

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT  
BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

*Petroleum Search Subsidy Acts*

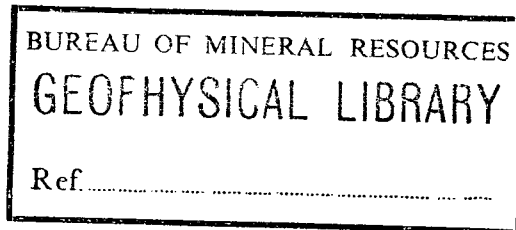
PUBLICATION No. 65

**SUMMARY OF DATA AND RESULTS  
OTWAY BASIN, SOUTH AUSTRALIA**

**Geltwood Beach No. 1 Well**

**OF**

**BEACH PETROLEUM NO LIABILITY**



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

1965

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

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

SECRETARY: SIR HAROLD RAGGATT, C.B.E.

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

DIRECTOR: J. M. RAYNER

---

THIS REPORT WAS PREPARED FOR PUBLICATION IN THE PETROLEUM EXPLORATION BRANCH

ASSISTANT DIRECTOR: M. A. CONDON

*Published by the Bureau of Mineral Resources, Geology and Geophysics  
Canberra A.C.T.*

## FOREWORD

Under the Petroleum Search Subsidy Act 1959-1961, agreements relating to subsidized operations provide that the information obtained may be published by the Commonwealth Government six months after the completion of field work.

The growth of the exploration effort has greatly increased the number of subsidized projects and this increase has led to delays in publishing the results of operations.

The detailed results of subsidized operations may be examined at the offices of the Bureau of Mineral Resources in Canberra and Melbourne (after the agreed period) and copies of the reports may be purchased.

In order to make the main results of operations available early, short summaries are being prepared for publication. These will be grouped by area and date of completion as far as practicable. Drilling projects and geophysical projects will be grouped separately. In due course, full reports will be published concerning those operations which have produced the more important new data.

This Publication contains a summary of data and results of the drilling operation undertaken at Geltwood Beach No. 1 in the Otway Basin, South Australia. The information has been abstracted by the Petroleum Exploration Branch of the Bureau of Mineral Resources from the well completion report furnished by Beach Petroleum No Liability.

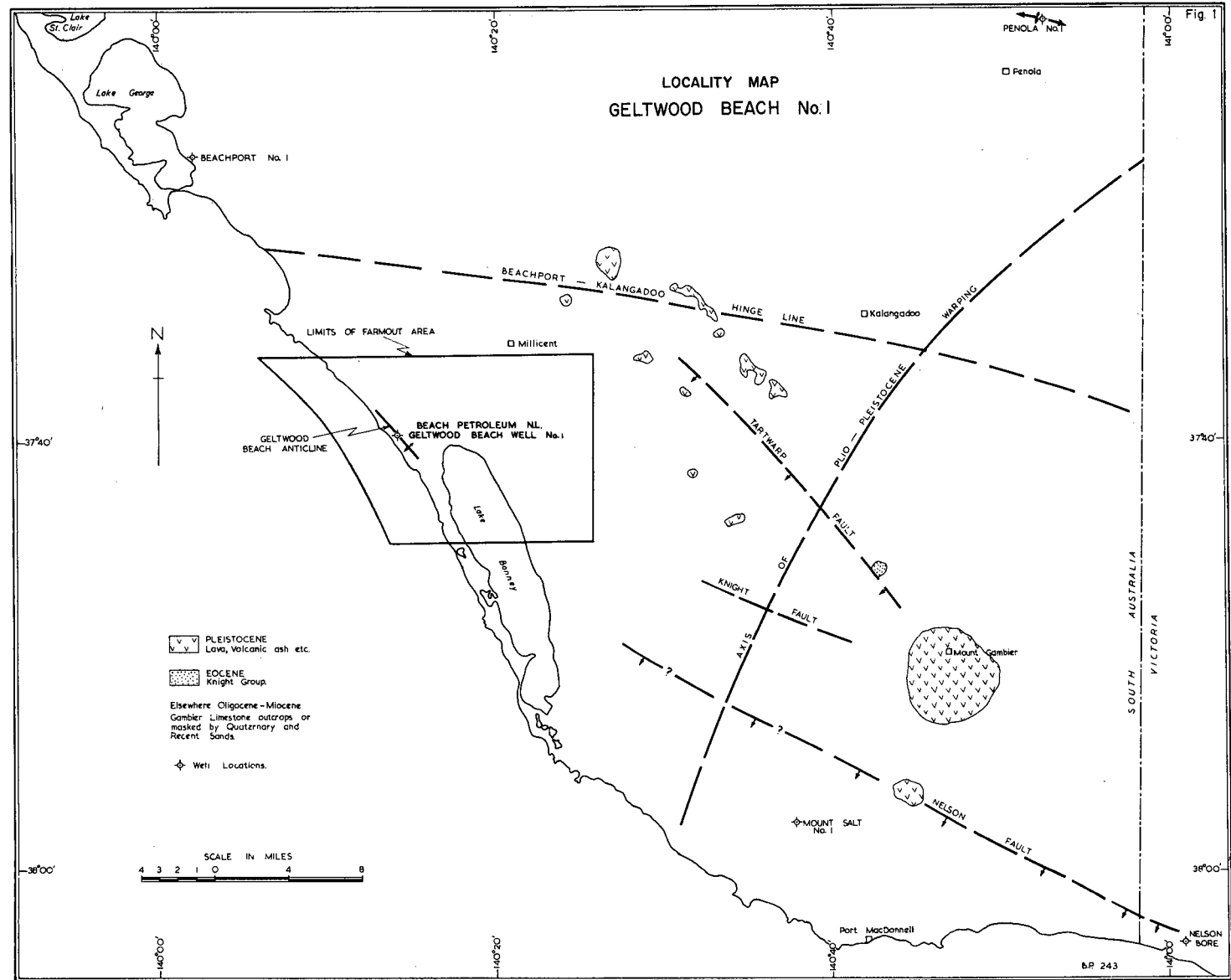
J.M. RAYNER  
DIRECTOR

## CONTENTS

	<u>Page</u>
SUMMARY .. .. .	1
WELL HISTORY .. .. .	2
General data .. .. .	2
Drilling data .. .. .	2
Logging and testing .. .. .	3
GEOLOGY .. .. .	4
General .. .. .	4
Stratigraphy .. .. .	4
Structure .. .. .	6
Relevance to occurrence of petroleum .. .. .	6
Porosity and permeability of sediments penetrated .. .. .	7
Contribution to geological concepts resulting from drilling .. .. .	7
REFERENCES .. .. .	7
ADDITIONAL DATA FILED IN THE BUREAU OF MINERAL RESOURCES	9

