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Record 1971/120

SHALLOW STRATIGRAPHIC DRILLING WESTERN EROMANGA BASIN AND ALCOOTA SHEET AREA, NORTHERN TERRITORY, 1971

by

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SUMMARY

Four shallow stratigraphic drill holes in the northern part of the Simpson Desert penetrated a thin sedimentary succession on the western margin of the Eromanga Basin. The units encountered were the equivalent of the upper part of the Longsight Sandstone, the Wallumbilla Formation, and Cainozoic sediments. BMR Alcoota No. 3 penetrated Cainozoic sediments. All holes bottomed in Precambrian basement.

BMR Hay River Nos 2 and 4 intersected aquifers and Nos 2, 3, and 4 intersected thin lignite seams.

INTRODUCTION

Shallow stratigraphic drilling was carried out on the Hay River 1:250,000 Sheet between May and August 1971 to reveal the subsurface Cainozoic and Eromanga Basin stratigraphy and to determine the nature of the Precambrian basement.

Palynological investigations of cores by D. Burger will be reported separately.

Naming of holes is serial by 1:250,000 Sheet areas. BMR Hay River No. 2 refers to the second hole drilled by the Bureau of Mineral Resources on the Hay River 1:250,000 Sheet area. The subsurface geology of the holes is described in the order drilled, and the position of each hole is shown in Figure 1.

The cuttings were logged at the drill sites with the aid of a X20 binocular microscope. Dilute sulphuric acid was used to detect the presence of carbonate.

BMR Hay River No. 2 was the only hole to be wireline logged, but, owing to technical difficulties with the logger, the logs are unreliable.

BMR HAY RIVER NO. 1 (Fig. 2)

Position: HAY RIVER Grid Reference 513101, 8.1 km south-southeast of Mount Winnecke on left bank of Hay River. Elevation 213.36 m.

Objectives: (a) to determine the subsurface stratigraphy.

(b) to determine the depth to, and nature of, basement.

(c) to take cores of any rocks considered suitable for palynological study.

Drilling: The hole was drilled with air down to the water table at 25.9 m, and thereafter with mud. It was plugged and abandoned.

Results: The results are shown diagrammatically in Fig. 2.

BMR HAY RIVER NO. 2 (Fig. 3)

Position: HAY RIVER Grid Reference 531060, 1.9 km south of the 595 foot spot height on the left bank of the Hay River. Elevation 179.83 m.

Objectives: As for BMR Hay River No. 1.

Drilling: A 3.05 m length of surface casing was inserted to a depth of 2.9 m to protect the top of the hole from caving. The hole was drilled with air down to 56.4 m, but kept collapsing owing to an inflow of groundwater. To overcome this problem, the hole was reamed and 42.67 m of 12.7 cm casing was inserted. Unfortunately, because of further caving, the casing could not be lowered down to the depth of the reamed interval, leaving an uncased portion at the base. Cementing in this lower portion failed to stop the inflow of water and subsequent collapse caused abandonment of the hole. A second hole was drilled adjacent to the first site; it was drilled with mud as soon as the water table was encountered and was eventually completed in basement at 196.3 m. Again, 3.05 m of surface casing was inserted to protect the top of the hole from caving.

Results: The results are tabulated in Fig. 3. Three aquifers were intersected in calcareous rocks between 21.3 m and 42.7 m. The total quantity was not determined, but 18 400 litres per hour would be an approximate estimate. The water was not analysed, but it tasted very fresh and was used by the drilling team for drinking and domestic purposes.

Two thin bands of lignite were intersected between 105.2 m and 111.0 m.

BMR HAY RIVER NO. 3 (Fig. 4)

Position: HAY RIVER Grid Reference 459087 adjacent to the eastern channel of the Plenty River and 0.365 km northwest of No. 7 bore, on Atula station. Elevation 253.6 m.

Objectives: As for BMR Hay River No. 1.

Drilling: The hole was drilled with air down to 6.4 m and with mud thereafter. 7.92 m of casing was inserted to a depth of 7.62 m to protect the top of the hole. On completion the casing was successfully recovered and the hole was plugged with cement and abandoned.

Results: The results are tabulated in Fig. 4. Quartzose sandstone and minor mudstone, thought to be equivalents of the Longsight Sandstone, were intersected between 140.8 m and basement. This unit also contains very thin lignite seams in the interval between 143.26 m and 176.78 m.

BMR HAY RIVER NO. 4 (Fig. 5)

Position: HAY RIVER Grid Reference 481028 and 0.9 km south of No. 6 bore on Atula station and adjacent to a channel of the Plenty River. Elevation 192.94 m.

Objectives: As for BMR Hay River No. 1.

Drilling: The hole was drilled with mud from the surface down to total depth. 23.16 m of casing was cemented from the surface to 22.86 m to preserve the top of the hole, which was sited on loose sand. The hole was capped with a steel plate and abandoned.

Results: The results are tabulated in Fig. 5. Groundwater supplies of unknown quantity were intersected within the equivalent of the Longsight Sandstone. The water rose to within 6.09 m of the surface. Two thin seams of lignite were intersected between 189.0 and 192.02 m.

BMR ALCOOTA NO. 3 (Fig. 6)

Position: ALCOOTA Grid Reference 285137, 5.6 km northeast of the Harts Range Police Station and 0.9 km along the track from the new Beef Road to Spinifex Bore on Mt Riddock station. Elevation 548 m.

Objectives: As for BMR Hay River No. 1.

Drilling: The hole was drilled with air down to 25 m, where circulation was lost in porous and permeable sediments. Thereafter, mud was used. The hole was plugged with wood and abandoned.

Results: The results are tabulated in Fig. 6. No argillaceous beds suitable for palynological work were encountered, and therefore none of the sediments were cored.

Groundwater of unknown quantity and quality was intersected approximately 30 m below the surface.

EVALUATION AND CONCLUSIONS

Outcrops of Cainozoic and Mesozoic sedimentary rocks of the Western Eromanga Basin are sparsely distributed. The nearest exposures to the holes drilled on the Hay River 1:250,000 Sheet occur in the Lake Caroline area and along the lower reaches of the Plenty River. These were previously mapped as 'undifferentiated Cretaceous' by Smith (1963).

The nearest outcrops of named correlatives occur in the Northern Eromanga Basin (Vine & Galloway, 1969), the Central Eromanga Basin (Senior et al., 1968, 1969), and the southern and southwestern Eromanga Basin (Parkin, L.W., ed., 1969). Subdivision of the Rolling Downs Group

(Cretaceous) by Vine et al. (1967) is currently in use and widely recognized in Queensland. Wopfner (1969, p. 141) has correlated this subdivision with the sections of Freytag (1966), Forbes (1966), Ludbrook (1966), and Wopfner et al. (1970) in South Australia and with that of Wells et al. (1964) in the Finke area, Northern Territory.

