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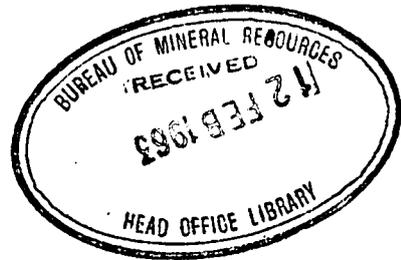
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THE STRATIGRAPHY OF MAGELLAN CORFIELD No.1 BORE,
THE GREAT ARTESIAN BASIN, QUEENSLAND.

by

P.R. Evans

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SUMMARY

Available lithological, electric log and palaeontological observations on Magellan Corfield No.1 Bore, Eromanga Sub-basin, Queensland, are used to interpret the bore-hole section as a sequence of Cretaceous, Upper Jurassic or Cretaceous, Lower - (?) Middle Jurassic, (?) Triassic, Permian and Pre-Permian (granite) units. Disconformities seem to occur above and below the Lower - (?) Middle Jurassic. Marine influences are evident in Jurassic times. Only the Cretaceous section is allocated to known lithological units - the Wilgunya and Winton Formations. The Toolebuc Member of the Wilgunya Formation probably exists at Corfield. The Lower - (?) Middle Jurassic beds are time equivalents of the Bundamba Group and (?) Hutton Sandstone of the Roma area. The Permian coal measures are correlates of the top of the Bandanna Formation of the Springsure area.

INTRODUCTION

During the period May-June, 1960, the new water bore (Lat. $21^{\circ}42'46''S$; Long. $143^{\circ}22'30''E$) at Corfield, a small town on the railway between Winton and Hughenden, northern Queensland, was deepened by Magellan Petroleum Corporation to obtain additional information about the stratigraphical section of that part of the Eromanga Sub-basin. The bore was extended from the existing depth of 2630 feet to a total depth of 4507 feet by the company in an operation that was subsidized by the Commonwealth Government. It entered granite at 4488 feet.

A composite log of the bore, including electric logs from 2726 feet to total depth, was compiled by Harris (1960). The driller's reports of the bore section were compiled by Mr. J. Mulholland, consulting engineer to the Corfield Shire Council, into a graphic log that has been made available to the Bureau of Mineral Resources by the Queensland State Mining Engineer. Electric, gamma-ray, temperature and caliper logs were run to a depth of 2450 feet by the Bureau of Mineral Resources (Jewell, 1960). Preliminary palaeontological investigations of cores from the bore were carried out by Evans (1961).

The object of the present report is to summarize stratigraphical information that may be derived from those sources and from additional palynological (Appendix I) and petrographical data (Appendix II) that are now available.

STRATIGRAPHY

A diagrammatic log of Corfield No.1 Bore, based on the listed sources of information, is presented in figure 1. It is not intended to be a detailed representation of the bore section; it has been constructed to illustrate the nature of the main units that are outlined below.

Cretaceous:

0-540 feet. Winton Formation. Grey mudstones with intercalating sandstone bands, 6 inches to 2 feet thick. Jewell (1960,p.3) chose the electric log characteristic at 540 feet as a possible base to the Winton Formation.

540-?2375 feet. Wilgunya Formation. Dominantly grey mudstone with some hard bands of sandstone. Jewell (1960,p.4) remarked that the "shaly sandstone" beds between 1680 and 1717 feet are more radioactive than the "shale". This interval is probably a correlate of the Toolebuc Member, although there is no indication whether or not the interval is calcareous.

The base of the Wilgunya Formation cannot be determined with certainty. Jewell (1960,p.4) thought that, from electric logs, the sandstone between 2375 and 2415 feet could be placed in the Blythesdale Group, although "mainly shale or mudstone with bands of sandstone" occurred between 2415 and 2450 feet.

Cuttings at 2630-40 feet yielded marine Cretaceous fossils of the "Dingodinium cerviculum Zone", but, if the section to that depth is included in the Wilgunya Formation, existence of an abnormally thick development of that formation below the Toolebuc Member is implied. For the present, it seems better to consider the base of the Wilgunya Formation at about 2375 feet.

Upper Jurassic or Cretaceous

2375-2885 feet. White sandstone, very fine grained, friable, quartzose, with intercalations of siltstone. Cuttings 2630-40 feet yielded marine Cretaceous microfossils, but it is possible they were derived from cavings (see above).