## ILLUSTRATIONS

Figure 1 : Locality Map, Geltwood Beach No. 1 .. .. .	Frontispiece
Plate 1 : Composite Well Log, Geltwood Beach No. 1 .. .. .	At back of report



GELTWOOD BEACH NO. 1

SUMMARY OF DATA AND RESULTS\*

SUMMARY

Geltwood Beach No. 1 Well was located on the Geltwood Anticline, approximately 7 1/2 miles south-west of Millicent in the Otway Basin, in the south-eastern part of South Australia. The well was drilled by Drilling Contractors (Australia) Pty Ltd for Beach Petroleum No Liability, to a total depth of 12,300 feet. Drilling commenced on 22nd August, 1963, and was completed on 10th November, 1963. A full programme of logging, testing, and coring was undertaken.

After passing through 45 feet of Recent calcareous sand, the well penetrated 1860 feet of Miocene to Eocene marine and paralic sediments, and 1760 feet of (?) Palaeocene to Upper Cretaceous sands and grits. Below 3680 feet, a monotonous sequence of Upper to Lower Cretaceous sediments of the Merino Group were encountered and continued to total depth at 12,300 feet.

Geltwood Beach No. 1 Well was drilled to test the hydrocarbon potential of Lower Tertiary and Upper Cretaceous sediments on a probable closed structure in an area where strandings of bitumen and heavy oil on the beaches were thought to indicate submarine seepages. Evidence from wells at Mount Salt and Beachport indicated that Geltwood Beach No. 1 was near the edge of probable wedge-out of Middle to Upper Cretaceous and (?) Palaeocene marine sediments overlying Lower Cretaceous beds. Traces of gas were recorded at intervals from 4500 feet to total depth, but five drillstem tests yielded only slightly gas-cut salty water and drilling mud. The well was plugged and abandoned as a dry hole.

The stratigraphic drilling operation at Geltwood Beach No. 1 was subsidized under the Petroleum Search Subsidy Act 1959-1961, from surface to total depth.

---

\* Abstracted from: Well Completion Report, Geltwood Beach No. 1, South Australia, by R.A. Laws and J.B. Woolley, for Beach Petroleum No Liability, March, 1964.

## WELL HISTORY

### General Data

Well name and number: Geltwood Beach No. 1

Location: Latitude 37°39'44"S.  
Longitude 140°14'35"E.

Name and address of Tenement Holder: General Exploration Company of Australia Ltd,  
68 Grenfell Street, Adelaide, South Australia

Details of Petroleum Tenement: Oil Exploration Licence No. 22/1, issued by the  
State of South Australia

Total Depth: 12,300 feet

Date drilling commenced: 22nd August, 1963

Date drilling completed: 10th November, 1963

Date well abandoned: 12th November, 1963

Date rig released: 13th November, 1963

Elevation (ground): 15 feet

Elevation (K.B.): 30 feet (datum for depths)

Status: Dry hole; plugged and abandoned

Cost: £150,862

### Drilling Data

#### Drilling Plant:

Make: National-Ideal  
Type: 80B

Hole sizes and depths: 30" to 60 feet  
17 1/2" to 1050 feet  
12 1/4" to 3332 feet  
8 3/4" to 12300 feet

#### Casing details:

Size (in.):	20	13 3/8	9 5/8
Weight (lb./ft):	-	48	36
Grade:	-	H.40	J.55
Setting depth (ft):	60	355	3327

## Logging and Testing

### Ditch Cuttings:

Interval: Ten feet from surface to total depth.

### Coring:

Twenty-nine cores were cut using a Reed model K675 core barrel with both hard formation and soft formation cutter heads. A total of 362 feet was cored and 176 feet 1 inch (49%) recovered.

### Sidewall Cores:

None

### Electric and other logging: (Wellex Inc.):

Induction-Electric Log:	100-12278 feet (5 runs)
Contact-Caliper Log:	1000-12300 feet (4 runs)
Acoustic Velocity Log:	10-12292 feet (2 runs)
Gamma Ray Log:	10-12292 feet (2 runs)
Continuous Dipmeter:	1009-12296 feet (2 runs)
Temperature Log:	150- 2584 feet (1 run)

### Velocity Survey:

Eleven horizons were tested at depths ranging from 870 to 12,270 feet.

### Drilling Time and Gas Log:

A complete record of drilling rate was kept over the following intervals: 100-530 feet, 780-970 feet, 1060-12,300 feet.

A Core Laboratories Inc. P.D. unit catalytic combustion hotwire filament gas detector connected to the mud stream operated continuously throughout the drilling of the well. A Waring Blendor attachment was also included in the equipment.

### Formation Testing:

Five drillstem tests were carried out by Halliburton; details are tabulated below:

<u>Test No.</u>	<u>Interval Tested</u> (feet)	<u>Recovery</u>	
1	3859 - 3901	3600 feet water;	270 feet mud
2	4708 - 4780	3100 feet water;	450 feet mud
3	4982 - 5054	400 feet water;	100 feet mud
4	6039 - 6081	320 feet water;	130 feet mud
5	8679 - 8783	Nil	

### Deviation Surveys:

Deviation surveys were run at intervals of not more than 300 feet with a Totco instrument. The maximum deviation was 2° 45' measured at 11,455 feet. At 12,210 feet, the deviation was 1° 15'.



## GEOLOGY

### General

Over the surrounding area, Quaternary deposits blanket Tertiary sediments, that are underlain in turn by thick accumulations of Cretaceous deposits.

Prior to the recent interest in oil exploration in this region, systematic geological investigations had been carried out by Sprigg (1952), O'Driscoll (1960), and Ludbrook (1961). With the advent of oil exploration activities, various geological and geophysical surveys were undertaken, and oil exploration wells were drilled at Penola (Oil Development N.L., 1963); at Beachport (South East Oil Syndicate Ltd, 1962); and at Mount Salt (Oil Development N.L., 1962).