In the absence of precise palaeontological data, there is no direct evidence for the ages of the Mesozoic and Cainozoic lithological units in the subsurface of the Hay River Sheet area. Further, formation names could not be assigned solely on the basis of palaeontology because the correlations between Queensland, South Australia, and the Hay River area are too distant for absolute precision. As lithostratigraphic units are laterally persistent in the Great Artesian Basin (Senior, in prep.) formation names have been assigned purely on lithological correlation from descriptions by Casey et al. (1960), Vine et al. (1967), Senior et al. (1969), and Vine & Galloway (1969). It is considered that the correlations with the Queensland sequences are more suitable at present than those of the South Australian part of the Basin listed by Wopfner (1969) because the Hay River area is closer to Queensland, than South Australia.

The basement rocks in BMR Hay River Nos 2, 3, 4 and BMR Alcoota No. 3 belong to the Arunta Complex. Petrographic descriptions from the cores taken are listed in Appendix 1. The basement in BMR Hay River No. 1 is considered to be part of the Proterozoic Grant Bluff Formation, as the cuttings are identical with well sorted, fine-grained, slightly metamorphosed quartzite and siliceous siltstone exposed at Mount Winnecke a few kilometres to the north.

The Longsight Sandstone (Casey et al., 1960) was encountered in BMR Hay River Nos 3 and 4. It consists mainly of well sorted fine to medium-grained quartz sandstone with lesser amounts of clayey sandstone, carbonaceous sandstone with a detrital dark mineral, calcareous sandstone, micaceous quartz sandstone, mudstone and thin lignite seams. It is in places pyritic and ferruginous.

The closest similar surface exposures have been mapped as Permo-Triassic Tarlton Formation (Smith, 1963, p. 11). More recent work carried out between May and September 1971 by A. Mond and the author has shown that the Tarlton Formation is lithologically identical with, though more condensed than, exposures of De Souza Sandstone (Jurassic) and the underlying Crown Point Formation (Permian) on the Finke, Rodinga, and Hale River 1:250,000 Sheet areas of the Northern Territory. However, outcrops of the De Souza Sandstone near Finke do not contain carbonaceous or calcareous units and therefore the rock types encountered during the drilling more closely resemble the description by

Casey et al. (1960) of the Longsight Sandstone in Western Queensland and the Algebuckina Sandstone described (in Parkin, 1969) from South Australia. In view of this, the unit can tentatively be called Longsight Sandstone because of its lithological similarity and its closer proximity to Queensland than to South Australia.

The Longsight Sandstone is a widespread aquifer in the Eromanga Basin and is considered an equivalent of the 'Hooray Sandstone' in Queensland which Wopfner (1969) has correlated with the Cadna-owie and Pelican Well Formations in South Australia. The potentiometric surface of this aquifer system is above the ground surface to the south of BMR Hay River No. 4 and artesian flows are likely.

The Wallumbilla Formation consists essentially of dark grey mudstone. It crops out in the Lake Caroline area and the lower reaches of the Plenty River, where the rocks are weathered, varicoloured by iron-staining, and slightly silicified. From the exposures near Lake Caroline, specimens of the invertebrate burrow Rhizocorallium, an indeterminate pelecypod, and plant stem debris were collected. Veevers (1962) concluded that Rhyocorallium could be tentatively accepted as a Lower Cretaceous index fossil. The Wallumbilla Formation thickens basinwards (Fig. 7) and lenses out on the basin margin. It is equivalent to the Bulldog Shale and part of the Marree Formation in South Australia (Wopfner, 1969). No marine rocks younger than the Wallumbilla Formation occur in the vicinity of the Hay River drill holes.

All younger units are Cainozoic fluvial, valley-fill, or pediment deposits. In Queensland, the marine Toolebuc Limestone, Allaru Mudstone, and Mackunda Formations occur above the Wallumbilla Formation and below the terrestrial Winton Formation. Because these younger marine units are missing in the Hay River area, it is reasonable to assume that the sea regressed in the Hay River area during the Lower Cretaceous. It is also possible that these units could have been eroded, especially as the Hay River area is close to the inferred basin margin. However, a Lower Cretaceous marine regression has been reported in both Queensland and South Australia and it is likely that it occurred in the Hay River area also, and that the marine units younger than Wallumbilla Formation were never deposited in the vicinity of the drill holes on the Hay River Sheet area. In BMR Hay River No. 2, some thin lignite layers were encountered in the Wallumbilla Formation. This indicates some terrestrial sedimentation near the shoreline, with marine sedimentation basinwards.

The overlying terrestrial Cainozoic sediments are distinguished from the Wallumbilla Formation by the occurrence of abundant quartz, and by their white to pale greenish and in places red-brown colours. They can be arbitrarily divided into: basal mainly white to pale green, clayey, quartz sandstone, siltstone, and mudstone, with thin beds of marl and fine-grained limestone; a fluvial facies of poorly sorted coarse channel sands and interbedded calcareous deposits of the Hay and Plenty Rivers; and a thin superficial cover of Quaternary aeolian red quartz sand which interfingers with the upper units of the river channel deposits.

The patchy red coloration, the presence of silicified layers below the water table, and the apparent massive nature of the bedding units are features of the basal Cainozoic sediments. The abundance of massive clayey units suggests that parts could be fossil soils. The interbedded quartz sands in BMR Alcoota No. 3 and BMR Hay River No. 3 are probably fluvial.

The minerals recovered from cuttings in the fluvial sands and granule gravels of the Hay River and Plenty River include garnet, biotite, muscovite, and magnetite, indicating their derivation from Archean metamorphic rocks of the Arunta Complex. Fine-grained limestone and calcareous sandstone occur in these units. In BMR Alcoota No. 3, the limestone and calcareous sandstone are rhythmically interbedded with coarse sand and gravel. Such occurrences suggest evaporite sedimentation in the low energy overbank areas of a meandering river regime. A dry climate is suggested by the lack of organic debris, the absence of dark colours in the sediments, and the occurrence of this type of limestone (following Allen, 1970, p. 143). However, the high-carbonate rocks in BMR Hay River No. 2 are more likely to be lacustrine evaporite deposits because of their much greater thickness in comparison with the interbedded epiclastic sediments, assuming they have formed in a fluvial setting. All other occurrences of carbonate-rich rocks have a sand admixture, and their carbonate could possibly have been deposits. In calcareous rocks with a low quantity sand content, the sand grains may have been blown into sites of carbonate deposition, the resulting rock being a calcareous sandstone with a dispersed framework. These limestones are associated with fluvial deposits; they occur interbedded with poorly sorted fluvial sands and gravels and their outcrops on the Huckitta, Alcoota, Boulia, and Glenormiston 1:250,000 Geological Sheets follow the courses of major drainage channels (Smith, 1964; Warren, in prep.; Casey, 1968; Reynolds, 1965, respectively). The limestones and calcareous sandstones are commonly porous and cavernous and make excellent subartesian freshwater aquifers.

