



W 572

COLLECTOR'S REPORT ON W 572

COMPLETION REPORT

by

Goldside Oil N.I.

April 1979

Oil

W572



Plus 2 Sheets
PP & T/S.

2 T/S Composite New Log

OIL and GAS DIVISION

COLLIERS HILL NO. 1 WELL

COMPLETION REPORT

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April 1970

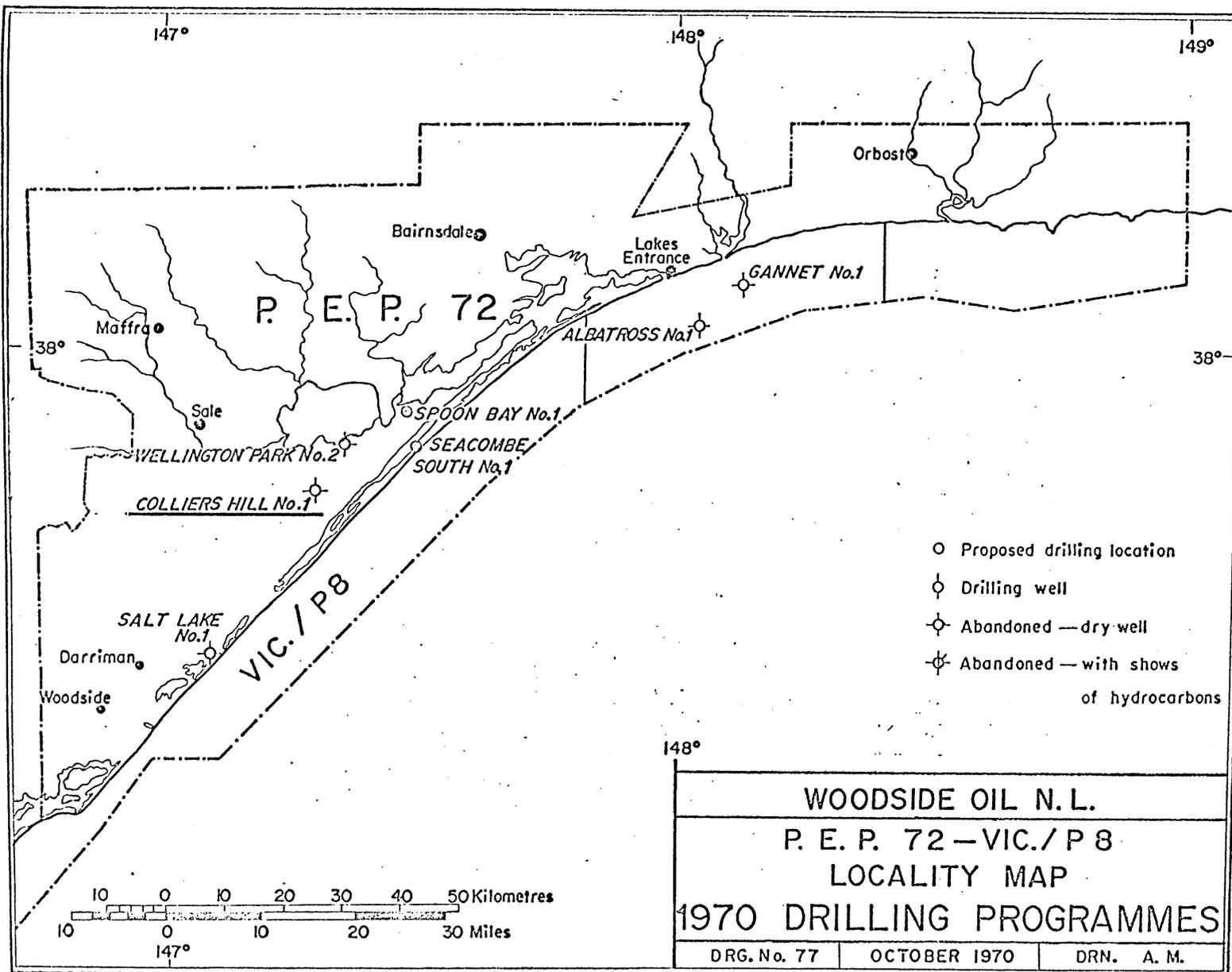


Figure 1

PE904810

This is an enclosure indicator page.
The enclosure PE904810 is enclosed within the
container PE904805 at this location in this
document.

The enclosure PE904810 has the following characteristics:

ITEM_BARCODE = PE904810
CONTAINER_BARCODE = PE904805
NAME = Colliers Hill 1 Location Map
BASIN = GIPPSLAND
ON_OFF = ONSHORE
PERMIT = PEP 72
TYPE = WELL
SUBTYPE = MAP
DESCRIPTION = Colliers Hill 1 Location Map.
REMARKS =
DATE_CREATED =
DATE_RECEIVED = 23/04/70
W_NO = W572
WELL_NAME = Colliers Hill 1
CONTRACTOR =
CLIENT_OP_CO = Woodside Oil N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

COLLIERS HILL NO. 1 WELL

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1. Surveyor's Locality Map.
2. Well Location Map.

Enclosures:

1. Composite log (2 sheets and key to abbreviations)
2. Well Correlation diagram.

Appendices

1. Notes on surveying of well. ✓
2. Cuttings descriptions.
3. Sidewall core descriptions.
4. Drill Stem Test reports.
5. Lithology.
6. Palynology (Added by DNRE 24/6/99)

Other Reports

1. Well Velocity Survey. ✓

SUMMARY

Colliers Hill No. 1 well was spudded on 9th January, 1970, and reached a total depth of 5612 feet on 31st January, 1970. The well encountered the following sequence:-

	<u>Well Depths</u>
Post Gippsland Limestone sediments	0' - 473'
Gippsland Limestone	473' - 1458'
Lakes Entrance Formation	1458' - 1802'
Latrobe Valley Coal Measures	1802' - 4132'
Golden Beach Beds	4132' - 5612' (TD)

No oil or gas was encountered during drilling and the well was plugged. Below a depth of 2300 feet it was abandoned. Above 2300 feet the well was handed over to Schlumberger Seaco Inc. for their use.

During drilling one drill stem test was conducted over the interval 1760' - 1870'. This test recovered a sample of water and pressure data from the sands at the top of the Latrobe Valley Coal Measures, but no hydrocarbons.

A series of sidewall cores were taken to assist in the lithological interpretation of the well section and also for palynological examination.

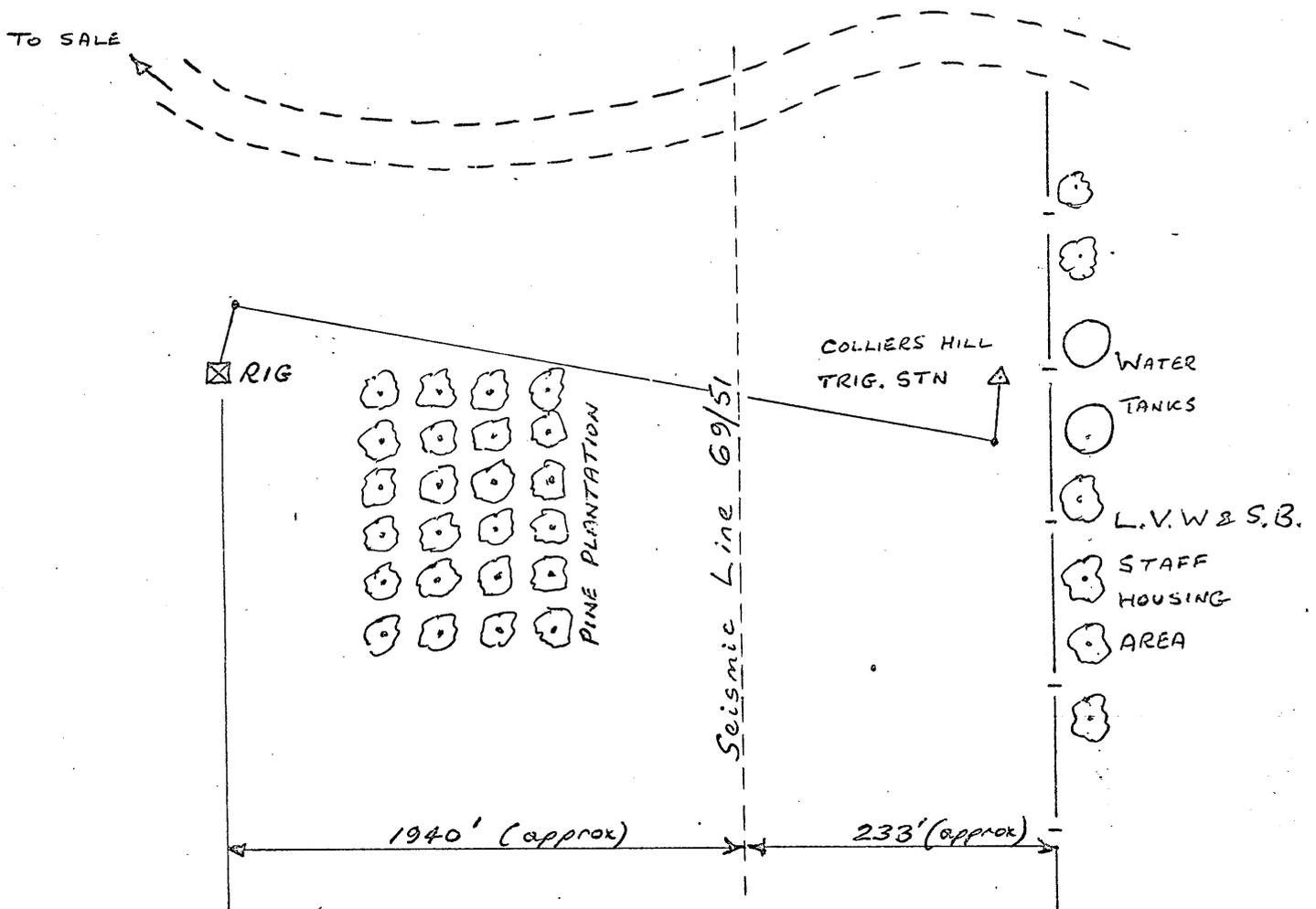
From a geological point of view this well has indicated a thickening of the Golden Beach Beds in a westerly direction from Golden Beach West No. 1 and Dutson Downs No. 1 Well.

1. GENERAL DATA

- (a) Well name and number: Colliers Hill No. 1.
- (b) Location: Latitude: 38° 11' 56"
 (Figs. 1 & 2) Longitude: 147° 17' 30"
 Datum: Australian Geodetic Datum
 Parish: Dulungalong
 See Appendix 1
- (c) Names of Tenement Holders: Woodside Oil N.L. (Operator)
 Australian Oil & Gas Corp.Ltd.
 B.O.C. of Australia Ltd.
 Continental Oil Co. of Aust Ltd.
 Planet Exploration Co. Pty.Ltd.
- (d) Details of Petroleum Tenement: Petroleum Exploration Permit No. 72 Issued by The State of Victoria.
- (e) Total Depth: 5612 feet.
- (f) Date drilling began: 9th January, 1970.
- (g) Date drilling ended: 31st January, 1970.
- (h) Date well completed: 3rd February, 1970.
- (i) Date rig released: 5th February, 1970.
- (j) Drilling time to T.D.: 22 days
- (k) Elevation: Ground 39.38 feet above sea level.
 RT 53.28 feet above sea level
 KB Well Datum 54.58 feet above sea level
 Datum: Williamstown Datum.
- (l) Status: Below a depth of 2300 feet the well was plugged and abandoned. Above 2300 feet the well was abandoned and left for Schlumberger Seaco Inc. to use for training Purposes.

WOODSIDE OIL N.L.
GIPPSLAND OIL RIG LOCATION SKETCH.

LOCATION:- Colliers Hill Rig.



GEOGRAPHICALS:- LATITUDE $38^{\circ}11'56''$ LONGITUDE $147^{\circ}17'30''$

AMG Coordinates N 5772 060.70 E 525 531.70
(Metres) A Zone 55

REDUCED LEVELS:- Ground Level 39.38 feet
Rotor Table 53.28 feet
Kelly Bushing 54.58 feet

LEVEL DATUM:- Williamstown

CADASTRAL DESCRIPTION:- Crown allotment 36 section C
Parish of Dulungalong
County of Buln Buln

Surveyed By	L. L. C.	Approved	P. F. G
Calculations	L. L. C.	Date	19.2.70
Drawn	L. L. C.	Drawing No.	112/1

ENGINEERING SURVEYS (AUSTRALIA) PTY. LIMITED
166 - 168 Albert Road, SOUTH MELBOURNE

L.V.W. & S.B. = Latrobe Valley Water and Sewerage Board.

PE904811

This is an enclosure indicator page.
The enclosure PE904811 is enclosed within the
container PE904805 at this location in this
document.

The enclosure PE904811 has the following characteristics:

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 PERMIT = PEP 72
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 SUBTYPE = MAP
DESCRIPTION = Colliers Hill 1 Well Locality Map.
 Figure 2 of WCR.
REMARKS =
DATE_CREATED = 31/01/70
DATE_RECEIVED = 23/04/70
 W_NO = W572
 WELL_NAME = Colliers Hill 1
CONTRACTOR =
CLIENT_OP_CO = Woodside Oil N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

2. DRILLING DATA

(a) Contractor: Woodside Oil N.L.'s drilling rig and equipment were operated by Richter Bawden Drilling Pty. Ltd.

(b) Drilling Plant:

Make: Brewster

Type: N - 4

Rated capacity with
3½" drill pipe: 7,500 feet

Rated capacity with
4½" drill pipe: 6,000 feet

Motors: G.M. Diesel, 6-71 twin 6, rated 396 BHP.

(c) Mast:

Make: Lee C. Moore

Type: Jackknife, 126 feet.

Capacity: 368,000 lbs.

(d) Pumps - Two:

Make: Oilwell

Type: 214 P

Size: 7½" x 14"

Motors: G.M. diesel 6-71 twin 6, rated 396 BHP.

(e) Blowout preventer equipment:

(i) Make: Cameron
Size: 12" double rams
Series: 900

(ii) Make: Reagan 10"
Series: 900

(f) Hole Size, Casing, and Cementing:

Hole Size	23½"	20"	12¼"	8¾"
Interval	0'-30'	30'-220'	220'-1782'	1782'-T.D.

Casing:

Size	20"	13⅜"	9⅝"
Weight	64 lbs.	48 lbs.	36 lbs.
Grade	-	H40	J55
Range	-	R2	R2
Setting Depth	30'	206'	1760'

Cementing Casing:

Quantity (Sx)	20	168	510
Cemented to:	Bottom of collar	100'	Surface
Method	Hand mixed	Halliburton cementing unit. Float-shoe and top-cement plug used.	Halliburton cementing unit. Guideshoe, float collar, top and bottom cement plugs used.

(g) Drilling Fluid

(i) Type and Treatment

A Freshwater - Bentonite - Lignosulphonate system of drilling mud was generally used throughout the well.

From 0' to 210' a freshwater conventional mud with minor treatment was used. From 210' to T.D. a Milwhite lignosulphonate system was used with regular treatments of unicol, milcon, caustic soda, supercol and cellucol.

(ii) Average Weekly Proportions:

Week.	Depth Ft.	Weight lbs. U.S. Gall.	Visc. Secs/ 946 cc	W.L. c.c.	FC ins.	pH.
1		9.5	56	9	3/32	9.5
2		9.8	52	8	2/32	9.5
3		10.00	43	5.5	2/32	9.7

(iii)	Acquagel	12,950 lbs.	Cellucol	1265 lbs.
	Volclay	21,726 lbs.	Soda Ash	933 lbs.
	Supercol	15,050 lbs.	Barytes	5000 lbs.
	Unicol	4,650 lbs.	Cekol CMC	400 lbs.
	Milcon	1,550 lbs.	Micatex	100 lbs.
	Caustic Soda	980 lbs.	Ca Cl2	1120 lbs.

(h) Water Supply: was pumped from a water channel operated by the Latrobe Valley Water and Sewerage Board.

(i) Perforations and Shooting: Nil

(j) Plug back and cementation jobs: Nil

Abandonment plugs 5400' - 5500'
 4080' - 4180'
 2300' - 2500'

(k) Fishing Operation: Nil

(l) Side-tracking hole: Nil

3. LOGGING AND TESTING

(A) Ditch cuttings.

Representative samples were collected at the shale shaker every 10 feet. These samples were washed, dried and examined. The descriptions of them are give in appendix 2.

(B) Coring.

No conventional cores were cut, but 30 sidewall cores were attempted and 29 recovered.

Details of these cores are given in appendix 3.

(C) Electrical and other logs.

Schlumberger Seaco Inc. ran the following logs:

(1) Induction Electrical Log.

- Run 1: 202' - 1797'
- Run 2: 1758' - 5053'
- Run 3: 4493' - 5592'

(2) Borehole Compensated Sonic/Gamma Ray Log.

- Run 1: 203' - 1800' (No gamma ray)
- Run 2: 1758' - 5042' (Gamma Ray: 200' - 5042')
- Run 3: 5043' - 5573'

(3) Compensated Formation Density Log.

- Run 1: 203' - 1799'
- Run 2: 1758' - 5053'

(4) Continuous Dipmeter Survey:

- Run 1: 1756' - 5576'

(D) Drilling time.

Drilling time was recorded by a "Geograph" mounted on the derrick floor. The penetration rate is plotted on the composite log.

(E) Gas Log.

Gas detecting equipment, including gas chromatography, was supplied, operated and maintained by Data Analysis Pty. Ltd. at the well site. The equipment was continuously in operation during drilling.

(F) Testing.

One drill stem test was conducted over the interval 1760' - 1870' in order to obtain a sample of water and pressure data from the top of the Latrobe Valley Coal Measures. This test was conducted by Halliburton Ltd. whose report is included as Appendix 4..

(G) Deviation Survey.

Seventeen measurements of the deviation of the hole were made during drilling. The details were:-

Deviation (degree)	Depth (feet)	Deviation (degree)	Depth (feet)
$\frac{1}{4}$	210	$1\frac{3}{4}$	1512
$\frac{1}{4}$	335	$1\frac{1}{4}$	1750
$\frac{3}{4}$	435	$1\frac{1}{2}$	2340
$\frac{3}{4}$	548	$\frac{1}{4}$	3820
1	667	2	2952
$\frac{3}{4}$	847	1	3342
$1\frac{1}{4}$	1028	$1\frac{1}{2}$	4245
1	1210	$\frac{1}{2}$	4672
1	1362		

(H) Velocity Survey

A velocity survey was conducted over the interval 1405' to 5200' when the well had reached total depth. This survey was conducted by United Geophysical Corporation who have reported the results separately.

REGIONAL GEOLOGY

The Gippsland Basin is located in south^{east}western Victoria both onshore and offshore, with the greater part of the basin being offshore.

The term "Gippsland Basin" has been used to cover the area of sedimentation of Mesozoic to Tertiary rocks in eastern Victoria, but is now restricted to that of Upper Cretaceous and Tertiary rocks. These sediments rest on Lower Cretaceous and Palaeozoic rocks.

The Palaeozoic rocks are seen cropping out to the north of the basin and in bores drilled at its margin. These rocks form part of the north-south trending Tasman Geosyncline which extended along the eastern coast of Australia.

The Lower Cretaceous sediments are a thick sequence of feldspathic sandstone, siltstone and mudstone and are considered economic basement. These sediments show an east-west trend which is in contrast to that of Palaeozoic rocks. (Richards & Hopkins, 1969; Weeks & Hopkins, 1967).

The Gippsland Basin, as now defined, contains over 15,000 feet of sediments occupying a roughly triangular area whose apex is onshore and base offshore and parallel to the present coastline.

Sedimentation in this basin developed a delta complex (Wallis, 1967) of essentially non-marine rocks which range in age from Upper Cretaceous to late Eocene. From a study of well data these sediments have been divided into an upper unit and a lower unit. The upper unit has been named the "Latrobe Valley Coal Measures" and is made up predominantly of coal and sands. The lower unit is called the "Golden Beach Beds" and consists of mudstone with interbedded sandstones.

From well data it is seen that a major change occurs between the Latrobe Valley Coal Measures and the overlying Lakes Entrance Formation. This is seen as a change from non-marine to marine sedimentation, as an unconformity, and as channel erosion of the Latrobe Valley Coal Measures.

At the end of Latrobe Valley Coal Measures deposition an eroded topographic surface was developed across which diachronic sediments of a marine transgression were laid down. From a regional point of view these sediments, The Lakes Entrance Formation, have a basal glauconite sandstone followed by calcareous mudstone or marl. (Hocking & Taylor, 1964.)

Marine conditions persisted with the transgression extending further to the west than the initial transgression. In discussion of the Tertiary Sediments of the Gippsland Basin it is common for writers to talk about the Lakes Entrance Formation and the overlying Gippsland Limestone as two distant rock units. This is satisfactory in the Lakes Entrance area but becomes somewhat less satisfactory away from there. The lithology of the two units is similar except towards the top of the Gippsland Limestone where Bryozoal and other limestones occur. However, a boundary can usually be picked by using electrical and other logs.

Above the Gippsland Limestone two other units of marine rocks are encountered in the basin. These are the Tambo River Formation of marl and the overlying Jemmy's Point Formation of shelly sands and marls.

The overlying and surface sediments are non-marine and consist of sands, clays and gravels of the Boisdale Beds, Haunted Hills gravels and Quaternary sediments. (Jenkin, 1968).

