



Natural Resources and Environment

AGRICULTURE • RESOURCES • CONSERVATION • LAND MANAGEMENT



KINGFISH-1 (W504)

WELL SUMMARY

1 Folio No.	2 Referred to	3 Date	4 Clearing Officer's Initials	1 Folio No.	2 Referred to	3 Date	4 Clearing Officer's Initials

<p style="text-align: center;">FILE COVER INSTRUCTIONS FOR ACTION OFFICERS</p> <p>(1) FOLIO NUMBERS: Each subject paper attached to a file is to be given a consecutive number by the attaching officer. Papers must not be removed from or attached to a file without approval.</p> <p>(2) REFERRAL TO OTHER OFFICERS: When an Officer completes action on the file and further action is required by some other Officer, please initial Column (4) and on the next vacant line, enter the relevant folio number in Column (1), indicate to whom the file is to be forwarded in Column (2) and record the date in Column (3).</p> <p>(3) BRING UP MARKINGS: When action on a file is required at a later date, the officer will initial Column (4) and, on the next vacant line, enter the relevant folio number in Column (1), then write "B/U" followed by the action officer's name in Column (2) and the date the file is required in Column (3).</p> <p>(4) PUTAWAY MARKINGS: When ALL action on a file is completed the officer concerned will initial Column (4) and, on the next vacant line, write "P/A" in column (2).</p> <p style="text-align: center;">REGISTRY MUST BE NOTIFIED OF ANY FILE MOVEMENTS BETWEEN OFFICERS</p>	FILE NO.
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EARLIER FILES

LATER FILES

RECORDS DISPOSITION

PLUG + SUSPENDED.

SPUD 6-4-67
COMPLETED 15-6-67.
T.D. 8451.

38° 35' 50 S

148° 12' 35 E

KINGFISH - I

ESSO. WILDCAT.

504

W.D. 253 R

GLOMAR III

✓	IES	Run 1.	798 - 3518	Separate Logs	2" and 5"
✓	"	" 2	3500 - 8329	" "	2" " 5"
✓	"	" 3	7400 - 8436	" "	2" " 5"
✓	"	Runs 1, 2, 3.	798 - 8436.	" "	2" " 5"
✓	BHCS/GR.	Run 1.	799 - 3500	" "	2" " 5"
✓	"	" 2	3500 - 8320	" "	2" " 5"
✓	"	" 3	8200 - 8430.	" "	2" " 5"
✓	"	Runs 1, 2, 3.	799 - 8430.	" "	2" " 5"
✓	FDC	Run 1	3502 - 8330	" "	2" " 5"
✓	"	" 2	8159 - 8439	" "	2" " 5"
✓	"	Runs 1, 2, 3.	3502 - 8439	" "	2" " 5"
✓	CDM.	Run 1	799 - 3500	" "	2" " 5"
✓	"	" 2.	3520 - 8435	" "	2" " 5"
✓	MLL	" 1.	7350 - 8329	" "	2" " 5"
✓	"	" 2.	{ 7400 - 7700 8225 - 8437	" "	2" " 5"
✓	LL.	" 1.	7350 - 7650	" "	2" + 1" 5" + 1c
✓	GRN	" 1.	7300 - 7850	" "	2" + 1" 5" + 1c
✓	"	" 2.	7193 - 7623.	" "	only 5"
✓	FIT	" 1.	Tests 1-3.		
✓	Temperature	" 1.	1" 910 - 7630.		+ 1c
✓	Casing Collar & Perforat.		7585 - 7593		+ 1c
✓	Core Lab. Completion Coregraph				
✓	"	"	Grapholog. 820 - 8451		+ 1c 820 - 8450
✓	4 Cores from		7509 - 7620.		Sent to store
✓	Cuttings	3530 - 7290.	7300 - 8300.	800 - 8390.	15/10/74. Received
✓	"	800 - 3530.	7300 - 7790.		del. by Brain
✓	S.W.C.	28.	3558 - 8773.		
✓	Well Summary				
✓	Cuttings, Cores and S.W.C. Descriptions				03/198.
✓	Velocity survey				
✓	Palaeontology by D. Taylor				
✓	Palynology				L. E. Stover + A. D. Partridge. Plus revision
✓	Well Summary.				+ PART 1c
✓	Weekly Reports				
✓	HYDROCARBON ANALYSIS Summary				1 page.

**KINGFISH-1
(W504)**

Well Summary Report

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WELL SUMMARY

KINGFISH - 1 (W504)

(AUG. 1967)

INC 1111 1

ESSO KINGFISH A-1 WELL SUMMARY

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BASIC

DEPT. NAT. RES & ENV



PE902905

Purpose of Well

New field wildcat, Gippsland Basin, to test a large east-west elongate anticline. Five hundred and fifty feet of vertical closure, covering an area of 42 square miles, was mapped on the unconformity at the top of the Latrobe Delta Complex. Closure was also mapped at the top of the Lakes Entrance Formation and was shown to increase with depth within the Latrobe Delta Complex. The primary objective was sandstone at the top of the Latrobe Delta Complex. Secondary objectives were sandstone horizons within the Latrobe Delta Complex and possible sandstones within the Lakes Entrance Formation. The well was programmed to 15,000'.

Well Statistics

Location: 38° 35' 50" S
148° 12' 35" E

Seismic shot point 590, Line EG-29.
Gippsland Basin, Victoria, Australia.

Elevation: Rotary Table 31' above mean sea level.

Water Depth: 253 feet.

Spudded: April 6, 1967.

Completed: June 15, 1967.

Total Depth: 8451 feet.

Well Status: Plugged and suspended.

Casing: 30" @ 393 feet.
20" @ 799 feet.
13-3/8" @ 3500 feet.
9-5/8" @ 7766 feet.

Perforations: 7585 - 7593', 2 holes per foot.

Plugs:

No.1 Packer at 8532 feet squeezed perforations 7585-7593' displacing 98, sacks cement into formation and leaving 18 sacks in casing.

No.2 7300-7400'; 35 sacks cement, circulated at 7280 feet.

No.3 3300-3600'; 100 sacks cement, top found at 3379 feet.

No.4 400-600'; 100 sacks cement, circulated at 300 feet.

Cores: Four conventional cores in the interval 7509-7622'; cut 113 feet, recovered 105 feet. Twenty-eight sidewall cores taken in the interval 3558-8113'.

Mud Logs: Well logged by Core Laboratories from 800 feet to total depth.

KINGFISH - 1

2 of 4

Electric Logs:	Induction Electric Log	798-8436
	Sonic Log - Gamma Ray	799-8430
	Formation Density Log	3502-8439
	Laterolog	7350-7650
	Microlaterolog	7350-8437
	Gamma Ray Neutron	7300-7850
	Dipmeter	3500-8430

Velocity Survey: 2531', 3790', 4400', 5799', 6420',
7477', 8208'.

Tests

Wireline Formation Tests:

- Test 1 7581' Recovered 2000 cc water, 5500 ppm (filtrate), scum of oil. Sample pressure 3329 psi, shut-in pressure 3375 psi in 10 minutes.
- Test 2 7570' Recovered 18 cf gas, plus 14,000 cc oil, 5% mud, GOR 204, oil gravity 47.5° API at 62° F, color dark brown-green, pour point 53° F. Sample pressure, 3360 psi, shut-in pressure 3401 psi.
- Test 3 7483' Recovered 17 cf gas, 9250 cc oil, 2½% mud, GOR 295, oil gravity 51° API at 69° F, color dark brown-green, pour point 57°.

DAILY DRILLING REPORT TO THE
HON. THE MINISTER OF MINES

Kingfish A1 Well Programmed depth 15,000 ft.
Report received at 10.30 a.m. Thursday,
1st June, from Hopkins, Hematite, Melbourne.

Depth 8451' Progress since last report: Nil

Operation Waiting for weather to moderate

Results of Wireline Formation Tests

Test No. 1 at 7581' Recovered 20,000 cc water
containing 5,600 p.p.m. dissolved
solids, 20 cc oil and 480 cc mud
Pressures - Sampling 3275 p s i
Shut in 3305 "
Sampling time - 45 minutes

Test No. 2 at 7573' Recovered 14,000 cc of oil
of 47.5° A.P.I. gravity, 18 c ft. of ^{barrel}
gas, 2,000 cc mud. G.O.R. 204 c ft. / ~~unit~~
Pressures - Sampling 3220 p s i
Shut in 3220 "
Sampling time - 48 minutes

Test No. 3 at 7483' Recovered 15,000 cc oil of
51° A.P.I. gravity, 17 c ft. of gas
450 cc mud. G.O.R. 295
Pressures - Sampling 3300 p s i
Shut in 3300 "
Sampling time - 47½ minutes

Comment by Director, Petroleum and Natural Gas Branch:

The above figures are taken from the report by
Schlumberger, the agency conducting the tests
for Esso. Some figures vary from those given
by Hematite in last night's report but they do
not lead to any essentially different conclusions.

DRILLING DATA:

Production testing has been completed. Wellplugging operations are now in progress.

The following are the details of the production test carried out between 7585 and 7593 ft. This was the only production test carried on the well.

Production Test

Interval 7585 - 7593 ft.
2 shot/ft Total 17 shots.

½" choke 600 BOPD increasing to 1160 BOPD. G.O.R.
160 scf/bl oil 51° API.

5/8" choke 1645 BOPD. G.O.R. 137 scf/bl Green black
oil 48 - 49° API at 60° F Gas 0.226 mmcf/d. No sand or water
2% emulsion
FTHP 690 p.s.i.
CITHP 960 p.s.i.
Temperature 84 - 85° F
Closed the well at 07.22 hrs on June 8.

Bottom Hole Sampling

Two samples of water and two samples of oil. Water
salinity of samples 32,000 and 33,500 ppm.

DAILY PETROLEUM DRILLING REPORT TO THE
HON. THE MINISTER OF MINES.

Kingfish A1 Well Programmed depth 15,000 ft.

Received at 9.30 a.m., Thursday, 8th June, 1967,
from Foster, Hematite, Melbourne.

Depth 8451 ft. Progress since last report: Nil

Operations: The following results of production tests
have been received:

Interval tested: 7585'-7593'

- (a) Using a $\frac{1}{2}$ " choke the well gave an initial production of 600 barrels of oil per day. This increased to 1160 barrels of oil per day. The gas/oil ratio was 160 (i.e. 160 cubic feet of gas was produced for each barrel of oil produced).
- (b) Using $\frac{5}{8}$ " choke the well gave a production at the rate of 1645 barrels of oil per day for a period of 4 hours of testing. The oil is green black and has an API gravity of 48°-49° at 60° F. Gas/oil rate was 137. No sand was produced and no water was produced with the oil. The flowing tubing head pressure was 690 p.s.i. The closed-in tubing head pressure was 960 p.s.i.

The well was closed in at 7.22 a.m. and the drilling crew are awaiting further instructions. Esso are now considering if any further testing in this well is warranted.

Comment: by Mr. P.W. Bollen, Geologist, Mines Department:

The results given above are from a test in what has been called the "transition zone", which produced water by wire-line testing. This test has proved that this zone is not a transition zone but part of the oil column. It is considered that sufficient information has been gained from this test, and it is confidently anticipated ~~that~~ that Esso will not continue with further testing.

These results are extremely encouraging.

Esso's flow summary.

1500 b.h.d. — 5/8" choke.

Interval 7584-7592'

Time 4 1/2 P.M.

Noted
JB

Further drilling & evaluation work
to establish reserves.

Further study of reservoir from this well needed
to fix size for future work.

[Signature]
8.6.67

Lithology

- 800-1500' Interbedded skeletal and granular limestone.
Skeletal limestone; white to light grey, contains large fossil fragments predominantly lamellibranchia, gastropods and bryozoa.
Granular limestone; light grey to mottled black, very argillaceous, finely disseminated, glauconite and black carbonaceous grains.

- 1500-3630' Interbedded granular limestone, marl and mudstone.
Granular limestone; light grey, slightly skeletal, argillaceous and occasionally silty and sandy, commonly glauconitic.
Marl; light grey to buff, slightly silty, very soft, sparsely glauconitic, carbonaceous and fossiliferous.
Mudstone; light green to olive grey, calcareous, silty and sparsely sandy, glauconitic, fossiliferous.

- 3630-5800' Interbedded siltstone and mudstone.
Siltstone; light to medium grey, compacted, very argillaceous, very calcareous (may vary to a dirty limestone which is often micritic), slightly sandy, pyrite and glauconite common, traces of carbonaceous material and mica.
Mudstone; light to medium grey-green, soft, very silty, very calcareous, glauconitic, very fossiliferous, sparse carbonaceous pyrite and micaceous stains.

- 5800-6470' Calcareous Mudstone; medium olive grey, firm, sparsely glauconitic, pyritic and carbonaceous, trace quartz grains, abundant foraminifera.

- 6470-7477' Calcareous Mudstone; medium olive grey, fine, sparsely glauconitic, pyritic and carbonaceous, trace quartz grains, abundant foraminifera.

- 7877-8280' Interbedded quartz sandstone and quartzwacke.
Quartz sandstone; light grey, massive, friable, poor to well sorted, fine grained to granular, sub angular to rounded. Cores indicate quartz grains are bimodal: (1) fine to medium grained, sub angular to sub rounded; (2) coarse grained to granular, sub rounded to rounded. Granular grains often smokey and have frosted surfaces. Trace of grey lithic grains, phlogopite mica, and dark green glauconite. Matrix variable from clay free to common white clay. Porosity

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averages around 25% and permeability varies from several hundred millidarcies in the clay choked sandstones to darcies in the clay-free sandstones.

Quartzwacke; medium to dark grey, firm to hard, fine grained, angular to sub rounded, quartz in white clay matrix, laminated with abundant brown mica. Low porosity and permeability

8280-8451'

Interbedded shale and quartz sandstone.

Shale; brown grey, well compacted, very silty and sandy, abundant pyrite, carbonaceous flakes and mica.

Quartz sandstone; as for interval 7477-8280.

KINGFISH OIL FIELD SUMMARY

Owners

Esso Exploration and Prod. Aust. — 50% W.I. — Operator
Hematite Petroleum Pty. Ltd. (B.H.P.) — 50% W.I.

Royalties and overrides

10% Royalty (6% to Victorian Government, 4% to Commonwealth Government); 2½% O.R.R. to Lewis G. Weeks and 2½% O.R.R. to Victorian Government.

Lease No.

VIC/L7 and L8.

Location

48 mi (77.2 kms) offshore, and 193 mi (310 kms) east-south-east of Melbourne.

Discovery well

Kingfish No. 1

- Coordinates: 38° 35' 50" S; 148° 12' 35" E.
- Discovery date: May, 1967.
- Elevation: K.B. 31 ft (9.4 m)
- Water depth: 250 to 260 ft (76 to 79 m) for field.
- Total depth: 8,451 ft (2,576 m)
- Drilled by: 'Glomar III'

Productive interval and maximum flow rate

(Prod. Test) 7,584 — 7,592' (8'):
FARO 1,500 BOPD (49° API), 5/8" t.c., low G.O.R.

Method of location

Reflection seismic.

FIELD DESCRIPTION AND DEVELOPMENT DATA

Estimated ultimate recoverable reserves (Victorian Ministry of Fuel and Power, 1972)

(Oil) 1,060 million bbls (168.5 million kls) — proved and probable.
(Associated Gas) 0.25 trillion CF (7.0 billion m³)

Productive area

28 sq mi; 17,920 acres; 74.5 sq kms *
Length: 8 mi (12.9 kms) *
Width: 3.5 mi (5.6 kms) *

Total area of closure

28 ± sq mi (74.5 sq kms)

Maximum vertical closure

270 ft (82.3 m) at top of Latrobe.

Depth to top of pay zone

-7,296 ft (-2,223.8 m)

Interface

Oil/Water contact: -7,566 ft (-2,306.1 m)

Total hydrocarbon column

(Oil) 270 ft (82.3 m)

Number of wells

(Wildcat wells) oil — 3, dry — nil; Total — 3.
(Platform wells) "A" Platform: 21 oil producers.
"B" Platform: 21 oil producers.

Number of platforms and sizes

Two, 21-conductor platforms, each 172' x 66' (52.4 x 20.1 m); total height 702 ft (214 m); main deck stands 72 ft (21.9 m) above sea level.

Well spacing

Approximately 320 acres; drainage in main reservoir is from 1,800 to 2,000 ft spacing.

GEOLOGICAL FACTORS

Producing zone

Malvacipollis diversus Zone of Latrobe Group (M — 1 reservoir).

Age

Lower Eocene

Environment of deposition

Inter-deltaic nearshore; includes braided-stream complexes, lateral beaches, intercalated clastic and organic flood plain deposits, and widespread marine transgression facies.

Reservoir rock description

Sandstone; fine to coarse grained quartz, clean, friable to unconsolidated.

Source rock

Intra-Latrobe shale and coal, and possibly Lakes Entrance Formation (Oligocene) marine-mudstone.

Cap rock

Lakes Entrance Formation (Oligocene) marine mudstone.

Type of trap

Structural-stratigraphic; large anticlinal closure at Latrobe (Eocene-Oligocene) unconformity surface, with porous Latrobe sands at angular (sub-conformable) contact with sealing marl and mudstone of the Lakes Entrance Formation.

Regional setting

Located in central portion of offshore Gippsland Basin.

Relation to unconformities

Production lies directly beneath Latrobe-Lakes Entrance (Eocene-Oligocene) unconformity.

Deepest formation penetrated.

Upper Cretaceous Latrobe Group.

RESERVOIR DATA

Net pay thickness

(Oil) maximum 200 ± ft (61 m) *; average 120 ± ft (36.6 m) *
Kingfish Nos. 1, 2 and 3 wells contained 114 ft (34.7 m), 188 ft (57.3 m), and 99 ft (30.2 m) net oil sand above the same oil-water contact, respectively.

Number of reservoir beds

In order of 9 or 10

Acres-feet

Average 120 ft net pay * x 16,000 acres = 1,920,000 acre-ft. *

Porosity (intergranular)

17% to 22% (average 20%)

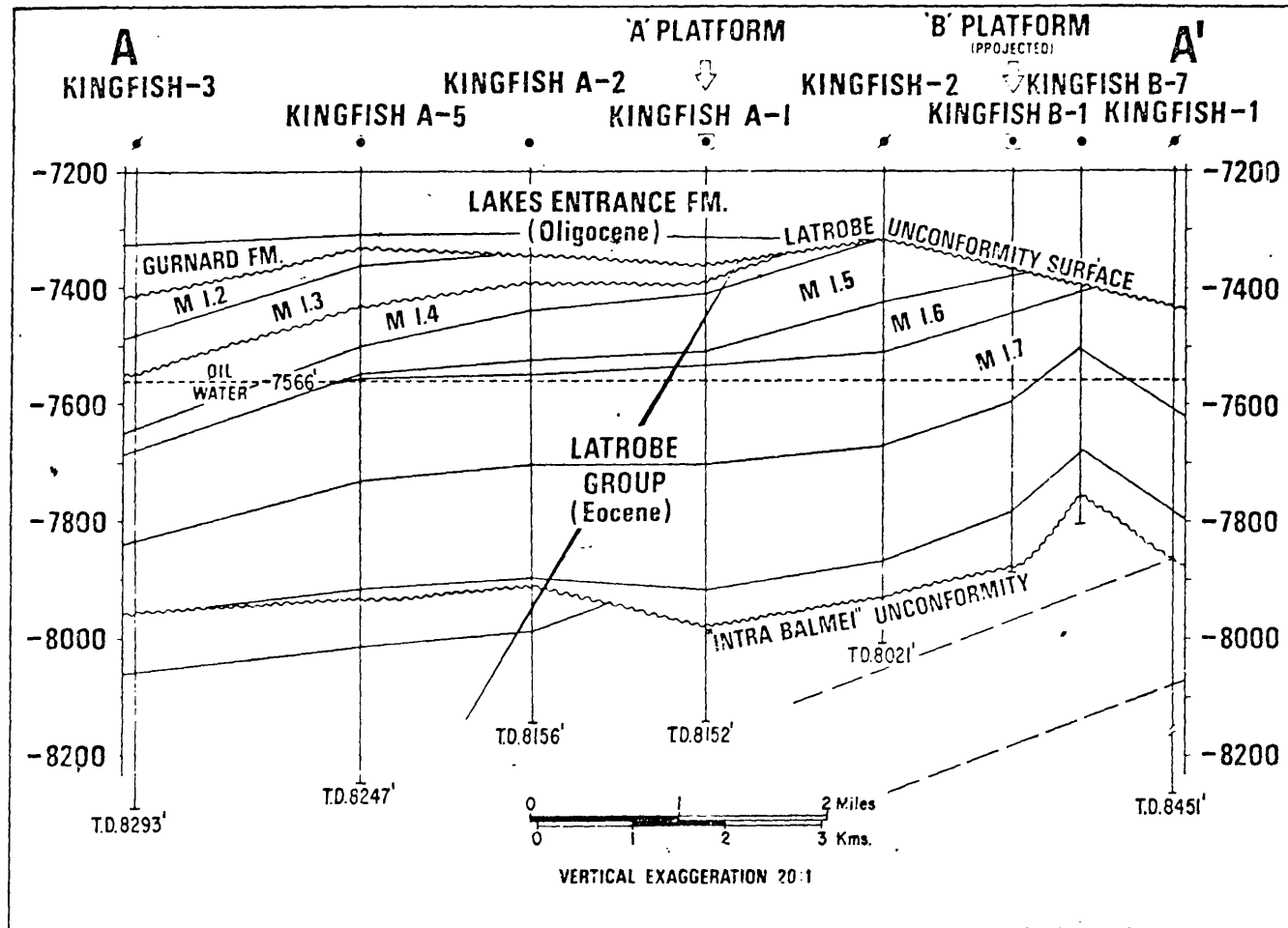
Permeability

50 to 1,000 + md

Water saturation

Less than 11% to 42% (average 15%)