The Quaternary aeolian red well sorted quartz sands are of uniform thickness regionally and their upper surface is parallel to the palaeoslope of the inland drainage basin, at present occupied by the Simpson Desert.

REFERENCES

ALLEN, J.R.L., 1970 - PHYSICAL PROCESSES OF SEDIMENTATION. London, Unwin.

CASEY, J.N., 1968 - Boulia Qld - 1:250,000 Geological Series. Bur. Miner. Resour. Aust. explan. Notes SF/54-9.

CASEY, J.N., REYNOLDS, M.A., DOW, D.B., PRITCHARD, P.W., VINE, R.R., and PATEN, R.J., 1960 - The Geology of the Boulia area, western Queensland. Bur. Miner. Resour. Aust. Rec. 1960/12 (unpubl.).

FORBES, B.G., 1966 - The geology of the Marree 1:250,000 Map area. Geol. Surv. S. Aust. Rep. Invest. 28.

FREYTAG, I.B., 1966 - Proposed rock units for the marine Lower Cretaceous sediments in the Oodnadatta region of the Great Artesian Basin. Quart. geol. Notes, geol. Surv. S. Aust., 18, 3-7.

LUDBROOK, N.H., 1966 - Cretaceous biostratigraphy of the Great Artesian Basin in South Australia. Geol. Surv. S. Aust. Bull. 40.

PARKIN, L.W., ed., 1969 - Handbook of South Australian geology. Geol. Surv. S. Aust.

REYNOLDS, M.A., 1965 - Glenormiston, Qld - 1:250,000 Geological Series. Bur. Miner. Resour. Aust. explan. Notes SF/54-9.

SENIOR, B.R., GALLOWAY, M.C., INGRAM, J.A., and SENIOR, Daniele, 1968 - The geology of the Barrolka, Eromanga, Durham Downs, Thargomindah, Tickalara, and Bulloo 1:250,000 Sheet Areas, Queensland. Bur. Miner. Resour. Aust. Rec. 1968/35 (unpubl.).

SENIOR, B.R., INGRAM, J.A., THOMAS, B.M., and SENIOR, Daniele, 1969 - The geology of the Quilpie, Charleville, Toompine, Wyandra, Eulo, and Cunnamulla 1:250,000 Sheet areas, Queensland. Bur. Miner. Resour. Aust. Rec. 1969/13 (unpubl.).

SENIOR, B.R., (in prep.) - The geology of the Central Eromanga Basin. Bur. Miner. Resour. Aust. Bull.

SMITH, K.G., 1963 - Hay River, N.T. - 1:250,000 Geological Series. Bur. Miner. Resour. Aust. explan. Notes SF/53-16.

SMITH, K.G., 1964 - Huckitta, N.T. - 1:250,000 Geological Series. Bur. Miner. Resour. Aust. explan. Notes SF /53-11.

VEEVERS, J.J., 1962 - Rhizocorallium in the Lower Cretaceous rocks of Australia. Bur. Miner. Resour. Aust. Bull. 62.

VINE, R.R., DAY, R.W., MILLIGAN, E.N., CASEY, D.J., GALLOWAY, M.C., and EXON, N.F., 1967 - Revision of the nomenclature of the Rolling Downs Group in the Eromanga and Surat Basins. Qld Govt Min. J., 68, 144-51.

VINE, R.R., and GALLOWAY, M.C., 1969 - Shallow stratigraphic drilling, Northern Eromanga Basin, 1963-64. Bur. Miner. Resour. Aust. Rec. 1969/20 (unpubl.).

WARREN, R.G., (in prep.). - Alcoota, N.T. - 1:250,000 Geological Series. Bur. Miner. Resour. Aust. explan. Notes SF/53-10.

WELLS, A.T., STEWART, A.J., and SKWARKO, S.K., 1965 - Geology of the south-eastern part of the Amadeus Basin, Northern Territory. Bur. Miner. Resour. Aust. Rep. 88.

WOPFNER, H., 1969 - in Parkin, L.W. ed. HANDBOOK OF SOUTH AUSTRALIAN GEOLOGY. Geol. Surv. S. Aust.

WOPFNER, H., FREYTAG, I.B., and HEATH, G.R., 1970 - Basal Jurassic - Cretaceous rocks of western Great Artesian Basin, South Australia: stratigraphy and environment. Bull. Amer. Ass. Petrol. Geol. 54(3), 383-416.

APPENDIX 1. BASEMENT DESCRIPTIONS

Precambrian biotite metaquartzite from BMR Hay River No. 2, Core 1.

Mineralogy and Approximate Mode

quartz	65%
plagioclase (altered)	5%
biotite	20%
chlorite	8%
muscovite	1%
opaque oxide	1%

Texture: The rock has a linear fabric, defined by orientation of biotite crystals and optical orientation of quartz. It has a weakly defined foliation.

Pre-Metamorphic Nature: The rock was originally a quartzo-feldspathic sediment with a clay or mud matrix.

Precambrian biotite schist from BMR Hay River No. 3 Core 2.

Mineralogy and Approximate Mode

quartz	50%	
biotite	30%	
muscovite	18%	
pyrite	1%	(identification confirmed by X-ray diffraction)
calcite	1%	

Texture: schistose. The schistose texture is defined by parallel planar orientation of mica flakes in layers which form approximately 50% of the rock. The pyrite and calcite occur in secondary cross-cutting veinlets.

Pre-metamorphic Nature: This rock has been formed by regional metamorphism of a pelitic sediment.

Precambrian biotite gneiss from BMR Hay River No. 4, Core 3.

Mineralogy and Approximate Mode

quartz	15%
plagioclase	20%
microcline	35%
biotite	25%
muscovite	2%
hornblende	1%
pyrite	1% (identification confirmed by X-ray diffraction).

Texture: gneissose. The gneissic texture is defined by alternate layers of red-brown biotite and quartzo-feldspathic bands, which form a planar fabric in the rock. Biotite layers define microfolds. The quartz shows undulose extinction.