STRATIGRAPHY

The sequence found in Colliers Hill No. 1 was as follows:

<u>Age</u>	<u>Formation</u>	<u>Depth</u>	<u>Thickness</u>
U.Pliocene-Recent	Post Jemmy's Point	0'	290'
L.Pliocene	Jemmy's Point	290'	100'
U.Miocene	Tambo River	407'	83'
Miocene	Gippsland Limestone	473'	987'
Oligocene	Lakes Entrance	1458'	338'
Eocene	Latrobe Valley Coal Measures	1802'	2330'
Paleocene/ U. Cretaceous	Golden Beach Beds	4132'	1480+'
TOTAL DEPTH		5612'	

The recognition of the rock units given in the Stratigraphic Table is based on sidewall cores, cuttings and wire-line log characters. These characters were correlated with the Dutson Downs No. 1 well and other wells drilled in the area. The ages assigned to the rock units are those generally accepted to these units in the Gippsland Basin. (Hocking 1965 & Jenkin 1968).

Post Jemmy's Point Formation (0' - 290')

The poor quality of the samples and the incomplete wire-line logs obtained from this unit did not allow further subdivision.

The samples obtained, consisted of sands with minor clays, silts, gravels and marls. The presence of peat and coal in the cuttings suggests that at least some of the Boisdale Beds were encountered.

Jemmy's Point Formation (290' - 390')

This unit consists of marine sediments of Lower Pliocene age. In the Colliers Hill No. 1 well it was present as sands and sandstones with many marine fossils. The lithology in this well differs from that of the type area where it has been described as sandy calcarenite, calcareous sandstone and foraminiferal silty sand. The Colliers Hill well was drilled close to the Baragwanath Anticline, which was emergent promontory from late Miocene times, and thus the sands and sandstones encountered represent a shoreline facies of Jemmy's Point sedimentation. The top of this formation has been selected where the first marine fossils occur together with wire-line log character.

Tambo River Formation (390' - 473')

This rock unit is found to have a fairly constant lithology and thickness over the area of marine Tertiary sedimentation of the Gippsland Basin. It consists of slightly sandy calcareous marl with Bryozoa, Ditrupea and other fossil material.

Gippsland Limestone (473' - 1458')

The top of the Miocene Gippsland Limestone has been selected at the first appearance of limestone in the cuttings. This depth was correlated with changes in the character of the wire-line logs especially the sonic log where a decrease in Interval Transit Time from 155 to 140 microseconds per foot occurred. The lithology of the whole unit consists of limestone, calcarenite and marl.

Lakes Entrance Formation (1458' - 1802')

The overlying marl of the Gippsland Limestone differs from the marl of the Lakes Entrance formation because the latter is more compact, less sandy; however, the lithological differences are extremely minor. The lithology consists of marl underlain by a less shaly marl or calcilutite with a dolomite bed, 10 feet thick, separating the marly section from a basal glauconitic sandstone. The top of this unit was selected on wire-line characters defined by Hocking 1965.

Latrobe Valley Coal Measures (1802' - 4132')

This unit consists of sands, silts, clays and coal, and represents the first non-marine sediments encountered in the well below 290'. As the contact of this unit with the overlying Lakes Entrance Formation is a sand-on-sand contact, reliance for its selection was put on the sidewall cores. The sidewall cores at 1798' and 1804' indicated that the top of the unit must lie between these depths. Subsequently the depth of 1802' was selected from the wire-line log characters for the top of the Latrobe Valley Coal Measures.

Golden Beach Beds (4132' - 5612' T.D.)

The top of these beds has been selected from the electrical log and cuttings. In the cuttings an increase in clay content was accompanied by a greater degree of compactness of the clay in the sediment. These two features allowed the recognition of these beds from cuttings alone. The wire-line logs also showed a change at this level and allowed 4132' to be selected as the top of the beds. (Esso 1966).

The Golden Beach Beds are composed of mudstone, sandstone and siltstone in the proportion of 52% mudstone, 40% sandstone and 8% siltstone.

Further details of lithology are given in appendix 5 and included on the Composite log (Encl. 1).

RESULTS OBTAINED FROM DRILLING

The study of the results obtained from drilling are considered under 3 headings:-

1. "H" to "K" interval.
2. Golden Beach Beds.
3. Hydrocarbons.

1. "H" to "K" Interval.

Before the drilling of the Colliers Hill No. 1 well the seismic survey results indicated two horizons. The upper horizon ("H") was considered to represent the top of the Latrobe Valley Coal Measures and the lower horizon ("K") was regarded as the top of the first coal seam. Between these two horizons sand was thought to be present.

The velocity survey and sonic logging carried out in this well have made it possible to identify these horizons with more accuracy.

"H" horizon has a two-way reflection time of 510 milliseconds which from the velocity survey is at a depth of 1685 feet. Similarly the "K" horizon has a two-way reflection time of 550 milliseconds which from the velocity survey is at a depth of 1800 feet.

From a study of the sonic log the "H" horizon is correlated with a decrease in interval transit time from 180 to 130 microseconds per foot at a depth of 1615 feet. Similarly "K" horizon can be correlated with a depth of 1780 feet.

Now it is known that in Colliers Hill No. 1 well the "H" horizon occurs within the Lakes Entrance Formation and the "K" horizon remains unchanged as the top coal seam encountered.

The sand which was predicted to be about 50 feet thick was found to be only 15 feet thick. Part of this sand is made up of the basal glauconite sandstone of the Lakes Entrance Formation.

2. Golden Beach Beds

Before drilling it was expected that economic basement (i.e. Strzelecki Group) would be encountered at about 4750 feet. This depth estimate was based on regional geological studies together with seismic interpretation. When drilling was stopped at 5612 feet, economic basement had not been reached. The unexpected thickness (Enclosure 2) of the Golden Beach Beds in the Colliers Hill No. 1 well has indicated that very little reliance can be placed on the seismic information below the coal measures.

Some possible reasons for this thickening are given:

- a:- Golden Beach Beds laid down on an irregular surface of Strzelecki Group sediments.
- b:- Faulting of the Strzelecki Group before the Golden Beach Beds were laid down.
- c:- Erosion of the Golden Beach Beds before the deposition of the Latrobe Valley Coal Measures.

d:- Different rates of subsidence during sedimentation in various parts of the basin.

e:- Combination of any of the above.

3. Hydrocarbons

No hydrocarbons were detected during the drilling of this well.

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NOTES ON SURVEYING OF WELL

The well location was surveyed by Engineering Surveys (Australia) Pty. Ltd. of South Melbourne. The following notes accompanied their location sketch (Figure One)

- (1) Co-ordinates and latitude and longitude are based on the Australian Geodetic Datum.
- (2) Levels are based on the Williamstown Datum which is also the datum used for the 1969 seismic survey.
- (3) The position of seismic line 6951 could not be located on the ground and so its position is approximate.

The latitude and longitude given on the Schlumberger logs are the preliminary figures calculated from the Scale 1" = 1 mile military map whose datum is not the Australian Geodetic Datum, but is the Sydney Observatory.

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
30'-40'	100	<u>Sand</u> loose med/coarse subrounded to rounded clear & occ. cloudy quartz. Trace iron staining. Trace yellow & reddish clay and siltstone. Variable returns Clay may be dissem. in drilling fluid.
40'-50'	100	<u>Sand</u> as above. Some ang. grains - conglomeratic? Some yellow & white felspar grs? Minor amounts volcanic grs.
50'-60'	100	<u>Sand</u> (Conglomeratic in part) as above.
60'-70'	100	<u>Sand</u> med/coarse grained quartz & some feldspars as above. Gns. subangular to subrounded.
70'-80'	100	<u>Sand</u> coarse-very coarse, clear-white quartz grains sub ang - rounded. Gravel & pebbles?
80'-90'	100	<u>Sand</u> medium-coarse as above.
90'-100'	100	<u>Sand</u> medium-coarse & pebbles & gravel
100'-110'	100	<u>Sand</u> as above. Some felspar grains.
110'-120'	100	<u>Sand</u> as above pebbly in part.
120'-130'	100	<u>Sand</u> and pebbles as above.
130'-140'	100	<u>Sand</u> coarse - very coarse. Trace med. gr. quartz, felspar & rare black lithic grains. Sl. calc. in part. Trace black soft sl. pyritic coal subang-rounded pebbly-gravel. <u>Siltstone</u> brown dirty.
140'-150'	100	<u>Sand</u> as above also rare volcanic grains. Grains med. to very coarse. Rare calcareous grains.
150'-160'	100	<u>Sand</u> as above
160'-170'	100	<u>Sand</u> Predominantly med. to coarse ang. to subrounded, colourless, cream. Random ferruginised grains. Tr. pyrites, mica, detrital material. Grains of felspar.
180'-190'	100	<u>Sand</u> Predominantly, more uniform (crs. grd.) Abundant detrital grains. Tr. calcareous fractions, also felspar fragments blk. coal.
190'-200'	100	<u>Sand</u> as above. Random gravel fractions.
200'-210'	100	<u>Sand</u> as above. Black coal fragments. Trace detrital grains.
210'-220'	100	<u>Sand</u> Colourless, pale grey, milky qtz. grains, subrnd - rnd., med-coarse grd., poorly sorted, ferruginised in pt., trace calcite. Random detrital grains, variable blk. coal fragments.
220'-230'	100	<u>Sand</u> Mostly colourless, milky white qtz., crs.-very crs., subrnd. subang., partly ferruginised; trace felspar, occas. flakes mica, often coarse. Random coal fragments.
230'-240'	100	<u>Sand</u> As above.
240'-250'	100	<u>Sand</u> As above with increased proportion of mica.

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
250'-260'	100	<u>Sand</u> As above with increased proportion of mica.
260'-270'	100	<u>Sand</u> As above with increased proportion of mica.
270'-280'	100	<u>Sand</u> As above with abundant ferruginised fragments coal (blk.) fragments prominent.
280'-290'	100	<u>Sand</u> Predominant colourless, cloudy qtz. grains, subang., subrnd., poorly sorted, random feldspar aggregates; tr. black coal fragments, mica.
290'-300'	100	<u>Sand</u> as above, prominent mica flakes.
300'-310'	100	<u>Sand</u> as above.
310'-320'	100	<u>Sand</u> as above with random f.grd., sandst. aggregates, & prominent platy mica; brown & black coal chips, <u>Sst.</u> random feldspar grains.
320'-330'	100	<u>Sand</u> dom. qty. grains, colourless, milky wh. & Random siliceous grains, ang., subang. poorly <u>Sst.</u> sorted. Random coal (blk, brn.) feldspar. Abundant mica flakes. Skeletal remains of Echinoderms & Lamellibranchs, fragmentary in nature.
330'-340'	100	<u>Sand</u> as above siliceous fragments; abundant shelly & fractions including Gastropods & Echinoderm <u>Sst.</u> remains. Abundant platy mica.
340'-350'	100	<u>Sand</u> as above. Abundant shelly material, dom. & Gastropod and Lamellibranch remains. <u>Sst.</u>
350'-360'	100	<u>Sand</u> as above. Very crs. shelly material dom. & gastropod remains. Random forams. <u>Sst.</u>
360'-370'	100	<u>Sandstone</u> quartzose sd.-as above
370'-380'	100	<u>Sandstone</u> quartzose sd.- as above
380'-390'	100	<u>Sandstone</u> dom. colourless, pale gry. aggregates, siliceous in pt., with lithic inclusions, partly kaolinitic. Random milky white colourless qtzose, subang., poorly sorted., together with gastropod shelly material.
390'-400'	100	<u>Sandstone</u> dom. siliceous aggregates mostly f. grd., lithic inclusions shelly fractions.
400'-410'	100	<u>Sandstone</u> dom. fine grd. aggregates, siliceous, carbonaceous calcareous, (calcarenite?), random qtzose fragmts. (cavings?)! Shelly fragmts., Ditrupa-worm
410'-420'	100	<u>Sandstone</u> <u>Sand</u> Sandstone, f.grd. aggregates, siliceous calcareous tending to calcarenite with carbonaceous inclusions; <u>Qtzose</u> . Crs. to v.crs., subrnd. to rounded, pale grey, milky white. Ditrupa & coral remains (Polyzoal lmst?) Random gravel bands
420'-430'	100	<u>Qtzose</u> <u>Sandstone</u> As above with embedded fossils. Qtzose fractions v. crs. to granule sizes. Random v.crs. fossil fragments.

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
430'-440'	100	<u>Qtzose.sst.</u> As above with increasing amts. of Ditrupa casts (megascopic). Formation continues to be marly.
440'-450'	100	<u>Sandstone</u> Fn. grd., kaolinitic, strongly calcareous, approaching calcarenite sst. aggregates, with black & dk. grn. lithic inclusions. Loose qtzose, v. crs. to granule size. Sample is heavily impregnated with marl. Abundant shelly fragmts.
450'-460'	10	<u>Siliceous Sandstone</u> pale gry, colourless, f-med. grd., kaolinitic, strongly calcareous with prominent dk. grn. & blk. lithic inclusions. Abundant colourless milky wht. qtzose, v.crs.-granule sized. Increased proportion megascopic fossil remains including Polyzoan corals
	90	Sample very marly.
460'-470'	90	Predominantly grey marl, (ooze), argillaceous.
	10	Siliceous sst. & qtzose. as above.
470'-480'	100	<u>Clay-Marl?</u> (Not calc in part) light brown abund. fossil frags. Sandy (fine gr.) qtz. & lithic grains a siltstone - v. fine sand in part.
480'-490'	100	<u>Clay-Marl</u> As above.
490'-500'	40	<u>Siltstone</u> - <u>Sandstone</u> - fine-v.fine grained v. pale brown. Fossil frags. glauc? sl. sandy.
	60	<u>Limestone</u> bryozora, coral, lam. brack. echin. & forams calc. matrix. skeletal. porous in part. light brown to cream & white.
500'-510'	20	<u>Siltstone</u> <u>Sandstone</u>
	80	<u>Limestone</u> As above. predom. skel. fossil frags. Muddy in part.
510'-520'	40	<u>Calcareous Sandstone</u> Siltstone fine - v. fine grained - white - shell and coral fragments - glauconite grains, small amounts black detrital material.
	60	<u>Limestone</u> As above, many fossil coral & shell frags. slightly muddy. Trace Gypsum(?) Trace brown lithic m/s.
520'-530'	100	<u>Limestone</u> cream-white - fossil frags. with varying amounts of calc. cement. Skeletal & vuggy porosity in part. Prob. some marly patches & streaks.
530-540'	100	<u>Limestone</u> As above
540'-550'	100	<u>Limestone</u> As above
550'-560'	100	<u>Limestone</u> As above
560'-570'	100	<u>Limestone</u> As above

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
570'-580'	100	<u>Limestone</u> Fossil debris - corals bryozoa lamells. gastropods echinoderms. Some skeletal porosity. Variable calc. cement. Mostly fossil supported. Marly in part?
580'-590'	100	<u>Limestone</u> As above.
590'-600'	100	<u>Limestone</u> As above.
600'-610'	100	<u>Limestone</u> As above, also finer grained occ. sandy & silty. Still a small % of marl which washes out of the sample.
610'-620'	100	<u>Limestone</u> As for 610'.
620'-630'	100	<u>Limestone</u> As for 610'
630'-640'	70	<u>Limestone</u> As above
640'-650'	80 20	<u>Limestone</u> } <u>Calcarenite</u> } As above
650'-660'	30	<u>Limestone</u> } <u>Calcarenite</u> } As above
660'-670'	60 40	<u>Limestone</u> As above <u>Calcarenite</u> As above. More silty, clayey in part. Soft and friable.
670'-680'	70 30	<u>Limestone</u> } <u>Calcarenite</u> } As above. % of calcarenite may be more but difficult to est. accurately as it washes out.
680'-690'	40 60	<u>Limestone</u> } <u>Calcarenite</u> } As above.
690'-700'	40 30 30	<u>Limestone</u> } <u>Calcarenite</u> } As above. <u>Marl</u> Light-pale brown & grey. v. soft. silty. Shell frags.
700'-710'	30 10 60	<u>Limestone</u> as above. (may be all frags. out of marl) <u>Calcarenite</u> as above. grades to marl glauconitic. <u>Marl</u> Light - pale brown. calc. fossil frags & sand and silt particles & grains. Trace carb. particles.
710'-720'	100	<u>Marl</u> (calcilutite) light brown v. fine. fossil & sand & silt frags. May be more a mudstone or claystone. (Difficult to see how calc. matrix is) Some forams show glauconite replacement .
720'-730'	100	<u>Clay-Marl</u> As above.
730'-740'	100	<u>Clay-Marl</u> As above.
740'-750'	70 30	<u>Clay-Marl</u> As above. <u>Calcarenite</u> and <u>fossil frags.</u> as above.
750'-760'	30 50	<u>Clay-Marl</u> <u>Limestone</u> - <u>Calcarenite</u> pred. made up of fossil frags. - calc. cement but occ. sandy & silty.
760'-770'	40 10 20	<u>Clay-Marl</u> } <u>Limestone</u> } <u>Calcarenite</u> } As above.

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
770'-780'	60	<u>Clay-Marl</u>
	40	<u>Limestone</u> , arenaceous silty. Calcareonite.
780'-790'	70	<u>Clay-Marl</u>)
	30	<u>Calcareonite</u>) As above
790'-800'	40	<u>Clay-Marl</u>
	60	<u>Calcareonite</u> fine grained - v. fine silty. pred. fossil & calc. frags. glauconitic. quartzose rare carb. fragments.
800'-810'	50	<u>Clay-Marl</u>)
	50	<u>Calcareonite</u>) As above.
810'-820'	40	<u>Clay-Marl</u>)
	60	<u>Calcareonite</u>) As above.
820'-830'	60	<u>Clay-Marl</u> Soft. light br. calc. abund. fossil frags. & forams. sl. silty & sandy.
	40	<u>Calcareonite</u> light brown fine gr. calc. fossil frags. glauc. qtzose silty.
830'-840'	100	<u>Clay-Marl</u> As above.
	tr.	<u>Calcareonite</u>
840'-850'	100	<u>Clay-Marl</u>
	tr.	<u>Calcareonite</u>
850'-860'	100	<u>Clay-Marl</u>)
	tr.	<u>Calcareonite</u>) As above.
860'-870'	100	<u>Clay-Marl</u>
870'-880'	100	<u>Marl</u> Clayey, sl. silty, trace glauconite, forams & fossil fragments.
880'-890'	100	<u>Marl</u> As above.
890'-900'	30	<u>Marl</u> As above sl. more silty & fossiliferous
	20	<u>Calcareonite</u> & fossil frags.
900'-910'	30	<u>Marl</u>
	20	<u>Calcareonite</u> & fossil frags.
910'-920'	100	<u>Marl</u> sl. silty & fossiliferous
920'-930'	100	<u>Marl</u> As above.
930'-940'	100	<u>Marl</u> Fairly silty.
940'-950'	90	<u>Marl</u> light grey, ooze.
	10	<u>Calcareous sst.</u> fine-med. grd., with embedded fossil frags. Random dk. grn., grn., black lithic inclusions.
950'-960'	90	<u>Marl</u> As above.
	10	<u>Calcareous sst.</u> As above.
960'-970'	90	<u>Marl</u>)
	10	<u>Calcareous sst.</u>) As above.
970'-980'	90	<u>Marl</u>)
	10	<u>Calcareous sst.</u>) As above.
980'-990'	90	<u>Marl</u> - grey)
	10	<u>Calcareous sst.</u>) As above
990'-1000'	90	<u>Marl</u>)
		<u>Calcareous sst.</u>) As above

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
1000'-1010'	95 5	<u>Marl</u> <u>Calc. sst.</u> } As above with prominent coral & gastropod fragments.
1010'-1020'	95 5	<u>Marl</u> <u>Calc. sst.</u> } As above.
1020'-1030'	90 10	<u>Marl</u> grey, lt. gry, sticky. <u>Calc. sst.</u> - colourless, pale gry, fine grd. Poor porosity, variable calcareous content, with abundant fossil fragments embedded in matrix. Possible interbeds with limestone calcarenites.
1030'-1040'	90 10	<u>Marl</u> <u>Calcarenites</u> } As above.
1040'-1050'	90 10	<u>Marl</u> <u>Calcarenite</u> } As above.
1050'-1060'	100	<u>Marl</u> , very sticky. Random calcarenite, lmst(?) fractions.
1060'-1070'	100	<u>Marl</u> As above.
1070'-1080'	95 5	<u>Marl</u> As above. <u>Calc. Sandstone</u>
1080'-1090'	95	<u>Marl</u> <u>Calcarenite</u> } As above.
1090'-1100'	90 10	<u>Marl</u> <u>Calcarenite</u> } As above.
1100'-1110'	90 10	<u>Marl</u> <u>Calcarenite</u> } As above.
1110'-1120'	80 20	<u>Marl</u> very sticky <u>Calcarenite</u> - pale gry., gry., fine grd. aggregates. Strongly calcareous, intergranular qtzos with blk. & dk. grn. lithic inclusions. Random calcite and variable fossil fragments. Tr. ferrug. qtz.
1120'-1130'	60 40	<u>Marl</u> As above. <u>Calcarenite</u> - as above. The sample contains fairly large sized chips as well. Geolograph indicates variable rates of drilling, suggesting interbeds. Random loose qtzose (rnd., s/rnd.) and fossil frags.
1130'-1140'	60 40	<u>Marl</u> <u>Calcarenite</u> } As above.
1140'-1150'	70 30	<u>Marl</u> <u>Calcarenite</u> } As above.
1150'-1160'	70 30	<u>Marl</u> <u>Calcarenite</u> } As above.
1160'-1170'	60 40	<u>Marl</u> <u>Calcarenite</u> } As above.
1170'-1180'	70 30	<u>Marl</u> <u>Calcarenite</u> } As above.
1180'-1190'	30 20	<u>Marl</u> <u>Calcarenite</u> } As above.