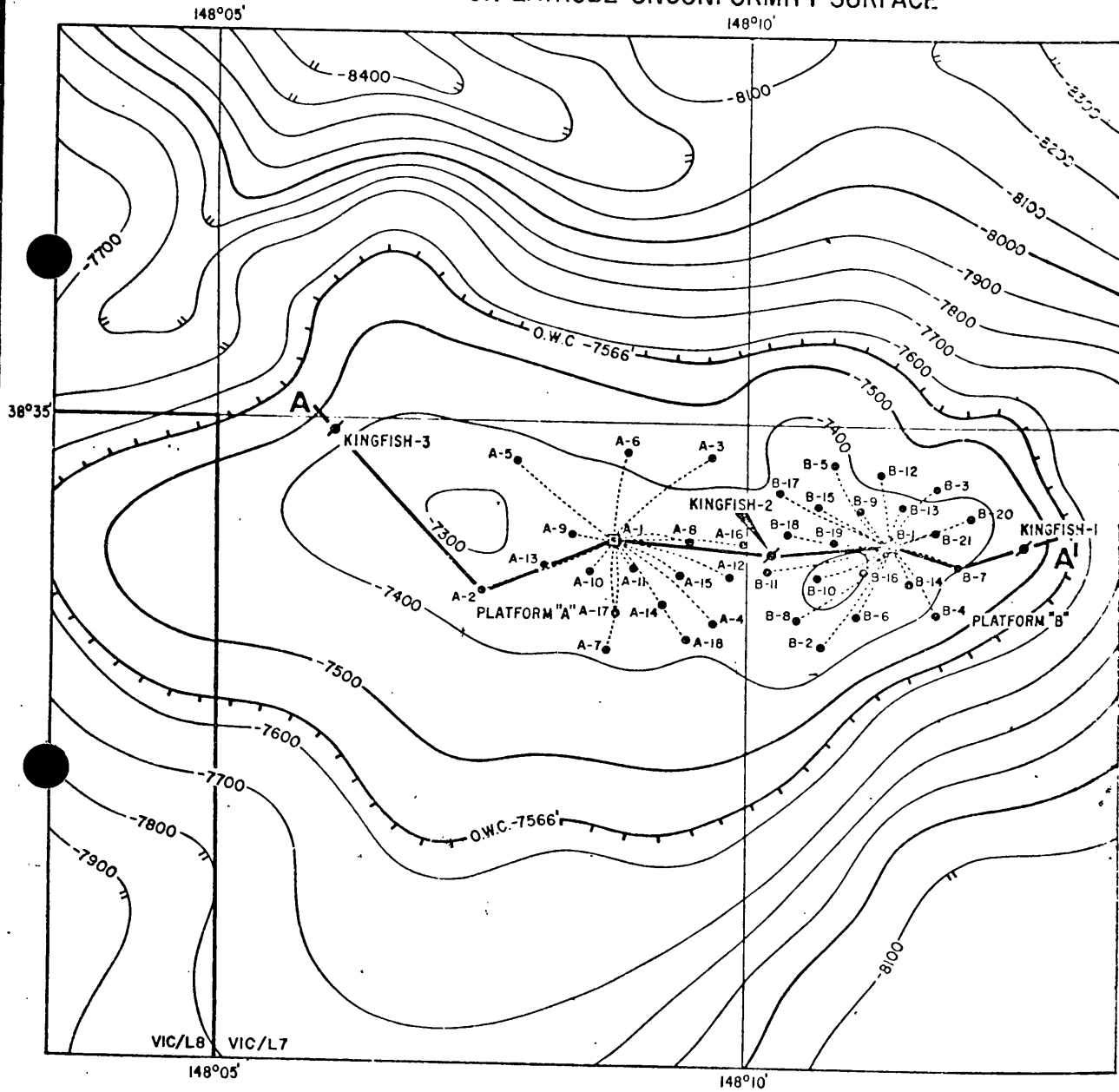
KINGFISH OIL FIELD STRUCTURE CROSS-SECTION A-A'



After Griffith and Hodgson, 1971;
and Bein, et al, 1973.

KINGFISH OIL FIELD GIPPSLAND BASIN, VICTORIA

STRUCTURE MAP ON LATROBE UNCONFORMITY SURFACE

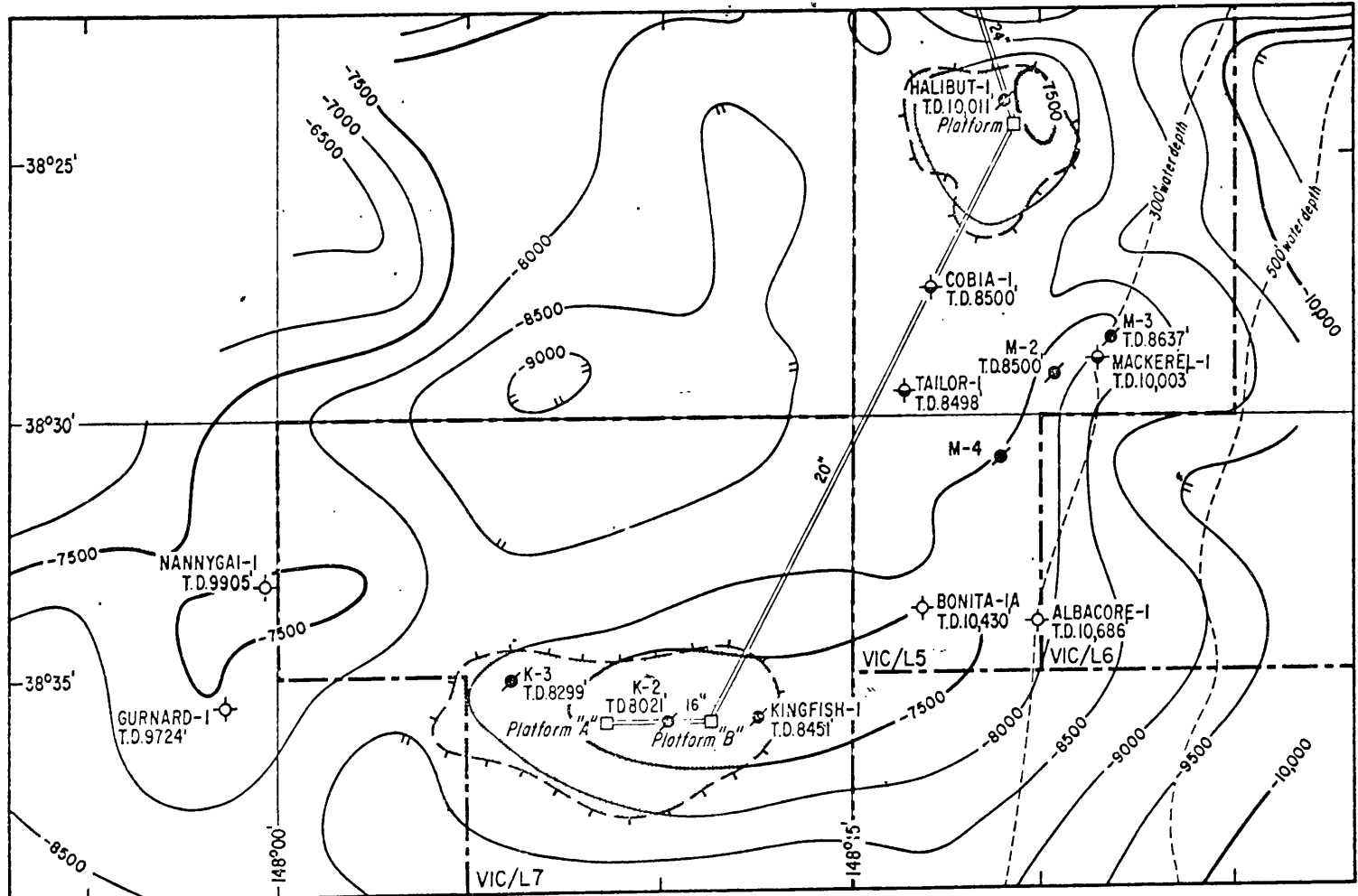


After Griffith and Hodgson, 1977,
and Bein, et al., 1973

KINGFISH-MACKEREL-HALIBUT OIL FIELDS

GIPPSLAND BASIN, VICTORIA

STRUCTURE MAP: TOPOGRAPHIC SURFACE AT TOP OF LATROBE DELTAIC COMPLEX



Contour interval: 500ft.



5/5

4/5

Kingfish Oil Field

Gippsland Basin, Queensland

Reservoir temperature

215°F (101.7°C) at 7,500 ft (2286.0 m)

Initial reservoir pressure

3,303 psig at 7,500 ft (0.440 psi/ft gradient)

Probable drive mechanism

Strong water drive.

Recovery factor

(Oil) 550 ± bbls/acre-ft* (Based upon announced reserves and Editor's estimate of reservoir volume).

Remaining recoverable reserves (to December 31, 1972)

958.73 million bbls (152.4 million kls)

Delivery system

15.7 mi (25.3 kms) of 20 in (50.8 cm) diameter submerged pipeline to Halibut Field, then 47 mi (75.6 kms) of 24 in (61.0 cm) diameter submerged pipeline to shore; then 35 mi (56.3 kms) of 26 in (66.0 cm) onshore pipeline to Gippsland gas processing and crude stabilisation plant at Longford.

Number of wells currently producing (at December 31, 1972)

"A" Platform: 20 wells at an average rate of 7,999 BOPD (1,272 kls per day) per well during December, 1972.

"B" Platform: 20 wells at an average rate of 3,742 BOPD (595 kls per day) per well during December, 1972. Production from "B" Platform is lower than from "A" Platform due to equipment limitations.

Pressure maintenance and secondary recovery

None

FLUID PROPERTIES

OIL (undersaturated)

Gravity: 47° API at 60°F
Base: Paraffin
Sulphur (% wt): 0.13
Wax content (% wt): 13.0
Initial G.O.R.: 363 cu ft/bbl
Pour point: + 60°F (+15.6°C)
Viscosity: 2.15 cp at 100°F
Bubble point: 853 psig

WATER

No data

COSTS

Not available, see Barracouta and Marlin.

REMARKS

1. Kingfish No. 1 well was not subsidized, consequently most well and field data are confidential.

PRODUCTION DATA

(Field declared commercial in May, 1968).

Date production began

"A" Platform: April 21, 1971.

"B" Platform: November 1, 1971.

Initial production

113,719 BOPD (18,078 kls per day)

Current production

During December 1972:

"A" Platform averaged 159,989 BOPD (25,433 kls per day)

"B" Platform averaged 74,846 BOPD (11,898 kls per day)

Cumulative production (to December 31, 1972)

101,268,207 bbls (16,098,606 kls).

REFERENCES

Bein, J., B.R. Griffith, and A.K. Svalbe, 1973.
Griffith, B.R. and E.A. Hodgson, 1971.
James, E.A. and P.R. Evans, 1971.
Ministry of Fuel and Power of Victoria, 1971 and 1972.
Robinson, K. and W.J. Stewart, 1970.
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Victorian Mines Department, Annual Report, 1972.

FOOTNOTES

* Editor's estimate.

LITHOLOGY



03 NOV 1988

PETROLEUM DIVISION

SIDEWALL SAMPLES - ESSO KINGFISH #1

- 3558 Marl; light olive grey, soft to firm, very fossiliferous (forams - globigerina predominate), carbonaceous grains and small crystalline pyrite aggregates and internal moulds of forams common. Few rounded grains of glauconite. Abundant flakes of colourless muscovite.
- 3770 Very argillaceous calcareous siltstone; light brown to olive grey, abundant glauconite and white kaolinitic (felspar ?), grains, muscovite as colourless flakes common, soft, crumbly.
- 3830 Silty calcareous mudstone; light olive grey, abundant silt sized angular quartz, glauconite and black carbonaceous fragments. Muscovite and biotite flakes common. Soft, crumbly.
- 4210 Silty calcareous mudstone; light to medium grey, slightly sandy in part with medium to fine grained, sub rounded quartz. Abundant silt sized quartz and glauconite. Minor carbonaceous fragments and mica flakes. Traces of white non-calcareous, silt sized grain - kaolinite after felspar, soft, crumbly. *Abundant forams.*
- 4210 Silty calcareous mudstone; light to medium grey, slightly sandy in part, with medium to fine, sub rounded quartz. Abundant silt sized quartz and glauconite. Minor carbonaceous fragments and mica flakes. Traces of white non-calcareous, silt sized grains of kaolinite after felspar. Soft, crumbly.
- 4422 Calcareous, argillaceous siltstone; light green-grey to medium grey. Very argillaceous with abundant glauconite and carbonaceous grains. Muscovite flakes common. Trace pyritic concretions as internal moulds. Relatively harder than above.
- 4475 Calcareous, argillaceous siltstone; pale green-grey, to light grey, slightly sandy in part. Abundant glauconite and carbonaceous grains. Common muscovite flakes. Traces pyrite as internal moulds and concretions. Crumbly, tendency to become flakey.
- 4650 Calcareous, argillaceous siltstone; as above, relatively compact, contains abundant dark yellow brown limonitic fragments.
- 4697 Silty, calcareous mudstone; light to medium grey, slight evidenced of laminations. Slightly sandy in part. Very glauconitic and sparsely disseminated carbonaceous grains and flecks, minor pyrite and muscovite. Crumbly, moderately firm.
- 4880 Silty calcareous mudstone; as above, slightly less silty than above.
- 4920 Silty, calcareous mudstone or silty marl; light to medium mottled grey. Very glauconitic with sparsely disseminated chert grains. Slightly pyritic and micaceous. Crumbly - tending to be flakey.
- 5104 Silty Marl; pale grey, slightly laminated, very finely sandy in part, glauconitic, slightly fossiliferous (forams) carbonaceous and micaceous grains of a yellow-orange (-limonitic ?) material unidentified. Crumbly, flakey.
- 5140 Silty marl; as above, traces of white (kaolinitic) grains and large ferruginous aggregates.

SIDEWALL SAMPLES - KINGFISH - I.

- 5320 Silty marl; as above, slightly sandy in part.
- 5354 Loose quartz; silt to medium size, carbonaceous and glauconitic grains embedded within filtered drilling mud.
- 5550 Argillaceous, silty limestone; light grey, silty sized quartz, glauconitic and minor carbonaceous grains embedded in an aphanitic, micritic, carbonate, soft, crumbly.
- 5600 Silty marl; pale to light grey, very glauconitic, carbonaceous and micaceous, crumbly.
- 5750 Argillaceous, calcareous siltstone; light to medium grey, slightly sandy in part. Very glauconitic, carbonaceous, micaceous. Moderately compact.
- 5820 Silty, calcareous mudstone; light grey to olive grey. Very glauconitic, common carbonaceous grains, pyritic aggregates and mica flakes, soft, flakey.
- 6210 Calcareous mudstone; medium grey to olive grey, glauconitic. Sparsely disseminated chert flakes and grains. Micro micaceous, pyrite as fine crystalline aggregates common. Moderately compact to crumbly.
- 6480 Calcareous mudstone; as above. Pyrite internal moulds of forams.
- 6735 Calcareous mudstone; as above.
- 6954 Calcareous mudstone; as above.
- 7250 Calcareous mudstone; as above.
- 7454 Calcareous mudstone; as above.
- 7884 Quartz wacke; medium to dark grey, very argillaceous, fine to very fine grained, angular to sub angular quartz. Very micaceous. Matrix consists of an off white to buff coloured clay. Non-calcareous. Very slightly carbonaceous. Soft friable.
- 7934 Quartz wacke; as above.
- 8113 Quartz Arenite; light to dark grey, very fine to fine, angular to sub angular quartz, abundant muscovite and biotite flakes, slightly calcareous white to light brown matrix material. Poorly developed laminations due to varying concretions of carbonaceous material. k8 Soft and friable.

CORE NO.1

7509-7540

Cut: 31

Recovery: 31

7509-7530 Quartz Arenite: Massive, light green to light brown, composed of moderately well sorted to ill-sorted quartz grains, medium to granular, sub rounded to rounded. No clay matrix. Grains are generally equidimensional. Granular quartz has frosted surfaces, scattered smokey grains. Minor glauconite grains, fine, sparsely disseminated brown mica flakes and lithic fragments. Very friable to unconsolidated. Porosity high, permeability high. Strong white fluorescence. Strong white light blue cut. Brown residual ring. Distinct petroliferous odour.

7530-7536 Quartzwacke: Light green to medium grey, argillaceous white clay matrix, very slightly calcareous, quartz grains, medium to coarse, sub rounded, moderately well sorted. Grains are predominantly clear with minor smokey, accessory glauconite, fine grains, and imbricating layers of brown mica. Minor disseminated aggregates of pyrite. Firm to friable, massive. Porosity moderate, permeability moderate. Strong fluorescence and cut, as above. Weakly developed current ripple laminae related to concentrations of brown mica flakes. Laminae are discontinuous and wavy, in part has mottled appearance depending on local concentrations of mica. Laminae do not fluoresce.

7536-7540 Quartz Arenite: Light green to light brown, massive, very friable to unconsolidated. Composed of medium to granular, sub rounded to rounded quartz, medium sorting, accessory minerals, glauconite and fine brown mica flakes. Quartz is clear, large grains have frosted surfaces. Smokey quartz common. Good fluorescence, cut and odour, as above. Porosity high, permeability high.

CORE NO.2

7540-7564

Cut: 24

Recovery: 18

7540-7564 Quartz Arenite: Light to medium green-grey, fine grained to granular, (appears to be bimodal size distribution), sub rounded to rounded quartz grains. Grains are clear to frosted surfaces, numerous smokey grains. Up to 10% clay matrix, white, slightly calcareous. Massive, friable, weakly developed banding due to variable clay, mica and grain size concentrations. Accessory minerals, disseminated fine grains of glauconite, brown plates of mica (phlogopite?). Trace of lithic fragments, rounded dark grey shale. Many quartz grains are fractured, giving reflection surfaces. Porosity moderately high, permeability moderately high. Strong pale yellow white to light blue fluorescence, strong pale yellow to light blue cut. Distinct petroliferous odour.

NOTE Core recovered by pumping out of barrel at 6000 psi. Much of core washed into sandy mud eventually recovered 18'. The 6' lost due to compression and washing action. (24' in barrel before pumping). Recovered core was moderately strong, but crumbly.

CORE NO. 3

7564-7592

Cut: 28

Recovery: 28

7564-7581

Sandstone (quartz arenite, protoquartzite):
Light grey to grey white, fine pebbly to granular, fine to coarse grained (generally medium grained), sub angular to sub rounded, generally poorly sorted, trace mica (bronze and white), trace dark brown to black carbonaceous grains and streaks. Trace dark grey lithic grains. Trace to moderately abundant white clay matrix. Moderately hard to friable. Porosity excellent to good, permeability excellent to fair.

Quartz bimodal (i) fine to medium grained, sub angular to sub rounded.

(ii) coarse grained to granular, finely pebbly, sub rounded to rounded.

Coarse grained to finely pebbly quartz grains, irregular distribution throughout section; finely disseminated or concentrated as diffuse bands, lenses, aggregates etc. Overall grain size gradually decreases towards base of section, accompanied by increase in clay matrix content. As matrix content increases sandstone becomes moderately hard. Permeability depending on clay matrix content.

Section homogeneous to very faintly laminated and banded produced by subtle variations in grain size distribution. Weakly current bedded in part (Foresets 2" thick, slopes 10°).

7581-7584

Sandstone: Light grey to grey white, argillaceous, silty, fine to very fine grained (quartzwacke), sub angular to sub rounded, generally fairly well sorted, but with scattered sub rounded to rounded granular to fine pebbly quartz sand, micaceous (bronze + white) carbonaceous, sparsely pyritic, moderately abundant white clay matrix, moderately hard, porosity good, permeability poor to fair.

7584-7591

Sandstone: As for 7564-7581, but with moderately abundant white clay matrix throughout. Porosity good, permeability fair to good

Whole core has excellent petroliferous odour and taste, and displays very strong, even, bright bluish white fluorescence throughout.