Attention was first directed to the Geltwood area by the recognition of significant strandings of bitumen and heavy oil in the vicinity of Geltwood Beach (Sprigg and Woolley, 1963b). The freshness and quantity of stranded material were considered indicative of strong submarine seepages in the immediate off-shore area.

A regional reflection seismic survey (Beach Petroleum N.L., 1962) suggested the presence of an anticlinal structure on the presumed basal Tertiary horizon, with indications of a similar structure persisting within the Cretaceous section. A programme of shallow structure drilling to a suitable Tertiary marker was undertaken, to check these relationships (Beach Petroleum N.L., 1963a). This work confirmed the presence of a structure and suggested probable closure at depth.

The geology and petroleum prospects of the Geltwood structure were reviewed by Sprigg and Woolley (1963a). This paper contains a detailed account of structure and stratigraphy and includes a bibliography of previous work in the area.

The Gambier portion of the Otway Basin extends south from the Padthaway Horst (which separates it from the much shallower Murray Basin) to far beyond the present coast line. Small granitic exposures occur along the line of the Horst. An isolated outcrop of Eocene sediments occurs at Knight's Quarry near Mount Gambier. Exposures of the Oligocene-Miocene Gambier Limestone occur more extensively about Mount Gambier and to the south. Recent and Pleistocene ashes, tuffs, breccias, and basalts crop out in the Mount Gambier area, extending north-westwards beyond Mount Burr. Elsewhere the surface is entirely covered by Quaternary sediments.

### Stratigraphy

The stratigraphic sequence encountered in Geltwood Beach No. 1 Well is shown in the following Table:

<u>Age</u>	<u>Formation</u>	<u>Lithology</u>	<u>Depth Intervals (feet)</u>	<u>Thickness (feet)</u>
Recent		Calcareous sand	15- 60	45
Miocene-Oligocene	Gambier Limestone	Bryozoal limestone	60- 910	850
Upper Eocene	Bucclench Group	Green clay and ferrugin- ous quartz grit	910- 920	10
Middle-Lower Eocene	Knight Group	Brown sand and grit with some carbonaceous silt- stone passing down into brown-grey sandstone	920- 1920	1000
(?) Palaeocene-Upper Cretaceous	Unnamed	Grey quartz grit and pebbly mudstone passing down into feldspathic sandstone	1920- 3680	1760
Cenomanian-Albian	Merino Group	Sandstone and siltstone	3680- 7120	3440
Albian - Aptian	Merino Group (Runnymede Formation)	Interbedded mudstone and sandstone	7120-12300	5180+

Recent : Surface to 60 feet

Light brown, coarse shelly sand, with rare plant fragments.

Gambier Limestone (Miocene to Oligocene) : 60 to 910 feet (850 feet)

Calcarenite, bryozoal limestone, marl, marly limestone, and crystalline limestone. Some glauconite occurs and chert is common throughout. Marl is most abundant above 190 feet and below 640 feet. Sponge spicules also abundant between 710 and 910 feet.

Bucclench Group (Upper Eocene) : 910 to 920 feet (10 feet)

Green clay with limonite and glauconite pellets, and ferruginized, quartz grit. Foraminifera and fish scales occur.

Knight Group (Middle to Lower Eocene) : 920 to 1920 feet (1000 feet)

Alternating beds of coarse grit, quartz sand, brown, carbonaceous siltstone and silty and sandy clay, micaceous and calcareous in places. The section contains molluscan fragments, fish teeth, and foraminifera.

Unnamed Formation (? Palaeocene to Upper Cretaceous) : 1920 to 3680 feet (1760 feet)

Fine to very coarse-grained, poorly sorted, angular to rounded, feldspathic quartz sand and friable sandstone with traces of chert, mica, and coal; and hard, grey, glauconitic, silty mudstone and siltstone. Molluscan fragments, microflora, and a few foraminifera occur.

Merino Group (Cretaceous: Cenomanian to Aptian) : 3680 to 12,300 feet (8620 feet+)

Interbedded sandstone, siltstone, and mudstone with carbonaceous material, plant remains, and worm burrows. Glauconitic and calcareous in parts. The coarser sediments are mostly of greywacke type. No marine fossils were found below about 4000 feet; evidence of age was derived from pollens.

Structure

The well was drilled on an anticlinal structure with possible closure indicated by seismic survey and a structure drilling programme (total of nine holes). The structure plunges south-eastwards and is two miles wide and at least six miles long. The reversal in the north-west which gives closure is very slight.

It is evident that the anticlinal form carries to the base of the Tertiary and probably well below this level. However, marked sedimentary wedging and/or erosional truncation at deeper levels can be expected to modify this simple form.

Relevance to Occurrence of Petroleum

Shows in the well were confined to fluorescence, kicks on the gas detector, gas bleeding from cores, and gas-cut fluids recovered from drillstem tests. In certain cases the gas bleeding from a core was observed to be coming from thin coaly layers; it is therefore important to note that the gas from DST No. 3 (4982 - 5054 feet) showed significant ethane and propane, and trace quantities of normal and iso - butane.

The upper group of hydrocarbon shows extended from 4507 to 6150 feet, and was underlain by an interval almost 3000 feet thick, in which shows were rare and very weak.

A group of gas shows was encountered between 8750 and 9075 feet.

More gas was found at 9600 to 9750 feet, and minor gas detector kicks from 10,000 feet to total depth. Fluorescence in the sandstones was almost continuous and some large kicks were observed on the detector over this latter interval.

With regard to the inferred presence of submarine seepages in the immediate off-shore area, no evidence of shallow petroliferous-bearing formations was found in the well, and it is concluded that the seepages may be fault controlled, the petroliferous material originating at considerable depth. Diapiric rise of pitch along zones of faulting is suggested as a possible explanation. Alternatively, the submarine seepages could be escaping from Upper Cretaceous-Tertiary wedge out in faulted location down westerly dip.

### Porosity and Permeability of Sediments Penetrated

No measurements of porosity and permeability were made. Both the Gambier Limestone and the sands of the Knight Group are very porous and permeable; the underlying unnamed formation is considerably less so. The beds of the Merino Group appear in the cores to be very tight, but the gas shows which occur, and the fact that fluid was recovered from drillstem tests, point to a degree of fracture permeability.