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
1190'-1200'	80 20	<u>Marl</u> <u>Calcarenite</u> } As above.
1200'-1210'	90 10	<u>Marl</u> <u>Calcarenite</u> } As above.
1210'-1220'	90 10	<u>Marl</u> <u>Calcarenite</u> } As above.
1220'-1230'	75 25	<u>Marl</u> sticky, grey <u>Calcarenite</u> , sst. Calcarenite, pl. gry, colourless, fine grd., sst. fine grd. with black and drk. grn. inclusions. Variable amts. fossil remains & carbonaceous matter. Penetration rate suggestive, interbedding.
1230'-1240'	75 25	<u>Marl</u> As above <u>Calcarenite</u> & <u>Sandstone</u> Variable chips; qtzose compacted fine to med. grd. with widespread lithic components.
1240'-1250'	80 20	<u>Marl</u> Grey <u>Calcarenite</u> As above.
1250'-1260'	90 10	<u>Marl</u> <u>Calcarenite</u> } As above.
1260'-1270'	90 10	<u>Marl</u> <u>Calcarenite</u> } As above.
1270'-1280'	90 10	<u>Marl</u> Grey, tending dark grey. <u>Mixture of Calcarenite, sst., and Lmst.</u> Fine grd., pale gry. with variable amts. of skeletal remains embedded within the matrix.
1280'-1290'	90	<u>Marl</u> <u>Calcarenite</u> } As above.
1290'-1300'	90 10	<u>Marl</u> Grey, dk. grey, some as solid lumps. <u>Calcarenite</u> Pale grey, grey, dark brown, fine grd., kaolinitic in pt., strongly calcareous with dk. brn., black & dk. grn. lithics. Random crystalline qtzose also embedded within matrix. Fossil fragments evident.
1300'-1310'	90 10	<u>Marl</u> (lumps) <u>Calcarenite</u> } As above.
1310'-1320'	90 10	<u>Marl</u> , solid lumps <u>Calcarenite</u> } As above.
1320'-1330'	90 10	<u>Marl</u> <u>Calcarenite</u> } As above.
1330'-1340'	90 10	<u>Marl</u> <u>Calcarenite</u> - dk. grn, blk., brn. lithic inclusions also qtzose embedded within siliceous matrix.
1340'-1350'	75 25	<u>Marl</u> <u>Calcarenite</u> } As above.
1350'-1360'	70 30	<u>Marl</u> pale brown - light brown. <u>Calcarenite</u> Brown, calc. sl. quartzose in part. sl. glauconitic.

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
1360'-1370'	60	<u>Marl</u> As above.
	40	<u>Calcarenite</u> (a) light grey containing fossil fragments with a v. fine matrix. v. calcareous.
		(b) White & Speckled, soft & blocky contains fossil frags. & grains of CaCO ₃ , black grains (detrital?) glauconite, matrix v.v. fine & white.
1370'-1380'	70	<u>Marl</u> White to brownish, no fossil frags.
	30	<u>Calcarenite</u> As above, but with trace of hard brittle material.
1330'-1390'	70)	As above.
	30)	
1390'-1400'	80	<u>Marl</u> grey-light grey. soft & plastic. calc., sl. quartzose with occ. rounded lithic frags. & glauconite.
	20	<u>Calcarenite</u> grey, fairly compact, calc. frags. in a calc. groundmass, occ. lithic & glauconite grs.
1400'-1410'	80	<u>Marl</u> } As above. Fossil frags. few and very small.
	20	
1410'-1420'	70	<u>Marl</u> } As above.
	30	
1420'-1430'	80	<u>Marl</u> } As above.
	20	
1430'-1440'	90	<u>Marl</u>
	10	<u>Calcarenite</u>
1440'-1450'	90	<u>Marl</u> pale grey - pale brown calc. as above.
	10	<u>Calcarenite</u> as above.
1450'-1460'	100	<u>Marl</u> as above
	tr.	<u>Calcarenite</u>
1460'-1470'	100	<u>Marl</u> } As above.
	tr.	
1470'-1480'	100	<u>Marl</u> as above, also some lumps of darker grey - light grey, green, plastic v. calc. . Only rare lithics.
	tr.	<u>Calcarenite</u>
1480'-1490'	100	<u>Marl</u> soft pale grey, green, plastic. Included grains of rare quartz. Some fossil frags. glauconite. Also pale grey-light brown v. soft.
1490'-1500'	100	<u>Marl</u> As above.
1500'-1510'	100	<u>Marl</u> As above.
1510'-1520'	100	<u>Marl</u> As above.
1520'-1530'	100	<u>Marl</u> As above.
1530'-1540'	100	<u>Marl</u> As above.
1540'-1550'	100	<u>Marl</u> As above.

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
1550'-1560'	100	<u>Marl</u> As above.
1560'-1570'	100	<u>Marl</u> As above.
1570'-1580'	100	<u>Marl</u> As above.
1580'-1590'	100	<u>Marl</u> Grey to green, sticky, generally discharged in large lumps. Embedded within clayey matrix, loose colourless quartzose fine to medium grained subrnd. rnd. Variable fossil fragment distributed throughout.
1590'-1600'	100	<u>Marl</u> As above.
1600'-1610'	100	<u>Marl</u> As above.
1610'-1620'	100	<u>Marl</u> Greenish lmst. with possible thin interbeds of calcarenites.
1620'-1630'	100	<u>Marl</u> As above.
1630'-1640'	100	<u>Marl</u> As above.
1640'-1650'	100	<u>Marl</u> As above.
1650'-1660'	100	<u>Marl</u>
1660'-1670'	100	<u>Marl</u> Green argillaceous matrix. Colourless to grey calcareous matrix, random fossil fragments, impregnated throughout. Lithic fractions throughout. Tr. pyrites. Small chips discharged. Possible limestone interbeds.
1670'-1680'	90 10	<u>Marl</u> As above. <u>Calcilutite</u> <u>Calcarenite</u> admixture. Variably <u>Calcareous</u> . kaolinitic in part.
1680'-1690'	90 10	<u>Marl</u> <u>Calcarenite</u> <u>calcilutite</u> } As above. Glauconite in pt Random forams. Pyrite aggregates.
1690'-1700'	90 10	<u>Marl</u> <u>Calcarenite</u> Variably glauconitic throughout. Siliceous aggregates with random fossil impregnations.
1700'-1710'	90 10	<u>Marl</u> <u>Calcarenite</u> } As above.
1710'-1720'	90 10	} As above.
1720'-1730'	90 10	} As above.
1730'-1740'	90 10	} As above.
1740'-1750'	90 10	} As above.
1750'-1760'		Circulated sample.
	90	<u>Marl</u>
	10	<u>Calcarenite</u> Abundant pyrites also glauc. grains.

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
1760'-1770'	90	<u>Marl</u> Grnish.
	10	<u>Calcarenite</u> Pale grey, colourless, with quartzose fine grd., lithic inclusions. Inclusions of pyrite in matrix plus., glauconite grains. Variably calcareous Random fossil fractions.
1770'-1780'	100	<u>Marl</u> light brown - light grey, calc. & silty & sandy in part. Sl. glauconitic. Trace fine quartz. V. soft plastic.
1780'-1790'	100	<u>Marl</u> As above & trace light brown crystalline limestone or dolomite?
1790'-1800'	20	<u>Marl</u> As above.
	70	<u>Sandstone</u> Loose med/some coarse rounded sub rounded quartz., glauconite grains, trace pyrite. Some fossil fragments. Calc. matrix. Also some v. fine grained well sorted pale brown sandstone also glauconitic and slightly pyritic in part. light.
	10	<u>Coal</u> Brown lignitic fair rounded frags. prob. as grains in sand.
1800'-1810'	60	<u>Sand</u> med. rounded to sub rounded quartz. (clear & cloudy) trace glauconite pyrite, rare lithic grains. No apparent matrix. Fair to good sorting. Good porosity 10%-20%.
	40	<u>Coal</u> Lignitic dark brown-black.
1810'-1820'	20	<u>Sand</u> As above.
	20	<u>Siltstone</u> light brown, soft, carb., clayey.
	60	<u>Coal</u> silty and sandy in part.
		2" Cleavage planes visible.
1820'-1830'	10	<u>Sand</u> As above & fine gr. lithic silty quartzose carb.
	20	<u>Siltstone</u> As above.
	70	<u>Coal</u> brown-black fairly soft lignitic Silty and sandy.
1830'-1840'	10	<u>Siltstone</u>
	60	<u>Coal</u> brown-dk. brown. Muddy and silty in part. lignitic soft. Almost a carbonaceous siltstone or mudstone in part.
	30	<u>Claystone</u> light brown, kaolinitic micaceous sl. quartzose present in cuttings as a sticky clay.
1840'-1850'	10	<u>Siltstone</u>
	50	<u>Coal</u>
	40	<u>Claystone</u> Silty & sandy in part.) } As above.
1850'-1860'	10	<u>Siltstone</u>
	40	<u>Coal</u>
	50	<u>Claystone</u> as above. v.car. in part. trace med./coarse band grs.
1860'-1870'	10	<u>Siltstone</u>
	50	<u>Coal</u>
	40	<u>Claystone</u>
1870'-1880'	50	<u>Sand</u> med. rounded to subangular quartz (clear to milky), some lithic grains, trace glauconite, no obvious matrix, even size well sorted.
	50	<u>Coal</u> dark brown lignite as above.

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<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
1890'-1900'	50 50	<u>Sand</u> } As above. <u>Coal</u> }
1900'-1910'	60 40	<u>Sand</u> As above - little more angular. <u>Coal</u> As above.
1910'-1920'	50 50	<u>Sand</u> As above. <u>Coal</u> As above. Still trace pyrite and glauconite.
1920'-1930'	90 10	<u>Sand</u> med, well sorted, rounded to sub angular, milky to clear qtz., rare lithic frags., v. little pyrite or glauconite. <u>Coal</u> brown lignite.
1930'-1940'	40 60	<u>Sand</u> As above. <u>Coal</u> As above, slightly more silty.
1940'-1950'	10 30 10	<u>Sand</u> As above. <u>Coal</u> Light to dark brown, silty, soft & friable, trace pyrite & marcasite(?) <u>Siltstone</u> soft, muddy silt with carbonaceous particles.
1950'-1960'	30 70	<u>Sand</u> As above. <u>Coal</u> As above.
1960'-1970'	20 80	<u>Sand</u> As above. <u>Coal</u> As above. Trace siltstone, solid & brittle but friable to some extent, buff colour trace soft mudstone as clay with carbonaceous particles.
1970'-1980'	30 70	<u>Sand</u> } As above. <u>Coal</u> }
1980'-1990'	70 30	<u>Sand</u> med/coarse loose dom. clear with some cloudy qtz. well rounded to sub.ang. fair sorting. Trace brown staining. Rare glauc. & lithic grs. <u>Coal</u> black-dark brown, soft, platey silty & clayey in part. Some brown <u>claystone</u> also present in sample.
1990'-2000'	60 40	<u>Sand</u> } As above. <u>Coal</u> }
2000'-2010'	70 30	<u>Sand</u> } As above. <u>Coal</u> }
2010'-2020'	70 30	<u>Sand</u> med-coarse clear & cloudy qtz. rare lithic grs. rounded - sub-ang, fair sorting. Trace brown staining. <u>Coal</u> black to dark brown, soft, platey silty & shelly in part. Trace <u>claystone</u> in mud.
2020'-2030'	30 20	<u>Sand</u> } As above. <u>Coal</u> }
2030'-2040'	50 50	<u>Sand</u> } As above. <u>Coal</u> }
2040'-2050'	80 20	<u>Sand</u> } As above. <u>Coal</u> }
2050'-2060'	30 20	<u>Sand</u> } As above. <u>Coal</u> }
2060'-2070'	70 30	<u>Sand</u> } As above. <u>Coal</u> }

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
2070'-2080'	100	<u>Coal</u> Trace of v. coarse (1.00m) angular quartz sand.
2080'-2090'	90	<u>Sand</u> med/med coarse v. well sorted rounded/sub. rounded clear qtz. No staining.
	10	<u>Coal</u> As above.
2090'-2100'	80	<u>Sand</u>) As above.
	20	<u>Coal</u>)
2100'-2110'	80	<u>Sand</u>) As above.
	20	<u>Coal</u>)
2110'-2120'	80	<u>Sand</u>) As above.
	20	<u>Coal</u>)
2120'-2130'	90	<u>Sand</u>) As above.
	10	<u>Coal</u>)
2130'-2140'	60	<u>Sand</u>) As above. Trace of fine grained bluff colour
	40	<u>Coal</u>) m/s.
2140'-2150'	50	<u>Sand</u> As above.
	40	<u>Coal</u> Some parts getting blacker.
	10	<u>Siltstone</u> buff, speckled with carbonaceous grains - calcareous frags., brittle.
2150'-2160'	50	<u>Sandstone</u>) As above. Trace s/s, siltstone & mudstone
	50	<u>Coal</u>) some quite hard.
2160'-2170'	10	<u>Sandstone</u>) As above.
	90	<u>Coal</u>)
2170'-2180'	90	<u>Sand</u> Clear as above.
	10	<u>Coal</u>
2180'-2190'	50	<u>Sand</u>) As above.
	50	<u>Coal</u>)
2190'-2200'	90	<u>Sand</u> As above, iron stained.
	10	<u>Coal</u> As above.
2200'-2210'	90	<u>Sand</u>) As above.
	10	<u>Coal</u>)
2210'-2220'	70	<u>Sand</u>) As above.
	30	<u>Coal</u>)
2220'-2230'	80	<u>Sand</u> Loose med/coarse qtz. grs. well sorted, rounded-sub ang. only rare staining. Clear and cloudy qtz.
	20	<u>Coal</u> black, silty in part.
2230'-2240'	90	<u>Sand</u>) As above.
	10	<u>Coal</u>)
2240'-2250'	80	<u>Sand</u>) As above.
	20	<u>Coal</u>)
2250'-2260'	80	<u>Sand</u>) As above.
	20	<u>Coal</u>)
2260'-2270'	40	<u>Sand</u>) As above.
	60	<u>Coal</u>)
2270'-2280'	80	<u>Sand</u> med/coarse clean rounded - sub ang. qtz. well sorted.
	20	<u>Coal</u>

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
2280'-2290'	90 10	<u>Sand</u> } As above. <u>Coal</u> }
2290'-2300'	100 tr.	<u>Sand</u> } As above. <u>Coal</u> }
2300'-2310'	90 10	<u>Sand</u> } As above. <u>Coal</u> }
2310'-2320'	80 20	<u>Sand</u> } As above. <u>Coal</u> }
2320'-2330'	80 20	<u>Sand</u> } As above. <u>Coal</u> }
2330'-2340'	90 10	<u>Sand</u> med-coarse clean loose subr.-subang. clear and cloudy quartz grs. <u>Coal</u> black sl. silty & clayey in part. Soft lignitic.
2340'-2350'	100 tr.	<u>Sand</u> } As above. <u>Coal</u> }
2350'-2360'	100 tr.	<u>Sand</u> } As above. <u>Coal</u> }
2360'-2370'	80 20	<u>Sand</u> } As above. <u>Coal</u> }
2370'-2380'	80 20	<u>Sand</u> } As above. <u>Coal</u> }
2380'-2390'	60 20	<u>Sand</u> } As above. <u>Coal</u> }
2390'-2400'	70 30	<u>Sand</u> } As above. <u>Coal</u> }
2400'-2410'	30 20	<u>Sand</u> } As above. <u>Coal</u> }
2410'-2420'	80 20	<u>Sand</u> } As above. <u>Coal</u> }
2420'-2430'	70 30	<u>Sand</u> } As above. <u>Coal</u> }
2430'-2440'	70 30	<u>Sand</u> } As above. <u>Coal</u> }
2440'-2450'	50 50	<u>Sand</u> } As above. <u>Coal</u> }
2450'-2460'	30 70	<u>Sand</u> } As above. <u>Coal</u> }
2460'-2470'	10 90	<u>Sand</u> } As above. <u>Coal</u> }
2480'-2490'	30 70	<u>Sand</u> } As above. <u>Coal</u> }
2490'-2500'	90 10	<u>Coal</u> Black, minor brn., blocky, massive, friable soft. <u>Sand</u> Colourless, milky wht., s/ang., s/rnd., fair sorting, ferrug. in pt., trace pyrite & mica also glauconitic sand grains, cavings Random dolomite (calcite?) grains.

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<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
2500'-2510'	90 10	<u>Coal</u>) <u>Sand</u>) As above.
2510'-2520'	10 90	<u>Sand</u>) <u>Coal</u>) As above.
2520'-2530'	100	<u>Coal</u> As above. trace siltstone. v. soft buff
2530'-2540'	100	<u>Coal</u> Predominantly black, fibrous, trace pale grey fine grd. sst. kaolinitic, calc. in pt.
2540'-2550'	100	<u>Coal</u> As above. Trace quartzose sandstone.
2550'-2560'	100	<u>Coal</u> As above.
2560'-2570'	100	<u>Coal</u>
2570'-2580') 2580'-2590') 2590'-2600')		No sample on shale shaker, a fair amount of very very fine quartz, silt in mud.
2600'-2610'	20 30	<u>Sand</u>) <u>Coal</u>) As above.
2610'-2620'	10 90	<u>Sand</u> <u>Coal</u> as above, tr. pyrite & glauconite.
2620'-2630'	100	<u>Coal</u> As above Hard and brittle. Trace quartzose sand.
2630'-2640'	100	<u>Coal</u> Very silty in part. Trace mudstone, plastic, very soft light brown. Trace quartz sand.
2640'-2650'	90 10	<u>Coal</u> As above. <u>Siltstone/Mudstone</u> brown, v. soft quartzose & carbonaceous, easily broken down.
2650'-2660'	30 20	<u>Coal</u> As above. <u>Siltstone</u> As above (micaceous?)
2660'-2670'	90 10	<u>Coal</u> dominantly dk. brn., black, soft, fibrous, often massive blocky. Also granule sized coal fragments occurring with <u>Quartzose Sandstone</u> Clear, cloudy, pl. grey, fine to medium grained embedded in sil. matrix, poorly sorted claystone, brn., kaol., weathered.
2670'-2680'	90 10	<u>Coal</u> As above <u>Claystone</u> containing fragments of brn. & blk. coal & qtzose sand in an argillaceous matrix, kaol. in pt.
2680'-2690'	90 10	<u>Coal</u>) <u>Claystone</u>) As above.
2690'-2700'	90 10	<u>Coal</u>) <u>Claystone</u>) As above.
2700'-2710'	90 10	<u>Coal</u>) <u>Claystone</u>) As above.
2710'-2720'	30 10 10	<u>Coal</u> As above. <u>Claystone</u> Lt. brn., sil., argill., soft. <u>Quartzose</u> Sandstone, med. to crs. s/ang., arg., good sorting, the quartzose and coal fragments embedded in argill. matrix. Random fossil (lamellibranch, echinoderm) fragments. Tr. x'talline fractions (unidentifiable, possible sandstone?)