Pre-metamorphic Nature: This rock was derived from a quartzo-feldspathic sediment and the biotite probably grew from an original clay or mud matrix.

Precambrian garnet-sillimanite-gneiss from BMR Alcoota No. 3, Core 1.

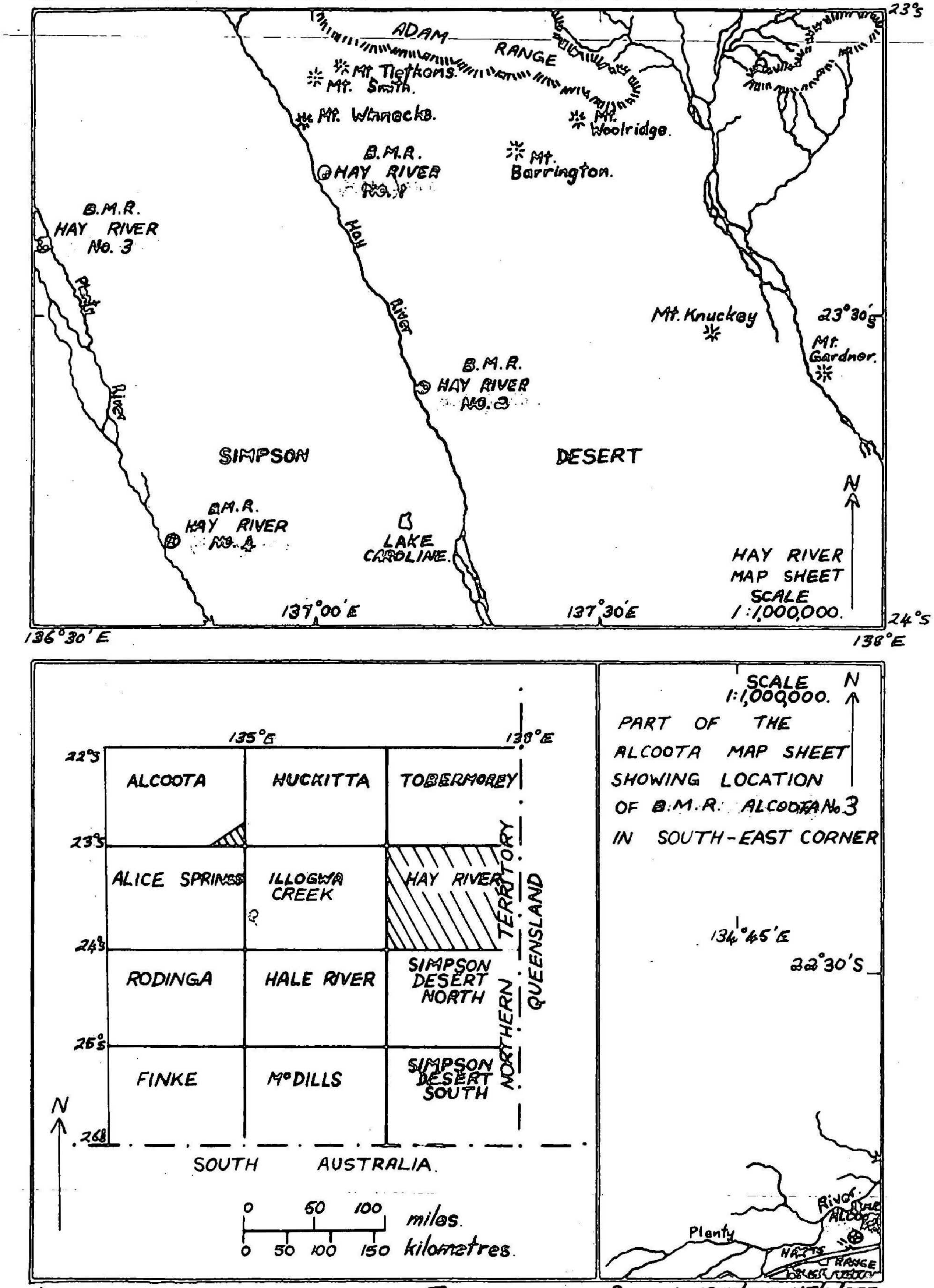
Mineralogy and Approximate Mode

quartz	50%
plagioclase	5%
garnet	10%
sillimanite	2%
biotite	25%
muscovite	5%
chlorite	2%
opaque mineral	1%

Texture: The rock has a porphyroblastic, gneissose texture. Fractured subhedral garnet, with abundant large inclusions, occurs as porphyroblasts. The gneissic texture is due to banding caused by alternation of coarse-grained quartz and plagioclase bands with micaceous layers. Some garnet has broken down to chlorite, and the fibrolite variety of sillimanite occurs as a mass of acicular micro-euhedra.