### Contribution to Geological Concepts resulting from Drilling

Geltwood Beach No. 1 Well has demonstrated the presence in this area of unexpectedly thick accumulations (over 8600 feet) of Cretaceous sediments, comprising essentially impure sandstones and siltstones, and interbedded mudstones. Evidence of marine fossils is lacking, although lithological and petrological evidence suggests that large volumes of sediments were rapidly deposited into a marine environment of shallow depth, the sediments being derived from nearby land areas which contained prominent exposures of igneous rocks.

The well evidently did not penetrate the full Lower Cretaceous section, so that the presence (or absence) of basal (?) Cretaceous sands such as occur elsewhere in the Otway Basin (Pretty Hill No. 1 Well) has not been demonstrated.

The thick section of Upper Cretaceous Paaratte Formation recognized at Mount Salt No. 1 may be represented in part by the 1760 feet of unnamed formation of equivalent age in Geltwood Beach No. 1. The thick development of Belfast Mudstone (over 3000 feet) known from Mount Salt appears to have wedged out northwards and is not represented at Geltwood. The Geltwood well has thus successfully narrowed the zone north-west of the Mount Salt No. 1 area where Middle to Upper Cretaceous wedge-out can be expected.

### REFERENCES

- BEACH PETROLEUM N.L., 1962: Final report, Mayurra seismic survey (Unpubl.).
- BEACH PETROLEUM N.L., 1963a: Completion report, Geltwood Beach structure drilling project (Unpubl.).
- BEACH PETROLEUM N.L., 1963b: Report on gravity investigation, Geltwood Beach - Millicent area (Unpubl.).
- BEACH PETROLEUM N.L., 1964: Completion report, Loxton Well No. 2 (Unpubl.).
- BRISBANE, P.G., LADD, J.N., and AMATO, M., 1963: Microbiological oil prospecting, Geltwood Beach survey. C.S.I.R.O. Div. Soils Tech. Memo. 3/63 (Unpubl.).
- BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS, (ED.), 1965: Summary of data and results, Mount Salt No. 1 Well, Otway Basin, South Australia, of Oil Development N.L. Bur. Min. Resour. Aust. Petrol. Search Subs. Acts Publ. 64.

REFERENCES (Cont'd)

- FROME-BROKEN HILL COMPANY PTY LTD, 1962: Completion report, Pretty Hill No. 1 Well (Unpubl.).
- HAEMATITE EXPLORATIONS PTY LTD, 1963: Final report, Flinders Island to Kingston seismic survey (Unpubl.).
- LUDBROOK, N.H., 1961: Stratigraphy of the Murray Basin in South Australia. Geol. Surv. S. Aust. Bull. 36.
- McQUEEN, A.F., 1962: The geology of the Otway Basin, Victoria. APEA 1961 Conference on the geology of South and Eastern Australia. Tech. and Indust. Press, Sydney.
- O'DRISCOLL, E.P.D., 1960: The hydrology of the Murray Basin Province in South Australia. Geol. Surv. S. Aust. Bull. 35.
- OIL DEVELOPMENT N.L., 1962: Completion report, Mount Salt No. 1 Well (Unpubl.).
- OIL DEVELOPMENT N.L., 1963: O.D.N.L. Penola No. 1 Well, South Australia. Bur. Min. Resour. Aust. Petrol. Search Subs. Acts Publ. 42.
- SAUVE, N.B., 1963: Analysis of refraction seismograph survey, Geltwood Beach, carried out by S.A. Department of Mines for Beach Petroleum N.L. (Unpubl.).
- SEEDSMAN, K.R., 1963: Report on refraction seismic survey for Beach Petroleum N.L., at Geltwood Beach near Millicent, South Australia. S. Aust. Dept Mines, SR. 11/5/46.
- SOUTH EAST OIL SYNDICATE LTD, 1962: Completion report, Beachport No. 1 Well (Unpubl.).
- SPRIGG, R.C., 1952: The geology of the South-East Province, South Australia, with special reference to Quaternary coastline migrations and modern beach developments. Geol. Surv. S. Aust. Bull. 29.
- SPRIGG, R.C., 1962: Oil and gas prospects of the Gambier-Portland Basin. APEA 1961 Conference on the geology of South and Eastern Australia. Tech. and Indust. Press, Sydney.
- SPRIGG, R.C., 1962: Petroleum prospects of the Gambier Sub-basin in relation to the evolution of the Continental Terrace. AIMM Conf., Surfers Paradise.
- SPRIGG, R.C., and WOOLLEY, J.B., 1963a: Oil and gas prospects of the Geltwood Beach Anticline, Millicent, South Australia. APEA Jour. March, 1963.

REFERENCES (Cont'd)

- SPRIGG, R.C., and  
WOOLLEY, J.B.,                      1963b: Coastal bitumen in southern Australia, with special reference to observations at Geltwood Beach, South Australia. Trans. Roy. Soc. S. Aust. 86, March, 1963.

ADDITIONAL DATA FILED IN THE  
BUREAU OF MINERAL RESOURCES

The following additional data relating to Geltwood Beach No. 1, have been filed in the Bureau of Mineral Resources, Canberra, and are available for reference:

- (i) Well Completion Report, By R.A. Laws and J.B. Woolley                      18 pp.
- Appendix 1a: Description of cores, by J. Cundill                                      15 pp.
- Appendix 1b: Petrography of cores, Report No. 1,  
                    by A.W.G. Whittle    6 pp.
- Appendix 1c: Petrography of cores, Report No. 2,  
                    by A.W.G. Whittle    3 pp.
- Appendix 2a: Stratigraphy and micropalaeontology,  
                    by N.H. Ludbrook    5 pp. + 2 Pl.
- Appendix 2b: Palynology, by W.K. Harris    7 pp. + 1 Pl.
- Appendix 3 : Report on drillstem tests    4 pp.
- Appendix 4a: Gas analysis, by AMDL.    1 p.
- Appendix 4b: Water analyses, by AMDL.    2 pp.
- Appendix 5 : Electric log results, by T.J. Starr                                      2 pp.
- Appendix 6 : Report on well velocity survey, by A. Yakunin                      2 pp. + 4 Pl.
- Enclosures : Stratigraphic columns before and after drilling  
                    Cross sections through well before and after drilling  
                    Structure contour map on base of Gambier Limestone  
                    Bouguer map of Geltwood Beach area  
                    Isopach map of Knight Group sediments.