Samples collected for EPRCO (13)

7564	7572	7582
7565	7575	7585
7568	7578	7587
7570	7581	7588
		7591

CORE DESCRIPTIONS KINGFISH-1

CORE NO.4

7592-7622

Cut: 30

Recovery: 28

- 7592-7597½ Quartz Arenite: Light to medium grey, composed of very fine to granular, sub angular to sub rounded quartz, clear and smokey, in a matrix of white clay. Moderate to ill-sorted. Accessories of brown mica flakes oriented parallel to bedding attitudes. Banding weakly developed within section, characterized by variations in grain size and matrix content. Rare thin wavy laminae of very fine quartz and mica. Firm, massive, slightly friable in part. Strong blue-white fluorescence. Blue cut. Porosity high, permeability high.
- 7597½-7603½ Quartzwacke: Dark blue grey, very fine to fine grained, angular to sub angular quartz in a white clay matrix. Abundant dark brown mica, providing laminae qualities. Disseminated pyrite aggregates. Laminae, stringers and bands of irregularly bedded shale; dark grey, slightly micaceous, carbonaceous. Common lenses and bands of granular, rounded quartz, as cut and fill deposits. Weakly developed current ripple bedding, generally wavy discontinuous, sub parallel, convolute. Possible discontinuous due to organisms. Dip 2° - 5°. Firm, splitting in thin layers, scattered patches of fluorescence. Porosity low, permeability low.
- 7603½-7611 Quartz Arenite: Massive, locally pebbly, otherwise as above. Porosity moderate to high, permeability moderate to high. No fluorescence.
- 7611-7620 Quartz Arenite: Medium light grey to medium grey, fine to coarse grained to granular, sub angular to sub rounded, quartz in a white clay matrix. Moderate to ill-sorted, clear and smokey, some frosted. Mica locally abundant in thin laminae. Pyrite, silver grey, fresh, concretions common, often as fine grains associated with fine grained black carbonaceous material. Trace glauconite, bright green. Firm to hard, friable in coarse grained portion. Bedding varies from massive to sections of sub parallel discontinuous, wavy mica layers. Localized cut and fill, coarse to granular, deposits; also irregularly dispersed lenses of granular quartz. Porosity moderate, locally high in coarse grained section, permeability moderate. No fluorescence.

NOTE: Fluorescence becomes patchy at 7597' and at 7598' is absent completely.

SAMPLE DESCRIPTIONSESSO KINGFISH #1830' - 8450'

03 NOV 1988

PETROLEUM DIVISION

830'		Trip sample
	60%	skeletal debris material
	10%	free quartz grains, very coarse to granular, sub angular to rounded.
	30%	cement.
		(Fossils - probably a <u>calcareenite</u> gastropods large lamellibrachia fragments, forams, bryozoa, (cellepora, fenestrella)
830-860	40%	skeletal material
	5-10%	quartz grains as above.
	50%	cement.
		Sandy <u>skeletal limestone</u> .
860-890	80%	skeletal material, mixture of very large fragments of bryozoa, lamellibrachia, gastropods,
	10%	sand grains, sub-rounded to sub-angular, very coarse to granular,
	10%	cement
		Sandy skeletal limestone.
890-920	90%	skeletal debris as above. Trace of light brown to orange siltstone with even grained quartz and little calcareous matrix.
	10%	quartz grains as above, with some rounded granular to pebbly ferruginous limonitic stained grains.
		Trace cement.
920-950	90%	skeletal material
	5%	quartz grains as above
	5%	cement
950-980	90%	skeletal debris with some aggregates of medium to coarse grained fossil fragments cemented with a white calcareous interstitial material.
	5-10%	Quartz grains, becoming more numerous than above.
		Trace cement.
		Sandy skeletal limestone.
950-1010	100%	skeletal debris (gastropods, lamellibrachia, bryozoa make up most, forams, minor constituent). Trace of quartz grains as above, large amount of aggregate material).
1010-1040	100%	skeletal material. Aggregates of medium to coarse grained fragments cemented with a white calcareous matrix occupy 40%. Trace <u>marl</u> = light grey, very soft, slightly arenaceous.
1040-1070	100%	skeletal limestone, aggregates of debris as above. Some dark grey fragments tending to be , cemented in the aggregates with white calcareous grains.
1070-1100	100%	skeletal - grain limestone skeletal material and aggregates of carbonate grains. Trace marl - light grey to buff, slightly arenaceous, speckled with dark grains (glauconite).
1100-1130	100%	skeletal limestone and grain or lump limestone as above. Trace marl, light grey, grains of carbonate prevalent.
1130-1160	90%	skeletal limestone and grain or lump limestone as above aggregates, as above.

	5%	quartz grains, clear, sub angular to rounded, medium to coarse and limonitic stained, coarse to granular.
	5%	Siltstone, light green only, very slightly calcareous, very argillaceous (acid action, oxidize to light brown).
1160-1190	100%	skeletal limp grain limestone. Trace quartz grains limonitic staining Trace siltstone as above Trace marl, light grey with grains of carbonate and very fine quartz speckled with very fine black specks (glauconite?).
1190-1220	100%	skeletal grain limestone, white to light grey. Trace marl as above. Trace siltstone as above. Trace quartz grains as above.
1220-1250	100%	skeletal and grain limestone becoming very argillaceous (muddy) giving a light to medium grey colour. Trace marl as above. Trace quartz as above.
1250-1280	100%	skeletal limestone and grain limestone, argillaceous as above, light grey speckled with white CO ₃ grains and black to dark grey limestone fragments. Large fragments of fossils as previously. Trace quartz grains, clear, sub angular to angular, medium and rounded coarse to granular limonitic stained quartz.
1280-1310	90%	skeletal debris and aggregates of argillaceous lump limestone (light grey) as above.
	5-10%	quartz, as above, fine to medium, rounded to sub angular, clear and limonitic stained quartz, rounded to coarse to granular.
1310-1340	100%	skeletal - grain limestone, as above. light grey, argillaceous with disseminated, fine to very fine grains grains of dark grey limestone? Trace carbonate. Trace - quartz sand, rounded to well rounded, coarse grained to granular, in part limonitic stained.
1340-1370	100%	light grey skeletal grain limestone, very argillaceous, silty, very finely sandy in part, finely granular, lumpy texture, slightly glauconitic. Porosity poor, permeability nil, slight min. fluorescence.
1370-1400	100%	skeletal grain limestone, light grey argillaceous, silty in part. Speckled with black grains (glauconite and dark grey limestone. Trace quartz grains, clear and orange as above.
1400-1430	100%	skeletal material, much less prominent. Aggregate of grain limestone, very argillaceous, glauconitic and carbonaceous? grains of CO ₃ are very fine to fine, white to light grey. Trace of marl, soft-puggy, light grey, slightly silty, glauconitic.
1430-1460	100%	Very argillaceous, slightly silty, granular, limestone, fossiliferous, material becoming minor as above, glauconite carbonaceous. Trace marl as above. (Mineral fluorescence only).
1460-1490	100%	Very argillaceous granular limestone, slightly silty in part. as above, trace marl as above.
1490-1500		As above, granular, aggregates of limestone, very argillaceous, slightly glauconitic, speckled in part white clear calcite but predominantly light grey to buff. Trace marl, slightly silty as above. Trace quartz, medium grained, orange & clear.
1520-1550		As above Trace marl, Trace quartz.
1550-1580	70%	grain limestone, as above, becoming more argillaceous.
	30%	marl, soft, puggy, light grey, slightly silty, speckled with glauconite and/or carbonate.

1580-1610	70%	granular limestone as above, slightly silty in part.
	30%	30% marl, light grey to buff, soft, puggy, slightly silty, has speckled look due to silt and glauconite and dark to black grains (very fine).
1610-1640	50%	grain limestone as above.
	50%	marl, light grey to buff to light grey, soft, speckled with silty CO ₃ and glauconite as above (very fine grained).
1640-1670	70%	As above, grain limestone, minor fossil. debris only.
	30%	marl, as above. Trace quartz, clear and orange limonitic stain.
1670-1700	70%	granular limestone aggregates as above.
	30%	marl, light grey to buff green, soft, speckled with silt, carbonate, glauconite, and carbonaceous ?? material. Trace quartz clear, rounded to sub angular, orange limonite stained.
1700-1730	70%	grain limestone as above, slightly fossiliferous, only fragments.
	30%	marl as above.
1730-1760	50%	grain limestone, argillaceous, light grey, speckled with glauconite and dark grey limestone plates, fossiliferous, fragments, minor.
	50%	marl, as above. Trace sand grains as above.
1760-1790	80%	marl, light grey to buff to green, slightly silty, speckled with dark coloured grains, glauconitic, carbonaceous.
	20%	granular limestone as above. Trace quartz grains.
1790-1820	80%	marl, as above.
	20%	skeletal and granular limestone, fossiliferous fragments, more common in this sample. Trace quartz grains, clean and orange coloured.
1820-1850	70%	granular limestone as above.
	30%	marl, light grey buff to pale green, speckled with finely disseminated silty glauconite and carbonate. Trace quartz as above.
1850-1880	70%	granular limestone, very silty, argillaceous with occasional medium sub angular quartz grains.
	30%	marl, as above. Trace quartz grains, free, as above.
1880-1910	60%	granular limestone as above.
	40%	marl, as above, light grey to white and finely disseminated silt, glauconite speckled. Trace of quartz grains, clear, milky and orange appearance.
1910-1940	50%	Marl, as above, light grey, sporadically dispersed, very fine silt and glauconite. Some quartz grains, medium, sub angular are found embedded in marl.
	50%	argillaceous, limestone as above, more argillaceous silty than previously, glauconitic (Foraminifera are abundant) and mica accessories. Trace quartz grains as above.
1940-1970	60%	marl, as above.
	40%	argillaceous granular limestone. Trace quartz grains (forams).
1970-2000	40%	marl, light grey to green, silty, glauconitic, black speckled texture
	60%	granular limestone as above, very argillaceous, slightly glauconitic, slightly micaceous (forams common).
2000-2030	50%	marl, light grey to grey green, sparsely glauconitic in part silty and very finely sandy. Exceedingly fine black insoluble residue.
	50%	limestone, light grey skeletal, very argillaceous, very fine grained, sparsely glauconitic.

		very finely sandy with moderately abundant bryozoa and foram skeletal debris. Trace rounded to sub rounded coarse grained quartz sand foram and bryozoa debris.
2030-2060	60%	marl, as above.
	40%	skeletal grain limestone, as above.
2060-2090	80%	marl
	20%	limestone, very argillaceous, skeletal, grain - as above.
2090-2120	100%	marl, as above.
2120-2150	100%	marl.
2150-2180	90%	marl,
	10%	calcareous skeletal debris, and loose calcite fragments, fluorescence yellow to blue-white, no cut. Trace sub rounded to rounded, medium to coarse grained quartz sand.
2180-2210	90%	marl.
	10%	skeletal debris and calcite, as above.
2210-2240	90%	marl as above.
	10%	skeletal debris and white opaque to light brown calcite fragments. Light grey to grey-green, in part silty, sparsely glauconitic, sparsely micromicaceous, fossiliferous, very fine (unresolvable) black insoluble residue.
2240-2270	90%	marl, as above.
	10%	XXXXXXXXXXXX light grey to grey-green, skeletal, fine to very fine grained limestone, very argillaceous, very sparsely glauconitic, rarely micromicaceous, with very fine carbonaceous debris (flecks). Trace sub angular to rounded medium to coarse grained quartz sand and calcareous skeletal debris and frag., as above.
2270-2300	100%	marl, as above. Trace limestone, skeletal debris to rounded coarse grained quartz sand, as above, also trace black to dark brown carbonaceous material.
2300-2330	100%	marl, as above. Traces limestone, skeletal debris, quartz sand and carbonaceous material, as above.
2330-2360	100%	marl, as above.
2360-2390	80%	marl as above.
	20%	limestone, light grey to grey-white, very argillaceous, skeletal, fine grained, trace glauconite and carbonate, lumpy texture in part. Trace calcareous fragments to skeletal debris, sub angular to rounded, coarse grained quartz sand.
2390-2420	90%	marl, as above.
	10%	limestone, as above. Traces, as above black carbonate material.
2420-2450	90%	marl as above
	10%	limestone, light grey to grey-white, argillaceous, skeletal grain, sparsely carbonaceous and glauconitic in part silty. Traces as above.
2450-2480	80%	marl as above.
	20%	limestone as above. Traces, as above.
2480-2510		As above
	70%	marl
	30%	limestone
2510-2540	50%	marl

grey, rounded limestone - skeletal fine - gran. sparsely glauconitic to carbonaceous, in part silty. Trace mm. Well cemented, with calcite (sparry). Dense. No permeability. Moderately hard to friable (depending on cement content).

Traces as above.

2540-2570	60%	marl as above.
	40%	limestone, as above.
2570-2600	40%	marl as above.
	60%	limestone as above.
2600-2630	30%	marl) - limestone; light grey to grey-white, slightly
	70%	limestone) - glauconitic, skeletal grain limestone, as above.
2630-2660	70%	marl) - dense, well calc. cement, moderately hard, with
	30%	limestone) - dark grey limestone - .
2660-2690	70%	marl as above.
	30%	granular limestone, slightly skeletal, light grey, slightly argillaceous, hard consolidated. Trace quartz grains, rounded to sub rounded, medium to coarse, clear XXX to milky. Trace sandstone, medium grained, sub angular, black calcareous, evenly textured, very little matrix (no show) Porosity low, permeability low. Foraminifera common, occasional bryozoa and lamellibranchia fragments.
2690-2720	80%	marl, as above.
	20%	limestone, granular, slightly skeletal, light grey, mottled look due to black and dark grey grains. Trace quartz grains, clear and milky free.
2720-2750	70%	marl, as above.
	30%	limestone, as above, light grey to brown, slightly argillaceous, (varying amount) hard, (relatively). Trace quartz grains, as above. Forams, common (Bulinidae, Rotal Rotalia, Textularia).
2750-2780	90%	marl, as above.
	10%	limestone, granular, slightly skeletal, argillaceous, slightly silty, Trace quartz grains. XXXXXX Forams, lamellibrachia, bryozoa, fragments common.
2780-2810	80%	marl, as above.
	20%	granular, limestone light grey, very argillaceous. Trace quartz grains, as above. Skeletal debris, rare.
2810-2840	90%	marl, light grey to buff, slightly silty, glauconitic, black speckled (residue).
1	10%	limestone, granular, light grey with dark grey mottling, slightly silty, rare foss. skeletal fragments. Rare foss. debris. Abundant quartz grains, sub rounded to rounded, medium to coarse grained milky clear and limonitic stained.
2840-2870	90%	marl as above.
	10%	granular limestone, light grey to dark grey mottling (due to gran). Rare foss. fragments quartz grains.
2870-2900	80%	marl, as above, light grey to buff, slightly silty,
	20%	granular limestone, light grey to dark grey, slightly silty, glauconitic. Rare foss. fragments and quartz grains.
2900-2930	60%	marl as above.
	40%	granular limestone Foram common foss. fragments rare. quartz grains.
2930-2960	90%	marl as above
	10%	granular limestone as above. Forams common.

2960-2990	90%	marl as above.
	10%	granular limestone as above. Trace foss. debris and quartz.
2990-3020	60%	marl as above.
	30%	granular limestone, some have large amounts of glauconite.
	10%	<u>Mudstone</u> ; light to olive medium green, spotted with dense insoluble grains, only very slightly calcareous, slightly silty in part. Action of acid causes dark to light brown colour. Moderately consolidated. Occasional quartz grains as above.
3020-3050	60%	marl as above.
	30%	granular limestone, light mk to medium grey, clusters of glauconite, common. Slightly silty, sandy in part.
	10%	<u>Mudstone</u> ; as above. Foss. fragments and quartz grains rare.
3050-3080	80%	marl
	20%	limestone, very argillaceous, glauconitic, granular texture. Trace mudstone. Trace quartz grains as above. Foram, bryozoa, lamell, fragments common.
3080-3110	50%	marl as above.
	40% 20%	granular limestone, light grey with clusters and sporadically dispersed glauconitic grains, slightly silty, very argillaceous.
	10%	<u>Mudstone</u> ; olive green to light medium brown, very slightly calcareous, slightly silty, glauconitic (acid turns green to brown by ox.) moderately consolidated. Minor quartz to fossil fragments.
3110-3140	6-%	marl as above.
	20%	granular limestone.
	20%	mudstone as above. Rare foss. fragm fragments and quartz grains.
3140-3170	60%	Mudstone, light to olive green, very slightly calcareous, slightly silty, dispersed glauconite as very fine grains, moderately consolidated.
	30%	marl as above.
	10%	limestone, granular, very glauconitic. Minor skeletal debris. Some of which are pyritized. Trace of micritic limestone, dark grey, hard, well consolidated.
3170-3200	70%	Mudstone, as above, very thin laminae of dark brown coloured mudstone, probably ox. layers of the olive green.
	30%	marl as above. Trace dark grey to dark brown micritic limestone, very argillaceous, slightly dolomitic. Hard, angular, fracture edges. Trace granular limestone.
3200-3230	60%	Mudstone, as above, light green to olive, some dark brown slightly argillaceous type.
	30%	marl as above
	10%	granular limestone. Trace dark brown dolomitic limestone, as above. Minor skeletal debris and free quartz grains.
3230-3260	80%	mudstone, light green (olive) predominant - minor dark brown laminae.
	20%	marl, offwhite to light grey as above, more consolidated. Trace granular limestone, light grey to white, becoming consolidated. Minor foss. fragments, forms abundant
3260-3290	40%	mudstone as above.
	30%	marl as above.
	30%	granular limestone as above. Foss. debris and quartz grains.

		Trip Sample
3290-3220	90%	granular limestone, light grey to buff, mottled (dark grey flecks), clusters and disseminated grains of glauconite slightly silty, very argillaceous, moderately consolidated.
	10%	(Trace marl as above (Trace mudstone, light green to olive. (Fossil debris and quartz grains.
3320-3250	100%	granular limestone, light grey to variable amounts of glauconite. Predominance of aggregates without glauconite grains, very argillaceous, slightly silty with/very fine black insoluble grains. (in part) Trace marl as above.
3350-3380	90%	granular limestone, as above, very glauconitic in part generally contained in the coarser grained aggregates, slightly silty, sandy, non glauconitic are finer grained insuluble black specks.
	10%	marl as above Mudstone - rare Fossil debris and foram Quartz grains as above.
3380-3410	90%	granular limestone, as above, less glauconitic, than above
	10%	mudstone, light green to olive, very slightly calcareous, slightly silty in part. Slightly glauconitic, fairly well indurated. Foraminifera common (- mainly) Free quartz grains rare as above.
3410-3440	60%	granular limestone as above.
	30%	marl as above, more siltier.
	10%	mudstone as above, more calcareous. Fossil debris common quartz grains, bryozoa fragments forams, lamellibrachia.
3440-3470	70%	granular limestone as above, sparsely glauconitic, moderately hard.
	40%	marl, as above, soft not quite as puggy, becoming more indurated.
3470-3500	50%	marl as above
	50%	granular limestone, as above (rare glauconite). Trace mudstone, as above. Forams, quartz common.
3500-3530	80%	granular limestone, as above.
	20%	marl as above. Trace forams, minor amounts quartz sand.
3530-3550	80%	marl
	20%	granular limestone as above. Trace forams, quartz grains as above.

(Case & log Hole).

SAMPLE DESCRIPTIONS

- 3590-3620 100% calcareous mudstone; light green, silty in part. Trace limestone; light grey, argillaceous, skeletal f-grain, very glauconitic, moderately hard, dense, rounded to sub rounded coarse grained quartz sand. Trace sandstone; light yellow brown, medium to coarse grained, sub angular to rounded, consisting of clear to black (chert)? quartz grains in a dense siliceous cement, hard, no porosity or permeability.
- 3620-3650 Mudstone; grey-green, (light brown on 'exposed' faces) slightly calcareous, silty, dark brown oil staining good cut. Trace limestone and quartz sand as above.
- 3650-3680 Mudstone as above. Trace limestone and sand as above.
- 3680-3710 Mudstone, as above. grey green (light brown on exposed faces), sparsely carbonaceous, possible trace of micro mica. Trace limestone and rounded to sub rounded quartz sand and sandstone.
- 3710-3740 Mudstone as above.
- 3740-3770 Limestone, buff, very argillaceous, skeletal micritic glauconitic, slightly carbonaceous in part, dense, hard.
- 3770-3800 TRIP SAMPLE - very contaminated.
100% Limestone, light brown, very argillaceous, glauconitic, grains, partly micritic, to granular, very fine grained. Heavily contaminated with pipe-dope, fluorescence, dull yellow brown). Dense, relatively hard, slightly fossiliferous, (forams ~~xx~~ test only).
- 3800-3830 Limestone, light grey-brown, very argillaceous, very fine grained, glauconitic, slightly fossiliferous as above. Minor black carbonaceous? flecks. Scattered crystals of calcite, elongate to columnar, clear. fractured.
- 3830-3860 Limestone, light grey, to dirty grey, very argillaceous, (almost becoming a marl) 50% CO₃ = 50% arg. mat). Grains of glauconite common. Iron shavings common.
- 3860-3890 100% Marl, or very argillaceous limestone, as above dirty grey, very argillaceous glauconitic, very fine grained, slightly fossiliferous, well compacted, moderately hard. Occurs as chips and thin plates, pyritic - large concretions. Trace siltstone, light grey, very argillaceous, slightly calcareous, no porosity or permeability, fluorescence slightly cut, due to spots of dark brown pipe dope).
- 3890-3920 90% Mudstone, light green, slightly glauconitic, soft, slightly silty in part, sparsely disseminated, carbonaceous (?), fragments pipe dope staining common, dark brown covering, Very slightly calcareous, ~~xx~~ acid oxide to brown colour.