This unit could be part of the Blythesdale Group (or Longsight Sandstone as it is known in the western part of the Artesian Basin) that generally underlies with conformity the marine Cretaceous of the Great Artesian Basin. It probably lies with disconformity on the underlying Lower -(?) Middle Jurassic beds.

Lower - (?) Middle Jurassic

2885-3560 feet*. Sandstone, very fine grained to medium grained quartzose, tuffaceous, friable. Carbonaceous shale and coaly intercalations are prominent below 3300 feet.

*Depths from this point refer to driller's depths. Significant differences occur between driller's figures and those of the electric logs.

The microfloras of cores 1 (2892-2902 feet) and 2 (3389-3399 feet) in this unit suggest it is Lower- (?) Middle Jurassic in age, a correlate of the Bundamba Group, and perhaps the Hutton Sandstone, of the Roma area.

Hystriospheres in core 1 suggest that brackish or marine conditions of deposition existed at the top of the unit at least.

(?) Triassic

3560-4100 feet. Sandstone, angular, fine to coarse, quartzose, with intercalations of dark red, soft shale, and green siltstones. Micaceous below about 3900 feet.

No microfossils were found in this unit which characteristically is devoid of organic matter. It is considered to be Triassic in age for reasons given in Appendix I.

Permian

4100-4488 feet. Sandstone, coarse, angular, friable with interbeds of coal and minor amounts of grey shale. The thicker coals occurred at 4100-4115 feet, 4210-4235 feet and 4440-4480 feet.

Microspores in the coals indicate the unit is of late Permian age.

Pre-Permian

4488-4507 feet. Coarse crystalline granite.

No detailed petrological description of the granite has been made. Available samples of the granite are not suitable for determination of its radiometric age.

APPENDIX I : PALYNOLOGICAL OBSERVATIONS

Introduction:

Provisional palynological examination of the subsidized part of the Corfield No.1 Bore suggested that Lower - (?) Middle Jurassic and (?) Lower Triassic sediments occupied most of this section (Evans, 1961). Modifications to that interpretation result from examination of additional bore material and from the correlative data now available from the Surat Sub-basin.

Observations and Comments:

The following observations include both previously obtained and new data.

Cretaceous

Cuttings 2630-2640 feet

Cyathidites minor
Sphagnumsporites australiensis
Microreticulatisporites telatus
Neoraistrickia truncatus
Baculatisporites comaumensis
Pilosporites notensis
Ischyosporites punctatus
Lycopodiumsporites austroclavatidites
Polypodiaceasporites sp. nov.
Microcachryidites antarcticus
Dingodinium cerviculum
Hystriosphera furcata
Micrhystridium sp.1
Micrhystridium spp.

The assemblage is of Lower Cretaceous aspect and the presence of Dingodinium cerviculum and Micrhystridium sp.1 indicate the existence at Corfield of the basal marine zone identified at Coronoo (Evans, 1962a) and Julia Creek (Evans, 1962b). The position of this zone at Corfield cannot be determined as nothing from higher in the well was available for examination, and as these cuttings may include cavings from the uncased hole below 300 feet. The zone should occur below the interval 1680 - 1717 feet, which probably represents the Toolebuc Member of the Wilgunya Formation.

Jurassic

Core 1, 2892-2902 feet

Leiotriletes directus
Cyathidites minor
Sphagnumsporites sp.

Baculatisporites comaumensis
Lycopodiumsporites spp. nov.
"Annulispora" sp.
Cingulati sp. nov.
Klausipollenites spp.
Inaperturopollenites turbatus
Laricoidites cf. reidi
Callialasporites dampieri
Classopollis torosus
Micrhystridium spp.
Veryhachium sp.

This assemblage seems to be considerably older than the cuttings at 2630-40 feet. The presence of Lycopodiumsporites spp. nov., Cingulati sp. nov., "Annulispora" sp. associated with fairly common I. turbatus, L. cf. reidi, C. dampieri suggest it is Jurassic in age, probably equivalent in time to the Hutton Sandstone or the Walloon Coal Measures to the north of Roma. Rare microplankton indicate possible marine or brackish water conditions of deposition.

Core 2, 3389-3399 feet

Leiotriletes directus
Lycopodiumsporites cf. rosewoodensis
Lycopodiumsporites spp. nov.
"Annulispora" sp.
Klausipollenites sp.
Alisporites sp.
Classopollis torosus (approx. 50% of the total specimen abundance).