(ii) Daily drilling reports for period 22nd August, 1963 to 13th November, 1963.

(iii) Well logs including the following:

(a) Induction-Electric Log

- Run 1, 100 - 1046 feet (1",5" = 100 ft)  
Run 2, 1000 - 3324 feet (1",5" = 100 ft)  
Run 3, 3325 - 7035 feet (1",5" = 100 ft)  
Run 4, 6900 - 9641 feet (1",5" = 100 ft)  
Run 5, 9550 - 12278 feet (1",5" = 100 ft)

(b) Contact-Caliper Log

Run 1, 1000 - 3326 feet (1",5" = 100 ft)  
Run 2, 3324 - 7037 feet (1",5" = 100 ft)  
Run 3, 7000 - 9551 feet (1",5" = 100 ft)  
Run 4, 9550 - 12300 feet (1",5" = 100 ft)

(c) Acoustic Velocity Log

Run 1, 10 - 3322 feet (1",5" = 100 ft)  
Run 2, 3226 - 12292 feet (1",5" = 100 ft)

(d) Gamma Ray Log

Run 1, 10 - 3322 feet (1",5" = 100 ft)  
Run 2, 3226 - 12292 feet (1",5" = 100 ft)

(e) Temperature Log

Run 1, 150 - 2584 feet (1",5" = 100 ft)

COMPOSITE WELL LOG  
COMPANY BEACH PETROLEUM NL.  
WELL NUMBER GELTWOOD BEACH No.1

PETROLEUM TENEMENT QEL. 22

STATE SOUTH AUSTRALIA

4-MILE SHEET PENOLA

BASIN GAMBIER SUB-BASIN

WELL STATUS DRY & ABANDONED

LOCATION 37° 39' 44" SOUTH  
140° 14' 35" EAST  
ELEVATION KA 30-03 feet above m.s.l. Port Adelaide  
GL 15-03 feet above m.s.l. Port Adelaide  
Date Spudded 22-8-63  
Date Drilling Stopped 10-11-63  
Total Depth Driller 12300'  
E. Log 12302'

Table with columns: RUN No., Depth Scale, ELECTRIC LOG DATA, VELOCITY LOG DATA, MICROLOG CALIPER DATA. Rows include Date, First Reading, Last Reading, Interval Measured, Casing Wex, Casing Driller, Depth Reached, Bottom Driller, Mud Nature, Density, Mud Resistivity, pH, Fluid Loss, Origin of Sample, Rat, Rmc, Bit Size, Casing Size, Opr Rig Time, Truck No, Recorded By, Witness.

Table with columns: Cement Pkgs, From, To, Sacks. Rows 1, 2.

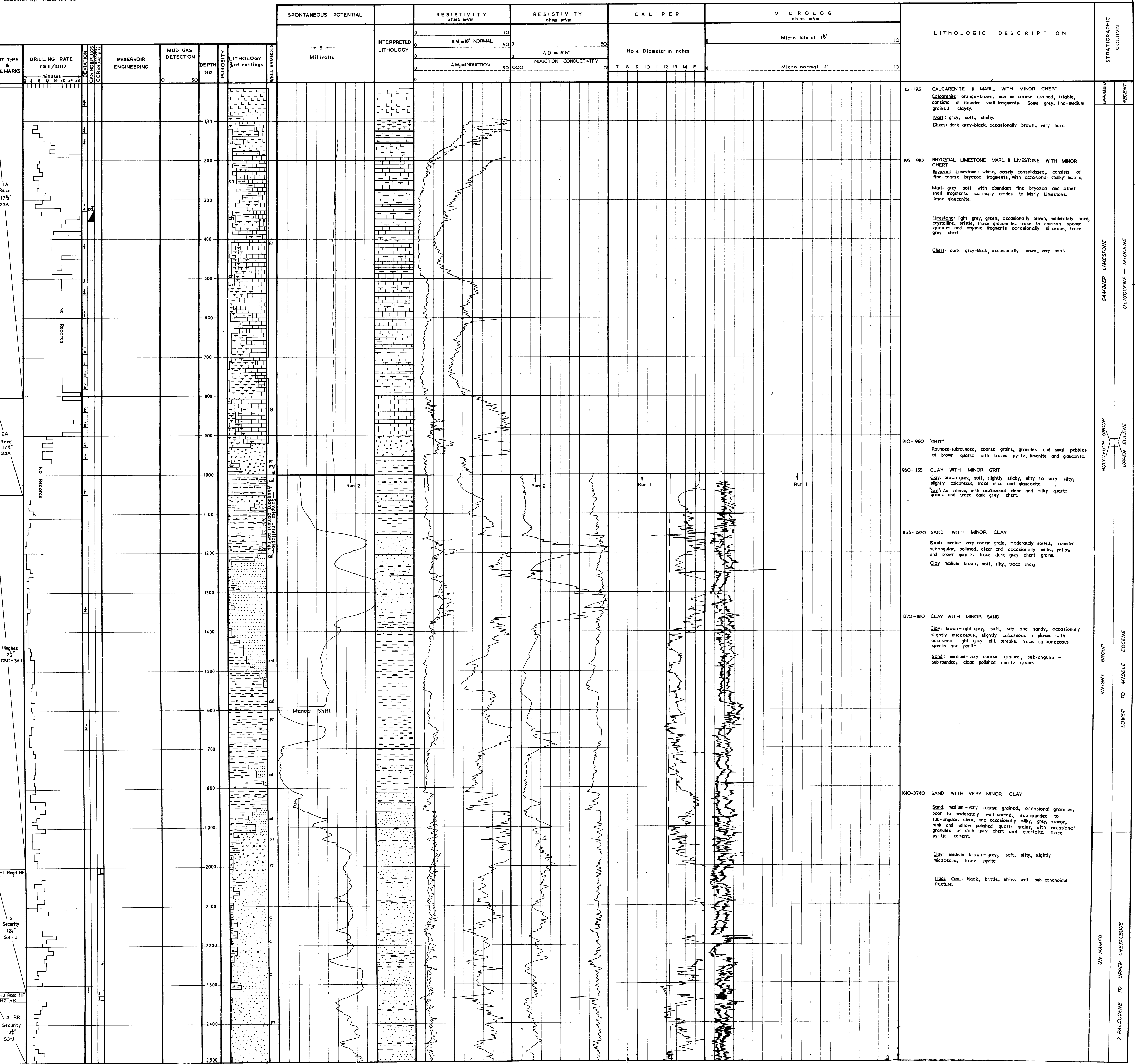
WELL SYMBOLS

- Gas show, slight
Gas show, strong
Oil show, slight
Oil show, strong
Oil and gas show
Fluorescence
Circulation loss, partial, and s.g. mud
Circulation loss, complete, and s.g. mud
Flow into well, and s.g. mud
Blowout
Core interval, number and recovery
Sidewall core