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
2720'-2730'	90	<u>Coal</u> As above. Only fragmented pieces.
	10	<u>Quartzose Sst.</u> Medium to fine grained. Random milky and white aggregates. Trace pyritic nodules and glauconitic sand grains.
2730'-2740'	30	<u>Coal</u> Fragmentary pieces.
	10	<u>Claystone</u> brown with coal & quartzose sd. embedded in argill. matrix, soft.
	10	<u>Quartzose</u> sand, derived from claystone, fine to coarse grained, good sorting, sub ang., angular. Trace green glauconitic grains. Milky to pale grey dolomite fractions. Random fossil fragments.
2740'-2750'	75	<u>Coal</u>) as above.
	25	<u>Claystone</u> & loose quartzose sst.)
2750'-2760'	50	<u>Coal</u> predominantly, brn., dark brown, soft, brittle, fragmentary pieces, rare coarse fragments.
	50	Loose <u>Quartzose</u> sst., poss. <u>Claystone</u> admixture with coal fragments, kaolinitic, argill. in part. Qtzose. v. crs. to crs., s/ang., s/rnd., good sorting. Tr. grn. glauc. grains and pale grn. dolom fractions. Random pyrite nodules, and fossil fragments.
2760'-2770'	50	<u>Coal</u>) As
	50	Loose <u>Quartzose</u> sand, random <u>Clayst.</u> , trace) Above. dolomite, fossil.
2770'-2780'	tr.	<u>Sandstone</u> As above.
	50	<u>Coal</u> As above.
	50	<u>Claystone</u> brown, silty, very soft, breaks up in mud, difficult to estimate %. Non calc. carb. in part.
2780'-2790'	tr.	<u>Sand</u>)
	50	<u>Coal</u>) As above.
	50	<u>Claystone</u>)
2790'-2800'	40	<u>Sand</u> med. to very coarse, sub. rounded, clear and cloudy, only fair sorting.
	30	<u>Coal</u> As above, also brown, fibrous micaceous silty.
	30	<u>Claystone</u> as above.
2800'-2810'	10	<u>Sand</u> As above.
	40	<u>Coal</u> brown, v. soft, lignitic.
	50	<u>Mudstone</u> <u>Claystone</u> , brown, soft, calcareous.
2810'-2820'	tr.	<u>Sand</u>
	80	<u>Coal</u>
	20	<u>Claystone</u>
2820'-2830'	tr.	<u>Sand</u>
	100	<u>Coal</u>
	tr.	<u>Claystone</u>
2830'-2840'	100	<u>Coal</u>
2840'-2850'	70	<u>Coal</u>
	30	<u>Claystone-Mudstone</u> brown, soft, silty.
	tr.	<u>Sand</u>

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
2350'-2360'	80 20	<u>Coal</u> <u>Claystone</u> } As above.
2360'-2370'	90 10	<u>Coal</u> brown - dk. brown v. soft sl. clayey, sl. silty in part. occ. fibrous. <u>Claystone</u> brown, soft, breaks up in mud. Tr. dolomite, milky wht., definitely identifiable partly weathered.
2370'-2380'	90 10	<u>Coal</u> brown-dk. brown. Some black, lignitic, soft, fibrous in part. <u>Claystone</u> brown, very soft, breaks up in mud. Silty in part.
2380'-2390'	90 10	<u>Sandstone</u> Colourless, pale grey, white, siliceous in part, kaolinitic in pt. with abundant loose qtzose. sst. crs. to v. crs., s/rnd., rnd., rare s/ang., poorly sorted. <u>Dolomite</u> Coal, brn., dk. brn., ligneous, massive, friable probable cavings. Tr. clayst. Sample becoming less silty.
2390'-2900'	80 20	<u>Sandstone</u> Sandstone as above. <u>Dolomite</u> Milky white, partly weathered. Loose quartzose, very crs. to granular. Abundant chips of coal, but regarded as cavings. Random pyrite mineralization.
2900'-2910'	60 40	<u>Sandstone</u> <u>Dolomite</u> } As above with ^{coal} cavings.
2910'-2920'	90 10	<u>Coal</u> <u>Sandstone</u> } Trace Dolomite (as above)
2920'-2930'	100	<u>Coal</u> Black, dark brown, fibrous, soft chips and very coarse fragments.
2930'-2940'	100	<u>Coal</u> As above.
2940'-2950'	100	<u>Coal</u> As above.
2950'-2960'	100	<u>Coal</u> As above.
2960'-2970'	100	<u>Coal</u> As above.
2970'-2980'	100	<u>Coal</u> As above.
2980'-2990'	100	<u>Coal</u> As above.
2990'-3000'	100	<u>Coal</u> As above.
3000'-3010'	100	<u>Coal</u> As above.
3010'-3020'	100	<u>Coal</u> Predominantly brown, very soft.
3020'-3030'	100	<u>Coal</u> As above.
3030'-3040'	100	<u>Coal</u> As above.
3040'-3050'	100	<u>Coal</u> As above.
3050'-3060'	80 20	<u>Coal</u> As above. <u>Claystone</u> Dark brown, pale brown. Very calc. in pt., kaolinitic in pt. Argill. Loose, clear qtzose, angular, poorly sorted

<u>Depth</u>	<u>β</u>	<u>Lithology</u>
3060'-3070'	90	<u>Coal</u> As above.
	10	<u>Claystone</u> As above. Tr. qtzose. only.
3070'-3080'	100	<u>Coal</u> As above. Trace siltstone - brittle.
3080'-3090'	100	<u>Sandstone</u> Comprising; loose qtzose. sand, clear, cloudy, med.-v.crs. s/ang., good sorting. Coal cavings. Tr. Dolomite (wht.) calcareous clayst.(dk. brn.)
3090'-3100'	100	<u>Sandstone</u> As above. Occasional small fragments show sandst. occurring as threading veins in claystone matrix which is strongly calcareous, argill. in pt. Rare v. crs. loose qtzose., but dom. med.-crs. grd. Good sorting.
3100'-3110'	100	<u>Sandstone</u> As above. V. crs. qtzose more common.
3110'-3120'	100	<u>Sandstone</u> Milky wht., colourless, clear loose qtzos dom. med. grd. minor crs., v. crs. random granular sized, good sorting. Tr. claystone, argill. in pt. variably calcareous siliceous. Strongly carbonaceous.
3120'-3130'	100	<u>Sandstone</u> Predominantly gry. pl. gry, silty clay, kaol. in pt. with loose qtzose. embedded in strongly argill. matrix, variably carbonaceous. Tr. claystone (brn.) soft, calc. in pt.
3130'-3140'	100	<u>Sandstone</u> with pale grey, clayey matrix not prominent. Coal cavings. Loose qtz. often very coarse. Good sorting; med. to coarse grd.
3140'-3150'	100	<u>Sandstone</u> as above, but grey white clay is markedly absent. Very coarse to coarse qtzose. sd. Dominantly s/ang. to angular.
3150'-3160'	100	<u>Sandstone</u> Milky white qtz. common. Granular to v. coarse grd. qtzose in sample. Angular qtzose. dominant.
3160'-3170'	90	<u>Sandstone</u> med.-coarse-gravelly. 100% qtz. rounded -sub ang. poorly sorted, clean. less than 20%.
	10	<u>Coal</u> As above.
	tr.	<u>Claystone-Mudstone</u> brown, silty, soft, breaks up in mud.
3170'-3180'	30	<u>Sand</u> med-v.coarse & gravel 100% quartz. Poor sorting, rounded to sub ang. qtz. predom. milky.
	70	<u>Coal</u> Dark brown, fairly compact, muddy, lignitic.
	tr.	<u>Claystone</u> brown, silty, breaks up in mud.
3180'-3190'	20	<u>Sand and gravel.</u>)
	60	<u>Coal</u>) As above.
	20	<u>Claystone</u>)
3190'-3200'	40	<u>Sand & Gravel</u> qtz.
	30	<u>Coal</u>
	30	<u>Claystone Mudstone</u> as above & white-cream fine clay?
3200'-3210'	70	<u>Sand and Gravel</u>)
	20	<u>Coal</u>) As above.
	10	<u>Claystone & Mudstone</u>)

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
3210'-3220'	80	<u>Sand & Gravel</u>) <u>Coal</u>) As above. <u>Claystone-Mudstone</u>)
3220'-3230'	90	<u>Sand & Gravel</u>
	tr.	<u>Coal</u>
	10	<u>Claystone-Mudstone</u>
3230'-3240'	90	<u>Sand & Gravel</u> As above.
	tr.	<u>Coal</u> As above.
	10	<u>Claystone-Mudstone</u> As above.
3240'-3250'	90	<u>Sand & Gravel</u> As above.
	tr.	<u>Coal</u> As above.
	10	<u>Claystone & Mudstone</u> As above.
3250'-3260'	90	<u>Sand</u> med. to v. coarse & gravel 100% quartz, poor sorting, sub angular - predom. clear.
	10	<u>Coal</u> as above.
	tr.	<u>Claystone & Mudstone</u> As above.
3260'-3270'	90	<u>Sand & gravel</u> - traces of pyrites. Some black staining on some grains.
	10	<u>Coal</u> As above. Tr. <u>claystone mudstone</u> as above.
3270'-3280'	70	<u>Sand & Gravel</u> as above.
	30	<u>Coal</u> Dark brown, soft.
	tr.	<u>Mudstone</u> - brown, silty
3280'-3290'	40	<u>Sand</u> med. to very coarse, sub-ang, clear quartz.
	60	<u>Coal</u> as above sl. more compact, rare quartzose veins.
3290'-3300'	30	<u>Sand</u>) As above.
	70	<u>Coal</u>)
3300'-3310'	40	<u>Sand</u> med. to very coarse, qtz. trace black and brown, staining on some grains.
	50	<u>Coal</u> black - dark brown, fairly hard & compact.
	10	<u>Claystone</u> brown, breaks up in mud.
3310'-3320'	60	<u>Sandstone</u> Loose med-coarse, some very coarse to pebbly, subrounded to angular, fair sorting, all qtz., trace brown & black staining on grs., trace pyrite.
	40	<u>Coal</u> black - dk. br. fairly hard & compact, earthy in part, lignitic. Also some brown claystone present which washes out of mud.
3320'-3330'	50	<u>Sandstone</u> med/coarse as above.
	50	<u>Coal</u>
3330'-3340'	40	<u>Sandstone</u> med. gr. as above, trace pyrite.
	60	<u>Coal</u> as above.
3340'-3350'	50	<u>Sandstone</u>) As above.
	50	<u>Coal</u>)
3350'-3360'	50	<u>Sandstone</u>) As above.
	50	<u>Coal</u>)
3360'-3370'	60	<u>Sandstone</u>) As above.
	40	<u>Coal</u>)

<u>Depth</u>	<u>%</u>	<u>Lithology</u>	
3370'-3380'	80	<u>Sandstone</u> Predominantly milky wht. pl. gry., massive v. crs. to granule sized, angular chips (trace) compact, intensely siliceous strongly pyritic (abundant pyrite nodules) very little porosity, compact, very abrasive, calcareous in pt. Tr. dolomite.	
	20	<u>Coal</u> Dk. brn., soft, friable. Random glauconitic clay.	
3380'-3390'	90	<u>Sandstone</u>	
	10	<u>Coal</u>	
3390'-3400'	100	<u>Sandstone</u> , as above. Intensely siliceous. Random pyrite nodules, often intertwined with quartzose material. Perhaps some marcasite aggregates.	
3400'-3410'	100	<u>Sandstone</u> Sample increasingly clayey. Dominantly med-crs. grd. quartzose. aggregate c pyrite disseminated throughout.	
3410'-3420'	100	<u>Sandstone</u> Sample less clayey.	
3420'-3430'	100	<u>Sandstone</u> As above.	
3430'-3440'	100	<u>Sandstone</u> As above.	
3440'-3450'	100	<u>Sandstone</u> As above.	
3450'-3460'	80	<u>Sand</u> med/coarse loose clean qtz. rounded - sub.ang. porous.	
	20	<u>Claystone</u> <u>Mudstone</u> brown v. soft & plastic. Breaks up in mud, silty.	
	Tr.	<u>Coal</u>	
3460'-3470'	70	} As above.	
	30		<u>Claystone</u>
	Tr.		<u>Coal</u>
3470'-3480'	40	<u>Sand</u> mainly loose med. grs. as above.	
	50	<u>Mudstone</u> <u>Claystone</u> soft brown, silty. Silty and very fine sand grains.	
	10	<u>Coal</u>	
3480'-3490'	50	} As above.	
	30		<u>Claystone</u> <u>Mudstone</u>
	20		<u>Coal</u>
3490'-3500'	90	} As above.	
	10		<u>Claystone</u>
	Tr.		<u>Coal</u>
3500'-3510'	60	} As above.	
	10		<u>Claystone</u>
	30		<u>Coal</u>
3510'-3520'	80	<u>Sand</u> med. gr. some fine med. pyritic. Fair sorting quartzose.	
	10	<u>Claystone</u> } As above.	
	10	<u>Coal</u>	
3520'-3530'	30	<u>Sand</u> as above.	
	70	<u>Claystone</u> v. soft, silty.	
	Tr.	<u>Coal</u>	
3530'-3540'	60	} As above.	
	40		<u>Claystone</u>
	Tr.		<u>Coal</u>

<u>Depth</u>	<u>f</u>	<u>Lithology</u>
3540'-3550'	80	<u>Sand & Sandstone</u> loose med/coarse as above & fine/med. qtz. & rare lithic grs. in a kaolinite matrix, rarely carb occ. calc. grs. rounded to ang. & fair to poor sorting. Trace pyrite matrix. V. tight.
	20	<u>Claystone</u>
3550'-3560'	90	<u>Sand & Sandstone</u> as above. V. hard and abrasive? sl. more lithic. Siliceous matrix in part.
	10	<u>Claystone</u>
3560'-3570'	100	<u>Sand & Sandstone</u> as above. Claystone prob. on cavings
3570'-3580'	100	<u>Sand & Sandstone</u> v. fine-med. gr. mostly loose, subround-sub.ang. Some pyrite. <u>Claystone</u> as cavings? (otherwise 30%)
3580'-3590'	100	<u>Sandstone</u> fine sandy subrounded (claystone cavings greater than 40%) Trace pyrite.
3600'-3610'	70	Fine <u>sand</u> , angular, sorted qtz.
	30	<u>Coal</u> brown to black, some brittle, some and silty, trace pyrite (claystone cavings more than 20%)
3610'-3620'	80	<u>Sand</u> medium to very very coarse 5 - 7 mm, rounded in larger grains, sub rounded in fine sizes ass. with trace pyrite.
	20	<u>Coal</u> as above.
3620'-3630'	90	<u>Sand</u> - as above but coarse to fine, trace pyrite (as cementing agent), glauconitic, kaolinitic & calcareous fragments.
	10	<u>Coal</u> As above.
3630'-3640'	100	<u>Sandstone</u> Colourless, intensely siliceous, loose quartzose, but mostly crs.-med. grained angular fragments, poor sorting. Abundant loose pyrite nodules, random intertwinning with sandstone fragments, argillaceous in pt.
3640'-3650'	100	<u>Sandstone</u> as above.
3650'-3660'	100	<u>Sandstone</u> as above.
3660'-3670'	100	<u>Sandstone</u> as above. Sample is clayey somewhat, Calcareous in pt. Trace dolomite, pale grey, carbonaceous in pt. claystone dk. brn, kaolinitic in part.
3670'-3680'	100	<u>Sandstone</u> Colourless, pale grey, med - crs. grained intensely siliceous, ferrug. in part., carbonaceous in pt. Abundant pyrite aggregates with close association with quartzose grains often fd. embedded in a pyrite matrix.
3680'-3690'	100	<u>Sandstone</u> as above. Sample clayey, intensely pyritic. Intertwinning of pyrite aggregates & qtz. sandstone (qtzose) common.
3690'-3700'	100	<u>Sandstone</u> as above.
3700'-3710'	100	<u>Sandstone</u> as above. Highly siliceous, pyrite aggregates not quite as prominent as in preceding sample.

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
3700'-3710'		Trace Claystone dk. grey, argillaceous, kaolinitic, some fractions granule sized.
3710'-3720'	20	<u>Sandstone</u> as above. Random pyrite aggregates. The sst. is very fragmented. (very coarse to medium sized.)
	10	<u>Claystone</u> Dark grey, green grey, argillaceous, kaolinitic in part. Randomly carbonaceous.
3720'-3730'	90	<u>Sandstone</u> fine to coarse & gravel as above. Fine grained has clay or silic. matrix.
	10	<u>Claystone</u> as above.
3730'-3740'	70	<u>Sandstone</u> as above.
	30	<u>Coal</u> black to dark brown, brittle in part.
	Tr.	<u>Siltstone</u> light brown carb.
3740'-3750'	60	<u>Sandstone</u> fine/coarse as above.
	40	<u>Coal</u> mainly dark brown lignitic.
3750'-3760'	60	<u>Sandstone</u> as above.
	40	<u>Coal</u> as above. Trace siltstone and claystone.
3760'-3770'	70	<u>Sandstone</u> mainly medium to coarse, fairly angular grains as above.
	30	<u>Coal</u> as above.
	Tr.	<u>Siltstone</u> brown qtzose carb.
3770'-3780'	70	<u>Sandstone</u> } As above.
	30	<u>Coal</u> }
3780'-3790'	60	<u>Sand</u> med/coarse loose subrounded to angular qtz. gr rare pyritic grs.
	40	<u>Coal</u> black - dark brown, fairly compact, occasionally silty.
3790'-3800'	70	<u>Sandstone</u> } As above.
	30	<u>Coal</u> }
3800'-3810'	80	<u>Sandstone</u> Med/coarse rare fine qtz. grains, rounded to subrounded with some sub-angular, loose, clean.
	20	<u>Coal</u>
3810'-3820'	70	<u>Sandstone</u> As above and trace marcasite(?)
	30	<u>Coal</u> as above. Trace calcareous. sample very muddy - cavings.
3820'-3830'	20	<u>Sandstone</u> angular and unsorted, assoc. with pyrite.
	80	<u>Coal</u> dark brown to brown, some soft & friable, the darker very brittle. Trace calcareous carbonaceous material, trace brown siltstone, soft and brittle.

NOTE - larger sample of s/s from mud tank indicates highly siliceous cemented lithic & quartzose s/s with considerable pyrite also large (conglomeratic) ~~greater~~ that 10 mm lithic and quartzose pebbles - well rounded, also thin beddings of fine brown carbonaceous and slightly calcareous siltstone v. hard and brittle.

BIT CHANGE @ 3834'

<u>Depth</u>	<u>β</u>	<u>Lithology</u>
3830'-3840'	30	<u>Coal</u> as above.
	20	<u>Sandstone</u> Intensely siliceous, calc. in part, crushed fragments, medium, coarse, minor granular fractions. Lithic fractions common. Trace claystone-mudstone, argillaceous, calcareous in part.
3840'-3850'	90	<u>Coal</u> as above.
	10	<u>Sandstone</u> Sample contaminated with pyrite aggregates
3850'-3860'	60	<u>Sandstone</u> - pale grey, colourless, fragments intensely siliceous, non calcareous, subangular, angular fragments.
	40	<u>Coal</u> as above.
3860'-3870'	70	<u>Sandstone</u>) As above.
	30	<u>Coal</u>)
3870'-3880'	80	<u>Sandstone</u>) As above.
	20	<u>Coal</u>)
3880'-3890'	90	<u>Sandstone</u>) Minor amounts pyrite aggregates.
	10	<u>Coal</u>) As above.
3890'-3900'	100	<u>Sandstone</u> Intensely siliceous, fragmented pieces, medium to very coarse, colourless, milky white, (minor granular) subangular, angular, poorly sorted, Partly kaolinitic. Random pyrite aggregates. Trace dolomite, & argillaceous claystone.
3900'-3910'	100	<u>Sandstone</u> as above. Random, very coarse and pebbly sized fragmented siliceous qtz. (milky white). Trace pyrite. Dark lithic inclusions. Very abrasive, hard formation. Quartzose intertwined with pyrite aggregates. Contaminated with clay to a degree.
3910'-3920'	100	<u>Sandstone</u> as above. Sample quite muddy but prob. due to caving as in coal.
3920'-3930'	100	<u>Sandstone</u> as above. Sample fairly muddy but could be due to caving.
3930'-3940'	100	<u>Sandstone</u> as above.
3940'-3950'	100	<u>Sandstone</u> medium to coarse grained clean quartzose subrounded to subangular, only fair sorting.
3950'-3960'	100	<u>Sandstone</u> as above.
3960'-3970'	100	<u>Sandstone</u> as above.
3970'-3980'	100	<u>Sandstone</u> medium to very coarse loose quartz grains, rare fragments showing clay or silic cement.
3980'-3990'	100	<u>Sandstone</u> as above.
3990'-4000'	100	<u>Sand & Sandstone</u> loose medium/coarse and very coarse occ. gravel size quartz. Subrounded-angular, fair sorting.
4000'-4010'	100	<u>Sand</u> as above.
4010'-4020'	100	<u>Sandstone</u> as above.

<u>Depth</u>	<u>5</u>	<u>Lithology</u>
4020'-4030'	100	<u>Sandstone</u> as above.
4030'-4040'	100	<u>Sandstone</u> as above.
4040'-4050'	100	<u>Sandstone</u>
4050'-4060'	100	<u>Sandstone</u>
4060'-4070'	100	<u>Sandstone</u> Two types of sandstone aggregates. Dominant siliceous quartzose type, milky white to colourless, subangular to angular, poorly sorted fragmentary quartzose ranging from medium to very coarse (random granular sized) <u>minor</u> pale grey, dark grey, medium to very fine grained sandstone with the colourless quartzose within siliceous, kaolinitic matrix variably calcareous, pyrite aggregates.
4070'-4080'	100	<u>Sandstone</u> as above.
4080'-4090'	100	<u>Sandstone</u> as above.
4090'-4100'	100	<u>Sandstone</u> as above.
4100'-4110'	100	<u>Sandstone</u> Medium to coarse subrounded to subangular quartz grains, traces white kaolinitic matrix on some grains.
4110'-4120'	100	<u>Sandstone</u> as above.
4120'-4130'	100	<u>Sandstone</u> as above.
4130'-4140'	100	<u>Sandstone</u> as above. Trace of fine grained quartzose argillaceous, very hard and tight.
4140'-4150'	30	<u>Sandstone</u> as above. Sample fairly muddy, brown, silty, may be caving? but could be up to 20% Mudstone. Top G. Beach @ 4145?
	20	<u>Mudstone</u>
4150'-4160'	50	<u>Sandstone</u> siliceous, fragmented granular, medium to fine grained.
	50	<u>Mudstone</u> brown pale brown, argillaceous with carbonaceous streaks with fine grained quartzose embedded in argill. matrix. Tr. dolomite and abundant pyrite aggregates. The sample as a whole was quite clayey.
4160'-4170'	75	<u>Mudstone</u> - as above, intensely argillaceous. Quartzose and abundant pyrite aggregates embedded in siliceous and clayey matrix. Strongly calc. black lithic inclusions and streaks (plant remains?)
	25	<u>Sandstone</u> as above Very clayey sample.
		* <u>PROBABLE TOP - GOLDEN BEACH FORMED @ 4162'</u>
4170'-4180'	90	<u>Mudstone</u> - sample heavily contaminated with a grey mud ooze. Very strongly pyritic. Randomly calcareous.
	10	<u>Sandstone</u> as above.
4180'-4190'	90	<u>Mudstone</u>
	10	<u>Sandstone</u> as above.