So great an abundance of C. torosus is known only in the Precipice Sandstone and basal Evergreen Shale to the north of Roma. This fact, the associated species, and the apparent absence of forms such as Callialasporites indicate that core 2 is a correlate of a part of the Lower Jurassic Precipice Sandstone.

The spores from cores 1 and 2 thus suggest that time equivalents of most of the Bundamba Group that outcrops to the north of Roma are present at Corfield, and that equivalents of the Blythesdale Group and perhaps most of the Walloon Coal Measures are thin or not developed. The hystriospheres in core 1 are consistent with similar occurrences in the Bundamba Group of the Surat Basin (Evans, 1962c).

Permian - (?) Triassic
Cuttings, 3580-3585 feet

Barren.

Core 3, 3930-3940 feet

Barren. Repeated attempts to extract microfossils from this core have failed. Its general organic content is negligible.

Cuttings, 4095-4100 feet

Barren.

Cuttings, 4100-4105 feet (coal)

Apiculati sp. (fairly common)

Striatiti spp. (common).

Core, 4,4262-4276 feet (coal)

Laevigatosporites vulgaris

Acanthotriletes spp. incl. A. tereteangulatus

Alisporites ovatus

Klausipollenites sp.

Striatiti spp. (very common) incl. Lunatisporites
amplus, L. limpidus

Circulisporites cf. parvus

Marsupipollenites triradiatus striatus

Evans (1961) concluded that core 4 was possibly of Lower Triassic age. However, the better spore yield from reprocessed material indicates that the core is of very young Permian age. The association of L. vulgaris and very common Striatiti is an unusual one apparently confined to the highest coals of the Upper Bowen beds of the Surat and southern Bowen Basins: for example, the highest coals in the Bandanna Formation of Reid's Dome, A.A.O.No.7 (Arcadia) and Cabawin No.1.

Although not as varied as that in core 4, the assemblage from cuttings, 4100-4105 feet, is considered on the same premisses to be of Permian age.

The section between 4100 and 3399 feet is, therefore, of Permian, Triassic or Jurassic age: much of it could belong to the Triassic, probably Lower Triassic. A change from coal measures to sandy beds with red or green-grey shales and with a very low organic content is a widespread feature of the Bowen and Surat Basins (Bandanna Formation - Rewan Formation; Latemore Formation - Pickanjinie Formation). Palynologically it compares directly with the change from the Upper Coal Measures to the Narrabeen Group of the Sydney Basin where it is defined as the Permian - Triassic boundary. A similar change occurs at Corfield at 4100 feet; the apparently barren strata above that level and below the carbonaceous beds containing core 2 may, therefore, be of Lower Triassic age. However, the portion of S.P.L.No.1 (Birkhead) Well (280 miles S.E. of Corfield), the spores from which show that it is of Middle or Upper Triassic age (Evans, 1962d), also contains red elements (Grissett, 1957) so that it is not possible to decide which part of the Triassic System is represented in this northern part of the Eromanga Basin.

APPENDIX II

PETROGRAPHIC DESCRIPTION OF CORES

by

A. Fehr*

Core 1: (2892 - 2902 feet)

Foot 1:(+) Sandstone, very fine, tuffaceous

Macro: Light grey, fine coal debris along sub-parallel streaks. Fine vein filled with pyrite.

Micro: Well sorted, diam. 0.1mm; 20% angular quartz and 60% (-80%) tuffaceous grains with indefinite boundaries altering into interwoven clay, kaolinite. Tuff grains are sometimes slightly darker in transmitted light, but not easily discernible from clay matrix. Small amount of subparallel, dirty biotite, some muscovite. Accessories glauconite and coal debris.

Foot 3: Specimen 2B as foot 1.

Specimen 2A: Sandstone, fine, tuffaceous.

Macro: Medium grey with slightly darker "fluidal" beds of very fine, soft material. Fine white grains disseminated, coal debris.

Micro: Rather well sorted, diam. 0.15 mm.; 30-40% angular (-subang) quartz, less than 5% fresh plagioclase and 40-50% glassy to clayey subrounded fragments, occ. of greenish colour. Accessories: Biotite, garnet and coal debris. The beds of fine material consist of almost isotropic clay (glass?) enclosing subrounded quartz with thin aureoles, diam. very small to 0.2 mm. unsorted. Dark brown lamellae probably organic material.

Core 2:(3389-3399 feet)

Foot 2: Shale, carbonaceous.