- Perforated interval
Formation test, QH interval, and no. in csg
Plugged interval
Conglomerate
Breccia
Quartz sandstone
Arkose
Greywacke
Siltstone
Claystone
Shale
Limestone
Dolomite
Calcareous
Calcareous
Calcilitite
Marl
Evaporite Salt
Coal
Igneous rocks Granite
Volcanic rocks Basalt
Metamorphic rocks Gneiss
Micaceous

LITHOLOGIC REFERENCE

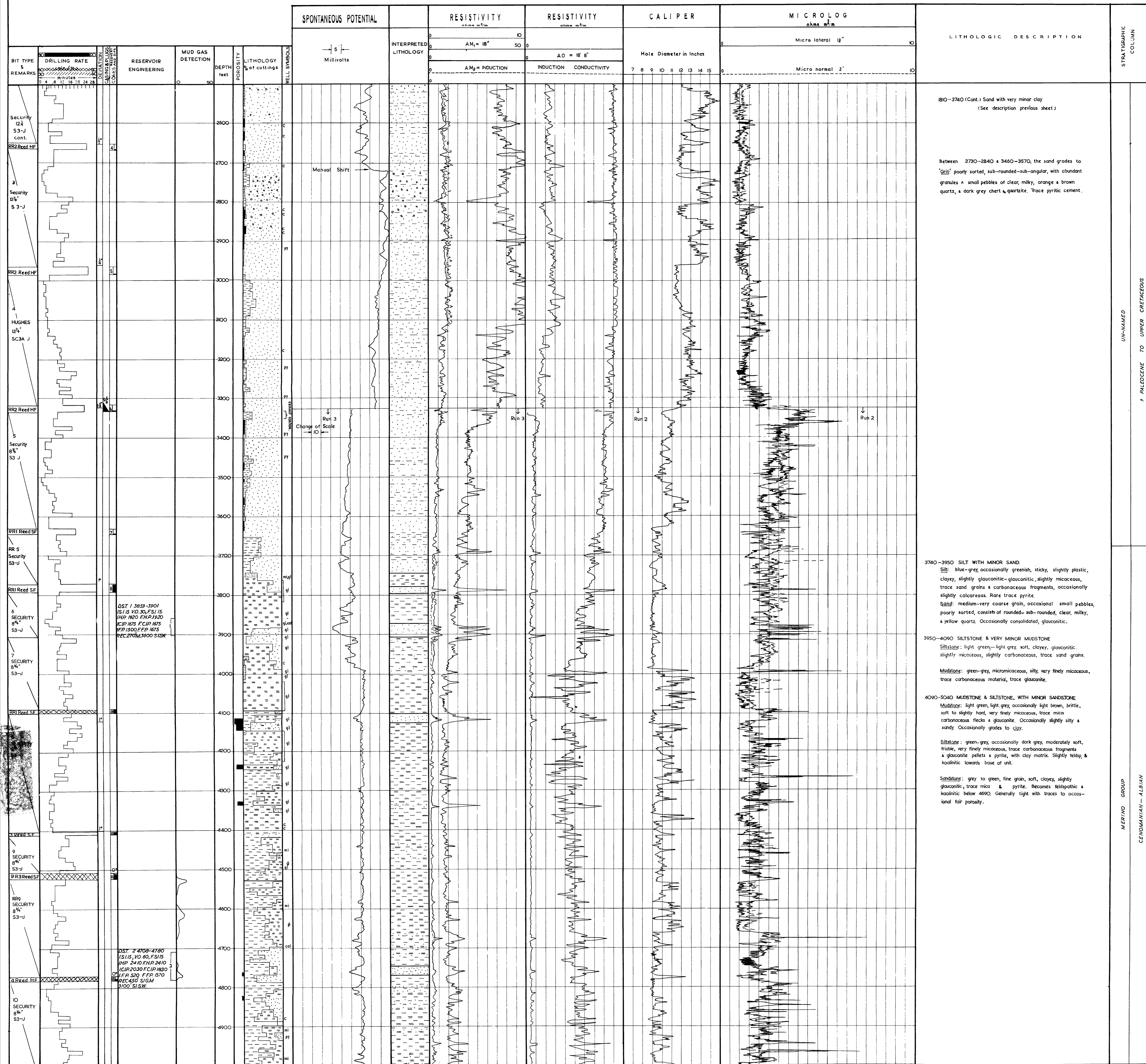
Lithology by Cundill, Rutledge & Laws



Drilled by Drilling Contractors (Aust) Pty. Ltd.  
Logged by Welox  
Drilling Method: Rotary  
Cemented by: Halliburton Co.