3920-

T.D. - 3931 BIT CHANGE	10%	very argillaceous limestone as above. Trace sandstone, coarse grained, well cemented, lateritic, very marked, yellow fluorescence with immediate light blue cut (pipe dope - unaccompanied by gas rock).
		Occasional coarse quartz (rounded) grains.
3920-3950 trip sample	100%	Limestone, light brown, very argillaceous, disseminated grains of very fine glauconite muscovite, well compacted hard. Trace of very coarse grained quartz.
3950-3980	100%	(Marl ?) Limestone, buff to light grey, some light green, very argillaceous, micritic and granular in part. Disseminated fine to very fine grained glauconite, hard, well compacted, Minor scattered medium to coarse grained quartz sub rounded.
3980-4010	100%	Limestone - Marl ? - as above. very argillaceous, granular to micritic. Trace mudstone, dark brown, finely laminated, micaceous.
4010-4040	90%	Limestone, very argillaceous, light grey to buff, glauconitic, disseminated specks, hard (thin flakey cuttings), micritic
	10%	Mudstone, light green, calcareous, outer surfaces brown coloured action of acid ox - brown. Moderately compact, softer than limestone.
4040-4070	100%	Limestone, as above, lighter colour, clear equidimensional and elongate, CO ₃ = grains in a micritic matrix. Appearance of coarse crystalline CO ₃ = as in veins. Trace mudstone, as above.
4070-4100	100%	Limestone, as above (foram tests probable). Trace mudstone as above.
4100-4130	100%	Limestone, as above, tending to become more granular (equidimensional calcite grains, clear to light grey brown), very argillaceous, glauconitic, slightly pyritic, hard, relatively well compacted, slightly fossiliferous, Trace mudstone, as above.
4130-4160	100%	Limestone as above. Trace mudstone, as above.
4160-4190		As above.
4190-4220	100%	Limestone, light grey, very argillaceous, micritic, to very fine grained, sparsely glauconitic, and carbonaceous, sparsely fossiliferous, moderately hard and dense.
4220-4250	100%	Limestone, as above, 2 types prevalent - (1) hard dense micritic - tends to be light grey to buff. (2) more granular type, softer, less consolidated than above. Slightly fossiliferous, globigerina tests common.

New Bit - 4280'

Trip
Ewell and Frew doing mud check
Rotary table overheating.

- 4250-4280 Trip sample
Limestone, as above.
Trace loose coarse-very coarse sub rounded quartz grains.
Trace mudstone and marl.

Twist off - fished for 24 hours.
Recovered collars and bit and overshot after milling.
- 4280-4310 100% Limestone,
light to medium grey, very argillaceous, disseminated, very fine, glauconite, micritic and slightly granular in part. Dense, relatively hard.
- 4310-4340 Limestone, as above. *Trace mudstone, dark grey, slightly calcareous, glauconite has speckled appearance but to black carbonaceous grains sporadically* Hard chips occurring as thin *disseminated* plates.
- 4340-4370 Limestone, as above, sparsely glauconitic, sparsely carbonaceous and fossiliferous.
- 4370-4400 Limestone, as above.
light grey, very argillaceous, micritic to very fine grained, sparsely glauconitic to carbonaceous, sparsely fossiliferous (pyritic foram.)
- 4400-4430 Limestone, as above, possibly grading in part to a sparsely fossiliferous, calcareous mudstone.
- 4430-4460 Limestone, as above, very sparsely micritic, very sparsely glauconitic.
- 4460-4490 Limestone, as above, badly contaminated with dope.
- 4490-4520 As above.
- 4520-4550 As above.
- 4550-4580 Limestone, light grey to buff, micritic, to very finely granular, very argillaceous, disseminated, carbonaceous grains, very fine grained, some chips show clear grains of calcite in a micritic matrix. Foraminifera rare, - globigerina, bragerina.
- 4580-4610 As above.
- 4610-4640 Limestone, as above, possibly grading in part to calcareous mudstone, together with alum, iron, paper, paint, plastic wood, rope, dope.
- 4640-4670 Limestone, as above.
Trace mudstone, dark grey to brown, slightly calcareous, carbonaceous specks.
- 4670-4700 Limestone, as above.
Trace mudstone, dark grey, calcareous, slightly carbonaceous, soft, poorly compacted.
- 4700-4730 80% Limestone as above
20% Mudstone, very calcareous, dark grey to grey-green, soft, crumbly, slightly fossiliferous, forams globigerina, rotalides, tests generally pyritized internally.
- 4730-4760 70% limestone,
30% mudstone, as above.

TD4780 - NEW BIT

4760-4790	60%	Limestone as above.
	40%	Mudstone, medium grey to grey green, calcareous, slightly fossiliferous, forams, soft, crumbly.
4790-4820	40%	Limestone, as above
	60%	Mudstone, as above, slightly micro micaceous. Some of it appears as thinly laminated, dark grey and buff mudstone, evenly bedded, calcareous, slightly glauconitic, micritic, slightly fossiliferous, globigerina (poreallaneous, costate-).
pipe dope, rubber, metal, common additions.		
4820-4850	70%	Limestone, light grey to off white, very argillaceous, speckled with fine grained glauconite, carbonaceous material, hard, dense, some - easily.
	30%	Mudstone, as above, light grey to grey green, calcareous, slightly micro micaceous, slightly glauconitic, sparsely fossiliferous (forams, globos, predominate), soft, crumbly crumbly.
4850-4880	80%	Limestone, as above.
	20%	Mudstone, medium grey to grey-green, as above.
4880-4910	100%	Limestone, light grey to medium grey-green, very argillaceous, micritic to very fine grained, sparsely glauconitic, with finely disseminated carbonaceous grains, rarely micro micaceous, moderately hard. Trace mudstone as above.
Washed out bumper sub and D.C. X-over sub.		
4910-4940	80%	Limestone as above.
	20%	Mudstone, as above.
4940-4970	80%	Limestone, as above, hard.
	20%	mudstone, light grey-green, calcareous, slightly glauconitic, fossiliferous (forams predominantly globigerina). Soft, crumbly, sparsely micro micaceous in part only.
4970-5000	40%	Limestone, as above.
	60%	Mudstone, light grey-green to buff, slightly glauconitic, calcareous, pyritized, fossiliferous, forams, disseminated carbonaceous material, soft, crumbly.
5000-5010	50%	Limestone as above.
	50%	Mudstone, as above, calcareous, pyritized, fossiliferous forams abundant in the dark grey to green type. * Occasional coarse, argillaceous quartz grains also one or two chips of dark brown to chocolate slightly calcareous mudstone.
5010-5020	50%	Limestone, light grey to off white, very argillaceous, slightly glauconitic, disseminated carbonaceous grains, micritic to very fine granular, hard to friable. * as above. 50% mudstone, as above.
5020-5030	50%	Limestone as above.
	50%	Mudstone, as above. Interbedded mudstone and limestone thinly laminated and gradational into each other.
5030-5040	60%	Limestone, light grey to off white, very fine granular to micritic, slightly argillaceous, occasional sparsely glauconite, disseminated carbonaceous specks, sparsely pyritic in part.
	40%	Mudstone, as above, light to dark grey-green, calcareous, slightly micro micritic, fossiliferous, pyritized.

5040-5050	60%	Limestone, as above.
	40%	Mudstone, as above.
5050-5060	80%	Limestone as above.
	20%	Mudstone as above.
5060-5070	70%	Limestone, as above.
	30%	Mudstone, as above.
		Dull yellow mineral fluorescence, xxx no cut.
5070-5080	80%	Limestone, as above.
	20%	Mudstone as above.
5080-5090	80%	limestone as above.
	20%	Mudstone as above.
5090-5100	70%	Limestone, as above
	30%	mudstone, as above.
5100-5130		As above.
5130-5140	80%	Limestone, as above.
	20%	Mudstone, as above.
5140-5150	60%	Limestone, argillaceous, micritic, fine grained, as above.
	40%	Mudstone, as above.
5150-5160	40%	Limestone, argillaceous, micritic, as above.
	40%	Mudstone, dark grey, calcareous, fossiliferous.
	20%	Limestone, light grey, slightly argillaceous, fine to medium grained, glauconitic, fossiliferous, Moderately hard, dense.
5160-5170	30%	Limestone, light grey, argillaceous, micritic, very fine grained, as above.
	20%	Limestone, grey, fine to medium grained, glauconitic, fossiliferous, sparsely micritic, moderately hard.
	50%	Mudstone, dark grey, sparsely glauconitic.
5170-5180	30%	Limestone, grey-white, argillaceous, micritic, very fine grained. as above.
	30%	Limestone, dark grey, slightly argillaceous, fine to medium grained, glauconitic, fossiliferous, as above.
	40%	Mudstone, dark grey, sparsely glauconitic, as above.
5180-5190	60%	Limestone, light grey, argillaceous, micritic, very fine grained, as above.
	20%	Limestone, dark grey, fine to medium grained.
	20%	Mudstone, as above.
5190-5200	90%	Limestone, as above.
	10%	Mudstone.
5200-5210	70%	Limestone, dark grey, micritic, Massive, dense, hard.
	10%	Limestone, very argillaceous, micritic, as above, splintery fracture.
	10%	Mudstone, as above.
	10%	Limestone, dark grey, fine to medium grained, as above.
5240-5250	60%	Mudstone, as above.
	30%	Limestone, as above, light grey to off white, very argillaceous, very fine grained, slightly glauconitic Moderately hard, to crumbly.
	10%	Marl, as above, light grey to off white, very soft, puggy, some appears to be very finely laminated with disseminated carbonaceous flecks and stringers. Spotted with clear calcite grains.

Samples becoming very puggy.

5250-5260	40%	Mudstone, as above.
	50%	Limestone. as above.

5260-5270	40%	Mudstone, grey-green, calcareous, sparsely glauconitic.
	30%	Limestone, light grey, very argillaceous, micritic, as above.
	30%	Marl, light grey white.
N.B. Probably more marl - washing out.		
5270-5280	40%	Mudstone, as above.
	30%	Limestone, as above.
	30%	Marl, as above.
5280-5290	40%	Mudstone.
	50%	Limestone, as above.
	10%	Marl as above.
5290-5300	20%	Marl, as above.
	20%	Limestone, as above.
	60%	Mudstone, as above.
5300-5310	50%	Mudstone, grey-green, calcareous, sparsely pyritic, fossiliferous, possibly with rare finely disseminated carbonaceous grains, sparsely glauconitic.
	30%	Limestone, light grey to grey brown, very argillaceous micritic to fine grained, sparsely glauconitic, carbonaceous, fossiliferous, sparsely sparsely pyritic, possibly rare micro micaceous, moderately hard to soft.
Min. fluorescence.		
	20%	Marl, light grey to grey-white.
5310-5320	60%	Mudstone
	30%	limestone, yellow min. fluorescence.
	10%	Marl.
5320-5330	60%	Mudstone, as above
	30%	Marl
	10%	Limestone, yellow min. fluorescence - no cut.
5330-5340	80%	Mudstone
	20%	Limestone.
5340-5350	60%	Mudstone.
	40%	Limestone.
5350-5360	30%	Mudstone.
	30%	Limestone, very argillaceous, micritic, as above.
	40%	Limestone, light brown, slightly argillaceous, very fine to cryptocrystalline, trace glauconite, and fossiliferous, dense, hard, hellow min. fluorescence. vitreous lustre.
5360-5370	30%	Limestone, light brown as above.
	40%	Limestone, very argillaceous, micritic, as above.
	30%	Mudstone, as above.
		Trace marl, as above.
5370-5380	50%	Limestone, grey-white, very argillaceous, micritic, very fine grained, sparsely glauconitic, carbonaceous, fossiliferous fossiliferous, and sparsely pyritic. Moderately hard, soft.
	10%	Limestone, light brown, cryptocrystalline, as above.
	40%	Mudstone, grey-brown, as above.
5380-5390	70%	Limestone, as above, very argillaceous, micritic.
	30%	Mudstone, as above.
		Trace sub rounded granular quartz sadd/
5390-5400	60%	Limestone, light grey to light grey-brown, very arg. micritic, as above.
	40%	Mudstone, light grey-brown, grey-green, as above.
		Trace light brown cryptocrystalline limestone, as above.
5400-5410	30%	Limestone, very argillaceous, micritic, as above.
	30%	Mudstone, as above.
	40%	Marlv, grey-white, to light grey.

5410-5420	80%	Marl, light grey
	20%	Limestone.
		Trace mudstone, as above.
5420-5430	75%	Marl
	25%	Limestone, as above.
		Trace mudstone and light brown cryptocrystalline limestone.
5430-5440	80%	Marl
	20%	Limestone.
5440-5450		As above.
TD 5450		

5450-5460		Contaminated sample - description not meaningful.
5460-5470	90%	Limestone; grey-white, very fine grained, slightly argillaceous, minor glauconite
	10%	Mudstone; grey-green, slightly calcareous, slightly fossiliferous.
5470-5480	80%	Limestone; light grey-white, very fine grained, slightly glauconitic,
	10%	limestone; tan, fine grained, glauconitic, slightly argillaceous.
	10%	Mudstone; as above.
5480-5490	60%	Limestone; grey white, fine grained.
	40%	Marl; grey green, slightly fossiliferous, calcareous, trace pyrite.
5490-5500	50%	Limestone; grey-white, very fine grained, slightly argillaceous, fossiliferous, glauconitic (glauconite brown green often globular, mainly dispersed fine grains) tending friable.
	40%	Marl; as above.
	10%	Limestone; hard white, micritic, argillaceous laminae common.
5500-5510	50%	As above
	40%	As above
	10%	As above.
5510-5520	50%	As above
	40%	As above
	10%	As above.
5520-5530	50%	As above.
	40%	As above.
	10%	As above.
5530-5540	90%	Limestone; grey, very fine grained, very argillaceous, granular, no porosity, hard to soft. Trace of marl and the hard white micritic limestone.
5540-5550	90%	Argillaceous limestone; as above. Still granular, glauconitic, present as grains. Trace marl and white limestone (micritic) Calcite fluorescence in minor amounts.
5550-5560	90%	Argillaceous Limestone; grey to dark grey, granular, fossiliferous glauconite grains, finely disseminated pyrite. Trace marl and limestone, (micritic) as above.
5560-5570	90%	Limestone; grey green, very argillaceous, granular glauconite grains, generally soft, fine grained, some fossils, trace of white micritic limestone and reddish brown marl.
5570-5580	90%	Limestone; grey green, very argillaceous etc., as above. Micritic limestone also in trace white, argillaceous laminae, very soft.
5580-5590		As above.
5590-5600	90%	Limestone, grey to grey green, very argillaceous, granular fine grained, glauconite, granular common, moderately hard. Trace of marl, grey green and the very soft white micritic limestone.
5600-5610		As above.
5610-5620	90%	Limestone, white to grey green, fine grained, granular, very argillaceous, glauconite, minor fossils, specks of black material in granular limestone (carbonaceous matter?) noted in all the argillaceous limestone in sequence. Trace white micritic limestone.

- 5620-5630 As above.
- 5630-5640 90% Limestone, white - grey green, granular, fine grained, very argillaceous, green glauconite grains, moderately hard, grains of black material present minor fossils. Trace of soft white micritic limestone showing argillaceous laminae.
- 5640-5650 Argillaceous limestone, as above. Predominant colour white to white grey.
- 5650-5660 100% Limestone; grey, very argillaceous, rare glauconite, very fine grained, almost micritic, (definite decrease in grain size ~~compared~~ compared with higher limestones), specks of black material, minor fossils, moderately hard. Traces of limestone which is definitely micritic white with argillaceous laminae.
- 5660-5670 90% Limestone, very argillaceous, as above.
10% Limestone; micritic, white less argillaceous than other limestones, very soft.
- 5670-5680 As above.
- 5680-5690 90% Limestone, sub micritic, white to grey green, very minor pyritization, argillaceous, slightly ~~xx~~ fossiliferous, specks of black material (carbonaceous?), granules of glauconite (green, bright), no porosity. Also can recognise traces of definite micritic white limestone which is very soft.
Two changes in limestone - (a) more micritic
(b) Less argillaceous.
- 5690-5700 100% Limestone, tends to be slightly less micritic in this interval. Rest as above.
- 5700-5710 100% Limestone, white grey, sub-micritic to very fine grained, slightly argillaceous, glauconitic, black specks (looks as though flakey material), slightly fossiliferous, moderately hard. Also can distinguish white, micritic soft limestone traces.
- 5710-5720 100% Limestone, as above. Tends to have more argillaceous limestone.
- 5720-5730 100% Limestone, white to light grey, sub-micritic to very fine grained, slightly argillaceous, slight fossil, minor glauconite, moderately hard. Traces of white very soft micritic limestone.
- 5730-5740 100% Limestone; white to light grey, sub-micritic to very fine grained, argillaceous (as more coarser grained becomes less argillaceous) glauconite, fossil, black material, fine grained material is granular, moderately hard. Micritic limestone, very soft in traces. Shows laminae of argillaceous material.
- 5740-5750 100% Limestone, white to light grey, micritic to very fine grained, slightly argillaceous (more argillaceous as less micritic), rare glauconite as green grains, black material common, no porosity, moderately hard.
- 5750-5760 100% Limestone, white to light grey, micritic to very fine grained, slightly argillaceous, slightly glauconitic, minor fossils, more argillaceous limestone, tends to be harder.
- 5760-5770 100% Limestone, white to grey green, white material tends to be micritic, grades to grey green colour with increasing grains size and higher argillaceous content, glauconite, very common large green grains up to .1 mm diameter, minor fossils, moderately hard - hard (limestone rich in glauconite is hard and micritic). No porosity.
- 5770-5780 100% Limestone, as above.
Glauconite still common.
Forams can be seen (common with glauconite rich areas).

- 5780-5790 Limestone, as above.
- 5790-5800 100% Limestone, white to grey green, micritic, slightly argillaceous, glauconite still common as large grains, minor pyrite, forams soft to moderately hard.
- 5800-5810 As above.
- 5810-5820 Limestone, white to light grey, variable hardness some extremely soft to hard, micritic, extremely soft, white material may be marl, very rich in pyrite. Glauconite absent.
Refine: 50% marl, white, very soft, pyrite rich.
50% limestone, micritic, moderately hard, minor pyrite, light grey.
- 5820-5830 50% Marl, white, very soft, minor pyrite, forams, common
50% Limestone, white to light grey, moderately hard, minor glauconite, micritic.
- 5830-5840 100% Marl, light grey, very soft, pyrite and forams rare. Trace limestone, as above.
- 5840-5850 100% Marl, as above.
- 5850-5860 No sample.
- 5860-5870 100% Marl, light grey, very soft, pyrite abundant, fine specks to coarse grains, minor fossils (forams), trace of light grey, moderately hard, slightly argillaceous limestone.
- 5870-5880 100% Marl, as above. Trace limestone, as above.
- 5880-5890 100% As above -Marl, pyrite still common specks to very coarse angular grains.
- 5890-5900 100% Marl, as above. Trace of grey, ~~xxxxxxx~~ slightly argillaceous, limestone.
- 5900-5910 100% Marl, as above. Trace of green glauconite.
- 5910-5920 100% Marl, as above.
- 5920-5930 100% Marl, as above, pyrite content has decreased.
- 5930-5940 100% Marl, as above. Trace of slightly argillaceous, grey, pyrite limestone. Calcite fluorescence.
- 5940-5950 100% Marl, as above.
- 5950-5960 100% Marl, as above.
- 5960-5970 100% Marl, white grey, very soft, pyritic, forams, Trace of slightly argillaceous, fine fine grained, grey, limestone.
- 5970-5980 100% Marl, as above. Trace limestone, as above.

