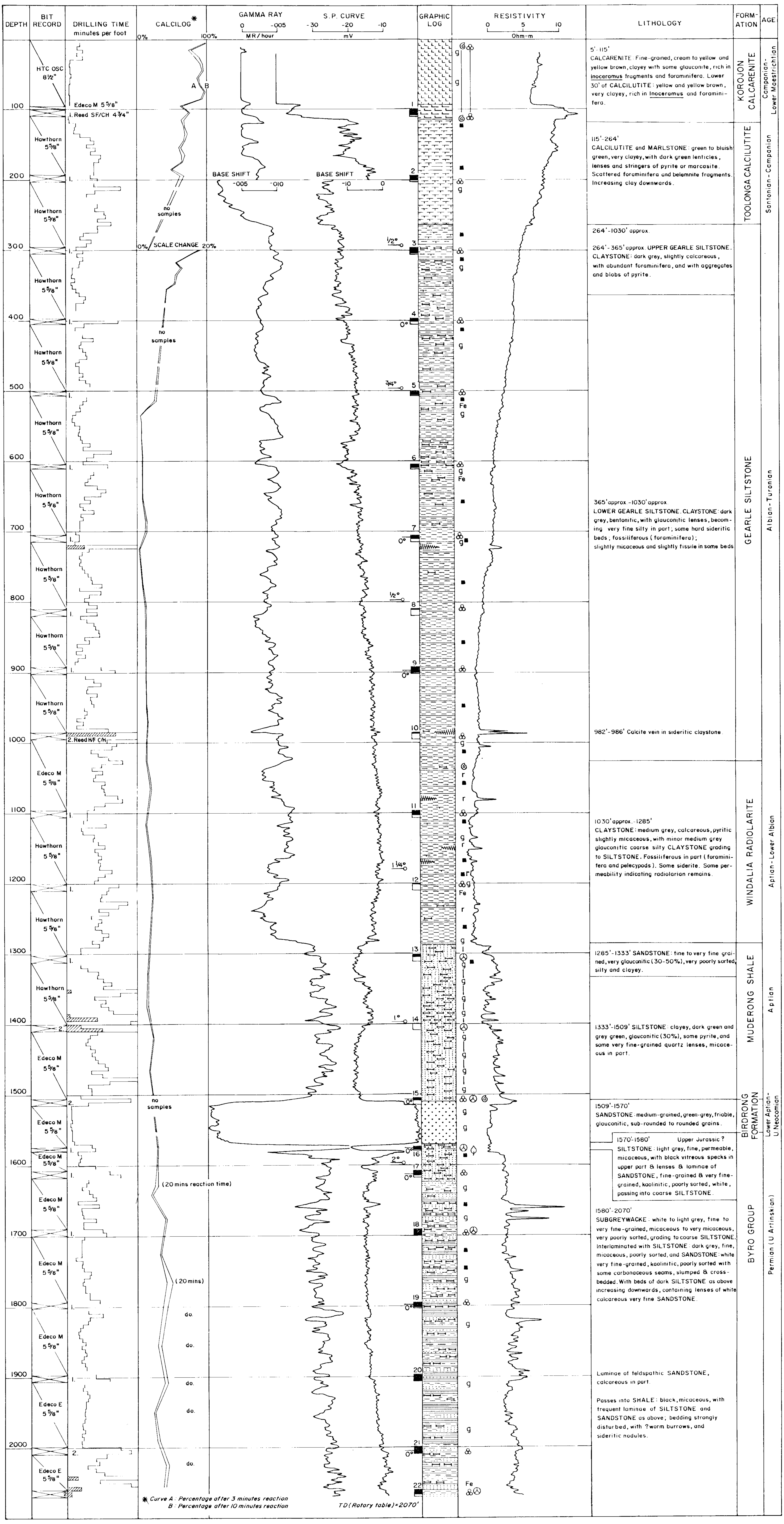
LOCATION: Latitude: 22°39'25.5"S
Longitude: 114°14'45"E
ELEVATION: Surface: 243' approx.
Rotary Table: 248' approx.
DATE SPUDDED: 26/6/58
DATE COMPLETED: 31/7/58
TOTAL DEPTH (from R.T.): 2070'
STATUS: Abandoned
HOLE PROFILE: 8½" 0-96'
5⅝" 96'-T.D.
CASING PROFILE: 7" to 93'
PLUG DEPTHS: 1397' and 110'

ELECTRIC LOG DATA:
INSTRUMENT: Electrical log 4000' Widco
Radioactive log 2000' Widco
DATE: 30th. July 1958
INTERVAL: 93'-2070'
MUD NATURE: Lime base
DENSITY: 77 lbs/cu.ft.
VISCOSITY: 55 S
RESISTIVITY: 0.9 ohm-m. at 72°F
pH: 8.2
WATER LOSS: 3 c.c per 30 mins.

Drilling Contractor: Oil Drilling and Exploration Ltd.
Lithology by: S.P. Willmott and L.V. Bastian

LITHOLOGY
- Medium-coarse sandstone
- Fine sandstone
- Siltstone
- Claystone / shale
- Calcarenite
- Calcilutite
- Marl
- Siderite rock

SYMBOLS
- Pyrite
- g Glauconite
- r Radiolarian remains
- Macrofossils
- Plant fossils
- Microfossils
- Spores
- Casing shoe
- 5° Cored interval, showing recovery and dip
- ½° Deviation



Bureau of Mineral Resources, Geology and Geophysics. September 1963.

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