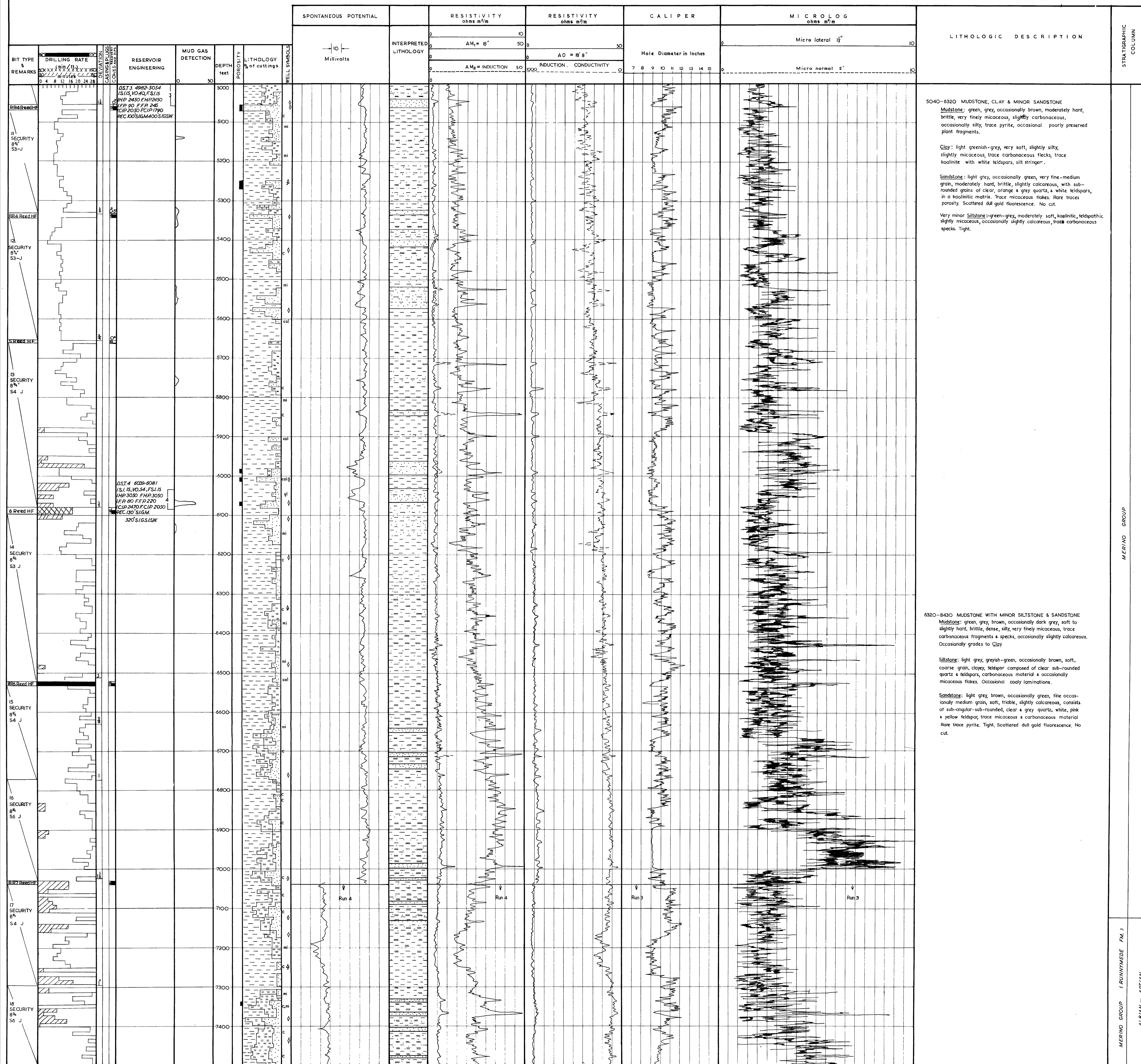
STRATIGRAPHIC COLUMN  
UNNAMED RECENT  
GAMBIER LIMESTONE OLI-GOCCENE - MIOCENE  
BUCCLEUCH GROUP UPPER EOCENE  
KYRIOT GROUP LOWER TO MIDDLE EOCENE  
UN-NAMED UPPER CRETACEOUS  
P. PALEOCENE TO