5980-5990	100%	Marl; very soft light grey, pyrite, slightly fossiliferous (forams), trace of grey, argillaceous, very fine grained, slightly pyritic, limestone. First sample after 1½ hour drilling break.
5990-6000	100%	Marl; as above.
6000-6010	100%	Marl; as above. Pyrite very common, specks to angular fragments 1 mm in diameter.
6010-6020	100%	Marl; as above. Pyrite less common, trace of grey, soft, argillaceous, very fine grained limestone.
6020-6030	80%	Marl, as above.
	20%	20% limestone; as above, plus pyrite grains, very fine.
6030-6040	80%	Marl; as above.
	20%	argillaceous marl; as above. Appears to be a definite increase in amount of argillaceous marl, could be due to washing out of marl.
6040-6050	80%	Marl; white to light grey, very soft, pyrite, minor as fine grains, fossils (forams).
	20%	Marl, very argillaceous, very fine grained, slightly glauconitic as green grains, soft, trace very fine pyrite.
6050-6060	80%	Marl; white to light grey, etc., as above.
	20%	Marl; very argillaceous, as above (may be more argillaceous marl?).
6060-6070	80%	Marl; as above (white to light grey)
	20%	20% argillaceous marl; soft but not as soft as the white marl, pyrite as coarse grains, forams common, very light olive grey.
6070-6080	80%	White marl; as above
	20%	Argillaceous marl.
6080-6090	60%	Marl; white to light grey, very soft, slightly pyritic, minor forams.
	40%	Marl; very argillaceous, soft, more pyrite than above form, very light grey olive colour. Marked increase in amount present.
6090-6100	60%	White marl; as above.
	40%	Argillaceous marl; definite darkening of colour, light grey olive, pyritic.
6100-6110	70%	Argillaceous marl; light grey olive, pyritic, glauconite present.
	30%	White, very soft marl; as above (could be cavings), traces of very hard material, slightly calcareous, dolomite cement in argillaceous xxxx marl.
6110-6120		As above.
6120-6130		As above. Colour of the argillaceous marl very distinctive - now light grey olive.
6130-6140		As above. White marl dominant in sample 80%. 20% of the argillaceous marl; colour contrast still distinct.
6140-6150	50%	Marl; white to light grey, very soft, slightly fossil. (forams), fine speck pyrite
	50%	Marl; argillaceous, light olive grey, fine to coarse pyrite, moderately soft. Trace of very hard, calcareous material, (dolomite cement ?).

6150-6160	40%	White, very soft marl, as above.
	60%	Argillaceous marl, soft, pyritic, colour light grey olive to a distinct green grey. Colour change may be due to glauconite but grains cannot be seen, pyritic (coarse grains to fine specks).
6160-6170	60%	Argillaceous marl, as above. Colour tends to be uniform light grey olive.
	40%	Soft white marl; as above.
6170-6180	70%	Argillaceous marl; grey olive, pyritic, soft
	30%	Marl; white, very soft, pyritic, fossil (forams which are often pyritized).
		Argillaceous marl becoming more dominant.
6180-6190	90%	Mudstone; grey green, slightly fossiliferous, has flecks of dark material (carbonaceous ?), very fine pyrite, often quite green colour but glauconite grains cannot be discerned, soft.
	10%	White, very soft marl; pyritic, fossils (forams quite common) probably cavings. Marked change in that argillaceous marl dominant.
6190-6200		As above. Traces of hard, tan colour min grains, non fluorescent, calcareous, looks like calcite, loose fragments.
6200-6210		As above. Colour of mudstone mainly medium grey. Tan min fragments still present, hard, some fluorescence calcareous, often mixed with round green glauconite grains, probably calcite. However, these min fragments not common.
6210-6220	90%	Mudstone, light olive grey, soft, slightly calcareous, pyritic, fossils, carbonaceous flecks. Trace of soft calcareous white marl.
6220-6230		As above. Mudstone colour tends to be more grey.
6230-6240		As above.
6240-6250	90%	Calcareous mudstone; light $\frac{1}{2}$ olive grey, as above. Plus trace white marl, as above.
6250-6260	90%	Mudstone; light olive grey, soft, pyritic, fossil, calcareous, minor (carbonaceous ?) flecks. Trace of very soft white fossil marl.
6260-6270		As above, mudstone more pyritic.
6270-6280	90%	Mudstone; as above, dominant colour still light olive grey, some tends to be green grey.
6280-6290	100%	Mudst. olive grey to brown grey, calcareous, sparse pyrite, sparse glauconite grains, sparsely fossiliferous, occasionally dolomitic, soft and firm occasionally.
6290-6300	100%	Mudstone, as above.
6300-6310	100%	Mudstone, as above; occasionally fine carbonaceous flecks.
6310-6320	100%	Mudstone, medium olive grey, as above.
6320-6330	100%	Mudstone; medium olive grey, calcareous, fossiliferous (forams), pyrite finely disseminated, throughout, soft to firm, rare carbonaceous flakes.

6330-6340	100%	Mudstone, as above with traces of white marl cavings.
6340-6350	100%	Mudstone, as above.
6350-6360	100%	Mudstone, as above.
6360-6370	100%	Mudstone, as above.
6370-6380	100%	Mudstone; medium olive grey, calcareous, fossils (forams), pyritic (very fine fresh grains), flecks of black carbonaceous material, soft - firm.
6380-6390	100%	Mudstone, as above.
6390-6400	100%	Mudstone; as above, except colour is more variable from light grey green to medium olive grey.
6400-6410	100%	Mudstone; as above.
6410-6420	100%	Mudstone, as above.
6420-6430	100%	Mudstone; medium olive green, calcareous, pyritic (fine fresh grains) fossils forams, trace carbonaceous black material, soft - firm. Trace of mineral fluorescence, associated with fine grained, calcareous granular, white material, hard.
6430-6440	100%	Mudstone; as above. still trace of granular calcareous material.
6440-6450	100%	Mudstone, as above.
6450-6460	100%	Mudstone, as above. calcite, granular, fluorescence, calcareous, trace.
6460-6470	100%	Mudstone, as above.
6470-6480	100%	Mudstone, as above.
6480-6490	100%	Mudstone, as above. Still trace calcite fluorescence.
6490-6500	100%	Mudstone; as above, trace of some which is light grey green.
6500-6510	100%	Mudstone, as above.
6510-6520	100%	Mudstone, olive grey, calcareous, soft and occasionally firm, rare finely disseminated pyrite, forams and ostracods. Trace quartz grains. Contaminated trip sample.
6520-6530	100%	Contaminated trip sample. Mudstone, as above.
6530-6540		Contaminated sample, probably 100% mudstone as above, occasionally tan colour, fine carbonaceous flecks common, calcareous.
6540-6550		Contaminated sample. 100% mudstone, as above.
6550-6560	100%	Mudstone, medium olive grey, fossils, trace pyrite finely disseminated, soft to firm, flecks of carbonaceous material, calcareous.
6560-6570	100%	Mudstone; as above. Colour variation grey-green, to medium olive grey only difference.
6570-6580	100%	Mudstone, as above.
6580-6590	100%	Mudstone, as above.

6590-6600	100%	Mudstone; medium olive grey, fossiliferous, slightly pyritic, finely disseminated grains, firm, slightly calcareous, traces of black carbonaceous material.
6600-6610	100%	Mudstone, as above. Carbonaceous material more noticeable; traces of bright green fine grains of glauconite.
6610-6620	100%	Mudstone, as above.
6620-6630	100%	Mudstone, as above.
6630-6640	100%	Mudstone, as above.
6640-6650	100%	Mudstone, as above.
6650-6660	100%	Mudstone, as above. XXXXXXXXXX colour varies in sample, light olive green to medium olive grey - grey green, but bulk is medium olive grey. Sample moderately pyritic, glauconite minor grains.
6660-6670	100%	Mudstone, grey green to light grey olive, fossiliferous, firm, slightly pyritic (disseminated grains), very minor glauconite, trace black carbonaceous material, slightly calcareous.
6670-6680	100%	Mudstone, as above.
6680-6690	100%	Mudstone, as above.
6690-6700	100%	Mudstone, as above. Content of white, very soft, pyritic, fossiliferous, <u>marl</u> is increasing in samples 50% now. Resembles <u>marl</u> higher in sequence. Could be cavings.
6700-6710	100%	Mudstone, as above. Content of <u>marl</u> , as above in actual sample is about 50%. Considered as cavings.
6710-6720	100%	Mudstone, as above. Content of white marl, now 20%.
6720-6730	100%	Mudstone, as above. <u>Marl</u> trace (was cavings most probably).
6730-6740	100%	Mudstone, light green - medium olive grey, firm, calcareous, slightly pyritic, fossiliferous, traces of black carbonaceous flecks, glauconite <u>rare</u> .
6740-6750	100%	Mudstone, as above.
6750-6760	100%	Mudstone, as above.
6760-6770	100%	Mudstone, as above. At least 40% of sample is white soft <u>marl</u> as above.
6770-6780	100%	Cavings, mudstone, as above. Medium to dark green grey. Colour definitely appears darker grey.
6780-6790	100%	Mudstone, as above.
6790-6800	100%	Mudstone, as above.
6800-6810	100%	Mudstone, as above. Calcite grains fluoresce (loose grains).
6810-6820	100%	Mudstone, as above.
6820-6830	100%	Mudstone, as above.
6830-6840	100%	Mudstone, grey green - medium olive grey, calcareous, firm, trace pyrite (fine disseminated grains), fossils, carbonaceous flecks, splintery.
6840-6850	100%	Mudstone, as above.
6850-6860	100%	Mudstone, as above.

6860-6870	100%	Mudstone, as above.
6870-6880	100%	Mudstone, as above. (heavy sample contains white <u>marl</u> cavings.)
6880-6890	100%	Mudstone, as above.
6890-6900	100%	Mudstone, as above.
6900-6910	100%	Mudstone, as above.
6910-6920	100%	Mudstone, as above (marl cavings still common).
6920-6930	100%	Mudstone, as above " " " "
6940-6950	90%	Mudstone, light grey to light olive grey, slightly calcareous, pyritic, xxxxxx occurs as small concretions and thin sinuous tube-like traces, fossiliferous in part, mainly forams, sparsely disseminated carbonaceous grains, very fine grained, f relatively firm to crumbly. Fluorescence light blue to yellow, mineral fluorescence.
	10%	Marl, light grey to buff white soft, puggy, (cavings).
6950-6960	90%	Mudstone, as above.
	10%	Marl.
6960-6970	90%	Mudstone, as above, fossiliferous, forams, pyritized internally, Glokeringinas predominant (porellaneous forms)
	10%	Marl, as above, soft to crumbly.
6970-6980	90%	Mudstone; as above.
	10%	Marl; as above.
6980-6990	90%	Mudstone; as above, abundant aggregates of crystalline pyrite.
	10%	Marl; as above.
6990-7000	80%	Mudstone; as above.
	20%	Marl; as above.
7010-7020	80%	Mudstone; as above.
	20%	Marl; as above.
7020-7030	80%	Light grey to light olive grey mudstone; slightly calcareous, rare sparsely disseminated fine angular to sub angular quartz, pyritic, concretions and thin elongate stringers, sparsely glauconitic with carbonaceous in part, abundant foram tests pred. globigerina. Relatively indurated and crumbly.
	20%	Marl; as above.
7030-7040	80%	Mudstone; as above.
	20%	Marl; as above.
7040-7050	80%	Mudstone, as above.
	20%	Marl; as above. Traces of clear angular quartz grains.
7050-7060	80%	Mudstone, as above.
	20%	Marl; as above.
7060-7070	80%	Mudstone; as above.
	20%	Marl. Trace coal, black, fibrous, sub resinous to satiny lustre.
7070-7080	80%	As above, in mudstone, evidence of thin, even laminations.
	20%	As above. Trace of medium to coarse, rounded to sub rounded quartz Trace of coal as above.
7080-7090	90%	Mudstone, as above.
	10%	Marl. Trace coal; trace coal grains, medium to very coarse sub angular to angular, clear.

Quartz grains become more abundant in the lower part of the section.

7090-7100	90% 10%	Mudstone, as above. Marl, as above. Trace coal, trace quartz grains as above.
7100-7110		As above, (
7110-7120	90% 10%	Mudstone Marl Trace coal; trace quartz grains as above.
7120-7130	90% 10%	Mudstone, as above. Marl, as above. Trace coal, as above; trace quartz grains, as above.
7130-7140	90% 10%	Mudstone, as above. Marl. Trace coal, as above. Trace quartz grains, as above.
7140-7150	90% 10%	Mudstone, as above. Marl, as above, (cavings) ? Trace coal and quartz as above.
7150-7160	90% 10%	Mudstone, as above. Marl, as above. Trace coal and quartz as above.
7160-7170	50% 50%	Mudstone, as above. Marl, as above (cavings). Trace coal, quartz grains, as above. Few aggregates of limestone - consisting of - grains, very argillaceous.
7170-7180	90% 10%	Mudstone, as above. Marl, as above, (cavings ?) Trace coal, quartz grains, as above.
7180-7190	80% 20%	Mudstone. Marl, (cavings ?) Trace coal. Trace quartz grains, unusual - rounded grains, medium to coarse have a patched, mottled surface appearance. Unusual nature doubtful.
7190-7200	70% 30%	Mudstone Marl Trace quartz grains as above. Trace coal. Pyritic concretions and fossil moulds common. Crinoid and forams sparsely scattered.
7200-7210	80% 20%	Mudstone, light grey to light grey green, calcareous, very pyritic, (as thin laminae, concretions and pseudomorph), slightly glauconitic, fossiliferous, forams, gastropod, crinoid). Moderately well indurated to crumbly, slightly tendency to - mainly due to thin even laminations within mudstone. Marl. as above. Trace quartz grains, as above.
7210-7220	80% 20%	Mudstone as above. Marl, as above, cavings. Trace clear coarse quartz grains.
7220-7230	80% 20%	Mudstone, as above. Marl, as above.
7230-7240	80% 20%	Mudstone, as above. Marl, as above.
7240-7250	50% 50%	Mudstone, as above, becomes slightly very fine, silty in part, micro-micaceous, slightly glauconitic, calcareous. Marl, as above. Trace quartz grains.
7250-7260		As Above.

7260-7270	70% 30%	Mudstone Marl Trace quartz grains.
7270-7280	60% 40%	Mudstone Marl.
7280-7290	70% 30%	Mudstone, as above, becoming light brown, slightly silty in part. Marl. Trace quartz grains.
7290-7300	50% 50%	Very poor sample. Mudstone as above Marl as above.
7300-7310	80% 20%	Mudstone, medium olive grey to brown grey, calcareous, authigenic pyritic as above. Marl, white and pinky, as above Trace quartz grains.
7310-7320	80% 20%	Mudstone, as above. Marl cavings
7320-7330	60% 40%	Mudstone, as above, tends to a light brown grey, very argillaceous, micritic, silty in part. Marl, as above.
7330-7340	70% 30%	Mudstone, becoming silty in part. Marl, as above.
7340-7350	80% 20%	Mudstone, as above. Marl, as above.
7350-7360	60% 40%	Mudstone, predominantly medium grey, becomes slightly silty in part. Marl, as above. Trace quartz grains. Trace of coal fragments.
7360-7370	50% 50%	Mudstone, light grey to medium, calcareous, fossiliferous, (forams), slightly glauconitic. xxx crumbly to fissile, thinly laminated. marl, white to light grey, soft, puggy, crumbly.
7370-7380	50% 50%	Mudstone, as above. Marl, as above.
7380-7390	60% 40%	Mudstone, as above Marl as above.
7390-7400	80% 20% 40%	Mudstone, as above. Marl, as above.
7400-7410	80% 20%	Mudstone, as above. Marl, as above.
7410-7420	80% 20%	Mudstone, as above. Marl, as above. Quartz, very rare in sample.
7420-7430	90% 10%	Mudstone, as above. Marl, as above.
7430-7440	90% 10%	Mudstone, light grey to light olive grey, calcareous fossiliferous, slightly pyritic, indurated. Marl, as above. Trace of coal, as above.

7440-7450 70% Mudstone, as above.
30% Marl, as above.

----- POH No.11, T.D. 7458' -----

7450-7460 Trip sample.
100% Mudstone; light grey, grey to light olive grey, calcareous, pyritic, crystalline aggregates and thin string, fossil (forams) - slightly glauconitic in part, relatively well indurated to slightly fossiliferous.
Trace light brown siltstone - slightly calcareous.
Trace very argillaceous, very fine sand, slightly calcareous.

7460-7470 100% Mudstone, as above. Trace siltstone, as above.

7470-7480 100% Shale, light grey to medium olive grey, calcareous, fossiliferous, pyritic, mainly disseminated grains minor aggregates, slightly glauconitic, indurated. Flecks carbonaceous material. Trace siltstone, as above. Marl, white to light grey, very soft, ~~ragging~~ cavings from higher.

7480-7490 80% Shale, as above.
20% Quartz grains, coarse, clear, to milky, frosted, rounded to sub angular, well sorted, pyrite inclusions, strong light blue to white fluorescent cut. Trace, cemented pyrite, glauconite and quartz grains and trace of argillaceous material.

7490-7500 80% Mudstone, as above.
20% Quartz grains.
Clear to frosted surface, well sorted, grain size 1/8" diameter, white blue-white fluorescent cut. Minor pyrite (inclusions sub-rounded to rounded).

7500-7510 80% Mudstone, as above.
20% Quartz grains, loose, very ~~coarse~~ to granular well rounded to sub rounded, well sorted, frosted surfaces, otherwise clear pyritic, inclusions and as a cementing agent. Trace of coarse pyritic aggregates sometimes medium to coarse sub-rounded quartz grains, cemented by pyrite. Cut - white tinted pale blue. Very slow to cut imperceptible dissolution. Fluorescent - white, localized patches on surface of grains become very intense.

Trace reddish brown to brown, very argillaceous, dolerite, aphanitic.

Run in with BIT # 13

7620-7630	80% 20%	Cavings - calcareous mud. Coarse grained to granule to fine pebbly, rounded to sub rounded quartz sand - trace bluish white fluorescence on one or two grains.
7630-7640	80% 20%	Cavings Rounded to granular - fine pebbly quartz sand, no fluorescence.
7640-7650	90% 10%	Shale, cavings of Lakes Entrance. Rounded, fine to granular quartz grains, clear frosted surfaces, minor smokey.
7650-7660	90% 10%	Shale, as above. Quartz grains, as above.
7660-7665	60% 40%	Shale cavings, of Lakes Entrance. Sub rounded, coarse to granular quartz grains, as above. Trace <u>marl</u> , white, very soft, cavings <u>pyrite</u> , cemented on quartz.
TD - P O H		
N B - No.13		
7660-7670	90% 10%	Shale cavings of Lakes Entrance. Quartz grains, rounded, granular. Trace pyrite concretions.
7670-7680		As above. Shale becoming silty in part. Quartz, medium to granular.
7680-7690	50% 50%	Shale, cavings of Lakes Entrance. Quartz grains, sub rounded, medium to granular, Clear to frosted surfaces, trace smokey quartz. Trace pyrite as inclusions in quartz grains, concretions and fine grained coating on quartz grains. Trace coal.
		<i>Pipe clay part. 50% in</i>
7690-7700	80% 20%	Quartz grains, as above. Shale, cavings of Lakes Entrance. Trace of coal and pyrite, as above.
7700-7710	10% 90%	Shale cavings as above. Quartz grains, xx fine to granular, sub angular to well rounded, predominantly coarse grained size, quartz clear and are frosted on surfaces. Many fractured grains due to bit action.
7710-7720	10% 90%	Cavings. Sand, fine - coarse grained - granular - fine pebbly, sub rounded to rounded predominantly (coarse grained - granular).
7720-7730	90% 10%	Quartz grains, fine to granular, sub rounded, clear - frosted. Shale, as above. Trace of pyrite and coal.
7730-7740	90% 10%	Quartz grains, fine to coarse to granular pebbly. Sub rounded to sub angular, clear to frosted, trace smokey pyrite inclusions, mainly coarse grains. Shale, as above. Trace coal, black, rounded fragments. pyrite, inclusions and concretions fresh grey.
7740-7750	90% 10%	Quartz grains grains, as above. Shale, as above. Trace coal and pyrite. Trace light brown, laminated, elongate material. Not identifiable (could be mineral like gypsum). Non calcareous, moderate yellow fluorescence,

7750-7760	90%	Quartz grains, as above.
	10%	Shale, as above.
		Trace coal, black, laminated, cellular.
		Trace pyrite.
		Trace white clay as coarse lumps. Minor free arenaceous forams - rolalids.
7760-7770	90%	Quartz grains, as above, disaggregated.
	10%	Shale, as above, becomes slightly silty in part.
		Trace coal fragments.
		Trace pyritic concretions with glauconite grains embedded.
7770-7780	50%	Shale, as above.
	50%	Quartz grains, as above.
		Trace of pyrite and coal.
7780-7790	40%	Shale, medium grey to grey green, calcareous, slightly fossiliferous, light brown, silty bands, firm to hard, fissile, trace disseminated pyrite, fine grains, specks carbonaceous materials, trace of <i>fine</i> ?
	60%	Quartz, grains, medium to coarse to granular to pebbly, mainly coarse grained to granular, clear to frosted surfaces, trace of smokey and <i>rose</i> quartz, sub rounded grains, inclusions (pyritic).
		Trace coal, pyrite.
7790-7800	80%	Shale, as above.
	20%	Quartz grains, as above (pyrite inclusions very common in sample).
		Trace coal, pyrite.
		Trace micritic, brown, argillaceous, hard, dense limestone.
7800-7810	40%	Shale, as above.
	60%	Quartz grains, coarse granular to pebbly, sub rounded to rounded, clear to frosted, pyrite xxx inclusions very common.
		Trace coal, as above, pyrite inclusions, loose concretions, finely disseminated grains on quartz, limestone, as above.
7810-7820	40%	Shale, as above.
	60%	sandstone grains, becoming very pyritic, as above.
		Trace of coal.
7820-7830	60%	Shale, as above.
	40%	Quartz grains, disaggregated, pyrite common as concretions and cement.
7830-7840	80%	Shale, as above.
	20%	Quartz grains, as above.
7840-7850	90%	Shale, medium grey to grey green, calcareous, slightly fossiliferous, pyritic, sparsely disseminated, glauconite and carbonaceous grains.
	10%	Quartz grains, as above.
7850-7860		As above. Trace white clay matrix.
7860-7870		As above. Trace white clay matrix.
		Quartz grains, medium grained to granular, rounded to sub rounded (many grains fractured by bit).
New Bit No.14		T.D.7884'
7880-7890	90%	Shale, as above.
	10%	Coarse quartz.
		Trace dark brown to golden brown siltstone, finely laminated with black carbonaceous stringers and dark brown clear mica, slightly glauconitic.
		Trace pyritic concretions, some cementing, fine to medium, angular to sub angular quartz grains.