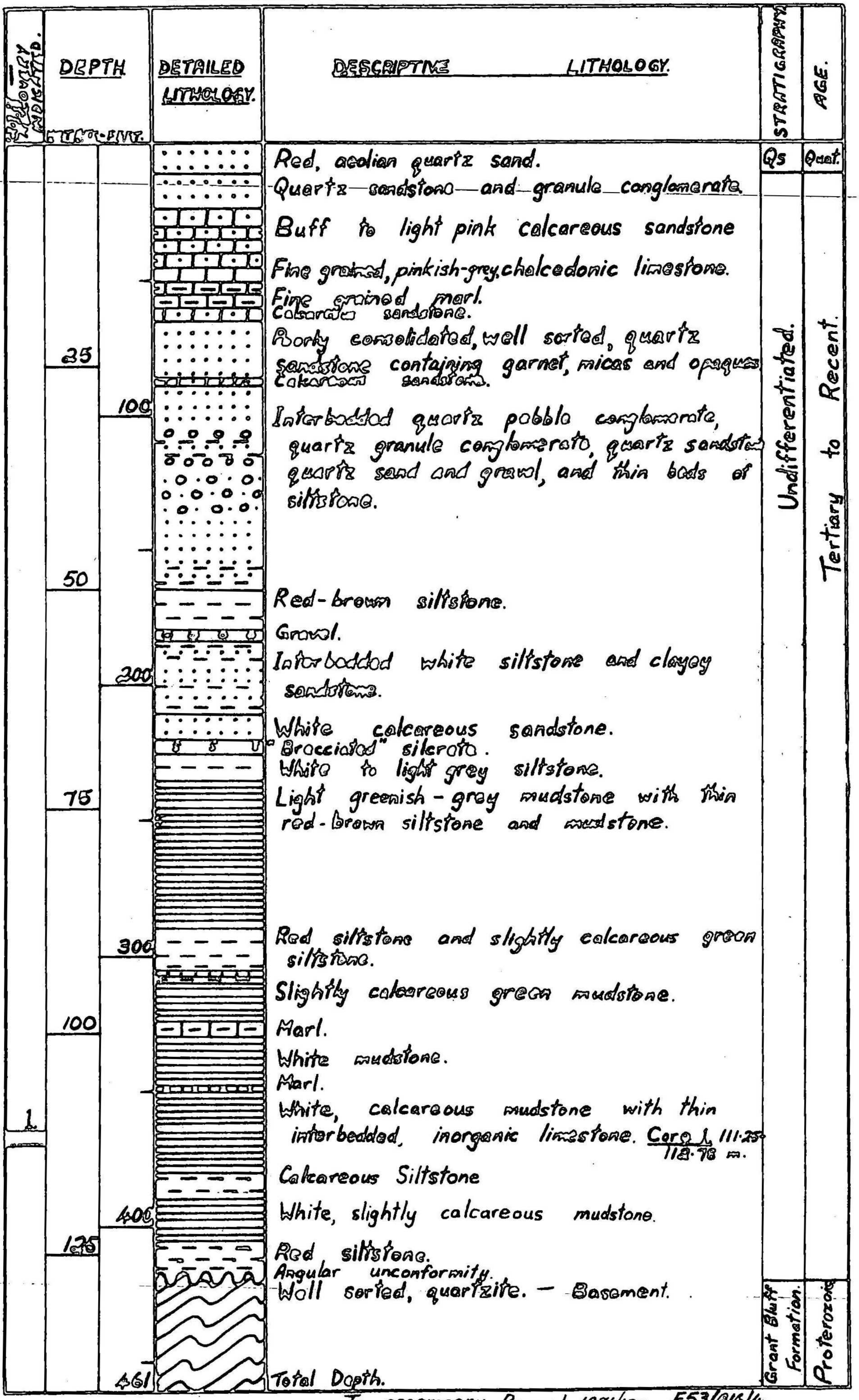
Pre-metamorphic Nature: The original rock was probably a psammitic sediment with a clay or mud matrix.

FIG. 1 MAPS SHOWING LOCATION OF B.M.R. HAY RIVER NUMBERS 1,2,3,4 AND B.M.R. ALC(OOTA) No. 3 WITH INSET SHOWING THE NEIGHBOURING 1:250,000 MAP SHEETS, NORTHERN TERRITORY.



To accompany Record 1971/120. NT/A/355.

FIG. 2. B.M.R. HAY RIVER No. 1.



Red, aeolian quartz sand.

Quartz sandstone and granule conglomerate.

Buff to light pink calcareous sandstone

Fine grained, pinkish-grey, chalcedonic limestone.

Fine grained marl.

Calcareous sandstone.

Poorly consolidated, well sorted, quartz sandstone containing garnet, micas and opaques

Calcareous sandstone.

Interbedded quartz pebble conglomerate, quartz granule conglomerate, quartz sandstone, quartz sand and gravel, and thin beds of siltstone.

Red-brown siltstone.

Gravel.

Interbedded white siltstone and clayey sandstone.

White calcareous sandstone.

"Brecciated" silcrete.

White to light grey siltstone.

Light greenish-grey mudstone with thin red-brown siltstone and mudstone.

Red siltstone and slightly calcareous green siltstone.

Slightly calcareous green mudstone.

Marl.

White mudstone.

Marl.

White, calcareous mudstone with thin interbedded, inorganic limestone. Core 1, 111·25-118·78 m.

Calcareous Siltstone

White, slightly calcareous mudstone.

Red siltstone.

Angular unconformity.

Well sorted, quartzite. — Basement.

Total Depth.

To accompany Record 1971/120. F53/A16/4.

FIG. 3. BMR HAY RIVER No. 2.