Macro: Black grey, with few lighter grains.

Micro: Undulous dark brown lignite encloses angular mostly elongated quartz, diam. 0.1-0.4 mm. Very fine quartz, diam. less than 0.02 mm., disseminated throughout. Accessory muscovite.

* Institut. Français. du Pétrole.

+ The exact depths from which the available samples were taken are unknown. The terms used are the ones marked on the sample bags.

Core 3:(3930-3940 feet)

- Foot 1: Specimen 5A: Sandstone, medium, argillaceous.
- Macro: Light green grey, white spots of diam. 1 mm.
- Micro: Sorting moderate, 60% subangular quartz, diam. 0.3 with variations to 0.1-0.4 mm; occ. slightly undulous; 5-10% microcline. Matrix interwoven sericite and finest quartz, spots of pure kaolinite.
- Foot 1: Specimen 5B: Siltstone, argillaceous (sandy).
- Macro: Light green grey, uniform, few white circular patches;
- Micro: Mixture of fine quartz and sub-parallel sericite. White spots are dirty recrystallized quartz. Sporadical sub-angular quartz, less microcline.
- Foot 2: Specimen 1A: Siltstone as above, but with some olive-green biotite, pyrite agglomerates, clay pebbles.
- Foot 2: Specimen 1B: Sandstone, very fine, argillaceous.
- Macro: Light green grey, slightly bedded by subparallel, abundant mica.
- Micro: Sorting rather good, diam. 0.1 mm; quartz 40-50%, microcline less than 10%; quartz often as angular shards. Beds of undulating olive-green biotite flakes, diam. up to 1 mm. Somewhat less large muscovite cutting off the biotite and of younger origin. Matrix, 50-60% clay (kaolinite, partly deriving from feldspar or less glaws?) fragments. Accessories tourmaline, green mineral.

Core 4:(4262-4276 feet)

- Foot 1: Sandstone fine, argillaceous.
- Macro: Light grey, with medium grey finer lenses. Soft. Muscovite, kaolinitic matrix.
- Micro: Sorting poor, diam. 0.7-0.6 mm. 70% angular (except rounded) quartz, less than 10% microcline; about 10% micro-crystalline chert, dirty brown mica. Matrix clay, partly kaolinite occurring as large flakes, sericite. Accessory blue tourmaline.

Foot 2: Shale, carbonaceous

Macro: Dark grey, silty.

Micro: 10-20% angular quartz, diam. 0.04 mm.
disseminated in abundant brown
macerated organic material.

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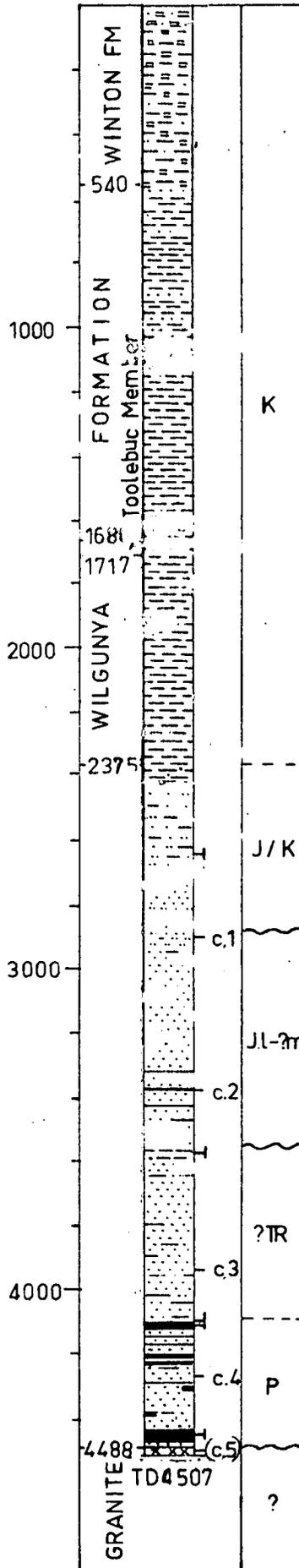
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FIGURE 1

GRAPHIC LOG
of
MAGELLAN CORFIELD NO.1 BORE



Ht RT 847
Ht GL 842

REFERENCE

-  Mudstone
-  Shale
-  Siltstone
-  Sandstone
-  Coal
-  Granite

c Core } Palyno-
H Cuttings } logical
Samples

Scale 1:6000

To Accompany Record
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