7890-7900	90%	Shale, as above.
	10%	Coarse grained quartz. Numerous sandstone aggregates, very fine to fine, angular to sub angular quartz, with numerous carbonaceous and mica flakes. Very little clay matrix, slightly pyritic, moderate sorting, firm to crumbly. Trace of coal. Trace of siltstone, as above.
7900-7910	40%	Shale, cavings, as above.
	30%	Coarse to granular quartz.
	20%	Siltstone, brown, very fine, sandy in part, generally inter-laminated with very fine to fine sand, sub angular to angular, carbonaceous and micaceous.
	10%	Sandstone, aggregates. Trace coal. Trace of white clay.
7910-7920	10%	Sandstone, grey white, fine to very fine grained, angular to sub rounded, generally fairly well sorted, trace carbonate, xi micrite, trace dark grey lithic grains, trace to moderately abundant white clay matrix, moderately hard to friable, porosity good, permeability fair.
	20%	Siltstone, grey brown, very argillaceous, in part very finely sandy, micritic, xi carbonaceous, pyritic.
	30%	Shale, grey brown, silty, micaceous, carbonaceous, pyritic.
	30%	XXXXXX Calcareous mudstone, cavings
	10%	Quartz sand, xi fine to very coarse grained, sub rounded, to rounded, trace bluish white fluorescence.
7920-7930		Sample very muddy.
	10%	Sandstone, as above, xi but becoming very argillaceous and dirty with -
	20%	Siltstone, as above.
	10%	Shale, as above.
	10%	Sand, as above.
	30%	Calcareous mudstone, as above.
7930-7940	20%	Sandstone, grey brown, silty, argillaceous, fine to very fine grained, sub angular to sub rounded, generally fairly well sorted, xi trace mica, carbonate, pyrite to dark grey lithic grains, moderately hard to friable. Porosity fair, permeability poor, no XXXXXX show.
	30%	Sand, as above, with trace white clay to light brown argillaceous matrix.
	10%	Siltstone, as above.
	40%	Mudstone cavings.
7940-7950	20%	Sandstone, as above.
	20%	Sand, as above, trace white clay to light brown argillaceous matrix.
	10%	Siltstone, as above.
	50%	Cavings.

7950-7960		Sample very muddy.
	20%	Sandstone, as above.
	30% **	Sand, very fine grained, granular, sub angular to rounded, associated with light brown, argillaceous to white clay matrix.
	10%	Siltstone, as above.
	40%	Calcareous mudstone cavings.
		Trace sub rounded carbonaceous grains (coal) considerable white clay sludge.
	**	Sand binoidal very fine to fine grained to coarse grained to granular, probably more fine sand than logged - going thro shakers and sieve.
7960-7970	60%	Quartz grains, loose, medium to coarse to granular (mainly coarse to granular) sub rounded clear to frosted surfaces, pyrite inclusions on surfaces.
	40%	Shale, as above.
		Trace of sandstone, as above,
		Siltstone, as above,
		Coal, black, micritic white limestone and pyrite concretions concretions.
7970-7980	50%	Quartz grains, coarse grained mainly, as above.
	50%	Shale, medium grey green, calcareous, firm, slightly glauconitic, fossiliferous, pyritic.
		Trace sandstone, very fine grained to granular, sub rounded, micaceous, pyritic, trace white clay, soft.
		Siltstone, as above.
		Limestone, soft white micritic, pyritic,
		Dolomite ? light brown, very hard, calcareous, loose forams seen.
7980-7990	70%	Quartz grains, coarse to granular, mainly with slight amounts of medium and pebbly, rest as above.
	30%	Shale, as above.
		Trace of siltstone, as above,
		Coal, micritic, limestone, sandstone, as above
		Pyrite.
7990-8000	70%	Quartz grains, as above.
	20%	Shale, as above.
	10%	Coal, very fine grained, aggregate of carbonaceous material, soft, most of probably poor quality coal. Deep brown black color. Have some true black coal present.
		Trace sandstone
		Limestone
		Siltstone
		Pyrite (very common as concretions).
8000-8010	70%	Quartz grains, range from fine grained to pebbly. Mainly medium to granular, marked increase in fine grained medium material in sample, clear to frosted. Pyrite very common on surfaces, disseminated grains and as inclusions. Sub rounded (smaller grains tending sub angular).
	20%	Shale, as above.
	10%	Sandstone, fine to medium grained, pyritic, slightly glauconitic, soft, clear to frosted grains, trace of mica, medium grey colour (mainly due to effect of pyrite), very minor white clay.
		Trace siltstone, as above, limestone, as above
		Pyrite concretions.
8010-8020	80%	Quartz grains, fine grained to granular, marked increase in amount of fine grained to medium grained material, Rest as above.
	20%	Shale, as above.
		Trace micritic limestone, white, very soft, pyritic (cavings m. p.)
		Trace coal, pyrite, siltstone, sandstone.
		Quartz grains and shale have been the predominant constituents of samples with increasing quartz which is tending to be predominantly of a finer

grain size in deeper samples (probably a feature of washing).

8020-8030	80%	Quartz grains, predominantly medium to granular, sub rounded, to rounded, clear to frosted surfaces, trace smokey and rose quartz pyrite inclusions and on surfaces of grains.
	20%	Shale, as above. Trace coal, pyrite, sandstone, siltstone, limestone (micritic).
8030-8040	90%	Quartz grains, as above, with trace glauconite, brown green, very fine grains on surfaces of quartz grains. Glauconite commonly associated with pyrite.
	10%	Shale, as above. Trace coal, pyrite, sandstone.
8040-8050	90%	Quartz grains, medium to coarse to granular mainly coarse, sub rounded to rounded (rounded more common in larger grains), clear to frosted surfaces, trace smokey and rose quartz. Pyrite inclusions and on surfaces.
	10%	Trace glauconite on surfaces of grains. Shale, as above. Trace coal, limestone, sandstone.
8050-8060	80%	Quartz grains, as above.
	10%	Shale, as above. Trace coal, pyrite, sandstone, and white soft clay.
8060-8070	50%	Sand, medium grained to granular, rounded to sub rounded, as above.
	50%	Sandstone, light grey to granular ^{green} , calcareous, sparsely pyritic to fossiliferous, cavings.
8070-8080	50%	Sand, as above.
	50%	Shale/mudstone, as above.
8080-8090	80%	Sand, medium grained to granular, pebbly, rounded to sub rounded, trace pyrite and very black carbonaceous grains, as above.
	20%	Shale/mudstone, as above.
8090-8100	90%	Sand, as above, with trace pyritic cement. Trace glauconite.
8100-8110	100%	Sand, as above, with trace pyritic cement, Trace shale, dark grey brown, carbonaceous, micritic, sparsely pyritic. Trace sandstone, grey white, silty, argillaceous, fine to very fine grained, sub angular to sub rounded generally fairly well sorted, trace micaceous, carbonaceous, pyritic, moderately hard to friable, porosity fair, permeability poor. Trace siltstone, dark grey brown, very argillaceous, in part very finely sandy, carbonaceous and micaceous Trace coal, black, brittle. <i>irregularly fractured.</i>
8110-8120	60%	Sand, as above.
	10%	Coal, black, brittle to resinous lustre, slightly conchoidal fracture
	30%	Shale, dark grey brown, to dark rk brown, carbonaceous in part silty, micro micaceous, with peculiar satin lustre.
8120-8130	90%	Coal, black, brittle, weak conchoidal fracture, dull lustre, some brown coloured pyritic.
	10%	Loose quartz grains, as above. Abundant siltstone fragments.
8130-8140	90%	Loose quartz grains, as above.
	10%	Siltstone, dark grey brown, very argillaceous, pyritic, carbonaceous

8140-8150	60%	Loose quartz grains as above.
	40%	Shale, equal amounts of shale which looks like Lakes Entrance cavings and; dark grey shale, carb. pyritic, soft to firm. Trace siltstone, as above. Coal, pyrite concretions, sandstone, very fine grained to medium, pyritic, clear to frosted grains. Firm.
8150-8160	60%	Quartz grains, as above.
	40%	Shale, two types, as above. Trace siltstone, coal, pyrite, sandstone.
8160-8170	90%	Quartz grains, medium to coarse to granular to pebbly mainly coarse to granular, sub-angular to sub rounded, clear to frosted, pyritic inclusions and on surfaces.
	10%	Shale, about equal amounts of Lakes Entrance cavings and dark grey pyritic, carbonaceous firm shale. <i>Trace coal, sandstone - very pyritic, siltstone.</i>
8170-8180	70%	Quartz grains, as above.
	20%	Shale, Lakes Entrance cavings.
	10%	White clay. Trace carbonaceous shale, as above, siltstone, pyrite, coal.
8180-8190	80%	Quartz grains, as above.
	20%	Shale, as above. Trace dark brown shale, silty in part, very carbonaceous. Trace coal.
8190-8200	70%	Sand, rounded to sub rounded, medium grained to fine pebbly, predominantly coarse grained to granular, trace pyrite cement and white clay matrix.
	30%	Olive grey calcareous shale/mudstone cavings. Trace dark grey to dark grey brown, very carbonaceous shale, micro micaceous and pyritic, coal, as above Trace pyrite.
8200-8210	40%	Sand, as above. (Quartzwacke).
	20%	Sandstone, light grey brown, very argillaceous, very fine to fine grained, sub angular to sub rounded generally fairly well sorted, micritic (sparsely), carbonaceous, sparsely glauconitic, moderately hard, porosity fair, permeability poor.
	40%	Calcareous shale/mudstone cavings. Trace dark grey brown, micro micaceous carbonaceous shale, with peculiar satin lustre. Sandstone, light grey, fine to medium grained, sub angular to rounded, argillaceous, with carbonaceous pyritic cement. Hard, poor porosity and permeability.
8210-8220	30%	Sandstone, grey brown, argillaceous, silty, fine to very fine grained, sub angular to sub rounded, generally fairly well sorted, but with trace scattered sub angular to sub rounded, medium to coarse grained quartz sand, trace micrite, carbonate, pyrite, moderately abundant light brown, argillaceous and white clay matrix. Trace glauconite, moderately hard to friable. Porosity fair, permeability poor. ? No sorting. ? No show
	40%	Sand, medium grained to very coarse grained to granular, rounded to sub rounded, trace pyrite cement and white clay matrix.
	30%	Olive grey calcareous mudstone/shale cavings, as above. Trace sandstone, light grey, very fine to medium grained, angular to sub rounded, generally poorly sorted with pyritic cement, as above. Shale, dark grey brown, micro micaceous, carbonaceous as above.

8220-8230	50% 20% 30%	Sand, as above with white clay and pyritic cement. Sandstone, as above, grey brown, light grey. Calcareous mudstone/shale, as above. Trace coal.
8230-8240	60% 30% 10%	Shale. Sandstone aggregates, fine grained, sub angular to angular, moderately well sorted, trace white clay matrix. Quartz grains, medium to granular, as above. Trace pyritic coal.
8240-8250	50% 20% 30%	Shale. Sandstone aggregates Quartz grains. Trace coal pyrite.
8240-8260	70% 20% 10%	Shale, as above. Sandstone aggregates as above. Quartz grains, as above. Trace coal.
8260-8270	80% 10% 10%	Mudstone/shale, medium grey to olive grey, calcareous, sparsely fossiliferous to pyritic cavings. Sand, as above. Sandstone, as above. Trace coal.
8270-8280	100%	Mudstone/shale, as above. Trace sand, and sandstone, as above.
8280-8290	100%	Mudstone/shale, as above, medium grey, calcareous, in part silty, trace glauconite, pyrite, fossiliferous, trace sand and sandstone, as above.
8290-8300	80% 20%	Mudstone/shale Sandstone, aggregate, very fine grained, micaceous brown, grades into silty micaceous shale. Trace sand grains. Trace siltstone.

8300-8330		Samples very poor. Shale-Mudstone; light grey brown - as above. Siltstone and very fine grained Sandstone, as above.
8320-8330	90%	Shale-mudstone; light grey brown, fairly well compacted, silty and occasionally finely sandy. Carbonaceous, micaceous and pyritic.
	10%	Siltstone; brown grey, fine, soft, micaceous, pyritic, carbonaceous and argillaceous. Sandstone; loose quartz sand grains, dominantly coarse to very coarse grained, angular to rounded. No fluorescence.(
8330-8340	80%	Mudstone, as above.
	20%	Siltstone Trace loose grains, as above. No fluorescence.
8340-8350	60%	Shale-Mudstone
	40%	Siltstone - grades to fine grained, micaceous Sandstone, light grey. Trace loose quartz sand grains, as above.
8350-8360	60%	Mudstone
	40%	Siltstone, as above, grading to fine sandstone, as above. Trace loose quartz sand grains, as above. No fluorescence.
8360-8370	30%	Mudstone
	60%	Silty sandstone, grey to light grey, very fine grained, micaceous, carbonaceous, very similar to siltstone, as above. No fluorescence.
	10%	Loose quartz sand grains, as above.
8370-8380	10%	Shale-Mudstone, as above. Trace siltstone, and very fine grained sandstone as previous.
	90%	Loose quartz sand grains, clear, transparent and white coarse to granular, angular to rounded, fractured.
8380-8390	80%	Mudstone, light grey brown, to buff, soft, micro micaceous, and silty, pyritic.
	20%	Loose quartz sand grains, as above.
8390-8400	80%	Mudstone, as above.
	20%	Loose quartz sand grains, as above. Trace micaceous siltstone and very fine grained sandstone, as above.
8400-8410	90%	Mudstone, light brown grey and light grey, non fissile, slightly calcareous, fairly well compacted in part, carbonaceous flecks, grades to siltstone and fine grained sandstone which is xxx micaceous and carbonaceous
	10%	loose quartz sand grains, medium to granule size, angular to rounded.
8410-8420	80%	Mudstone, buff, light brown grey and grey, fairly well compacted, sparse finely disseminated pyrite and relatively abundant thin pyritized fossil impressions (worms ?); very sparse carbonaceous flecks.
	10%	Siltstone, as above, grades into very fine grained micaceous carbonaceous sandstone.
	10%	Loose quartz sand grains as above. Black green mineral associated with quartz grains (tourmaline ?).

8420-8430	70%	Mudstone, as above.
	20%	Siltstone, with very fine grained sandstone as above.
	10%	Loose quartz grains.
8430-8440	30%	Mudstone, as above.
	60%	Siltstone with very fine grained sandstone as above.
	10%	Loose quartz sand grains.
8440-8450		(Badly caved).
	80%	Mudstone, as above.
	20%	Siltstone, with very fine grained sandstone, as above.
		Trace loose quartz sand grains.

PART A

HYDROCARBON REPORT

- PART A

- PART B

Page 1 of 1

X

CORE LABORATORIES AUSTRALIA (VIC) LTD.

Petroleum Reservoir Engineering

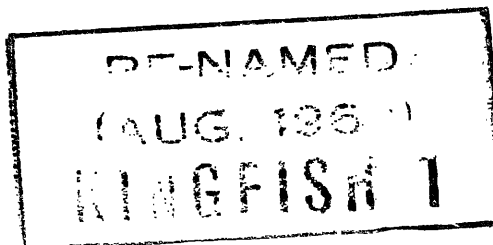
BRISBANE, AUSTRALIA

19 June, 1967

G.P.O. BOX 664 K
CABLE: CORELAB
PHONE: 55-1315
5 3222

ESSO STANDARD OIL (AUSTRALIA) LTD.,
G. P. O. BOX 4249
SYDNEY. N. S. W.

ATTENTION: MR. A. A. PHILLIPS.



SUBJECT: CORE, MUD AND CUTTINGS ANALYSIS, BY CORELAB
ESSO KINGFISH A-1 WELL,
WILDCAT (OFFSHORE),
VICTORIA, AUSTRALIA.

Gentlemen;

A CORE LABORATORIES AUSTRALIA combination drill cuttings and core analysis unit was on board at the site of the subject well during drilling operations. Normal logging procedures were followed from 820 feet to the total depth of 8451 feet.

Using standard equipment plus a Programmed Hydrocarbon Detector, the drilling fluid was monitored continuously for hydrocarbon content and the drill cuttings were checked at regular intervals for gas and oil content and lithology. A Beckman Chromatograph capable of detecting carbon dioxide and hydrogen sulphide gases was also provided on this well. No significant indications of carbon dioxide or hydrogen sulphide gas were detected in this well. All core analysis was performed by conventional procedures. The results of these operations are shown on the accompanying Grapholog, Coregraph and Core Analysis Results Sheets.

HYDROCARBON SHOWS:

The only significant show in the well occurred in the zone, 7480' - 7600'. Good white fluorescence was detected in loose sand cuttings. These cuttings gave a fair bluish white cut in chloroethene solvent. Gas associated with this show was poor in quality but very significant in composition as it contained notable percentages of Methane, Ethane, Propane and Butane.

CORE ANALYSIS:

Analyses of cores No. 1, 2, 3 & 4 indicate probable oil production from the zone 7531' - 7590'. This is followed by a transition zone down to 7605' and a water saturated zone below that.

We sincerely appreciate this opportunity to have been of service, and we trust that the information furnished in this report and during drilling operations has assisted in the evaluation of this well.

Yours very truly,
CORE LABORATORIES AUSTRALIA (VIC) LTD.

JOE B. MC ADAMS,
RESIDENT MANAGER.

PETROLEUM DIVISION

ESSO PRODUCTION RESEARCH COMPANY

POST OFFICE BOX 2189

HOUSTON, TEXAS 77001

PRODUCTION ENGINEERING DIVISION
A. L. HICKS, MANAGER

September 15, 1967

Mr. N. Belknap
Esso Standard Oil (Australia) Ltd.
Box 4249, G. P. O.
Sydney, N. S. W.
Australia

Attention: Mr. M. M. Tongish

Dear Sir:

"Hydrocarbon Report - Subsurface Oil
Esso Standard Oil (Australia) Ltd.
Kingfish A-1 Well"

Attached are four copies of a report which presents the results of analyses of subsurface crude oil from the Kingfish A-1 well, in accordance with the instructions in your letters of June 19 and June 30, 1967.

Items 9 and 10 in your letter of June 19, 1967 requested viscosity measurements of the total sample at 5° F above the pour point, at the pour point, and at two temperatures below the pour point. Measurements were obtained at 65° F which is five degrees above the pour point. However, at the pour point temperature of 60° F, the sample saturated with gas became plastic and measurements could not be made.

Your letter expressed concern about potential problems in pipelining this crude, and asked our recommendations for additives to control wax solidification and foaming. We are studying this problem now and will forward our thoughts in a separate letter in a few days.