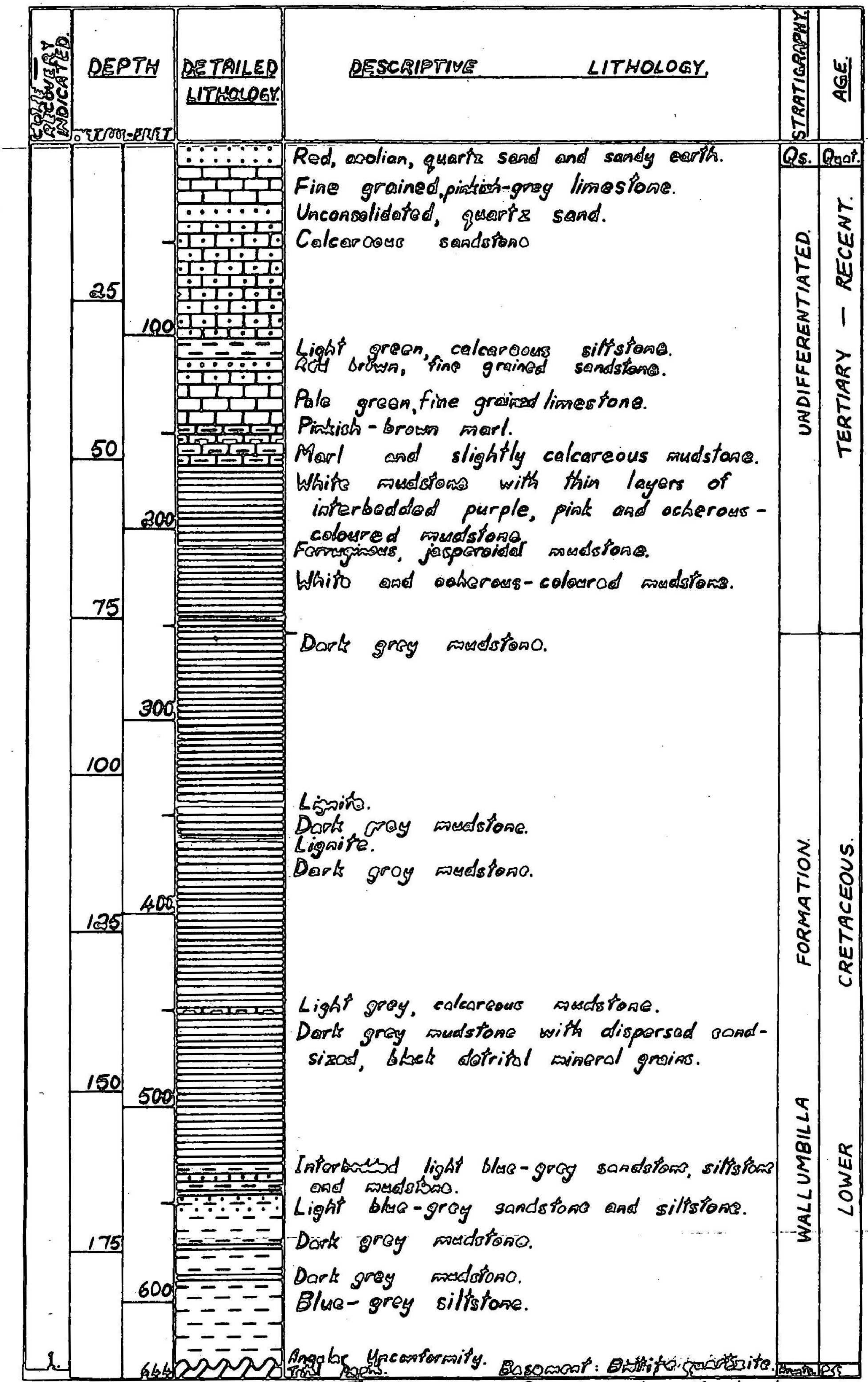


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FIG. 4. B.M.R. HAY RIVER No. 3.