<u>Depth</u>	<u>f</u>	<u>Lithology</u>
4190' - 4200'	100	<u>Mudstone</u> as above. Calcareous.
4200' - 4210'	100	<u>Mudstone</u> as above. Calcareous.
4210' - 4220'	100	<u>Mudstone</u> Dark grey, silty, pyrite nodules still dominant in washed sample. Minor sandstone fractions, quartzose (ang.) Variably.
4220' - 4230'	100	<u>Mudstone</u> as above. Calcareous.
4230' - 4240'	100	<u>Mudstone</u> as above.
4240' - 4250'	100	<u>Mudstone</u> as above.
4250' - 4260'	100	<u>Mudstone</u> silty, slightly calc. in part. dark to medium grey, rare pyrite, trace quartzose grains.
4260' - 4270'	90	<u>Mudstone</u> Dominantly represented as pale grey sticky clay, argillaceous arenaceous, (with quartzose) embedded within matrix. Lithic and dark brown (coal) inclusions within matrix (dark streaks).
	10	<u>Sandstone</u> Siliceous fractions embedded in clayey matrix. Subrounded, subangular, very coarse fractions. Sample exceedingly clayey. Trace soft brown mudstone, variable amounts of pyritic nodules and aggregates. Dolomite.
4270' - 4280'	90	<u>Mudstone</u>)
	10	<u>Sandstone</u>) As above.
4280' - 4290'	50	<u>Mudstone</u>) Slightly calc.
	25	<u>Siltstone</u>) As above, random fluores-
	25	<u>Sandstone</u> (fine grained)) cence. Sample less clayey
4290' - 4300'	50	<u>Mudstone</u> Pale brown, argillaceous, dark streaks, minor random quartzose distributed through matrix. Dark green lithics.
	25	<u>Siltstone</u> dark grey, argillaceous, kaolinitic in part, pyritic in part, carbonaceous in part.
	25	<u>Sandstone</u> Pale brown, brown, medium to fine grained, quartzose in a sil. matrix, compact, strongly kaolinitic. Minor amounts loose quartzose milky white, angular very coarse to fine grained.
4300' - 4310'	50	<u>Mudstone</u>)
	25	<u>Siltstone</u>) As above.
	25	<u>Sandstone</u>)
4310' - 4320'	50	<u>Mudstone</u>)
	40	<u>Siltstone</u>) As above, very clayey sample.
	10	<u>Sandstone</u>)
4320' - 4330'	50	<u>Mudstone</u>)
	40	<u>Siltstone</u>) As above, sample very clayey.
	10	<u>Sandstone</u>)
4330' - 4340'	50	<u>Mudstone</u>)
	40	<u>Siltstone</u>) As above, sample very clayey.
	10	<u>Sandstone</u>)
4340' - 4350'	80	<u>Mudstone</u>
	20	<u>Sand</u> Loose fine medium grains, siltstone fragments pyrite trace fine lithic quartz, sandstone as above, Mudstone very plastic & sticky.

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>	
4350'-4360'	80	<u>Mudstone</u> brown to light brown, soft plastic with trace included fine quartz and lithic grains.	
	20	<u>Sandstone</u> & <u>Siltstone</u> as above.	
4360'-4370'	90	<u>Mudstone</u> as above.	
	10	<u>Sandstone</u> and <u>Siltstone</u>	
4370'-4380'	80	<u>Mudstone</u>	
	20	<u>Sandstone</u> fine grained quartzose lithic and siltstone grey lithic carb. quartzose and carb. fragments.	
4380'-4390'	90	<u>Mudstone</u> light brown, soft, very finely silty and sandy (v. fine qtz. and lithics)	
	10	} <u>Sandstone</u> pyrite very rare also rare medium grains qtz.	
			} <u>Siltstone</u> <u>Dolomite?</u> brown, hard crys.
4390'-4400'	90	<u>Mudstone</u>	
	10	<u>Sandstone</u> <u>Siltstone</u> <u>Dolomite?</u>	
4410'-4420'	90	<u>Mudstone</u> as above	
	10	<u>Sandstone</u> & <u>Siltstone</u> as above.	
4420'-4430'	90	} <u>Mudstone</u>) As above.	
	10		} <u>Sandstone</u>)
4430'-4440'	90	} <u>Mudstone</u>) As above.	
	10		} <u>Sandstone</u>)
4440'-4450'	90	<u>Mudstone</u> Thinner but still appearing as a sticky grey mud on shaker.	
	10	<u>Siltstone</u> angular qtz. very very fine, trace siltstone compact grey-brown with carbonaceous plant (?) fossils.	
4450'-4460'	100	<u>Mudstone</u> Trace mudstone, compact, brown with plant remains(?). Trace sandstone - cemented. Trace pyrite.	
4460'-4470'	100	<u>Mudstone</u> as above.	
4470'-4480'	100	<u>Mudstone</u> as above.	
4480'-4490'	100	<u>Mudstone</u> as above.	
4490'-4500'	100	<u>Mudstone</u>	
4496'-4513'		Drilling break. Circulated sample. Pale grey sticky clay, no fluorescence. Sample was thoroughly washed - revealed abundant fine grained to medium grained quartzose, colourless, minor milky white, subrounded, subangular random sandstone aggregates fine grained quartzose in siliceous matrix. Also recovered mudstone & siltstone chips.	
4490'-4500'	50	} <u>Mudstone</u>) As above, sample very clayey.	
	25		} <u>Siltstone</u>)
	25		} <u>Sandstone</u>)
4500'-4510'	50	} <u>Sandstone</u>) * Described above.	
	25		} <u>Mudstone</u>)
	25		} <u>Siltstone</u>)
4510'-4520'	50	} <u>Mudstone</u>) As above.	
	25		} <u>Siltstone</u>)
	25		} <u>Sandstone</u>)

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
4520'-4530'	90	<u>Mudstone</u> brown to dark brown, soft, plastic with minor included sand & silt grains. Some coal fragments (cavings?)
	10	<u>Siltstone</u> & <u>Sandstone</u> as above
4530'-4540'	50	<u>Mudstone</u>
	20	<u>Coal</u> black
	20	<u>Dolomite</u> pale brown, cryst. hard, slightly carb. in part.
	10	<u>Siltstone</u> brown to dark grey quartzose carb. also loose very fine/fine sand grains prob. from mudstone.
4540'-4550'	60	<u>Mudstone</u>)
	20	<u>Dolomite</u>) As above
	10	<u>Coal</u>)
4550'-4560'	60	<u>Mudstone</u>
	20	<u>Coal</u>
	10	<u>Dolomite</u>
	10	Loose <u>Sand</u> and glauconite & pyrite grains, mainly fine, very fine and medium. Trace <u>siltstone</u> .
4560'-4570'	80	<u>Mudstone</u>
	20	<u>Sandstone</u> & <u>Siltstone</u>
4570'-4580'	30	<u>Mudstone</u>
	20	<u>Sandstone</u> & <u>Siltstone</u>
4580'-4590'	70	<u>Mudstone</u> as above, sandy and silty in part.
	10	<u>Sandstone</u> fine and trace medium quartzose, trace glauc. & pyrite, carb. in part, very silty.
	20	<u>Siltstone</u> brown with sand grains, carb, in part. rarely calc.
	Tr.	<u>Coal</u>
4590'-4600'	50	<u>Mudstone</u>
	40	<u>Sandstone</u> Med/coarse, some fine quartzose and slightly lithic, abund. white clay matrix, tight coarse and some med. coarse qtz. grains, but trace white matrix grains, subrounded to subangular.
	10	<u>Siltstone</u> brown
4600'-4610'	70	<u>Mudstone</u>
	30	<u>Sandstone</u> fine mainly medium. Trace coarse pred. loose qtz. rare pyrite and glauc. grs. subr.-subang. fair sorting.
	Tr.	<u>Siltstone</u>
4610'-4620'	90	<u>Mudstone</u> brown, soft, plastic, silty.
	30	<u>Sandstone</u> as above.
	10	<u>Siltstone</u> brown - light brown, muddy carb. feldspathic, rarely quartzose.
4620'-4630'	30	<u>Mudstone</u> pale brown, argillaceous, soft, carbonaceous streaks.
	10	<u>Siltstone</u>
	10	<u>Sandstone</u> - dom. very fine to medium grained, subangular, subrounded, trace dolomite, glauconitic grains and increasing amounts of pyrite nodules.
4630'-4640'	30	<u>Mudstone</u>)
	10	<u>Siltstone</u>) As above.
	10	<u>Sandstone</u>)
4640'-4650'	50	<u>Mudstone</u>)
	25	<u>Siltstone</u>) As above.
	25	<u>Sandstone</u>)

<u>Depth</u>	<u>ft</u>	<u>Lithology</u>
4650'-4660'	50	<u>Mudstone</u>)
	30	<u>Siltstone</u>) As above, sample very clayey.
	20	<u>Sandstone</u>)
4660'-4670'	50	<u>Mudstone</u>)
	30	<u>Siltstone</u>) As above, slight increase in pyrite
	20	<u>Sandstone</u>) nodules and aggregates.
4670'-4680'	50	<u>Mudstone</u>)
	25	<u>Siltstone</u>) As above.
	25	<u>Sandstone</u>)
4680'-4690'	60	<u>Mudstone</u> brown, argill., soft, carbonaceous streaks kaol. in part.
	30	<u>Siltstone</u> dark grey, argill., kaol. in part.
	10	<u>Sandstone</u> fine grained to medium grained, rare crs. milky white, subangular, angular, slightly ferrug. in part. lithic inclusions. Tr. dolomite, slightly increased pyrite aggregates and nodules. Glauconitic grains and loose lithics.
4690'-4700'	60	<u>Mudstone</u>)
	30	<u>Siltstone</u>) As above.
	10	<u>Sandstone</u>)
4700'-4710'	60	<u>Mudstone</u>)
	20	<u>Siltstone</u>) As above.
	20	<u>Sandstone</u>)
4710'-4720'	50	<u>Mudstone</u>) As above, quartzose, mostly subangular
	30	<u>Sandstone</u>) - angular. Trace glauconitic grains,
	20	<u>Siltstone</u>) pyrite nodules, minor amts. dolomite.
4720'-4730'	50	<u>Mudstone</u>) As above \bar{c} abundant glauconitic
	25	<u>Siltstone</u>) grains, variably calcareous,
	25	<u>Sandstone</u>) (dolomite).
4730'-4740'	60	<u>Mudstone</u>) As above. Very fine to medium grained
	30	<u>Siltstone</u>) subangular qtzose., trace glauconitic
	10	<u>Sandstone</u>) grains. Sample very clayey.
4740'-4750'	50	<u>Mudstone</u>) As above. Carbonaceous streaks in
	25	<u>Siltstone</u>) mudstone. Increasing amounts of pyrite
	25	<u>Sandstone</u>) & glauc. grains. Random white fragmented angular quartzose.
4750'-4760'	50	<u>Mudstone</u>) As above. Large amounts of glauconitic
	20	<u>Siltstone</u>) and pyrite granules.
	30	<u>Sandstone</u>)
4760'-4770'	40	<u>Mudstone</u> As above \bar{c} prominent carbonaceous streaks, soft
	40	<u>Sandstone</u> Pale brown, brown, intensely siliceous, kaolinitic in part, minor loose qtzose. fine-medium grained rare coarse and very coarse milky white quartzose subangular, angular.
	20	<u>Siltstone</u> Dark brown, relatively soft, kaol. in part. Increasing amounts dolomite, pale brown, yellow, dark green, glauc, grains, pyrite aggregates. Sample less clayey.
4770'-4780'	40	<u>Mudstone</u> as above.
	40	<u>Sandstone</u> as above. Ferruginous in part.
	20	<u>Siltstone</u> as above. Sample less clayey.

<u>Depth</u>	<u>3</u>	<u>Lithology</u>
4770'-4780'	40	<u>Mudstone</u> as above
	40	<u>Sandstone</u> as above. Ferruginous in part.
	20	<u>Siltstone</u> as above. Sample less clayey.
4780'-4790'	50	<u>Mudstone</u>)
	30	<u>Siltstone</u>) as above.
	20	<u>Sandstone</u>)
4790'-4800'	50	<u>Mudstone</u> Pl. brown, grey, soft, argill., friable, with prominent carbonaceous, random quartzose embedded in argill. matrix.
	30	<u>Sandstone</u> Colourless, clear fine-med. grained angular quartzose (random coarse grd. milky white) ferrug. kaol. in part. siliceous matrix.
	20	<u>Siltstone</u> Dark grey, pale grey, kaol. in places.
	Tr.	<u>Glauconitic</u> grains, strongly calc., dolomite, pyrite granules.
4800'-4810'	50	<u>Mudstone</u>)
	30	<u>Siltstone</u>) As above.
	20	<u>Sandstone</u>) Sandstone comprise dom. very fine-medium grained angular quartzose. Increase in dolomite fractions. Decrease in pyrite and glauc. content from previous sample, coloured grey, clayey.
4810'-4820'	50	<u>Mudstone</u>)
	30	<u>Sandstone</u>) As above, sample clayey, pale grey.
	20	<u>Siltstone</u>)
4820'-4830'	50	<u>Mudstone</u>)
	30	<u>Sandstone</u>) As above, sample clayey, pale grey.
	20	<u>Siltstone</u>)
4830'-4840'	70	<u>Mudstone</u> light brown, soft, silty.
	20	<u>Sandstone</u> loose, very fine to medium grained dom. qtz., some lithics & glauc. trace with silic or very kaol. matrix. Trace dolomite frags.
	10	<u>Siltstone</u> brown, grey, lithic qtz. carb.
4840'-4850'	70	<u>Mudstone</u> very soft brown.
	20	<u>Sandstone</u> more kaolin. in matrix. Some feldspar grains. Fine grained.
	10	<u>Siltstone</u> as above.
4850'-4860'	50	<u>Mudstone</u> as above.
	40	<u>Sandstone</u> dom. fine to very fine grains quartzose. feldspathic in part. off-white - brown, very kaolinitic, lithic in part. (dark grey chert?) sl. carb. in part. Also some fine grained quartzose sl. lithic, silic. cement, hard. Trace white soft, kaolinitic fragments with included fine quartz lithics. Very rarely calc.
	10	<u>Siltstone</u> As above.
4860'-4870'	60	<u>Mudstone</u> as above but mainly more compact brown, carb. fragments & streaks, some plant frags. occ. silty. Quite carb. in part.
	10	<u>Coal</u> Trace coal black brittle vitreous fracture also brown - black coal could be cavings.
	20	<u>Sandstone</u> as above & rare med/coarse quartz grains.
	10	<u>Siltstone</u> as above.

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
4870'-4880'	90	<u>Mudstone</u> soft brown.
	10	<u>Sandstone</u> very fine quartzose, some lithics & fels?
4880'-4890'	70	<u>Mudstone</u> dark grey, minor chips, argill. prominent carbonaceous streaks, kaol. in pt.
	20	<u>Sandstone</u> pale brown, quartzose medium to fine grained set in sil. matrix, also inclusions of coal fragments.
	10	<u>Siltstone</u> pale brown, argill. soft, minor amounts dolomite, trace pyrite & glauc. grains.
4890'-4900'	50	<u>Mudstone</u>)
	30	<u>Sandstone</u>) As above, sample clayey - dark grey.
	20	<u>Siltstone</u>)
4900'-4910'	50	<u>Mudstone</u>)
	30	<u>Sandstone</u>) As above.
	20	<u>Siltstone</u>)
4910'-4920'	50	<u>Mudstone</u>)
	40	<u>Sandstone</u>) As above.
	10	<u>Siltstone</u>)
4920'-4930'	50	<u>Mudstone</u> dark grey, steel gry., prominent carb. streaks. Strongly kaolinitic in places.
	40	<u>Sandstone</u> as above.
	10	<u>Siltstone</u> with lithic inclusions. Trace pyrite aggregates.
4930'-4940'	50	<u>Mudstone</u>)
	30	<u>Sandstone</u>) As above.
	10	<u>Siltstone</u>)
4940'-4950'	50	<u>Mudstone</u>)
	30	<u>Sandstone</u>) As above, sample dark grey, clayey.
	20	<u>Siltstone</u>)
4950'-4960'	50	<u>Mudstone</u>)
	30	<u>Sandstone</u>) As above.
	20	<u>Siltstone</u>)
4960'-4970'	50	<u>Mudstone</u>)
	40	<u>Sandstone</u>) As above.
	10	<u>Siltstone</u>)
4970'-4980'	60	<u>Sandstone</u> Greenish grey, very fine to medium grained, subangular, subrounded, qtzose., siliceous, kaolinitic in pt., carb. in part.
	30	<u>Mudstone</u> as above.
	10	<u>Siltstone</u> Sample still clayey, greenish grey.
4980'-4990'	60	<u>Sandstone</u> as above. Qtzose. recovered after sample was washed crs.-med. grd. s/ang., s/rnd.
	30	<u>Mudstone</u>
	10	<u>Siltstone</u> as above.
4990'-5000'	60	<u>Sandstone</u> abundant very fine quartzose, generally lost through screens into mud tank. Recovered dom. fine-medium grained & coarse qtzose. Sample is clayey, pale grey.
	30	<u>Mudstone</u>)
	10	<u>Siltstone</u>) As above.

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
5000'-5010'	50	<u>Sandstone</u> fine/coarse Qtzose. feldspathic abund. matrix (kaolin) lithic rarely carb.
	40	<u>Mudstone</u>)
	10	<u>Siltstone</u>) As above.
5010'-5020'	50	<u>Sandstone</u>)
	40	<u>Mudstone</u>) As above.
	10	<u>Siltstone</u>)
5020'-5030'	50	<u>Mudstone</u>)
	30	<u>Sandstone</u>) As above.
	20	<u>Siltstone</u>)
5030'-5040'	50	<u>Mudstone</u> as above & very fine silt & sand grains.
	30	<u>Sandstone</u> very fine-coarse Qtzose. Some feldspar slightly lithic (dk. grey & brown) very kaolinitic in part.
	20	<u>Siltstone</u> brown - dark grey, Qtzose. lithic carb. feldspathic.
5040'-5050'	40	<u>Mudstone</u>)
	30	<u>Sandstone</u>) As above.
	30	<u>Siltstone</u>)
5050'-5060'	40	<u>Mudstone</u>)
	30	<u>Sandstone</u>) As above.
	30	<u>Siltstone</u>)
5060'-5070'	60	<u>Mudstone</u>)
	25	<u>Siltstone</u>) As above.
	15	<u>Sandstone</u>)
TD Drilled 5070		
5070'-5080'	60	<u>Mudstone</u> grey, soft, plastic, silty & sandy in part. some brown compact.
	20	<u>Sandstone</u> fine, medium and rare coarse grained Qtzose. sl. lithic and fels. kaol. matrix
	20	<u>Siltstone</u> grey and brown Qtzose lithic fels. carb.
5080'-5090'	50	<u>Mudstone</u> as above.
	30	<u>Sandstone</u> mainly very fine - fine/med. as above.
	20	<u>Siltstone</u> as above.
5090'-5100'	40	<u>Mudstone</u>)
	20	<u>Sandstone</u>) As above.
	40	<u>Siltstone</u>)
5100'-5110'	50	<u>Mudstone</u>)
	30	<u>Siltstone</u>) As above.
	20	<u>Sandstone</u>)
5110'-5120'	50	<u>Mudstone</u>)
	20	<u>Siltstone</u>) As above.
	30	<u>Sandstone</u>)
5120'-5130'	50	<u>Mudstone</u>)
	20	<u>Siltstone</u>) As above.
	30	<u>Sandstone</u>)
5130'-5140'	40	<u>Mudstone</u> dark grey, small chips, argill., friable soft, carbonaceous streaks.
	40	<u>Sandstone</u> light green, pale tinge (grn.) pale grey, fine grained, in sil. matrix, dom. dark lithic inclusions.
	20	<u>Siltstone</u> pale brown, soft. trace dolomite.

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
5140'-5150'	50 30 20	<u>Mudstone</u> <u>Sandstone</u> <u>Siltstone</u> } As above, sample essentially clayey (dk.gry.). Washed sample contains gry. clayey matter.
5150'-5160'	50 30 20	<u>Mudstone</u> <u>Sandstone</u> <u>Siltstone</u> } Clayey sample. Random coal fragments in argill. matrix.
5160'-5170'	50 30 20	<u>Mudstone</u> <u>Sandstone</u> <u>Siltstone</u> } As above.
5170'-5180'	50 30 20	<u>Mudstone</u> <u>Sandstone</u> <u>Siltstone</u> } Sample clayey, pale grey.
5180'-5190'	50 20 30	<u>Mudstone</u> as above. <u>Siltstone</u> as above. <u>Sandstone</u> dom fine grained embedded in sil. matrix kaol. in pt., lithic inclusions. Less clayey sample.
5190'-5200'	50 25 25	<u>Mudstone</u> <u>Siltstone</u> <u>Sandstone</u> } As above.
5200'-5210'	50 25 25	<u>Mudstone</u> <u>Siltstone</u> <u>Sandstone</u> } As above.
{ 5210'-5215'	50 30 20	<u>Mudstone</u> <u>Sandstone</u> <u>Siltstone</u> } As above.
{ 5215'-5220'	70 20 10	<u>Sandstone</u> Pale green, pale grey, fine grained - medium, intensely sil., kaol., micromicaceous, lithic inclusions. Also abundant med.-crs. grained clear quartzose, subangular, subrounded, poorly sorted. <u>Mudstone</u> not as dark as in previous samples. Abundant coal fragments, embedded in argill. matrix. <u>Siltstone</u> Pale grey, argill., kaol. in pt. variably calcareous.
5220'-5230'	50 25 25	<u>Mudstone</u> <u>Sandstone</u> <u>Siltstone</u> } As above. Variably calc. matrix.
5230'-5240'	70 20 10	<u>Mudstone</u> <u>Sandstone</u> <u>Siltstone</u> } As above.
5240'-5250'	50 10 40	<u>Mudstone</u> <u>Sandstone</u> <u>Siltstone</u> } As above. Grey quartzose, lithic, slightly fels. very car. in part. Traces of a pale brown quartzose, slightly lithic, feldspathic dolomitic sand (dolomite!) are also present.
5250'-5260'	60 10 30	<u>Mudstone</u> <u>Sandstone</u> <u>Siltstone</u> } As above. as above, also very shaley in part.
5260'-5270'	60 10 30	<u>Mudstone</u> as above <u>Sandstone</u> very fine - fine gr. as above. <u>Siltstone</u> as above.