Very truly yours,

A. L. HICKS

By

R. V. Randall

R. V. Randall

GTPyndus:wb

cc: Producing Coordination
(Mr. M. C. Sons)
Messrs. R. J. Howe
Zeb Mayhew
J. L. Roman (2)
D. M. Stewart

PRODUCTION LIBRARY

ESSO PRODUCTION RESEARCH COMPANY

HYDROCARBON REPORT - SUBSURFACE OIL
ESSO STANDARD OIL (AUSTRALIA) LTD.
KINGFISH A-1 WELL

G. T. Pyndus
W. F. Muzacz
W. F. Donahy
H. W. Faulkner
H. H. Shepherd

Production Engineering Division

September 1967

EPR67-PS90

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KINGFISH SUBSURFACE OIL SAMPLE

Source: Esso Standard Oil (Australia) Ltd., Kingfish A-1 Well

Date Taken: June 8, 1967

Sampling Data

Sampling depth (measured total)	7569 ft
Status of well	Shut in for 10 hrs after a 12-hr pro- duction test

Reservoir Data

Elevation RDB	31 ft
Top of sand	7445 ft ss
Water-oil contact	7568 ft ss
Original reservoir pressure	3330 psig at 7554 ft ss
Reservoir temperature	210° F at 7554 ft ss
Perforated interval	7553-7561 ft ss

Saturation Pressure

853 psig at 210° F
543 psig at 65° F

Properties of Samples

Pressure-Volume Relations	Table I
Flash Liberation and Differential Liberation Results	Table II
Comparison of Experimental and Computed Flash Liberation Results	Table II-A
Hydrocarbon Analysis of Subsurface Oil Sample	Table III
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Viscosity of Reservoir Oil at 65° F - Pour Point and Wax Content	Table V
Residual Oil Viscosity	Table VI

TABLE I

Pressure-Volume Relations of Subsurface Oil Sample

Source: Esso Standard Oil (Australia) Ltd., Kingfish A-1 Well

Date Taken: June 8, 1967

Temperature: 210° F

<u>Pressure psig</u>	<u>Relative Volume V/V_{bpt}</u>	<u>*Y = $\frac{P_s - P}{P(\frac{V_t}{V_{bp}} - 1)}$</u>
4000	0.9635	
3500	0.9680	
3000	0.9729	
2500	0.9784	
2000	0.9841	
1500	0.9907	
1000	0.9977	
900	0.9993	
853	1.0000	
835	1.0108	1.961
820	1.0203	1.947
800	1.0339	1.918
780	1.0484	1.897
755	1.0682	1.866
730	1.0900	1.834
700	1.1184	1.807
645	1.1812	1.740
590	1.2597	1.674
540	1.3516	1.604
490	1.4642	1.548
465	1.5343	1.513
435	1.6215	1.471
410	1.7199	1.448
375	1.8730	1.404
350	2.0030	1.374
295	2.3761	1.308
270	2.6006	1.278
240	2.9341	1.243
200	3.5459	1.193
175	4.0381	1.175
155	4.6017	1.140
140	5.1035	1.121
130	5.5002	1.108

Specific Volume at Saturation Pressure = 0.02306 cu ft/lb

*Calculated data for use in correcting subsurface oil sample

P_s = Saturation pressure of sample at 210° F, psia = 868

P = Pressure below saturation pressure, psia

V_t = Two-phase relative volume factor at 210° F and PV_{bp} = Saturation oil relative volume at 210° F and 868 psia (853 psig)

TABLE II

Flash Liberation and Differential Liberation Results - Subsurface Oil Sample

Source: Esso Standard Oil (Australia) Ltd., Kingfish A-1 Well

Date Taken: June 8, 1967

Sampling Conditions: Well shut in 10 hrs after a 12-hr flow test

Properties of Saturated Oil:

Temperature, °F	65	210
Saturation Pressure, psig	543	853

Gas Liberation and Shrinkage of Oil:
(Computed Flash)

Pressure (p ₁) psig	Temp. °F	Gas-Oil Ratio: cu. ft. at 60 °F and 14.7 psia/bbl. Residual Oil		Residual Oil Gravity °API at 60 °F	Sp. Gr. Gas at 60 °F (air=1)	V _R /V _S *
		Flashed at p ₁	Flashed from p ₁ to 0			
0	85	363	-	47.5	1.231	0.7832
50	85	223	69	49.5	0.9091	0.8194
100	85	177	124	49.2	0.8060	0.8141
200	85	122	201	48.6	0.7203	0.8034

Pressure psig	Properties of Liberated Gas at 210 °F and Indicated Pressure***		Gas-Oil Ratio: cu. ft. at 14.7 psia and 60 °F/bbl. Reservoir Oil at 853 psig, 210 ° F	Residual Oil Gravity °API at 60 °F	V ^{**} /V _S
	Compressibility, Z	Viscosity, cp			
853	-	-	0		1.0000
692	0.912	0.0130	30		0.9947
528	0.923	0.0127	65		0.9807
382	0.933	0.0122	100		0.9612
240	0.944	0.0113	137		0.9436
115	0.950	0.0099	179		0.9104
0	0.991	0.0057	300	46.5	0.8313

*V_R, Volume residual oil at 0 psig, 60 °FV_S, Volume saturated oil at 853 psig, 210 ° F

**V, Volume saturated oil at indicated pressure, 210 ° F

***, Determined from calculated composition of equilibrium gas

TABLE II-A

Comparison of Experimental and Computed Flash Liberation Results
Subsurface Oil Sample

Source: Esso Standard Oil (Australia) Ltd., Kingfish A-1 Well

Date Taken: June 8, 1967

(P ₁) Pressure psig	Temperature °F	Gas-Oil Ratio - cu ft/bbl Residual Oil				Residual Oil Gravity °API at 60°F		V _R /V _S	
		Flashed at P ₁		Flashed from P ₁ to 0		Experimental	Computed	Experimental	Computed
		Experimental	Computed	Experimental	Computed				
0	85	366	363	-	-	47.1	47.5	0.7809	0.7832

Experimental gravity of gas in 0 psig, 85° F flash = 1.245 (air = 1)

Data Used in Flash Calculations

Subsurface Oil Sample		
Component	Mol %	gal/mol
Hydrogen Sulfide	-	
Carbon Dioxide	0.10	9.09
Nitrogen	-	
Methane	14.71	
Ethane	4.57	
Propane	6.93	
Iso-Butane	2.94	
N-Butane	6.93	
Iso-Pentane	2.63	
N-Pentane	3.66	
Hexanes	5.92	15.52
Heptanes	8.35	16.32
Octanes	6.87	17.36
Nonanes	4.99	18.27
Heavier Fraction	31.40	29.11
Total	100.00	

K-value Source: NGAA (1957)
Convergence Pressure: 7500 psia

Unadjusted Flash Data

Molecular weight of heavier fraction	204
Density of heavier fraction, gm/cc at 60°F	0.8396
Specific volume of reservoir fluid at bubble point and reservoir temperature, cu. ft./lb.	0.02306
Mols per barrel	2.249

TABLE III

Hydrocarbon Analysis of Subsurface Oil Sample

Source: Esso Standard Oil (Australia) Ltd., Kingfish A-1 Well

Date Taken: June 8, 1967

Component	Weight %	Density g/cc at 60°F	Molecular Weight
Hydrogen Sulfide	-		
Carbon Dioxide	0.04		
Nitrogen	-		
Methane	2.18		
Ethane	1.27		
Propane	2.82		
Iso-Butane	1.58		
N-Butane	3.72		
Iso-Pentane	1.75		
N-Pentane	2.44		
Hexanes	4.92	0.6948	90
Heptanes	7.71	0.7340	100
Octanes	6.98	0.7593	110
Nonanes	5.44	0.7739	118
Heavier Fraction	<u>59.15</u>	0.8396	204
Total	100.00		
Pentane-Free Fraction		0.8118	155

Orsat Analysis of Gas Liberated at 0 psig and 75°F

Component	Volume %
Hydrocarbons	99.70
Hydrogen Sulfide	0.00
Carbon Dioxide	<u>0.30</u>
Total	100.00

TABLE IV

Viscosity of Reservoir Oil at 210°F

Source: Esso Standard Oil (Australia) Ltd., Kingfish A-1 Well

Date Taken: June 8, 1967

<u>Pressure, psig</u>	<u>Viscosity, cp</u>	<u>Density, gm/cc</u>
3500	0.341	0.7171
2500	0.318	0.7095
1500	0.292	0.7007
1000	0.281	0.6958
853 = Saturation Pressure	0.280	0.6942
800	0.285	0.6966
600	0.313	0.7056
400	0.349	0.7146
200	0.394	0.7225
100	0.433	0.7282
0	0.835	0.7327

TABLE V

Viscosity of Reservoir Oil at 65° F

Source: Esso Standard Oil (Australia) Ltd., Kingfish A-1 Well

Date Taken: June 8, 1967

<u>Pressure, psig</u>	<u>Viscosity, cp</u>	<u>Density, gm/cc</u>
2500	1.071	0.7788
2000	1.035	0.7738
1500	0.952	0.7689
1000	0.957	0.7640
800	0.943	0.7620
600	0.929	0.7601
543 = Saturation Pressure	0.926	0.7596
400	0.980	0.7682
315	1.026	0.7733
200	1.104	0.7802
105	1.250	0.7859
0*	2.249	0.7922

* Residual Liquid Pour Point = 60° F
Residual Liquid Wax Content = 13.03 percent by weight

TABLE VI

Residual Oil Viscosity

Source: Esso Standard Oil (Australia) Ltd., Kingfish A-1 Well

Date Taken: June 8, 1967

<u>Temperature, °F</u>	<u>Viscosity, cp</u>
75	2.0
65	2.3
60	Sample in plastic state

PART B

HYDROCARBON REPORT

FIELD: Kingfish A-1	REPORT DATE: 8-7-67
COUNTY: Offshore, Bass Strait, Australia	DATE DISTILLED: 7-24-67
REPRESENTATIVE OF: Crude produced during initial testing of Well 1-A in Kingfish Field, located 50 miles offshore in the Gippsland basin portion of Bass Strait. Assay run on composite of five 1-quart samples air expressed from Melbourne at request of Esso Standard Eastern - Manufacturing Department. Low C ₃ /C ₄ content indicates sample probably weathered.	DATE SAMPLED:
	ASSAY NO.: 1163
	FILE NO.: SL.71C-AB.67
	CARDS:
	COST CENTER: 2503-200
	REPORT BY: J. M. Eberly J. F. HICKERSON

DATA ON CHARGE		DATA ON PRODUCTS			
		NAPHTHAS			
GRAVITY °API	44.0	VAPOR TEMP., °F			
SULFUR, %, DIETERT	0.13	C6-175	C6-250	C6-300	C6-375
FLASH, °F, P.M.		RANGE OF CUT, LV%	0.6-10.5		
S.U. VISCOSITY AT 100°F		YIELD, LV%	9.9		
60°F		GRAVITY, °API	79.6		
60°F		RESEARCH OCTANE NO.	71.0		
40°F		+1.5 CC TEL			
S.S. & W., %		+3.0 CC TEL			
WATER BY DISTILLATION, %		MOTOR OCTANE NO.			
REID VAPOR PRESSURE, LB.	3.2	+1.5 CC TEL			
BOILING POINT, °F		+3.0 CC TEL			
SALT AS NACL, PTB		REID VAPOR PRESSURE, LB.			
NEUTRALIZATION VALUE, D65%		SULFUR, %, LAMP	0.0028		
HYDROCARBON ANAL., LV%		MERCAPTAN NO., MG/100 CC.	0.16		
C ₂ & LIGHTER	0.0	% AT 155°F. + LOSS			
C ₃	0.1	212°			
1C ₄	0.1	257°			
NC ₄	0.4	284°			
1C ₅	1.1	302°			
NC ₅	1.6	F.B.P., °F			
MERCAPTAN NO., MG/100 CC.		LOSS, %			
COLOR, SAYBOLT					
COLOR, ROBINSON					

RE-NAMED
(AUG. 1968)
KINGFISH 1

VAPOR TEMPERATURE, °F	HEAVY NAPHTHAS			KEROSENE & TURBO FUELS		
	250-375	175-300	350-375	375-530	500-530	375-430
RANGE OF CUT, LV%		10.5-31.2			31.2-55.9	
YIELD, LV%		20.7			24.7	
MIDPOINT OF CUT, °F		228				
GRAVITY, °API		57.0			44.4	
RESEARCH OCTANE NO., CALC.						
SULFUR, %, LAMP		0.0041			0.038	
ANILINE POINT, °F		124			139	
MERCAPTAN NO., MG/100 CC.		0.77			1.92	
VISCOSITY, SAY. THERMO						
VISCOSITY, KINEMATIC, 40°F., CS						
FREEZING POINT, °F						
RING NUMBER						
P.T. SMOKE POINT						
COLOR, SAYBOLT						
AROMATICS, LV%, M.S.		18	7.6			
NAPHTHENES, LV%, M.S.		23	52.4			
PARAFFINS, LV%, M.S.		60	40.0			
AROMATICS, LV%, F.I.A.						
LUMINOMETER NO.						
REFRACTIVE INDEX @ 20°C						
VISCOSITY, KINEMAT. @ 150°F., CS.						

:lhn:mk

DEPT. NAT. RES & ENV

 95003357

344-00356
 FIELD: Kingfish A-1, AUS...ALIA
 ASSAY NO.: 1163

FILE NO.: SL.71C-AB.67

INTERMEDIATE ASSAY, PAGE 2

VAPOR TEMPERATURE, °F	MIDDLE DISTILLATES			GAS OILS		
	430-530	500-650	650-850	850-1050	1050-	
RANGE OF CUT, LV%		55.9-74.6				
YIELD, LV%		18.7				
GRAVITY, °API		35.9				
REFRACTIVE INDEX, ND ₆₇ °C.		1.4548				
SULFUR, %, DIETERT		0.19				
ANILINE POINT, °F		170				
DIESEL INDEX		61				
POUR POINT, °F		40				
CONRADSON CARBON, %	—					
NITROGEN, WT. %	—					
AROMATIC RINGS, CALC.		9.7				
NAPHTHENE RINGS, CALC.		24.8				
WET ASH, PPM NI	—	—	—	—	—	
V	—	—	—	—	—	
FE	—	—	—	—	—	
S.U. VISCOSITY AT 100°F.	—	39.8			—	
130°	—	—				
150°	—	—				
175°	—	—				
210°	—	—				
NEUTRALIZATION VALUE D574	—					
Mercaptan No., Mg/100 cc.		1.20				

VAPOR TEMPERATURE, °F	WAXY LUBE OIL	DEWAXED LUBE	BOTTOMS		CORRELATED DATA
	790-1000		BEYOND 1050	BEYOND 650	
RANGE OF CUT, LV%				74.6-100.0	PHENOL TREATING CHARACTERISTICS ON NARROW LUBE CUT DEWAXED
YIELD, LV%		—		25.4	
GRAVITY, °API				31.8	
SULFUR, %, DIETERT		—		0.40	
ANILINE POINT, °F			—	—	% TREAT V.I.
DIESEL INDEX			—	—	C
S.U. VISCOSITY AT 100°F	—		—	—	100
130°F	—	—	—	—	200
150°F	—	—	—	58.4	300
175°F	—	—	—	—	V.G.C.
210°	—	—	—	41.9	
S.F. VISCOSITY AT 122°F	—	—			
210°	—	—			
275°	—	—			
300°	—	—			
FLASH, °F, C.O.C.					
POUR POINT, °F			—	110	
VISCOSITY INDEX			—	—	
NEUTRALIZATION VALUE D664		—			
MAX. S.B.A., %		—	—	—	
CONRADSON CARBON, %	—	—			
MOD. INSOL. IN 88° NAPH	—	—			
NITROGEN, WT. %	—	—			
WET ASH, PPM NI	—	—			
V	—	—			
FE	—	—			
OLIENSIS	—	—			
SOFTENING POINT, °F	—	—			
PENETRATION AT 77°F	—	—			
PENETRATION AT 39.2°F	—	—			
DUCTILITY AT 77°F	—	—			
SOLUBLE IN CCl ₄	—	—			

•D974

CRUDE: Kingfish A-1, AUSTRALIA
ASSAY NO.: 1163 FILE NO.: SL.71C-AB.67

650+ RESID.

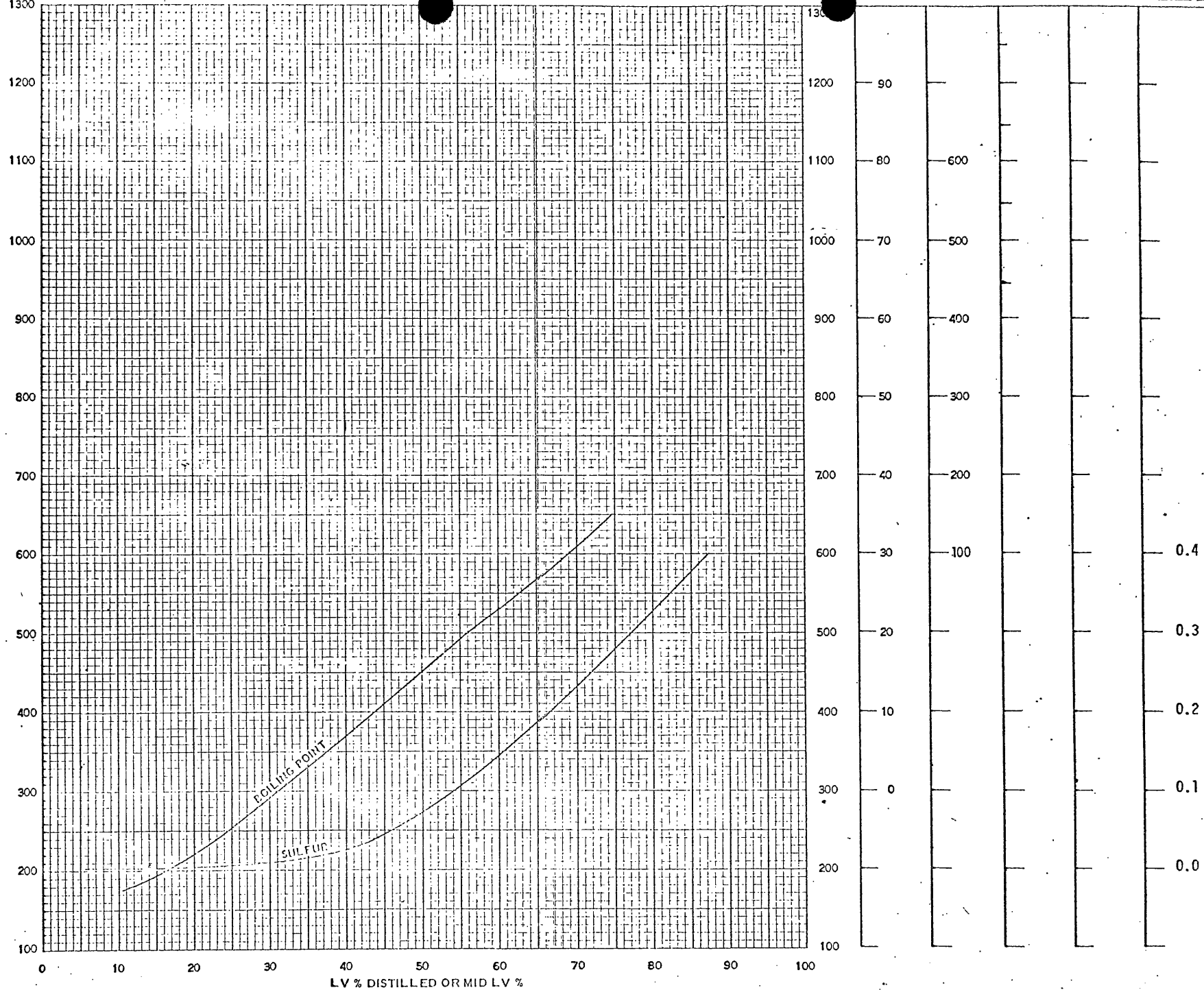
DISTILLATION, D-1160, 10 mm:

F.B.P.		97.0% @ 700°F.
5%	75.9	430 (705)
10	77.1	440 (717)
20	79.7	450 (728)
30	81.2	457 (735)
40	84.2	470 (750)
50	87.6	485 (768)
60	89.8	500 (786)
70	92.4	523 (812)
80	93.9	555 (850)
90	97.7	634 (937)
95	98.7	674 (982)

25.4
1.270

152.4
177.8
193.2
228.6

TEMP.	DATE	ASSAY NO.	FIELD	FILE NO.:	TEMP.	GRAVITY API	MID LV %, VS THERMO VIS	SMOKE POINT	FREEZING POINT, °F	SULFUR, %
1300	8-7-67	1163	Kingfish A-1, AUSTRALIA	SL-71C-AB.67	1300					



Handwritten marks: 24/4

PART A

PALYNOLOGICAL REPORTS

KINGFISH-1

- PART A

- PART B

✓
2

~~Palynological Report on Esso Kingfish (A-1), (B-1), and (C-1) Wells~~
PALYNOLOGICAL REPORT ON ESSO KINGFISH (A-1), (B-1), AND
(³C-1) WELLS

The present account includes results of palynological investigations of samples taken from Esso Kingfish A-1 well, 7402 feet - 8300 feet, Esso Kingfish B-1 well, 7480 feet - 7517 feet, and Esso Kingfish C-1 well, 7655 feet - 8260 feet.

Samples examined from Kingfish A-1 well include conventional cores (7402-43 feet, 7595-601 feet), sidewall cores (7884 - 8113 feet) and cuttings (8000 - 8300 feet). Microfloras extracted from the core at 7595 -601 feet and sidewall cores between 7884 feet and 8113 feet are documented in previous reports (Dettmann 1967a,b). The microfloras, which consist of land derived forms, include suites (from 7595-601 feet) possessing characteristics of the Eocene Duplopollis orthoteichus Assemblage and a sparse assemblage (at 7934 feet) that may be referable to either the Paleocene Triorites edwardsii Assemblage or to the late Cretaceous - early Tertiary Transition Assemblage. A subsequent examination of cuttings (8000 - 8300 feet) confirms that the Paleocene T. edwardsii Assemblage is represented in sediments at and below 7934 feet. Moreover, the suites extracted from the horizons between 8000 feet and 8300 feet include abundant microplankton and chitinous foraminiferal tests, with only minor representation of spore-pollen elements.

Samples from Kingfish B-1 well yielded only land derived plant microfossils that form microfloras referable to the Duplopollis orthoteichus Assemblage.

The Kingfish C-1 sediments investigated include horizons, which on microfloral evidence, are attributable to the Duplopollis orthoteichus Zone (7655 - 8005 feet) and to the Triorites edwardsii Zone (8257-60 feet).