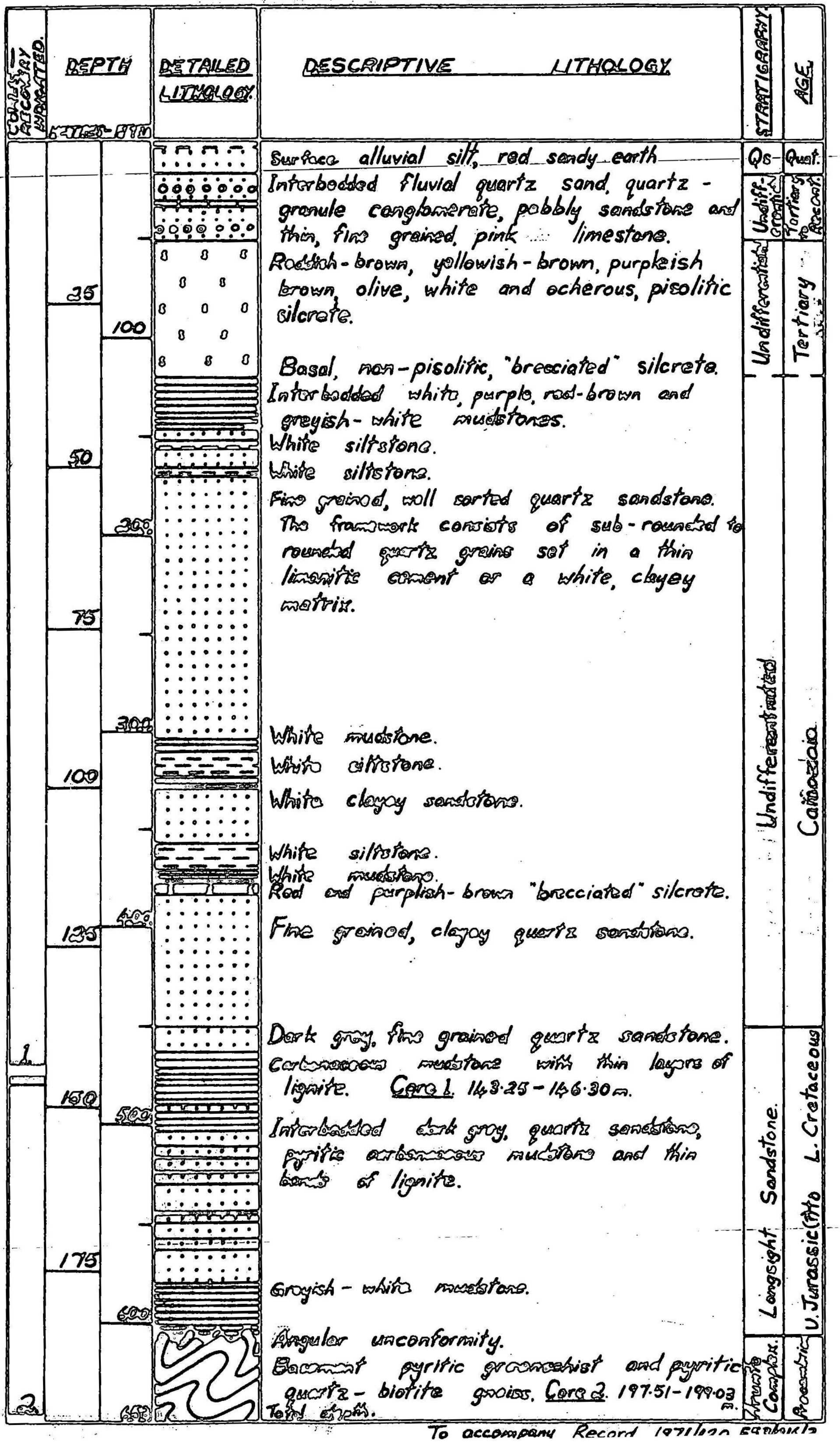

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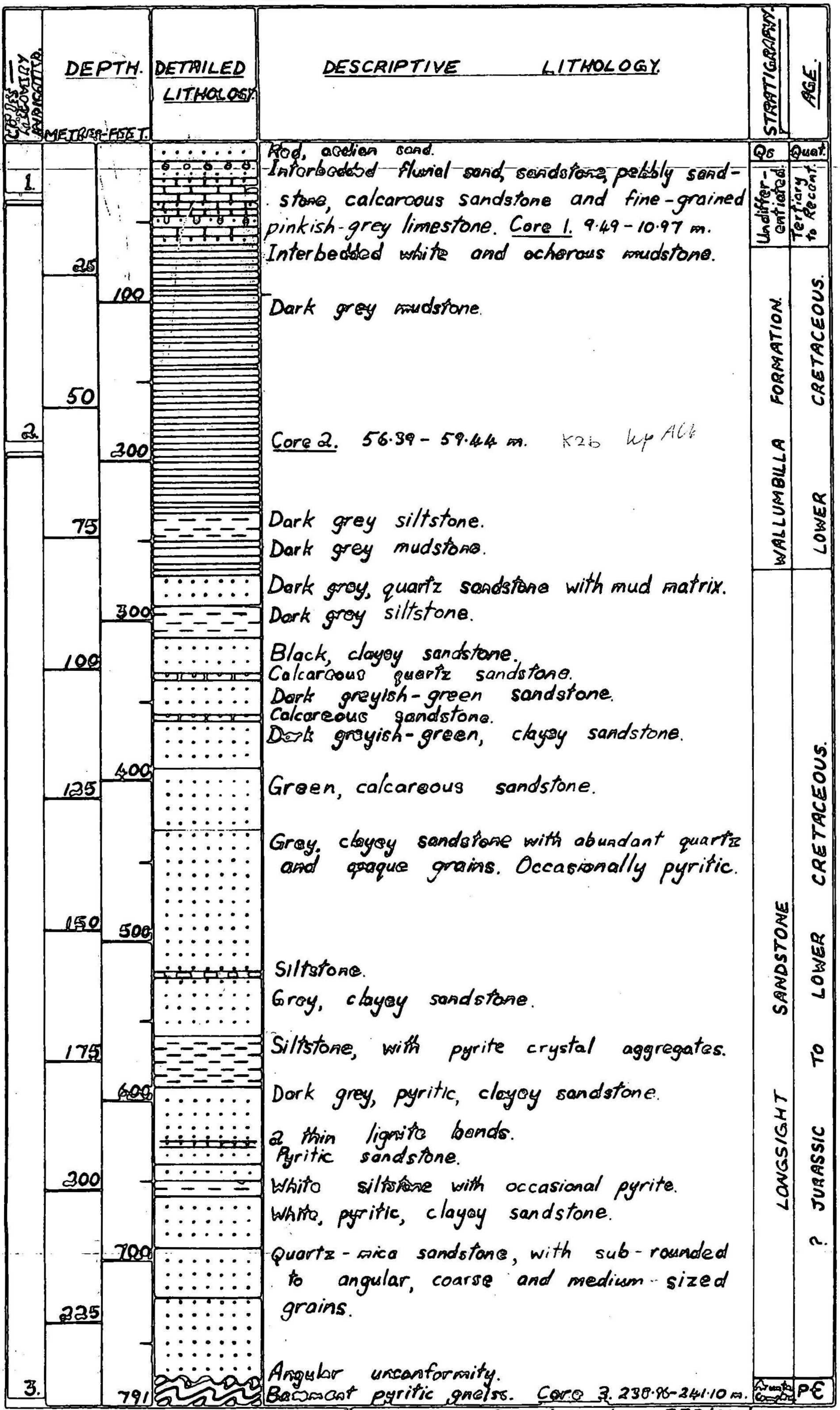
FIG. 5. B.M.R. HAY RIVER No. 4.



Red, aeolian sand.

Interbedded fluvial sand, sandstone, pebbly sandstone, calcareous sandstone and fine-grained pinkish-grey limestone. Core 1. 9·49 – 10·97 m.

Interbedded white and ocherous mudstone.

Dark grey mudstone.

Core 2. 56·39 – 59·44 m. K2b lwp Alb

Dark grey siltstone.

Dark grey mudstone.

Dark grey, quartz sandstone with mud matrix.

Dark grey siltstone.

Black, clayey sandstone.

Calcareous quartz sandstone.

Dark greyish-green sandstone.

Calcareous sandstone.

Dark greyish-green, clayey sandstone.

Green, calcareous sandstone.

Grey, clayey sandstone with abundant quartz and opaque grains. Occasionally pyritic.

Siltstone.

Grey, clayey sandstone.

Siltstone, with pyrite crystal aggregates.

Dark grey, pyritic, clayey sandstone.

2 thin lignite bands.

Pyritic sandstone.

White siltstone with occasional pyrite.

White, pyritic, clayey sandstone.

Quartz-mica sandstone, with sub-rounded to angular, coarse and medium-sized grains.

Angular unconformity.

Basement pyritic gneiss. Core 3. 238·96 – 241·10 m.

~~Cenom~~

K2a L. Alb.

K1-1 Apt.