Depth	%	Lithology
5270'-5280'	60	<u>Mudstone</u>)
	10	<u>Sandstone</u>) As above.
	30	<u>Siltstone</u>)
5280'-5290'	60	<u>Mudstone</u> as above
	20	<u>Sandstone</u> very fine to fine grained quartzose, sl. lithic & fels. & Carb., kaol. matrix silty & carb. streaks.
	20	<u>Siltstone</u> grey and dark brown, as above.
5290'-5300'	60	<u>Mudstone</u>)
	10	<u>Sandstone</u>) As above.
	30	<u>Siltstone</u>)
5300'-5310'	60	<u>Mudstone</u>)
	10	<u>Sandstone</u>) As above.
	30	<u>Siltstone</u>)
5310'-5320'	50	<u>Mudstone</u> grey - dark brown, soft and plastic, some more compact.
	20	<u>Sandstone</u> white, pale brown, light grey. Very fine and rare med. gr. qtzose., slightly lithic and fels. Occ. carb. clay matrix.
	30	<u>Siltstone</u> grey - dark grey & brown.
5320'-5330'	50	<u>Mudstone</u> as above.
	20	<u>Sandstone</u> as above and fine grained light green & grey. Qtzose. feldspathic lithic carb. Trace biotite poorly sorted grs. subang. (graywacke?) glauc. in part. dolomite.
	30	<u>Siltstone</u> as above.
5330'-5340'	50	<u>Mudstone</u>
	10	<u>Sandstone</u>
	40	<u>Siltstone</u> as above & grey green & grey & brown shale.
5340'-5350'	10	<u>Mudstone</u>)
	20	<u>Sandstone</u>) As above
	40	<u>Siltstone</u>) grading to
	30	<u>Shale</u> brown - grey green, slightly mic. in part. compact - carb in pt.
5350'-5360'	20	<u>Mudstone</u>)
	30	<u>Siltstone</u>) As above
	20	<u>Shale</u>)
	30	<u>Sandstone</u>)
5360'-5370'	30	<u>Mudstone</u>)
	20	<u>Siltstone</u>) As above. Sample becoming progressively
	25	<u>Shale</u>) clayey. (dk. gry.) Cavings of coal (?)
	25	<u>Sandstone</u>)
5370'-5380'	30	<u>Mudstone</u>)
	30	<u>Siltstone</u>) As above.
	40	<u>Sandstone</u> Sandstone, largely fine grained, greenish tinge kaol. in pt. calcareous; micro-micaceous. Random loose quartzose med. grained rare coarse. Trace dolomite, felspar grains.
5380'-5390'	40	<u>Mudstone</u>)
	40	<u>Sandstone</u>) As above. Trace coal fragments.
	20	<u>Siltstone</u>)

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
5390'-5400'	50	<u>Mudstone</u> grey, dark grey, argill., dark lithics
	30	<u>Siltstone</u> pale brown, brown, random lithics, plant frags., coal streaks.
	20	<u>Sandstone</u> pale green, grey, fine grained, medium grained, siliceous kaolinitic, black lithic inclusions. Random fine grained (rare med. grd.) colourless Qtzose. Variably calcareous. Trace dolomite.
5400'-5410'	50	<u>Mudstone</u>)
	25	<u>Siltstone</u>) As above, trace shale fractions.
	25	<u>Sandstone</u>) Tr. coal frags.
5410'-5420'	50	<u>Mudstone</u>)
	20	<u>Siltstone</u>) As above, trace coal fragments.
	20	<u>Sandstone</u>)
	10	<u>Shale</u>
5420'-5430'	50	<u>Mudstone</u>)
	30	<u>Siltstone</u>)
	10	<u>Sandstone</u> Strongly calcareous) As above.
	10	<u>Shale</u>)
5430'-5440'	50	<u>Mudstone</u> dark grey, argill., (sample less clayey)
	30	<u>Siltstone</u> pale brown, carb. streaks, micromic. argill.
	10	<u>Sandstone</u> green-grey, fine grained, kaol., sil. lithic inclusions, strongly calcareous.
	10	<u>Shale</u> pale yellow, random quartzose (very fine grained. Trace clay, clear, subangular medium to coarse grained Qtzose.
5440'-5450'	50	<u>Mudstone</u> as above.
	30	<u>Siltstone</u> as above.
	20	<u>Sandstone</u> as above, strongly calcareous. Trace dolomite, random feldspar grains. (Tr. pink feldspar). Loose quartzose medium - coarse grained subangular, subrounded.
5450'-5460'	50	<u>Mudstone</u>)
	30	<u>Siltstone</u>) as above. Sandstone strongly calc., feldspathic.
	20	<u>Sandstone</u>)
5460'-5470'	30	<u>Mudstone</u>)
	40	<u>Siltstone</u>) as above.
	30	<u>Sandstone</u>)
5470'-5480'	10	<u>Mudstone</u>)
	10	<u>Siltstone</u>) as above.
	80	<u>Sandstone</u> med/coarse grained quartzose, fair sorting, rare grey lithics, white kaol. matrix, grains subround. subang.
5480'-5490'	20	<u>Mudstone</u> grey, soft, plastic 30% brown to grey mic. & carb.
	10	<u>Sandstone</u> white-grey. Fine grained Qtzose. lithic fels. carb. clay matrix.
	30	<u>Siltstone</u> brown - dark grey, Qtzose. mic. lithic. carb. fels. - greywacke in part?
	10	<u>Shale</u> dark grey and brown mic. & carb.
5490'-5500'	40	<u>Mudstone</u> as above.
	20	<u>Sandstone</u> as above. Some med/coarse quartz grains, white clay matrix, poorly sorted. - arkosic in part!
	30	<u>Siltstone</u>)
	10	<u>Shale</u>) as above.

<u>Depth</u>	<u>%</u>	<u>Lithology</u>
5500'-5510'	30	<u>Mudstone</u> as above.
	40	<u>Sandstone</u> dom. fine gr. grey - pale grey green qtzose. fels. biotitic glauc. lithic carb. very calc.
	20	<u>Siltstone</u>
	10	<u>Shale</u>
5510'-5520'	30	<u>Mudstone</u>)
	20	<u>Sandstone</u>) As above.
	40	<u>Siltstone</u>)
	10	<u>Shale</u>)
5520'-5530'	30	<u>Mudstone</u>)
	20	<u>Sandstone</u>) As above.
	40	<u>Siltstone</u>)
	10	<u>Shale</u>)
5530'-5540'	20	<u>Mudstone</u>)
	10	<u>Sandstone</u>) As above.
	60	<u>Siltstone</u>) (greywacke?)
	10	<u>Shale</u>)
5540'-5550'	20	<u>Mudstone</u>)
	20	<u>Sandstone</u>) As above.
	50	<u>Siltstone</u>)
	10	<u>Shale</u>)
5550'-5560'	30	<u>Mudstone</u>)
	20	<u>Sandstone</u>) As above.
	40	<u>Siltstone</u>)
	10	<u>Shale</u>)
5560'-5570'	40	<u>Mudstone</u> light grey - brown, soft.
	30	<u>Sandstone</u> white - pale grey fine grained qtzose. sl. lithic, feldspathic occ. mic. & carb. white clay matrix.
	10	<u>Siltstone</u>) As above.
	20	<u>Shale</u>)
5570'-5580'	30	<u>Mudstone</u> soft grey & light brown, silty & sandy.
	30	<u>Sandstone</u> fine grained qtzose., lithic fels. mic. clay matrix carb. in part. grading to grey wacke in part.
	20	<u>Siltstone</u> brown - grey mic. & carb.
	20	<u>Shale</u>
5580'-5590'	20	<u>Mudstone</u>
	60	<u>Sandstone</u> as above.
	20	<u>Siltstone</u> & <u>Shale</u>
5590'-5600'	20	<u>Mudstone</u>)
	50	<u>Sandstone</u>) As above
	30	<u>Siltstone</u> & <u>Shale</u>)
5600'-5610'	20	<u>Mudstone</u>
	50	<u>Sandstone</u>
	30	<u>Siltstone</u> & <u>Shale</u>

TD Driller 5612'

COLLIERS HILL NO. 1

<u>Core No.</u>	<u>Depth</u>	<u>Lithology</u>
30	1790'	<p><u>Marly Sandstone</u></p> <p>Dark greenish grey, dominantly colourless quartzose, medium to fine grained, trace coarse grained, subangular, subrounded, siliceous in part, kaolinitic in part, argillaceous in part, strongly calcareous together with abundant quartzose grains impregnated with glauconite disseminated throughout the sample. Moderately well sorted. Minor pyritic nodules and fine grained aggregates. Good porosity.</p>
29	1798'	<p><u>Sandstone</u></p> <p>Dark grey, dominantly colourless random milky white quartzose, fine grained, minor coarse and very coarse, subangular, subrounded, siliceous in part, kaolinitic in part, strongly calcareous, poorly sorted abundant quartzose grains impregnated with glauconite. Pyrite occurs throughout the matrix. Good porosity.</p>
28	1804'	<p><u>Coal & Sand</u></p> <p>Dominantly a sand with coal admixture, black, greenish black. Sand composed predominantly of colourless milky white quartzose medium to fine grained, random coarse grained, subangular, subrounded siliceous in part, slightly calcareous, minor glauconitic fractions, trace ferruginised quartzose. Fair porosity. Coal as fine sized particles disseminated throughout the sample.</p>
27	1816'	<p><u>Coal</u></p> <p>Dark brown, brown, soft, friable with abundant colourless milky white quartzose coarse, medium and fine grained, subangular, subrounded, poorly sorted, disseminated throughout, minor kaolin grains.</p>
26	1860'	<p><u>Coal</u></p> <p>Dark brown, brown, soft, friable, abundant massive black coal fragments, random kaolin fragments. Trace clear quartzose fine to medium grained disseminated throughout the sample.</p>
25	1865'	<p><u>Coal</u></p> <p>Dark brown, brown, soft, friable with abundant black coal occurring as streaks together with carbonaceous (plant) remains, random kaolinised particles.</p>

<u>Core No.</u>	<u>Depth</u>	<u>Lithology</u>
24	1876'	<u>Sandstone</u> Grey, pale grey, composed dominantly of clear, milky white quartzose, fine to very fine grained subangular, subrounded, siliceous in part, well sorted, with dark lithic and carbonaceous inclusions. Moderate porosity. Prominent coal streaks and carbonaceous interbeds.
23	2905'	<u>Sandstone</u> Light brown, consist of dominantly clear, milky white quartzose, very fine grained, strongly siliceous, strongly calcareous, well sorted, kaolinitic in part, with dark lithic inclusions and abundant coal and carbonaceous streaks. Moderate porosity.
22	3035	<u>Coal</u> Dark brown, brown, soft, friable, argillaceous in part.
21	4090'	<u>Sandstone</u> Grey, pale grey, dominantly milky white, clear quartzose, coarse to very coarse as well as granule sized fractions embedded in siliceous matrix, kaolinitic in part, argillaceous in part, trace of ferruginised grains. Dark grey, black lithic inclusions. Good porosity.
20	4112'	<u>Sandstone</u> Pale grey, dominantly milky white, clear quartzose, very coarse grained, abundant granule sized, subrounded, rounded, embedded in siliceous matrix, argillaceous in part, kaolinitic in part, randomly ferruginised, traces of dolomite fractions. Poor porosity. Occasional lithic inclusions and prominent carbonaceous streaks.
19	4148'	<u>Sandstone</u> Pale grey, dominantly colourless quartzose very fine to fine grained, subangular, subrounded, embedded in siliceous matrix, kaolinitic in part, well sorted. Random lithic inclusions and trace carbonaceous streaks. Good porosity.
18	4159'	<u>Sandstone</u> Pale grey, composed of colourless, clear quartzose, very fine to fine grained, subangular, subrounded, embedded in siliceous matrix, kaolinitic in part, argillaceous in part, slightly calcareous, well sorted. Dark brown, black lithic inclusions. Good porosit

<u>Core No.</u>	<u>Depth</u>	<u>Lithology</u>
17	4210'	<u>Mudstone</u> Dark grey, grey, dark brown argillaceous soft, friable, siliceous in part, variably calcareous, fair porosity.
16	4416'	<u>Mudstone</u> Dark grey, dark brown, soft, friable argillaceous, siliceous in part containing carbonaceous streaks and plant remains, fair porosity.
15	4490'	<u>Sandstone</u> Pale grey, composed of colourless, minor milky white quartzose, fine grained, rounded, subrounded, strongly siliceous, slightly calcareous, kaolinitic in part, prominent black, coarse to medium grained lithic particles. Good porosity.
14	4540'	<u>Mudstone</u> Dark grey, pale grey, dark brown soft, friable argillaceous, kaolinitic in part, calcareous in part, prominent plant remains.
13	4594'	<u>Mudstone</u> This sample may not be representative of the formation. Sample is dark grey, plastic mass, probably mud cake with some drill cuttings embedded in the media.
12	4881	<u>Shale</u> Dark grey, soft friable, intensely argillaceous.
11	4959'	<u>Sandstone</u> Pale green, grey, composed of colourless, green quartzose, coarse to fine grained, rounded subrounded, siliceous matrix argillaceous in part, strongly calcareous, poorly sorted, randomly ferruginised grains, occasionally micaceous, minor lithic inclusions.
10	5040'	<u>Mudstone & Siltstone</u> <u>Mudstone</u> , grey, argillaceous, siliceous in part, soft, friable, kaolinitic in part. <u>Siltstone</u> , pale grey, argillaceous, feldspathic.
9	5143'	<u>Mudstone & Siltstone</u> <u>Mudstone</u> , dark grey, grey, dark brown, argillaceous, soft, friable slightly siliceous. <u>Siltstone</u> grey, argillaceous, soft.

<u>Core No.</u>	<u>Depth</u>	<u>Lithology</u>
8	5250'	<u>Mudstone & Siltstone</u> <u>Mudstone</u> , dark grey, argillaceous, soft, friable, plastic with minor colourless, milky white quartzose, coarse to very coarse, rounded, subrounded, siliceous in part, prominent carbonaceous inclusions, often blocky, massive. <u>Siltstone</u> , dark brown.
7	5390'	<u>Mudstone & Siltstone</u> <u>Mudstone</u> , dark grey, grey, plastic, argillaceous, soft, friable, trace colourless quartzose, very fine grained embedded in clayey matrix, kaolinitic in part, slightly calcareous interbeds of black coal streaks random granular coal fractions distributed throughout the matrix. <u>Siltstone</u> , dark brown.
6	5425'	<u>Mudstone & Siltstone</u> <u>Mudstone</u> , dark grey, plastic, argillaceous soft, friable, siliceous in part, slightly calcareous, slightly kaolinitic. <u>Siltstone</u> dark brown.
5	5483'	<u>Sandstone</u> Pale green, pale grey, composed of colourless quartzose, medium to fine grained, minor coarse, clayey matrix, strongly siliceous variably calcareous, kaolinitic in part, abundant dark green, black lithic inclusions. Trace pink felspar grains. Good porosity.
4	5542'	<u>Mudstone</u> Dark grey, strongly argillaceous, trace grey quartzose, very fine grained, subangular, subrounded, siliceous in part, kaolinitic in part, poor porosity.
3	5550'	<u>Siltstone</u> Dark greenish grey, composed of colourless, milky white quartzose, very fine grained, subrounded, subangular, strongly siliceous, kaolinitic in part, ferruginous in part, slightly calcareous, fair sorting, random cream coloured feldspar particles.
2	5565'	<u>Sandstone</u> Pale grey, green, composed of colourless milky white quartzose, very fine to fine grained, rounded, subrounded, siliceous, kaolinitic in part, strongly calcareous, moderately well sorted, randomly ferruginised grains with prominent dark lithic inclusions. Good porosity.
1	5575'	<u>Sandstone</u> Pale green, pale grey, composed of milky white colourless quartzose, medium to fine grained, rounded, sub rounded.

<u>Core No.</u>	<u>Depth</u>	<u>Lithology</u>
1 cont.	5575'	Siliceous in part, kaolinitic in part, poorly sorted with prominent dark lithic inclusions. Trace feldspar grains. Good porosity.

Sample descriptions by A. MARIMUTHU

PE905881

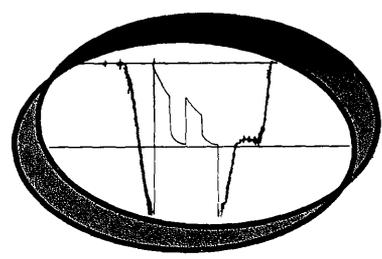
This is an enclosure indicator page.
The enclosure PE905881 is enclosed within the
container PE904805 at this location in this
document.

The enclosure PE905881 has the following characteristics:

- ITEM_BARCODE = PE905881
- CONTAINER_BARCODE = PE904805
- NAME = FIT Photos for Colliers Hill-1
- BASIN = GIPPSLAND BASIN
- PERMIT = PEP/72
- TYPE = WELL
- SUBTYPE = FIT
- DESCRIPTION = FIT Photos (from appendix 4 of WCR) for
Colliers Hill-1
- REMARKS =
- DATE_CREATED =
- DATE_RECEIVED =
- W_NO = W572
- WELL_NAME = COLLIERS HILL-1
- CONTRACTOR = HALIBURTON
- CLIENT_OP_CO = WOODSIDE OIL NL.

(Inserted by DNRE - Vic Govt Mines Dept)

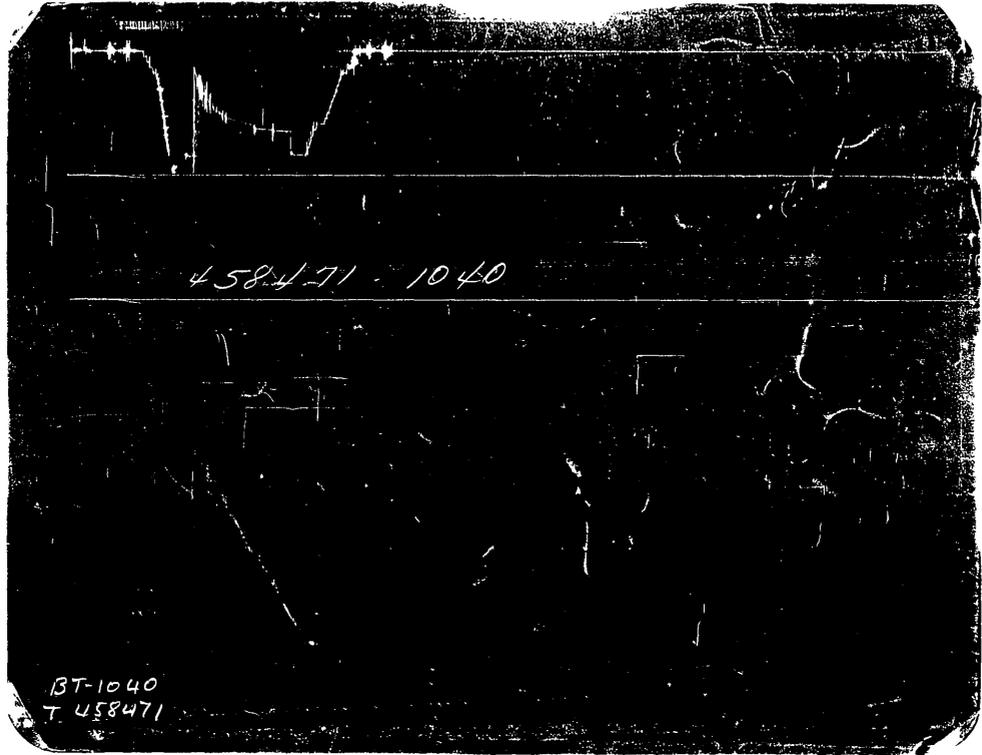
Formation Testing Service Report



DEPT. NAT. RES & ENV

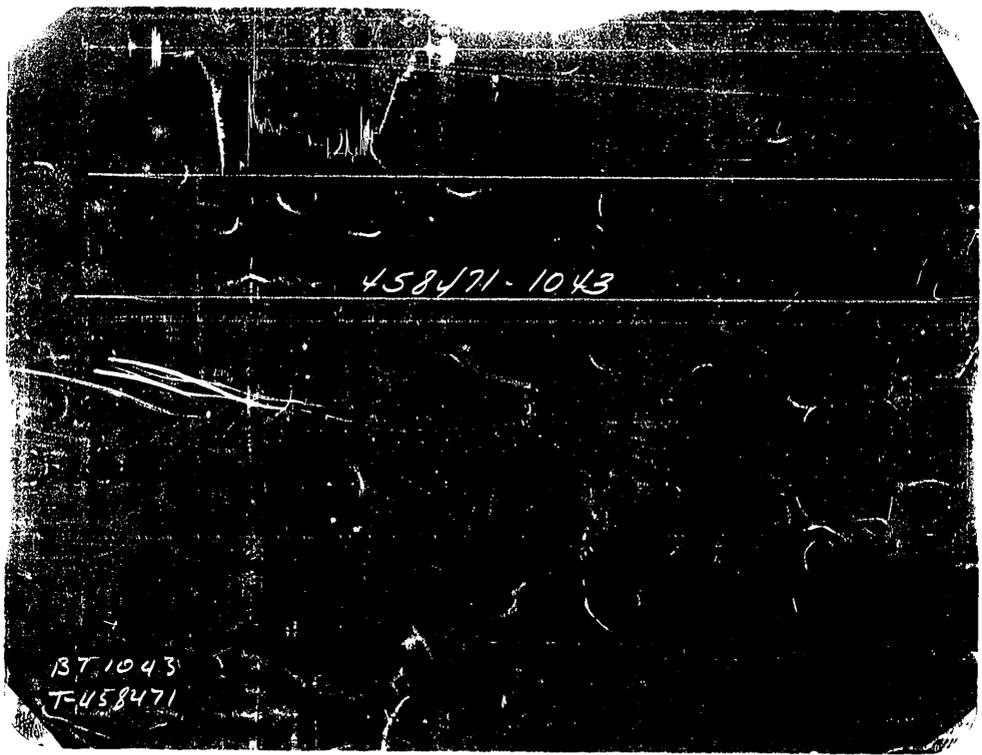


PE905881



PRESSURE
↓

← TIME →



Each Horizontal Line Equal to 1000 p.s.i.