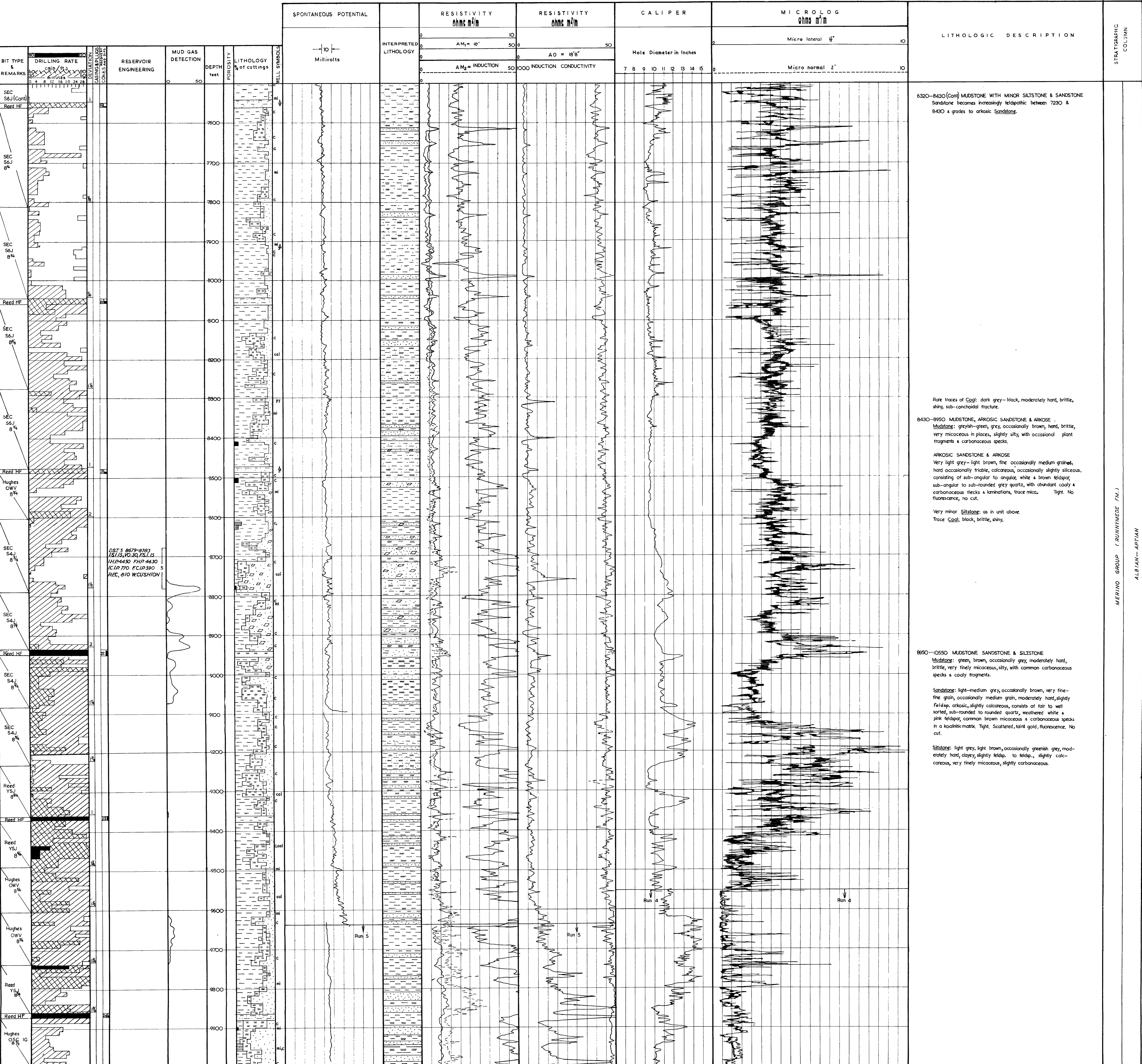


GELTWOOD BEACH No.1

PLATE 1  
SHEET 3



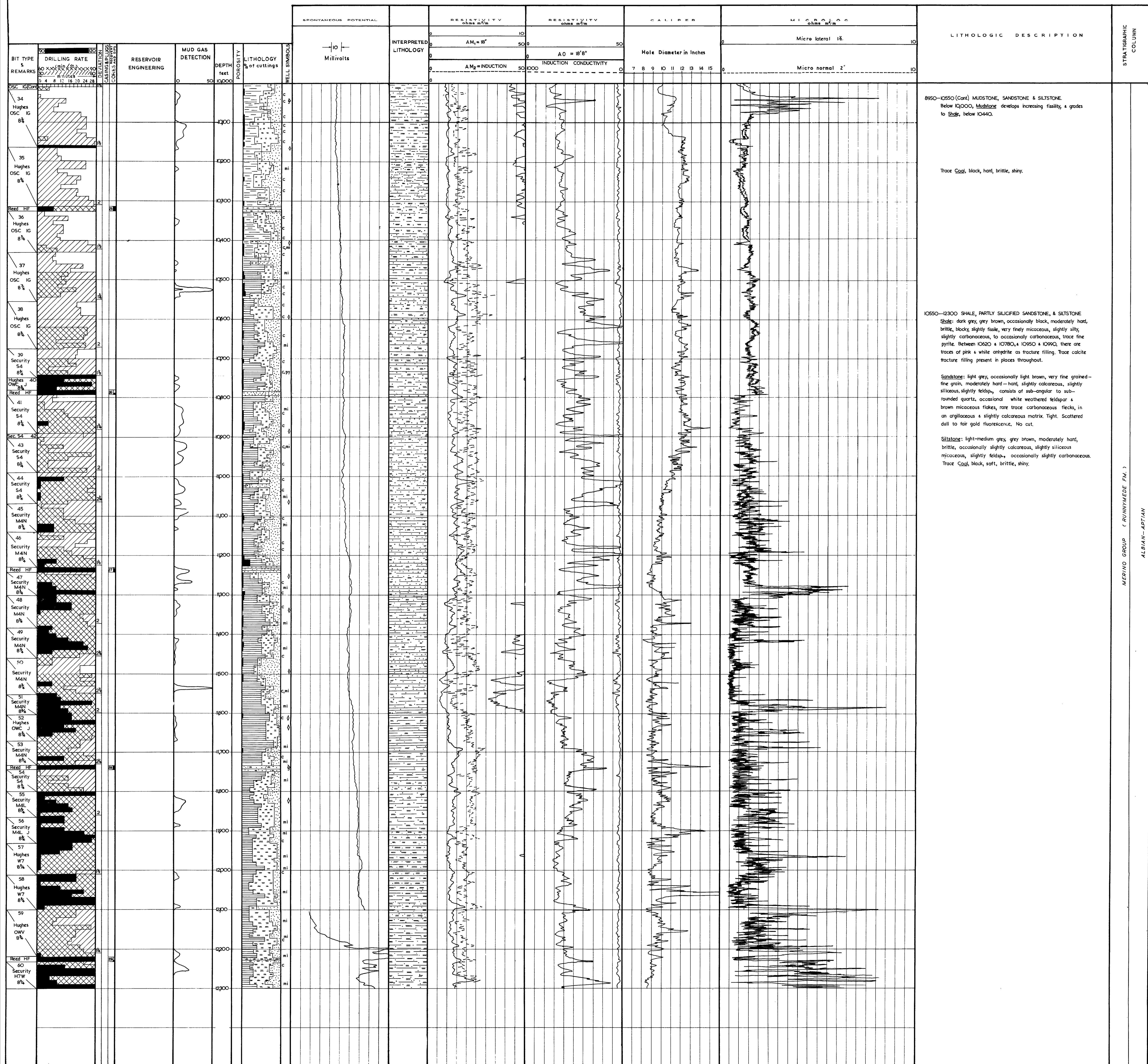
GELTWOOD BEACH No.1



MERINO GROUP (RUNNYMEDE FM.)

ALBIAN - APTIAN

GELTWOOD BEACH No.1



8950-10550 (Cont) MUDSTONE, SANDSTONE & SILTSTONE  
Below 10000, Mudstone develops increasing fissility, & grades to shale, below 10440.

Trace Coal, black, hard, brittle, shiny.

10550-12300 SHALE, PARTLY SILICIFIED SANDSTONE, & SILTSTONE  
Shale: dark grey, grey brown, occasionally black, moderately hard, brittle, blocky, slightly fissile, very finely micaceous, slightly silty, slightly carbonaceous, to occasionally carbonaceous, trace fine pyrite. Between 10620 & 10780, & 10950 & 10990, there are traces of pink & white anhydrite as fracture filling. Trace calcite fracture filling present in places throughout.

Sandstone: light grey, occasionally light brown, very fine grained - fine grain, moderately hard - hard, slightly calcareous, slightly siliceous, slightly feldsp., consists of sub-angular to sub-rounded quartz, occasional white weathered feldspar & brown micaceous flakes, rare trace carbonaceous flecks, in an argillaceous & slightly calcareous matrix. Tight. Scattered dull to fair gold fluorescence. No cut.

Siltstone: light-medium grey, grey brown, moderately hard, brittle, occasionally slightly calcareous, slightly siliceous micaceous, slightly feldsp., occasionally slightly carbonaceous. Trace Coal, black, soft, brittle, shiny.

MERINO GROUP (RUNNYMEDE FM.)  
ALBANY-APTIAN