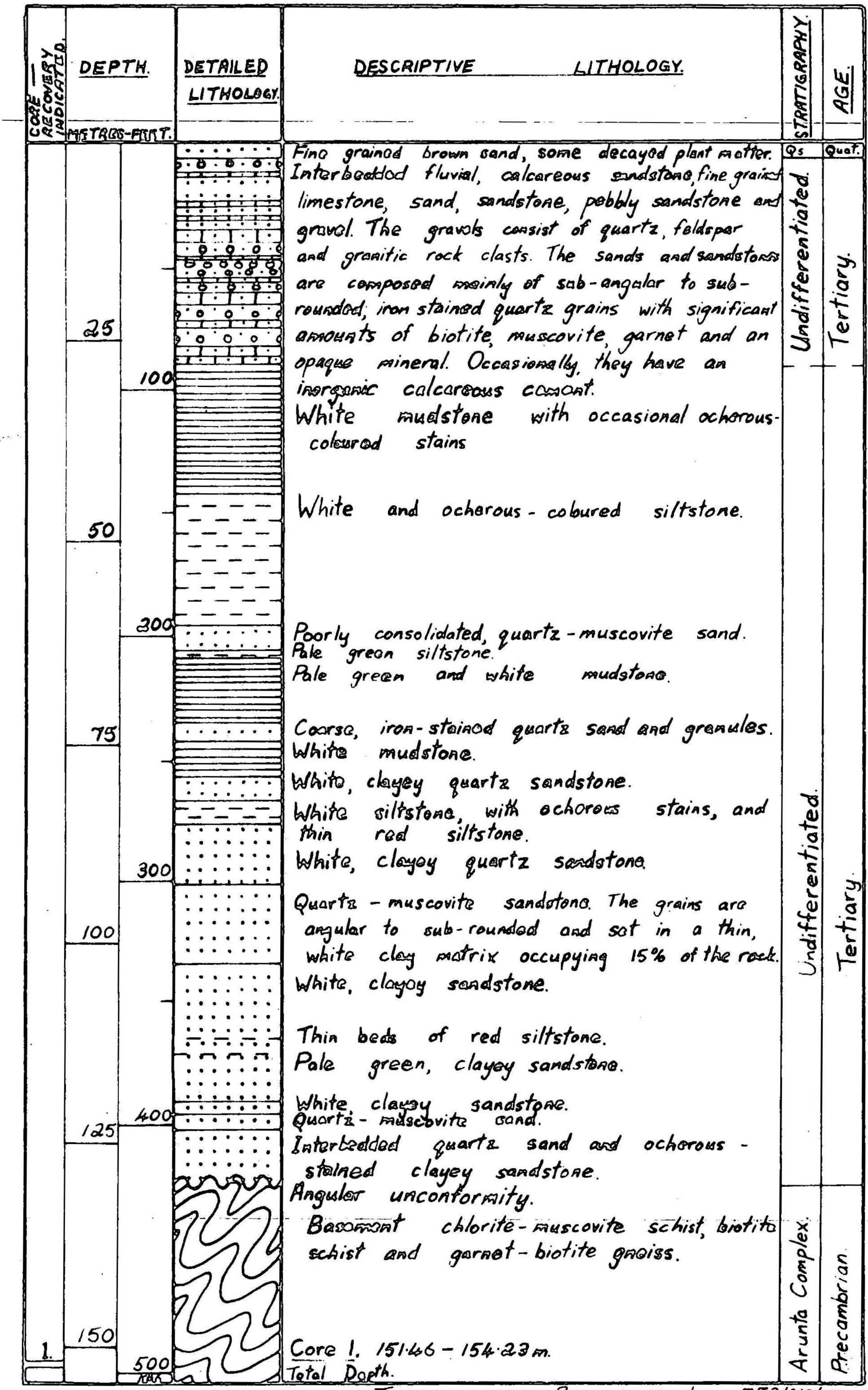
K1b-c ~~Aptian~~

Late Ne

E. Apt

To accompany Record 1971/120. F53/A16/3

FIG. 6 B.M.R. ALCOOTA No. 3.



Fine grained brown sand, some decayed plant matter.

Interbedded fluvial, calcareous sandstone, fine grained limestone, sand, sandstone, pebbly sandstone and gravel. The gravels consist of quartz, feldspar and granitic rock clasts. The sands and sandstones are composed mainly of sub-angular to sub-rounded, iron stained quartz grains with significant amounts of biotite, muscovite, garnet and an opaque mineral. Occasionally, they have an inorganic calcareous cement.

White mudstone with occasional ocherous-coloured stains

White and ocherous-coloured siltstone.

Poorly consolidated, quartz-muscovite sand.

Pale green siltstone.

Pale green and white mudstone.

Coarse, iron-stained quartz sand and granules.

White mudstone.

White, clayey quartz sandstone.

White siltstone, with ochorous stains, and thin red siltstone.

White, clayey quartz sandstone.

Quartz - muscovite sandstone. The grains are angular to sub-rounded and set in a thin, white clay matrix occupying 15% of the rock.

White, clayey sandstone.

Thin beds of red siltstone.

Pale green, clayey sandstone.

White, clayey sandstone.

Quartz - muscovite sand.

Interbedded quartz sand and ocherous - stained clayey sandstone.

Angular unconformity.

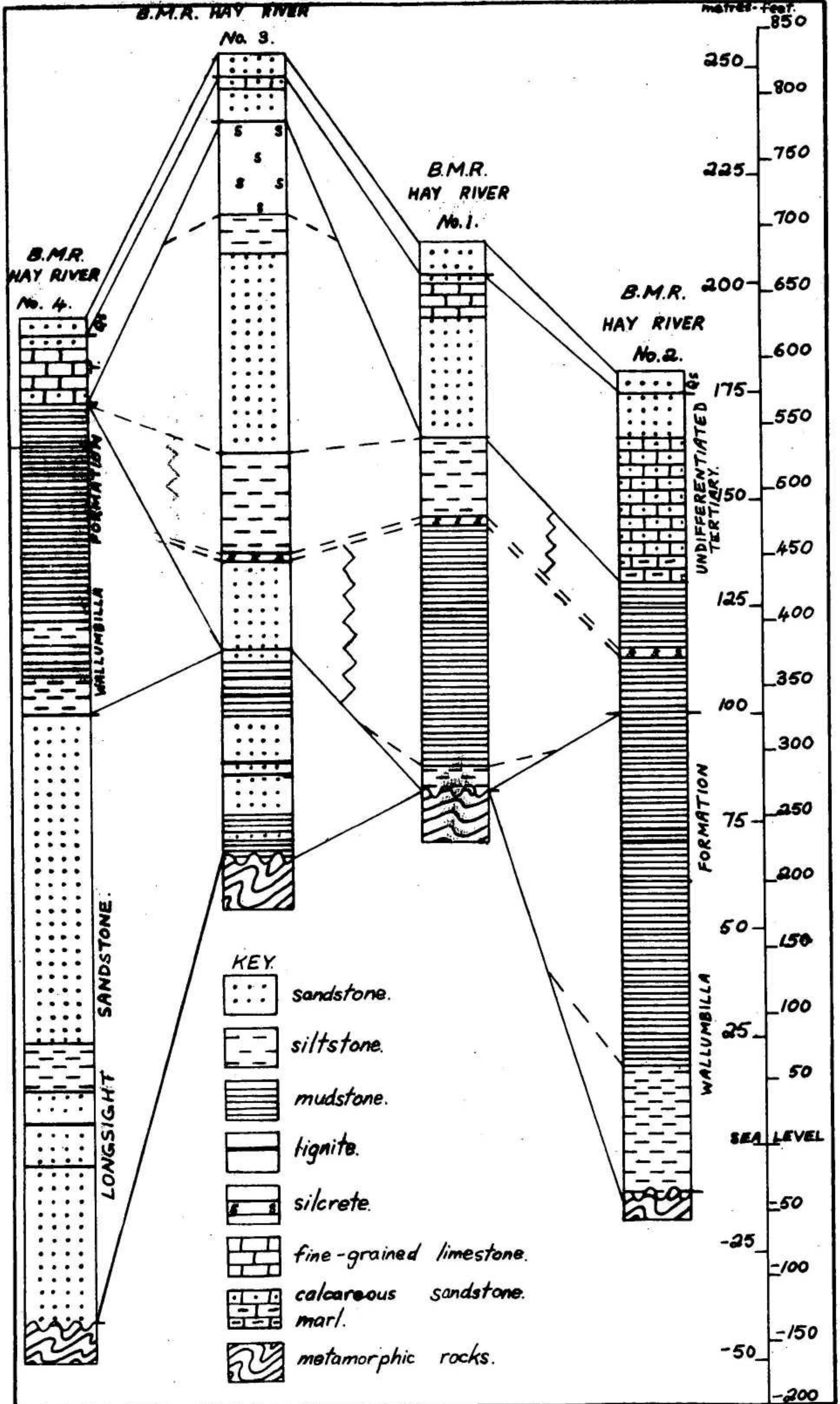
Basement chlorite - muscovite schist, biotite schist and garnet - biotite gneiss.

Core 1. 151·46 – 154·23 m.

Total Depth.

To accompany Record 1971/120. F53/A10/17.

FIG. 7. LITHOSTRATIGRAPHIC CORRELATION OF B.M.R. HAY RIVER Nos. 1, 2, 3 AND 4 PLOTTED WITH RESPECT TO SURFACE ELEVATION.



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