FLUID SAMPLER DATA		Date	1-18-70	Ticket Number	458471
Sampler Pressure	P.S.I.G. at Surface		Kind of Job	OPEN HOLE	Halliburton District SALE
Recovery: Cu. Ft. Gas	_____		Tester	MR. BENNET	Witness R. M. BELL
cc. Oil	_____		Drilling Contractor	RICHTER BAWDEN	SM
cc. Water	_____		EQUIPMENT & HOLE DATA		
cc. Mud	_____		Formation Tested	Latrose Valley Coal Measure	
Tot. Liquid cc.	_____		Elevation	40	Ft.
Gravity	° API @ _____ °F.		Net Productive Interval	110'	Ft.
Gas/Oil Ratio	_____ cu. ft./bbl.		All Depths Measured From	Kelly bushing	
	RESISTIVITY	CHLORIDE CONTENT	Total Depth	1870'	Ft.
Recovery Water	_____ @ _____ °F.	1000 ppm	Main Hole/Casing Size	8 3/4" hole 9 5/8" Csg.	
Recovery Mud	_____ @ _____ °F.		Drill Collar Length	360	I.D. 2.25"
Recovery Mud Filtrate	_____ @ _____ °F.		Drill Pipe Length	1388	I.D. 3.826"
Mud Pit Sample	_____ @ _____ °F.		Packer Depth(s)	1748'	Ft.
Mud Pit Sample Filtrate	_____ @ _____ °F.		Depth Tester Valve	1742'	Ft.
Mud Weight	9.2 vis	45 cp			

TYPE	AMOUNT	Depth Back Pres. Valve	1736	Surface Choke	1"	Bottom Choke	.75"
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Recovered	1400	Feet of muddy water, fresh	Meo. From Tester Valve
Recovered		Feet of	

Remarks Tool opened for a 53 minute first flow with a good blow, blow continued to weaken throughout test. Took a 45 minute first closed in pressure. Reopened for a 30 minute second flow. Took a 30 minute second closed in pressure. CHARTS INDICATE ANCHOR PERFORATIONS PLUGGING THROUGHOUT TEST.

TEMPERATURE	Gauge No. 1040		Gauge No. 1043		Gauge No.		TIME	
	Depth:	1760 Ft.	Depth:	1866 Ft.	Depth:	Ft.	Tool	A#A#
Est. °F.	24 Hour Clock		24 Hour Clock		Hour Clock		Opened 4:11	P.M.
	Blanked Off no		Blanked Off yes		Blanked Off		Tool	A#A#
Actual 110 °F.	Pressures		Pressures		Pressures		Closed 6:09	P.M.
	Field	Office	Field	Office	Field	Office	Reported	Computed
Initial Hydrostatic	840	848	905	909			Minutes	Minutes
First Period Flow	Initial	115	132	201	Plugging			
	Final	550	539	603	Plugging		53	
	Closed in	608	601	660	Plugging		45	
Second Period Flow	Initial	637	624	747	Plugging			
	Final	652	634	775	Plugging		30	
	Closed in	666	649	810	Plugging		30	
Third Period Flow	Initial							
	Final							
	Closed in							
Final Hydrostatic	-	835	-	833				

Legal Location Sec. - Twp. - Rng. -----
 Lease Name COLLIERS HILL
 Well No. 1
 Test No. 1
 Tested Interval 1748-1870'
 Field Area DUTTON DOWNS
 County AUSTRALIA
 State VICTORIA
 Lease Owner/Company Name WOODSIDE OIL COMPANY



	O. D.	I. D.	LENGTH	DEPTH
Reversing Sub	5.75"	2.75"	12"	
Water Cushion Valve				
Drill Pipe	4 1/2"	3.82"	1388'	
Drill Collars	6 1/2"	2.25"	360'	
Handling Sub & Choke Assembly	5.87"	2.58"	23.80"	
Dual CIP Valve	5"	.89"	56.08"	
Dual CIP Sampler				
Hydro-Spring Tester	5"	.75"	60.21"	1742'
Multiple CIP Sampler				
Extension Joint				
AP Running Case	5"	3.06"	48.37"	1740'
Hydraulic Jar	5"	1"	39.46"	
VR Safety Joint	5"	1"	28.35"	
Pressure Equalizing Crossover				
Packer Assembly	8"	1.75"	75"	1748'
Distributor				
Packer Assembly				
Flush Joint Anchor	5"	2.37"	25'	
Pressure Equalizing Tube				
Blanked-Off B.T. Running Case	5"	2.44"	48.71'	1866'
Drill Collars	6 1/2"	2.25"	93'	
Anchor Pipe Safety Joint				
Packer Assembly				
Packer Assembly				
Anchor Pipe Safety Joint				
Side Wall Anchor				
Drill Collars				
Flush Joint Anchor				
Blanked-Off B.T. Running Case				

Gauge No. 1040

Depth 1740

Clock 24 hour

Ticket No. T 458471

	<u>First Flow Period</u>		<u>Initial Closed in Pressure</u>			<u>Second Flow Period</u>		<u>Final Closed in Pressure</u>		
	<u>Time Defl. .000"</u>	<u>PSIG Temp. Corr.</u>	<u>Time Defl. .000"</u>	<u>Log $\frac{t+e}{e}$</u>	<u>PSIG Temp. Corr.</u>	<u>Time Defl. .000"</u>	<u>PSIG Temp. Corr.</u>	<u>Time Defl. .000"</u>	<u>Log $\frac{t+e}{e}$</u>	<u>PSIG Temp. Corr.</u>
P ₀	.000	132	.000	-	542	.000	629	.000		646
P ₁	.018	235	.0148	1.10721	549	.009	629	.0092	1.04139	646
P ₂	.036	-	.0296	0.83187	557	.018	631	.0184	0.77815	648
P ₃	.054	345	.0444	0.69285	565	.027	632	.0276	0.63649	649
P ₄	.072	380	.0592	0.59550	568	.036	633	.0368	0.54407	649
P ₅	.09	-	.074	0.52634	577	.045	635	.046	0.47712	649
P ₆	.108	455	.0888	0.47129	584	.054	635	.0552	0.42651	651
P ₇	.126	487	.1036	0.42813	590	.063	636	.0644	0.38561	651
P ₈	.144	500	.1184	0.39270	594	.072	636	.0736	0.35218	652
P ₉	.162	520	.1332	0.36361	600	.081	638	.0828	0.32428	652
P ₁₀	.18	542	.148	0.33846	606	.09	639	.092	0.30103	652

Gauge No. 1043

Depth 1866

Clock 24 hour

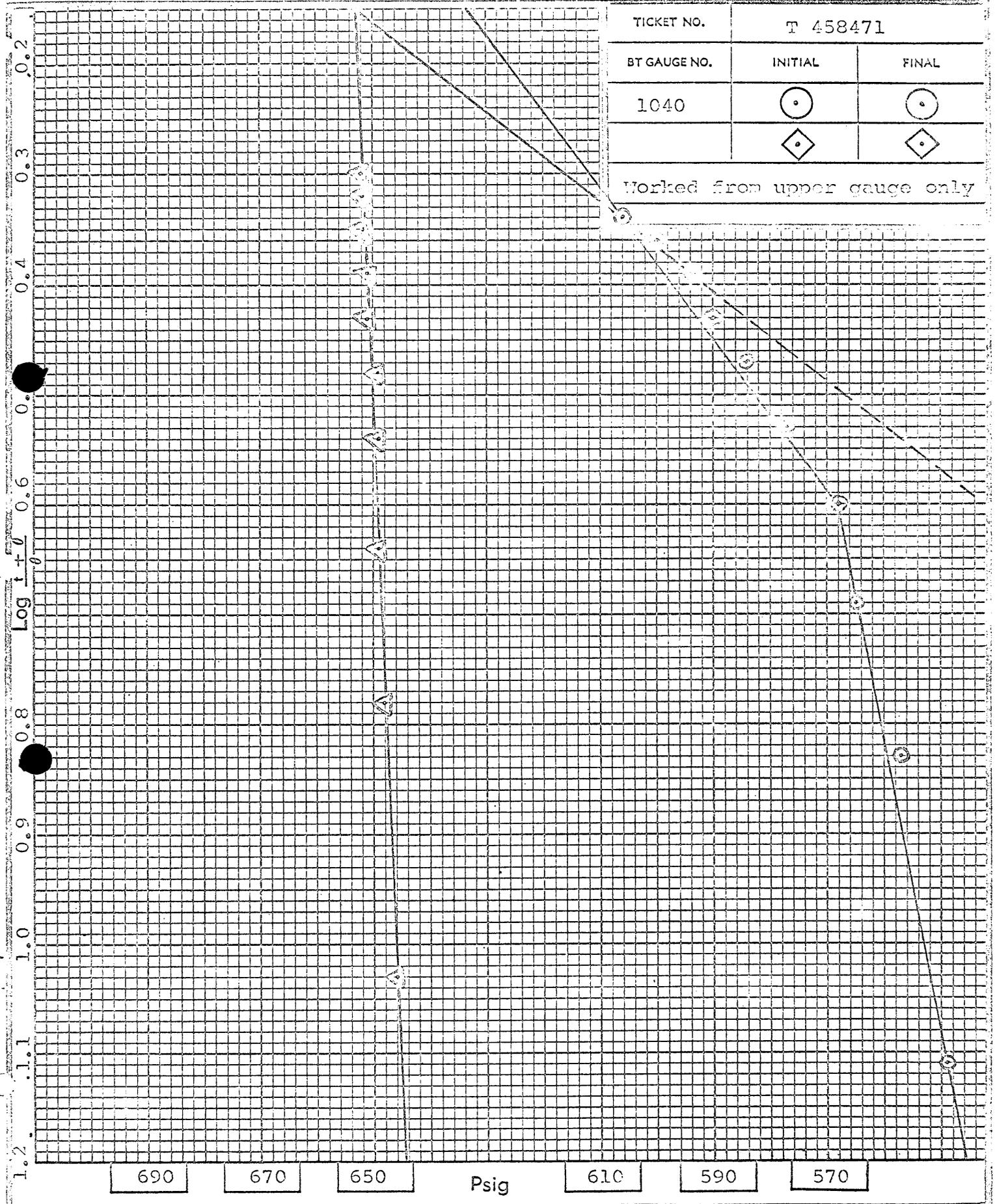
<u>First Flow Period</u>		<u>Initial Closed in Pressure</u>			<u>Second Flow Period</u>		<u>Final Closed in Pressure</u>		
<u>Time Defl. .000"</u>	<u>PSIG Temp. Corr.</u>	<u>Time Defl. .000"</u>	<u>Log $\frac{t+e}{e}$</u>	<u>PSIG Temp. Corr.</u>	<u>Time Defl. .000"</u>	<u>PSIG Temp. Corr.</u>	<u>Time Defl. .000"</u>	<u>Log $\frac{t+e}{e}$</u>	<u>PSIG Temp. Corr.</u>
P ₀					.000	612	.000		672
P ₁					.0156	612	.0105	1.04139	731
P ₂					.0312	621	.021	0.778	747
P ₃					.0468	629	.0315	0.636	747
P ₄					.0624	635	.042	0.544	747
P ₅					.078	644	.0525	0.471	751
P ₆					.0936	651	.063	0.427	751
P ₇					.1092	657	.0735	0.386	751
P ₈					.1248	662	.084	0.352	754
P ₉					.1404	668	.0945	0.324	756
P ₁₀					.156	672	.105	0.301	756

Celsius

F₁₀₀

6/8

TICKET NO.	T 458471	
BT GAUGE NO.	INITIAL	FINAL
1040	○	○
	◇	◇
Worked from upper gauge only		



EXTRAPOLATED PRESSURE GRAPH

NOMENCLATURE

b	= Approximate Radius of Investigation	Feet
b₁	= Approximate Radius of Investigation (Net Pay Zone h ₁)	Feet
D.R.	= Damage Ratio	—
EI	= Elevation	Feet
GD	= B.T. Gauge Depth (From Surface Reference)	Feet
h	= Interval Tested	Feet
h₁	= Net Pay Thickness	Feet
K	= Permeability	md
K₁	= Permeability (From Net Pay Zone h ₁)	md
m	= Slope Extrapolated Pressure Plot (Psi ² /cycle Gas)	psi/cycle
OF₁	= Maximum Indicated Flow Rate	MCF/D
OF₂	= Minimum Indicated Flow Rate	MCF/D
OF₃	= Theoretical Open Flow Potential with/Damage Removed Max.	MCF/D
OF₄	= Theoretical Open Flow Potential with/Damage Removed Min.	MCF/D
P_s	= Extrapolated Static Pressure	Psig.
P_f	= Final Flow Pressure	Psig.
P_{or}	= Potentiometric Surface (Fresh Water*)	Feet
Q	= Average Adjusted Production Rate During Test	bbls/day
Q₁	= Theoretical Production w/Damage Removed	bbls/day
Q_g	= Measured Gas Production Rate	MCF/D
R	= Corrected Recovery	bbls
r_w	= Radius of Well Bore	Feet
t	= Flow Time	Minutes
t_o	= Total Flow Time	Minutes
T	= Temperature Rankine	°R
Z	= Compressibility Factor	—
μ	= Viscosity Gas or Liquid	CP
Log	= Common Log	

* Potentiometric Surface Reference to Rotary Table When Elevation Not Given,
Fresh Water Corrected to 100° F.

LITHOLOGY

- 0' - 290' SAND and GRAVEL: Cream and pale grey, unconsolidated, medium to pebble size, poorly sorted, variably ferruginous, occasionally calcareous, minor laminations of clay, silt, granules, brown coal; occasional feldspar; micaceous, rare pyrite and peat.
- 290' - 407' FOSSILIFEROUS SANDSTONE: pale grey, clear, medium to granule sized, subangular to subrounded, quartzose, poorly sorted, occasionally calcareous with abundant mica and rare coal; traces of feldspar, black to brown lithics and kaolin, fossiliferous, occasional bands of mollusca, echinoids, bryzoa, foraminifera and corals.
- 407' - 473' MARL: light brown, very calcareous, sandy, fossiliferous, including Ditrupa, glauconite infilling fossils.
- 473 - 1050' LIMESTONE: cream to light brown, crystalline to microcrystalline, varying calcareous cement; Bryzoa and Ditrupa fragments; good porosity with interbedded calcarenite.
CALCARENITE: light brown to brown, crystalline to microcrystalline, brown microcrystalline cement, partly silty, traces of fine quartz, varying amounts lithics.
- 1050' - 1090' MARL: light grey to dark grey, very sticky, streaks of glauconite, traces of quartz grains.
- 1090' - 1405' CALCARENITE: light grey to grey, fine grained, traces of quartz, green, black and dark green lithics; abundant fossil fragments including corals and gastropods with traces of interbedded limestone.
LIMESTONE: brown to pale brown, microcrystalline.
- 1405' - 1458' MARL SANDY: pale grey to pale brown, plastic, very calcareous traces of lithics, quartz, glauconite.
- 1458' - 1615' MARL: pale grey to pale brown, variably calcareous.
- 1615' - 1780' CALCILUTITE: grey to green, sticky; quartz grains, loose, colourless; fossil fragments with glauconite infilling; very pyritic in places.
- 1780' - 1790' DOLOMITE: brown to light brown, hard, microcrystalline, unfossiliferous.
- 1790' - 1802' SANDSTONE GLAUCONITIC: brown and grey, loose medium to coarse grained, quartzose, subrounded, sorted, very calcareous, abundant pyritic nodules.
- 1802' - 1953' COAL: black, blackish brown to brown, slightly silty, slightly sandy, soft, slightly friable, slightly pyritic, with interbedded siltstone.
SILTSTONE: light brown, soft, very carbonaceous, slightly calcareous, slightly fissile.
- 1953' - 2255' SANDSTONE: pale grey to colourless, loose, medium to coarse grained, subangular to well rounded, sorted; occasional dark lithics, fairly porous with interbedded coal.
COAL: as above but tending to slightly brownish black.

- 2255' - 2519' SILTSTONE: light brown, soft, slightly siliceous carbonaceous, with interbedded sandstone.
SANDSTONE: as above, but with very siliceous matrix, poorly sorted, slightly porous to porous.
- 2519' - 3300' COAL: thick, dark brown and black, soft, fibrous, brittle, blocky; plant remains as streaks and laminations, occasional pyrites, with interbeds of claystone, siltstone, sandstone and dolomite.
CLAYSTONE: brown, very soft, slightly silty.
SILTSTONE: as above,
SANDSTONE: as above with abundant fine to medium grained loose quartz grain; slightly kaolinitic, moderately porous.
DOLOMITE: white crystalline, slightly carbonaceous, slightly weathered.
- 3300' - 3613' CLAYSTONE: as above;
SANDSTONE: as above but more compact, and with very siliceous cement, very abrasive, variably calcareous, and with random pyritic nodules, slightly porous.
DOLOMITE: as above.
- 3613' - 3830' SANDSTONE: colourless to pale grey, fine grained, siliceous, slightly carbonaceous, slightly calcareous; with abundant coarse to medium grained loose quartz often embedded in pyritic matrix; interbedded with claystone and siltstone.
CLAYSTONE: dark grey, very soft, very silty to slightly silty, carbonaceous to slightly carbonaceous.
SILTSTONE: as above.
- 3830' - 4132' SANDSTONE: milky white to pale grey, medium to coarse, occasionally very coarse, very siliceous, slightly carbonaceous, slightly argillaceous, rare medium to coarse subrounded to subangular quartz grain; trace dolomite and pyrite nodules, slightly porous, interbedded with claystone.
CLAYSTONE: dark grey, grey to greenish grey, very silty, occasionally carbonaceous.
- 4132' - 4700' CLAYSTONE: pale grey to pale brown, abundant carbonaceous streaks and plant remains, compact, slightly silty, very calcareous, interbedded with sandstone and siltstone.
SANDSTONE: dark brown to dark grey, slightly argillaceous, variably carbonaceous.
- 4700' - 4870' MUDSTONE: brown to dark brown, soft, plastic, slightly silty, prominent carbonaceous streaks and plant remains, slightly kaolinitic and slightly calcareous.
SANDSTONE: pale brown to brown, siliceous matrix, slightly kaolinitic, slightly carbonaceous, with abundant quartz, fine to medium grained, loose.
CLAYSTONE: as above.
SILTSTONE: as above but very pyritic.
- 4870' to 5612'
(T.D.) CLAYSTONE: dark grey, prominent carbonaceous streaks, slightly kaolinitic, slightly silty, friable, soft.
SANDSTONE: pale brown and pale green, fine grained,

4780' - 5612'
(T.D.)
cont'd.

siliceous matrix, very carbonaceous, with abundant fine to medium grained loose quartz grains, increasingly calcareous towards base; basal part increasingly feldspathic, trace dolomite, good porosity.

SILTSTONE: dark brown and grey, very silty, carbonaceous, slightly kaolinitic, micaceous towards the base.

Appendix 6

2nd Copy

COLLIERS HILL NO. 1

Palynological Reports

by

Dr. M. Dettmann

1970

W1572 Colliers Hill Co. 1.

PALYNOLOGICAL REPORT ON WOODSIDE COLLIERS HILL No.1 WELL,

4416 - 5550 FEET

Samples of six sidewall cores taken from between 4416 and 5550 feet in Woodside Colliers Hill No.1 well were submitted for palynological examination and age determination by Woodside Oil N.L. The six samples are from the "Golden Beach Beds", an informally named rock unit which occupies about 1500 feet of sediment in the well (4132 - 5612 feet) where it underlies the Latrobe Valley Coal Measures and younger Tertiary sediments.

The six samples were processed for palynological examination by a method involving the use of hydrofluoric acid and zinc bromide (digestion and separation of mineral matter from plant material) followed by brief exposure to ultrasonic vibration. The resultant residues were then treated with Schulze solution for five minutes, washed in distilled water, briefly immersed in 1% ammonium hydroxide, and thoroughly washed in distilled water before final mounting in glycerine jelly on glass microscope slides.

All samples yielded plant material, but in two of the samples (from 4807 feet and 5040 feet) the plant material is sparse and consists entirely of small wood fragments. The other four samples (4416 feet, 4540 feet, 5425 feet, and 5550 feet) yielded abundant plant material including reasonably well preserved spores, pollen grains, plant microfossils of uncertain affinity and possibly referable to the Actritarcha, together with wood and cuticular fragments. Specific analyses of the spore-pollen bearing samples indicates that the enclosing sediments are of Upper Cretaceous age. Moreover, the plant microfossil assemblages provide a basis for subdivision of the Colliers Hill Upper Cretaceous sequence in terms of the spore-pollen zones defined by Dettmann and Playford (1969) for the Upper Cretaceous of western Victoria.

As will be shown subsequently, sediments in Colliers Hill No.1 well between 4416 feet and 4540 feet are attributable to the Tricolpites pachyexinus Zone and are thus of Senonian age. Underlying strata between 5425 feet and 5550 feet are referable to the Appendicisporites distocarinatus Zone of ?Cenomanian -?Turonian age. As noted previously, sediments at 4807 feet and 5040 feet failed to yield stratigraphically significant plant microfossils, and thus the precise age of the horizons cannot be adduced by palynological means.

Productive horizons of the Colliers Hill sequence yielded in addition to Upper Cretaceous plant microfossil assemblages, recycled spores and pollen grains of Permian, Triassic, and Lower Cretaceous age. The recycled forms, although rarely common, indicate that Permian, Triassic, and Lower Cretaceous strata provided at least some of the source material of the Colliers Hill No.1 Upper Cretaceous sequence.

PLANT MICROFOSSIL ASSEMBLAGES AND AGE DETERMINATIONS

A. 4416 - 4540 feet

4416 feet

Plant microfossils extracted from the sample are reasonably well preserved showing indications of mild carbonisation effects. The following species of spores and pollen grains were obtained:

Spores: Baculatisporites comaumensis (Cookson)
Ceratosporites sp.
Cyathidites australis Couper
C. minor Couper
Laevigatosporites ovatus Wilson & Webster
Kraeuselisporites papillatus Harris

Pollen: Alisporites cf. grandis Cookson
Araucariacites australis Cookson
Cycadopites nitidus (Balme)
Microcachrydites antarcticus Cookson

Spore-pollen assemblages at 4416 feet and 4540 feet include Tricolpites pachyexinus, Camarozonosporites ohaiensis, Stereisporites viriosus, and Phyllocladidites mawsonii and lack Nothofagidites spp. The samples are accordingly referred to the Tricolpites pachyexinus Zone of Senonian age (Dettmann and Playford 1969). Moreover the samples are considered to be from the upper part of the zone because of their content of Proteacidites amolosexinus and Tricolpites sabulosus which are now known to have initial appearances near the top of the Tricolpites pachyexinus Zone (cf. Dettmann and Playford 1969).

Recycled spores and pollen grains of Lower (and early Upper) Cretaceous age occur in both samples; they are rare (1%) at 4416 feet but fairly plentiful (7%) at 4540 feet. The microflora from the latter horizon also contains species (Cicatricosisporites cuneiformis, C. pseudotripartitus, Balmeisporites glenelgensis, and Foraminisporis dailyi) that are significantly more abundant than elsewhere from the Victorian Senonian and at least some of the examples may represent secondarily deposited forms.

B. 4807 - 5040 feet

Samples from 4807 feet and 5040 feet yielded small residues of plant material composed entirely of wood fragments. On stratigraphic grounds and other palynological evidence documented herein the age of the samples can be given no more precisely than ?Cenomanian - ?Turonian-?Senonian.

C. 5425 - 5550 feet

5425 feet

Abundant plant material including fairly preserved spores and pollen grains was extracted from the sample. Other plant microfossils recovered include fairly common Amosopollis cruciformis, a species possibly referable to the Acritarcha, and common wood and cuticular fragments.

The following types were identified in the microflora:

- Spores: Baculatisporites comaumensis (Cookson)
Cicatricosisporites sp.
Cyathidites australis Couper
C. minor Couper
Foveotrilletes sp.
Kraeuselisporites jubatus Dettmann & Playford
Laevigatosporites ovatus Wilson & Webster
Lycopodiumsporites austroclavatidites (Cookson)
L. facetus Dettmann
Leptolepidites verrucatus Couper
Gleicheniidites cf. circinidites (Cookson)
Rouseisporites reticulatus Pocock
Sestrosporites pseudoalveolatus (Couper)
Stereisporites antiquasporites (Wilson & Webster)
- Pollen: Alisporites grandis (Cookson)
Araucariacites australis Cookson
Classopollis cf. classoides Pflug
Cycadopites nitidus (Balme)
Ephedra notensis Cookson
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson
Tricolpites pannosus Dettmann & Playford
T. spp.
- ?Acritarcha: Amosopollis cruciformis Cookson & Balme
- Remanié: Dictyotosporites speciosus Cookson & Dettmann - Lower Cretaceous
Lundbladispora denmeadi (de Jersey) - Triassic
Nuskoisporites sp. - Permian

5550 feet

Spores and pollen grains extracted from the sample occur commonly and are fairly preserved. Other plant material identified includes wood and cuticular fragments. The following spore-pollen types were identified:

- Spores: Baculatisporites comaumensis (Cookson)
Cicatricosisporites australiensis (Cookson)
Cyathidites australis Couper
Crybelosporites striatus (Cookson & Dettmann)
Gleicheniidites circinidites (Cookson)
Klukisporites scaberis (Cookson & Dettmann)
Laevigatosporites major (Cookson)
Lycopodiumsporites austroclavatidites (Cookson)
Stereisporites antiquasporites (Wilson & Webster)
- Pollen: Alisporites grandis (Cookson)
Araucariacites australis Cookson
Classopollis cf. classoides Pflug
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson
Tricolpites pannosus Dettmann & Playford

Tricolpites sp.
Triorites minor Couper
Remanié: Aratrisporites sp. - Triassic
Dictyotosporites speciosus - Lower Cretaceous

Samples at 5425 feet and 5550 feet are referred to the Appendicisporites distocarinatus Zone because of their content of Tricolpites pannosus, Krauselisporites jubatus, Triorites minor, and Amosopollis cruciformis, and lack of species diagnostic of the succeeding Clavifera triplex and Tricolpites pachyexinus Zones. The samples are thus of ?Genomanian - ?Turonian age. Amosopollis cruciformis, which occurs frequently in the sample from 5425 feet, has been tentatively referred to the Acritarcha although Cookson & Balme (1962) suggest a comparison with angiosperm morphology. Recycled forms of Permian, Triassic, and Lower Cretaceous age occur infrequently (less than 1%) in both samples.

CONCLUSIONS

Sediments examined from the "Golden Beach Beds" in Colliers Hill No.1 well are shown to be of Upper Cretaceous age and to include horizons of the Senonian Tricolpites pachyexinus Zone (4416 - 4540 feet) and the ?Genomanian - ?Turonian Appendicisporites distocarinatus Zone (5425 - 5550 feet). The intervening Turonian Clavifera triplex Zone was not recognized in the material studied but may be present within the interval 4540 feet - 5425 feet. On account of the presence of reworked plant microfossils within the material examined, source material of the sequence is suggested to have derived, at least in part, from Permian, Triassic, and Lower Cretaceous strata .

The tentative correlation (Fide letter 20th March, 1970) of the top of the "Golden Beach Beds" (4132 feet) in Colliers Hill No.1 well with sediments at 5378 feet in Esso Barracouta A-1 (Gippsland Shelf No.1) is not supported by the palynological evidence. From data provided by Douglas (1966)

and his determination of Nothofagidites spp. in cores 14 to 21 (5656 - 8701 feet) of Barracouta A-1, it is apparent that the Barracouta microfloras are at the oldest referable to the Nothofagidites Microflora of Dettmann and Playford (1960). Sediments containing the Nothofagidites are considered to be of Senonian - uppermost Cretaceous age and succeed the Tricolpites pachyexinus Zone (see Dettmann and Playford 1969, Table 9:4). Thus, the Colliers Hill No.1 sequence between 4416 feet and 5550 feet is older than sediments between 5656 feet and 8701 feet in Barracouta A-1.

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22nd April, 1970.

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PALYNOLOGY OF UPPER CRETACEOUS AND LOWER TERTIARY SEDIMENTS
IN WOODSIDE COLLIERS HILL No.1 WELL

A recent palynological examination (Dettmann 1970) of six sidewall cores from Woodside Colliers Hill No.1 well revealed that sediments from between 4416 feet and 5550 feet within the "Golden Beach Beds" are of Upper Cretaceous age. Furthermore it was demonstrated that the section could be subdivided in terms of the Upper Cretaceous spore-pollen zonation scheme of Dettmann and Playford (1969); sediments between 4416 and 4540 feet are attributable to the Senonian Tricolpites pachyexinus Zone and horizons at 5425-5550 feet to the ?Cenomanian - ?Turonian Appendicisporites disto-carinatus Zone.

The object of the present study is to delimit more precisely the vertical extents of the Upper Cretaceous spore-pollen zones within the "Golden Beach Beds" in the well, and to assess the age of the overlying Latrobe Valley Coal Measures. The study is based upon an examination of four samples (additional to those examined by Dettmann 1970) from the "Golden Beach Beds" and three horizons of the Latrobe Valley Coal Measures. The samples were processed by the method outlined by Dettmann (1970) and all were found to contain plant microfossils including spores and pollen grains together with wood and cuticular fragments. Several samples also yielded rare microplankton.

Data obtained from a specific analyses of the plant microfossil assemblages and the integration of this data with previously documented results (Dettmann 1970) enables palynological zonation and age determination of the Colliers Hill No.1 well section examined. As will be shown subsequently the Latrobe Valley Coal Measures are in the middle and upper portions (1860 - 2905 feet) of Upper Eocene age, and at the base (4090 feet) of uppermost

Cretaceous or early Paleocene age. The "Golden Beach Beds" are of Upper the Cretaceous age, including horizons of/?Cenomanian - ?Turonian Appendicisporites distocarinatus Zone and the Senonian Tricolpites pachyexinus Zone. The intervening (Turonian) Clavifera triplex Zone has not been recognized in the material examined.

The evidence derived from the palynological examination of the samples is also synthesised in terms of assessing the depositional environment and source material of the Latrobe Valley Coal Measures and the "Golden Beach Beds".

PLANT MICROFOSSIL ASSEMBLAGES AND AGE DETERMINATIONS

A. Late Eocene

1860 feet

A well preserved, prolific assemblage of spores and pollen was extracted from the sample. Other microfossils recovered include infrequent wood and cuticular tissue. The following species were identified:

Spores: Baculatisporites sp.
Cyathidites australis Couper
C. minor Couper

Pollen: Araucariacites australis Cookson
Beaupreaidites elegansiformis Cookson
B. verrucosus Cookson
Dacrydiumites florinii Cookson & Pike
Malvacipollis sp.
Nothofagidites asperus (Cookson)
N. cinctus (Cookson)
N. emarcidus (Cookson)
N. deminutus (Cookson)
N. heterus (Cookson)
N. goniatus (Cookson)
N. vansteenisi (Cookson)
Phyllocladidites mawsonii Cookson
Polyporina sp.
Polycolpites sp.
Podocarpidites ellipticus
Proteacidites annularis Cookson
P. crassus Cookson
P. incurvatus Cookson
P. subscabratus Couper

Triorites harrisii Couper
T. magnificus Cookson
Tricolporites prolata Cookson
Remaniè: Cicatricosisporites australiensis (Cookson) - Lower and/or early
2905 feet Upper Cretaceous

Plant microfossils extracted from the sample include well preserved and abundant pollen grains together with less frequent spores and rare microplankton. The following types were observed:

Spores: Cyathidites australis Couper
C. minor Couper
Pollen: Densoisporites velatus Weyland & Krieger
Beaupreaidites verrucosus Cookson
Casuarinidites cainozoicus Cookson & Pike
Dacrydiumites florinii Cookson & Pike
Microcachrydites antarcticus Cookson
Nothofagidites brachyspinulosus (Cookson)
N. cinctus (Cookson)
N. asperus (Cookson)
N. emarcidus (Cookson)
N. incrassatus (Cookson)
Phyllocladidites mawsonii Cookson
Podocarpidites ellipticus Cookson
Proteacidites annularis Cookson
P. crassus Cookson
P. crassipora Harris
P. rectomarginus Cookson
P. incurvatus Cookson
P. subscabratus Couper
P. pachypolus Cookson & Pike
Triorites magnificus Cookson
T. harrisii Couper
Tricolporites scabratus Harris
Microplankton: Deflandrea phosphoritica Eisenack
Remaniè: Aequitriradites spinulosus (Cookson & Dettmann) - Lower and/or early
Upper Cretaceous
The upper sample contains an abundance and diversity of

Nothofagidites, a feature of southern Australian Late Eocene microfloras.

Supporting evidence for such an age is provided by the presence of Triorites magnificus and Beaupreaidites verrucosus. The underlying horizon at 2905 feet contains a continued abundance of Nothofagidites, fairly plentiful Phyllocladites^{id} mawsonii and Triorites harrisii, and Proteacidites together with Triorites magnificus and Beaupreaidites verrucosus. The microflora is accordingly

considered to be of Late Eocene age. The microplankton species, Deflandrea phosphoritica recorded from 2905 feet is widely distributed in southern Australian Eocene sediments (Deflandre and Cookson 1955, Cookson and Eisenack 1965).

The assemblage from 1860 feet is composed entirely of land derived forms; that from 2905 feet contains a predominance of spores and pollen having similar derivation with rare examples of the possible marine or brackish water indicator Deflandrea phosphoritica. Both samples yielded a small percentage (<1%) of specimens recycled from Lower and/or Early Upper Cretaceous horizons.

B. Uppermost Cretaceous - Early Paleocene

4090 feet

The residue obtained from the sample consists chiefly of wood and cuticular material. Spores and pollen grains are infrequent and microplankton occur rarely. The following forms have been observed:

Spores: Cyathidites australis Couper
Camazonosporites ohaiensis (Couper)
Gleicheniidites circinidites (Cookson)
Laevigatosporites ovatus Wilson & Webster

Pollen: Araucariacites australis Cookson
Dacrydiumites florinii Cookson & Pike
Nothofagidites emarcidus (Cookson)
Phyllocladidites mawsonii Cookson
Podocarpidites ellipticus Cookson
Proteacidites amolosexinus Dettmann & Playford
P. crassus Cookson
P. reticulosacabratus Harris
P. subscabratus Couper
Triorites edwardsii Cookson & Pike
Triorites harrisii Couper
Tricolpites gillii Cookson

Microplankton: Baltisphaeridium sp.

Remanié: Cicatricosisporites ludbrookii Dettmann - Lower Cretaceous

Triorites edwardsii and Camazonosporites ohaiensis are

members of Dettmann and Playford's (1969) Nothofagidites Microflora of uppermost Cretaceous (Senonian and later) age and extend into Harris's (1965) Triorites edwardsii Zone (Paleocene). The presence of Triorites harrisii supports a Paleocene rather than an uppermost Cretaceous age; however, Proteacidites amolosexinus is hitherto unknown from Tertiary strata, with a documented range of Senonian - uppermost Cretaceous (Dettmann and Playford 1969).

Plant microfossils of the assemblage are mostly land-derived; the occasional examples of Baltisphaeridium are probably of aquatic origin. Recycled spores occur rarely and are from Lower Cretaceous horizons.

C. Senonian

4159 feet

The sample provided very few spores and pollen grains.

Examples of the following types have been observed:

Spores: Cyathidites australis Couper
 Rouseisporites reticulatus Pocock
Pollen: Araucariacites australis Cookson
 Microcachryidites antarcticus Cookson
 Phyllocladidites mawsonii Cookson
 Podocarpidites ellipticus Cookson
 Proteacidites subscabratus Couper

4416-4807 feet

See Dettmann (1970) for microfloral details.

4959 feet

Reasonably well preserved spores and pollen grains occur abundantly in the sample together with less frequent wood and cuticular tissue. Species identified include:

Spores: Cyathidites australis Couper
 C. minor Couper
 Clavifera triplex (Bolkhovitina)
 Cicatricosisporites cuneiformis Pocock
 Gamarozonosporites amplus (Stanley)

- Foraminisporis dailyi (Cookson & Dettmann)
Gleicheniidites circinidites (Cookson)
Kraeuselisporites jubatus Dettmann & Playford
Laevigatosporites ovatus Wilson & Webster)
L. major (Cookson)
Lycopodiumsporites austroclavatidites (Cookson)
Osmundacidites wellmanii Couper
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Araucariacites australis Cookson
Cycadopites nitidus (Balme)
Classopollis cf. classoides Pflug
Microcachryidites antarcticus Cookson
Phyllocladidites mawsonii Cookson
Podocarpidites ellipticus Cookson
Podosporites microsaccatus (Couper)
Proteacidites subscabratus Couper
Tricolpites sp.
Remanié: Triorites minor Couper
Cicatricosisporites australiensis (Cookson) -(Lower and/or early
Crybelosporites striatus (Cookson & Dettmann)(Upper Cretaceous

5040 feet

See Dettmann (1970) for microfloral details.

5153 feet

The microflora extracted from the sample is fairly well preserved and includes good concentrations of the following species of spores and pollen grains:

- Spores: Baculatisporites comaumensis (Cookson)
Cyathidites australis Couper
C. minor Couper
Cicatricosisporites cuneiformis Pocock
C. sp.
Coptospora sp.
Gleicheniidites circinidites (Cookson)
Kraeuselisporites jubatus Dettmann and Playford
Laevigatosporites major (Cookson)
Lycopodiumsporites austroclavatidites (Cookson)
Leptolepidites verrucatus Couper
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Araucariacites australis Cookson
Cycadopites nitidus (Balme)
Microcachryidites antarcticus Cookson
Podocarpidites ellipticus Cookson
Podosporites microsaccatus (Couper)
Phyllocladidites mawsonii Cookson
Proteacidites subscabratus Couper
Tricolpites pannosus Dettmann & Playford
T. pachyexinus Couper

Remanié: Aequitriradites spinulosus (Cookson & Dettmann) (Lower and/or
Cicatricosisporites ludbrooki Dettmann (early Upper
(Cretaceous

5250 feet

A sparse assemblage of spores and pollen grains and abundant wood and cuticular fragments were extracted from the sample. The following species were identified:

Spores: Cyathidites australis Couper
C. minor Couper
Clavifera triplex (Bolkhovitina)
Cicatricosisporites sp.
Laevigatosporites ovatus Wilson & Webster
Lycopodiumsporites austroclavatidites (Cookson)
Gleicheniidites cirrenidites (Cookson)
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Microcachryidites antarcticus Cookson
Podocarpidites ellipticus Cookson

The upper sample from 4159 feet yielded insufficient diagnostic forms for precise age determination, but on stratigraphic grounds and other palynological evidence documented herein is of Senonian or uppermost Cretaceous age. As discussed by Dettmann (1970) sediments at 4416 - 4540 feet are of Senonian age and are attributable to the upper portion of the Tricolpites pachyexinus Zone. The next productive sample down section is from 4959 feet and contains a microflora indicative of the lower or middle portions of the Tricolpites pachyexinus Zone. The sample at 5153 feet contains a similar assemblage and is also attributed to the Tricolpites pachyexinus Zone. The sample from 5250 feet provided a sparse assemblage containing Clavifera triplex but lacking other stratigraphically significant species. C. triplex provides evidence that the horizon is within the Clavifera triplex or younger Upper Cretaceous spore-pollen Zones.

The microfloras from all productive samples from between 4159 feet and 5250 feet are composed of land derived forms. Samples

attributed to the Tricolpites pachyexinus Zone contain recycled spores of Lower and/or early Upper Cretaceous age.

D. ?Cenomanian - ?Turonian

5425-5550 feet

See Dettmann (1970) for microfloral details. As discussed by this author the microfloras are composed chiefly of land-derived forms and include recycled examples of Permian, Triassic and Lower Cretaceous age.

CONCLUSIONS

Sediments of the Latrobe Valley Coal Measures in Colliers Hill No.1 well range in age from uppermost Cretaceous or Paleocene to Upper Eocene. The three horizons studied contain a dominance of land derived plant microfossils with rare examples of microplankton suggesting deposition in a continental or brackish to very near shore marine environment.

The underlying "Golden Beach Beds" include horizons of the Senonian Tricolpites pachyexinus Zone and the ?Cenomanian - ?Turonian Appendicisporites distocarinatus Zone; the Turonian Clavifera triplex Zone has not been positively identified but may be represented within the interval 5153 - 5425 feet. The microfloral assemblages of the Tricolpites pachyexinus Zone are composed entirely of land-derived forms suggesting accumulation of the sediments in a continental environment. Horizons of the Appendicisporites distocarinatus Zone contain a dominance of land-derived forms with minor representation of forms of uncertain derivation.

Recycled spores and pollen grains occur in the majority of samples examined. Types derived from Lower and/or early Upper Cretaceous sediments are rare in the Latrobe Valley Coal Measures and more prevalent in horizons of the Tricolpites pachyexinus Zone of the "Golden Beach Beds".

Underlying strata of the latter rock unit attributed to the Appendicisporites distocarinatus Zone contain reworked Lower Cretaceous, Triassic and Permian forms.

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21st July, 1970.

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PE904806

This is an enclosure indicator page.
The enclosure PE904806 is enclosed within the
container PE904805 at this location in this
document.

The enclosure PE904806 has the following characteristics:

- ITEM_BARCODE = PE904806
- CONTAINER_BARCODE = PE904805
- NAME = Colliers Hill 1 Well Correlation
Diagram
- BASIN = GIPPSLAND
- PERMIT = PEP 72
- TYPE = WELL
- SUBTYPE = CROSS_SECTION
- DESCRIPTION = Colliers Hill 1 Well Correlation
Diagram. Enclosure 2 of WCR
- REMARKS =
- DATE_CREATED = 31/01/70
- DATE_RECEIVED =
- W_NO = W572
- WELL_NAME = Colliers Hill-1
- CONTRACTOR =
- CLIENT_OP_CO = Woodside Oil N.L.

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PE603168

This is an enclosure indicator page.
The enclosure PE603168 is enclosed within the
container PE904805 at this location in this
document.

The enclosure PE603168 has the following characteristics:

- ITEM_BARCODE = PE603168
- CONTAINER_BARCODE = PE904805
- NAME = Colliers Hill 1 Composite Well Log
- BASIN = GIPPSLAND
- PERMIT = PEP 72
- TYPE = WELL
- SUBTYPE = COMPOSITE_LOG
- DESCRIPTION = Colliers Hill 1 Composite Well Log.
Enclosure 1 of WCR
- REMARKS = Sheet 1 of 2.
- DATE_CREATED = 30/04/70
- DATE_RECEIVED = 31/07/87
- W_NO = W572
- WELL_NAME = Colliers Hill-1
- CONTRACTOR =
- CLIENT_OP_CO = Woodside Oil N.L.

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PE603481

This is an enclosure indicator page.
The enclosure PE603481 is enclosed within the
container PE904805 at this location in this
document.

The enclosure PE603481 has the following characteristics:

ITEM_BARCODE = PE603481
CONTAINER_BARCODE = PE904805
NAME = Composite Well Log
BASIN = GIPPSLAND
PERMIT = PEP72
TYPE = WELL
SUBTYPE = COMPOSITE_LOG
DESCRIPTION = Composite Well Log (sheet 2 of 2) for
Colliers Hill-1
REMARKS =
DATE_CREATED = 30/04/1970
DATE_RECEIVED = 31/07/87
W_NO = W572
WELL_NAME = COLLIERS HILL-1
CONTRACTOR =
CLIENT_OP_CO = WOODSIDE OIL COMPANY

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