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Horizons investigated from both zones contain a predominance of land derived forms, with occasional microplankton occurring throughout the section.

The microfloral suites obtained from the three well sequences are documented and discussed below and the age of the sediments is discussed. Microfloras obtained from approximately age-equivalent sediments are shown to exhibit considerable variation in both quantitative and qualitative representation of spores, pollen grains and microplankton. Some of the variations observed in the microfloras are briefly discussed and the potential usefulness of certain plant microfossils in the interpretation of palaeoenvironments is indicated.

NOTE ON METHODS OF EXTRACTION

Extraction procedures used in the examination of the sediments include initial treatment in hydrofluoric acid followed by mineral separation with zinc bromide. Residues were then subjected to brief exposure to ultrasonic vibration (1 minute) before mounting in glycerine jelly.

The zinc bromide treatment was found to be unsatisfactory for samples from Kingfish A-1 well, 8000 - 8300 feet since small pyrite crystals were embedded in and/or closely attached to the walls of the contained plant microfossils. Consequently, the plant microfossils were extracted by treatment with hydrofluoric acid followed by immersion in 50% hydrochloric acid before exposure to ultrasonic vibration.

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MICROFLORAL CONTENT AND AGE OF SEDIMENTS

Kingfish(A-1) well

7402, feet, 7422 feet, and 7433 feet (core samples)

Samples from these levels failed to yield spores, pollen grains; or microplankton.

7595-98 feet and 7593-601 feet (core samples)

The microfloras which are composed of spores and pollen grains are documented by Dettmann (1967a) who referred them to the Eocene Duplopollis orthoteichus Assemblage.

7884 feet, 7934 feet, and 8113 feet (sidewall cores)

Dettmann (1967b) lists spore and pollen types obtained from the sediments. The horizon at 7934 feet yielded Dacrydiumites balnei and on this basis the microflora was considered to be referable to the Paleocene Triorites edwardsii Assemblage or to the late Cretaceous-early Tertiary Transition Assemblage. Evidence documented below from cuttings between 8000 feet and 8300 feet supports the former assignment.

8000 - 8300 feet (cuttings)

Small residues of fairly preserved plant microfossils were extracted from cutting samples between 8000 and 8300 feet. Chitinous foraminiferal tests in whorls of up to eight chambers were observed in the majority of samples between 8000 feet and 8150 feet. Microplankton are also abundant between 8000 feet and 8200 feet and numerically outnumber spores and pollen grains (60-70% microplankton, 30-40% spores and pollen). Pollen forms identified include rare angiospermous types referable to Nothofagidites emarcidus (Cookson), Proteacidites crassus Cookson, and P. subcabratus Couper, and more numerous gymnospermous grains which are represented by Phyllocladidites mawsonii Cookson, Podocarpidites ellipticus Cookson, Microcachryidites antarcticus Cookson, Dacrydiumites ellipticus

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Harris, and D. balmei Cookson (at 8200 feet only). The microplankton present include diverse hystrichosphaerid forms together with Cyclonephelium retiintextum Cookson, Cordosphaeridium spp., and Deflandrea dilwynensis Cookson & Eisenack. The occurrence of Dacrydiomites ellipticus, D. balmei, and Deflandrea dilwynensis supports assignment of the microfossils to the Triorites edwardsii Assemblage, despite the fact that Triorites edwardsii was not observed in any of the samples.

Spores and pollen grains are more common in samples between 8200 feet and 8300 feet, but are numerically insubordinate to microplankton.

Amongst the pollen, Phyllocladidites reticulosaccatus ^{Harris} Stephanoporopollenites obscurus Harris, and Dacrydiomites ellipticus ^{occur} Microplankton are represented by hystrichosphaerid types. The pollen species listed above indicate that horizons at 8300 feet are within the Triorites edwardsii Zone; forms diagnostic of older palynological zones were not observed.

Kingfish²(B-1)well

Samples examined include sediments of core 4 (7480, 7489 feet) and core 5 (7511, 7517 feet), which yielded abundant carbonaceous material consisting chiefly of wood fragments and rare spores and pollen grains. Microplankton were not observed.

7480 feet

- Spores: Gleicheniidites circinidites (Cookson)
Trilites tuberculiformis Cookson
Pollen: Proteacidites annularis Cookson
P. crassus Cookson
P. dilwynensis Harris
P. subscabratus Coupér
Podocarpidites ellipticus Cookson
Phyllocladidites mawsonii Cookson

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7498 feet

Pollen: Araucariacites australis Cookson
Proteacidites annularis Cookson
P. subscabratus Couper
Tricolpites sp.

7511 feet

Spores: Cyathidites australis Couper
Gleicheniidites circinidites (Cookson)
Pollen: Proteacidites annularis Cookson
P. incurvatus Cookson
P. subscabratus Couper
Phyllocladidites mawsonii Cookson
Tricolporites microreticulatus Harris
Triorites harrisii Couper

7517 feet

Spores: Baculatisporites comaumensis (Cookson)
Cyathidites australis Couper
Gleicheniidites circinidites (Cookson)
Pollen: Dacrydioidites florinii Cookson & Pike
Proteacidites crassus Cookson
P. dilwynensis Harris
P. subscabratus Couper

The sparse microfloras are referred to the Eocene Duplopollis orthoteichus Assemblage on the basis of Proteacidites dilwynensis.

³
Kingfish/C-1 well.

7655 feet (sidewall core)

Reasonably well preserved plant microfossils obtained from the sample include abundant cuticular material, low concentrations of spores and pollen grains, and rare microplankton. Species identified include:

Spores: Cyathidites australis Couper
C. splendens Harris
Gleicheniidites circinidites (Cookson)
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Araucariacites australis Cookson
Nothofacidites emarcidus (Cookson)
Podocarpidites ellipticus Cookson
Proteacidites annularis Cookson
P. crassus Cookson
P. dilwynensis Harris

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Microplankton: P. subscabratus Couper
Deflandrea dartmooria Cookson & Eisenack

7934 feet (sidewall core)

A residue containing abundant cuticular material and fairly preserved spores and pollen grains was extracted from the sample. Species identified include:

Spores: Baculatisporites comaumensis (Cookson)
Cyathidites splendens Harris
Gleicheniidites circinidites (Cookson)
Latrobosporites crassus Harris

Pollen: Araucariacites australis Cookson
Banksiaeidites sp.
Dacrydiumites ellipticus Harris (1 specimen only)
D. florinii Cookson & Pike
Myrtaceidites eugeniioides Cookson & Pike
Nothofagidites emarcidus (Cookson)
Phyllocladidites mawsonii Cookson
Podocarpidites ellipticus Cookson
Proteacidites annularis Cookson
P. crassus Cookson
P. incurvatus Cookson
P. subscabratus Couper
Triorites harrisii Couper

8005 feet (sidewall core)

Reasonably well preserved spores and pollen grains were extracted from the sample and include the following species:

Spores: Cyathidites minor Couper
C. splendens Harris
Gleicheniidites circinidites (Cookson)
Laevigatosporites ovatus Wilson & Webster
Trilites tuberculiformis Cookson

Pollen: Araucariacites australis Cookson
Cycadopites sp.
Dacrydiumites ellipticus Harris
Microcachryidites antarcticus Cookson
Nothofagidites emarcidus (Cookson)
N. cf. brachyspinulosus (Cookson)
Phyllocladidites mawsonii Cookson
P. reticulosaccatus Harris
Polyporites fragilis Harris
Proteacidites crassus Cookson
P. incurvatus Cookson
P. subscabratus Couper
Podocarpidites ellipticus Harris

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Stephanoporopollenites obscurus Harris
Tiliaepollenites notabilis Harris
Triorites harrisii Couper
Remanié: Trilobosporites trioreticulosus - Lower Cretaceous

8237 feet (sidewall core)

The fairly preserved microflora includes abundant spores and pollen grains and rare microplankton. Constituent species include:

Spores: Cyathidites australis Couper
C. minor Couper
Laevigatosporites ovatus Wilson & Webster
Gleicheniidites circinidites (Cookson)
Stereisporites anticuasporites (Wilson & Webster)

Pollen: Araucariacites australis Cookson
Dacrydiurnites balmei Cookson
D. ellipticus Harris
Monosulcites prominatus McIntyre
Nothofagidites emarcidus (Cookson)
N. cf. brachyspinulosus (Cookson)
Phyllocladidites mawsonii Cookson
P. reticulosaccatus Harris
Proteacidites subscabratus Couper
Stephanoporopollenites obscurus Harris
Triorites harrisii Couper

Microplankton: Epicephalonyxsis indentata Deflandre & Cookson

8260 feet (sidewall core)

Abundant poorly preserved and strongly compressed plant microfossils were extracted from the sample. The assemblage which is chiefly composed of spores and pollen grains also includes rare microplankton.

Spores: Cyathidites splendens Harris
Gleicheniidites circinidites (Cookson)
Stereisporites anticuasporites (Wilson & Webster)

Pollen: Dacrydiurnites balmei Cookson
D. ellipticus Harris
D. florinii Cookson & Pike
Microcachrylites antarcticus Cookson
Nothofagidites emarcidus (Cookson)
Proteacidites subscabratus Couper
Phyllocladidites mawsonii Cookson
Stephanoporopollenites obscurus Harris
Tricolpites gillii Cookson
Triorites edmarasii Cookson & Pike f. tenuis Stover & Jones

Microplankton: Deflandrea sp.
Ginsinodinium tabulatum Cookson & Eisenack

Microfloras obtained from samples between 7655 feet and 8005 feet

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are assigned to the Duplopollis orthoteichus Assemblage on the basis of Proteacidites dilwynensis, P. incurvatus, and Tiliaepollenites notabilis. Thus, it appears that Dacrydiumites ellipticus (found at 7934 feet and 8005 feet) and Phyllocladites reticulosaccatus (present at 8005 feet) extend into basal horizons of the Duplopollis orthoteichus Zone.

Triorites edwardsii was observed at 8260 feet where it is associated with Dacrydiumites balmei and Gingiodinium tabulatum; the sediment is accordingly assigned to the Triorites edwardsii Zone. This zone is probably represented at 8237 feet on the basis of Dacrydiumites balmei.

CONCLUSIONS

Sediments examined from Kingfish (¹A-1, ²B-1, and ³C-1) wells yielded microfloras diagnostic of the Duplopollis orthoteichus Zone (Eocene) and the Paleocene Triorites edwardsii Zone. The distribution of these zones in the wells is as follows:

- 1) The D. orthoteichus Zone occurs in all three well sections. In Kingfish A-1 well it is represented at 7595 - 7601 feet; in Kingfish B-1 well it was recognized between 7480 feet and 7517 feet; and in Kingfish C-1 well horizons between 7655 feet and 8005 feet are assigned to the zone. Samples studied from these sections yielded microfloras composed chiefly of land derived plant microfossils; microplankton were observed only in Kingfish C-1 well and occur in minor proportions.
- 2) The Triorites edwardsii Zone is represented in Kingfish A-1, and B-1 wells. In Kingfish A-1 well it was identified in horizons between 7934 feet and 8300 feet; the microfloras extracted from sediments between 8000 feet and 8300 feet include infrequent spores and pollen grains which are outnumbered by microplankton. Chitinous foraminiferal tests were also observed in samples between 8000 feet and 8150 feet. Kingfish C-1 well includes horizons of the T. edwardsii Zone at 8237 feet and 8260 feet; the micro-

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floras from these horizons contain a dominance of spores and pollen grains with rare microplankton.

The nominate species of the Triorites edwardsii Zone, T. edwardsii, which, in its first occurrences down section, has been used in previous work as a means of delineating the top of the zone, was identified in only one sample from the Kingfish sections. The apparent lack of this species in the majority of/samples assigned to the T. edwardsii Zone suggests that the dispersal of the species may have been limited by factors prevailing during the deposition of the sediments. Amongst the spore and pollen species having stratigraphical significance in relation to the T. edwardsii Zone in the Kingfish sections are the saccate gymnospermous types, Dacrydiumites balmei and D. ellipticus. These species may prove to have wider application in the recognition of the T. edwardsii Zone despite the fact that neither is restricted to the zone.

Saccate pollen may also prove to have significance in environmental interpretations. Traverse and Ginsburg (1966) and Muller (1959) emphasize that the lateral distribution of buoyant saccate pollen is influenced by changes in turbulence, water density, and current patterns.

The environmental significance of microplankton recovered from the Kingfish sections has yet to be assessed fully since most forms identified await detailed taxonomic study. The majority of types observed are of the hystrichosphaerid-type and are referable to the Acritarcha, the affinities of which are uncertain. Nevertheless the group is generally believed to be typical of/shallow marine and brackish-water environments. The dominance of microplankton and their association with foraminiferal remains in the Triorites edwardsii Zone of Kingfish A-1 well is of some interest. Similar observations have been made on certain horizons of

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the same zone in Halibut A-1 well (report in preparation). In contrast only rare microplankton occur in horizons studied of the T. edwardsii zone in Kingfish C-1 well. A similar rare occurrence was noted from samples investigated of the same zone in Marlin A-1 and B-1 wells (Dettmann 1966a,b,c). Microplankton appear to be absent in the T. edwardsii Zone of Barracouta A-1 and Dolphin A-1 wells (Stover and Jones 1966, Dettmann 1968). Further discussion concerning the distribution of microplankton in sections examined from the Gippsland Basin is planned for a later report.

REFERENCES

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30th August, 1968.

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BASIN

GIPPSLAND

DATE

WELL NAME

KINGFISH -1

ELEVATION

+ 31 feet

AGE	PALYNOLOGIC ZONES	HIGHEST DATA					LOWEST DATA				
		Preferred Depth	Rtg	Alternate Depth	Rtg	2 way time	Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time
IGC MIOC.	<i>T. bellus</i>										
	<i>P. tuberculatus</i>										
ECCENE	<i>U. N. asperus</i>										
	<i>L. N. asperus</i>										
	<i>P. asperopolus</i>										
	<i>U. M. diversus</i>										
	<i>L. M. diversus</i>	7595	1			1800	7601	1			1800
MIOCENE	<i>L. balmei</i>	7884	2			1850	8113	2	8300	3	1800
	<i>T. longus</i>										
LATE CRETACEOUS	<i>T. lilliei</i>										
	<i>N. senectus</i>										
	<i>C. trip./T. pach.</i>										
	<i>C. distocarin.</i>										
EARLY CRETACEOUS	<i>T. pannosus</i>										
	<i>C. paradoxa</i>										
	<i>C. striatus</i>										
	<i>D. C. hughesii</i>										
	<i>L. C. hughesii</i>										
	<i>C. stylosus</i>										
Pre-Cretaceous											

COMMENTS: T.D. 8451' (100%)

- RATINGS: 0; SWC or CORE, EXCELLENT CONFIDENCE, assemblage with zone species of spores, pollen and microplankton.
- 1; SWC or CORE, GOOD CONFIDENCE, assemblage with zone species of spores and pollen or microplankton.
- 2; SWC or CORE, POOR CONFIDENCE, assemblage with non-diagnostic spores, pollen and/or microplankton.
- 3; CUTTINGS, FAIR CONFIDENCE, assemblage with zone species of either spores and pollen or microplankton, or both.
- 4; CUTTINGS, NO CONFIDENCE, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If a sample cannot be assigned to one particular zone, then no entry should be made. Also, if an entry is given a 3 or 4 confidence rating, an alternate depth with a better confidence rating should be entered, if possible.

DATE RECORDED BY: L.E.S./ A.D.P.

DATE June 1971

DATA REVISED BY: L.E.S.

DATE Dec. 1971

Form Zones

		Highest Data	Quality	2 Way Time	Lowest Data	Quality	2 Way Time
MIOCENE	A	Alternate			1000	3	
		1110	3		1700	3	
	B	Alternate					
		1220	3				
		1820	3		2900	3	
	C	Alternate					
		2950	3		5100	3	
	D ₁	Alternate					
		5140	0		5600	1	
	D ₂	Alternate					
		5750			5820	1	
	E	Alternate					
F	Alternate						
G	Alternate						
H ₁	Alternate						
	6210	1					
H ₂	Alternate				7100	3	
I ₁	Alternate				7250	0	
	7250	0			7454	1	
I ₂	Alternate						
J ₁	Alternate				7470	4	
	7470	4			7500	4	
J ₂	Alternate						
K	Alternate				7680	4	
Pre K	Alternate				7934	2	
					8113	2	

COMMENTS:

Note: If highest or lowest data is a 3 or 4, then an alternate 0, 1, 2 highest or lowest data will be filled in if control is available.

If a sample cannot be interpreted to be one zone, as apart from the other, no entry should be made.

- 0 SWC or Core - Complete assemblage (very high confidence).
- 1 SWC or Core - Almost complete assemblage (high confidence).
- 2 SWC or Core - Close to zone change but able to interpret (low confidence).
- 3 Cuttings - Complete assemblage (low confidence).
- 4 Cuttings - Incomplete assemblage, next to uninterpretable or SWC with depth suspicion (very low confidence).

Date Revised 14/6/72

By DJT/ANP

BASIN GIPPSLAND

DATE _____

WELL NAME KINGFISH-1

ELEVATION +31 feet

AGE	PALYNOLOGIC ZONES	HIGHEST DATA					LOWEST DATA				
		Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time	Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time
Eocene	<u>P. tuberculatus</u>										
	<u>U. N. asperus</u>										
	<u>M. N. asperus</u>										
	<u>L. N. asperus</u>										
	<u>P. asperopolus</u>										
	<u>U. M. diversus</u>										
	<u>M. M. diversus</u>										
	<u>L. M. diversus</u>	7595	1				7601	1			
Paleocene	<u>U. L. balmei</u>	7884	2	7934	1		8300	3	8113	2	
	<u>L. L. balmei</u>										
	<u>T. longus</u>										
Cretaceous	<u>T. lilliei</u>										
	<u>N. senectus</u>										
	<u>C. trip./T.pach.</u>										
	<u>C. distocarin.</u>										
	<u>T. pannosus</u>										
EARLY CRETACEOUS											
PRE-CRETACEOUS											

COMMENTS: T.D. 8451'

- RATINGS: 0; SWC or CORE, EXCELLENT CONFIDENCE, assemblage with zone species of spores, pollen and microplankton.
- 1; SWC or CORE, GOOD CONFIDENCE, assemblage with zone species of spores and pollen or microplankton.
- 2; SWC or CORE, POOR CONFIDENCE, assemblage with non-diagnostic spores, pollen and/or microplankton.
- 3; CUTTINGS, FAIR CONFIDENCE, assemblage with zone species of either spore and pollen or microplankton, or both.
- 4; CUTTINGS, NO CONFIDENCE, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If a sample cannot be assigned to one particular zone, then no entry should be made. Also, if an entry is given a 3 or 4 confidence rating, an alternate depth with a better confidence rating should be entered, if possible.

DATA RECORDED BY: LES/ADP DATE June 1971; Dec 1971.

DATA REVISED BY: ADP DATE Jan. 1975

PART B

PALYNOLOGICAL REPORTS

PETROLEUM DIVISION

20 DEC 1989

REVIEW OF PALYNOLOGICAL AGE DATING FROM
THE KINGFISH-1 EXPLORATION WELL,
GIPPSLAND BASIN.

by

A.D. PARTRIDGE

INTRODUCTION

The field discovery well Kingfish-1 (originally called Kingfish A-1) was drilled in 1967. As this was before the establishment of the Esso Palynological Laboratory in late 1968 the initial palynological age dating was performed by consultant Dr M.E. Dettmann who prepared three short reports (Dettmann 1967a,b; 1968). Subsequent work has been restricted to the examination of a few conventional core samples and cuttings. This data was used to modify palynological data sheets, but was never written-up as a report nor has a palynological range chart previously been constructed for the well.

In an attempt to age data and correlate the distinctive shales near the bottom of Kingfish-1, between 8275-8360 feet and 8385-8410 feet additional cuttings samples have been processed and analysed.

The opportunity of preparing a report on this work has been used to summaries all palynological analyses in Kingfish-1 and prepare a range chart.

PALYNOLOGICAL SUMMARY OF KINGFISH-1

AGE	FORMATION	SPORE-POLLEN ZONES (DINOFLAGELLATE ASSOC.)	DEPTH RANGE (ftKB)
Oligocene	Lakes Entrance 7477 ft		
Late Eocene	Latrobe Group (coarse clastics) T.D. 8451ft	Lower <i>M. diversus</i>	7595-7900
Paleocene		<i>L. balmei</i>	7934-8350
Paleocene		Lower <i>L. balmei</i> (<i>G. retiintexta</i>)	8430-8450

COMMENTS

- 1) In at least two instances erroneous samples have been assigned to Kingfish-1 causing confusion about the age datings in the well. These errors are:-
 - a) The three barren core samples reported from Kingfish A-1 at 7402ft, 7422ft and 7433ft in Dettmann (1968) cannot come from Kingfish-1 as there are no conventional cores or sidewall cores taken at these depths. The samples most likely come from Kingfish-2 (originally called Kingfish B-1) as conventional cores were cut over this interval.
 - b) The three sidewall cores reported as containing both the Upper *L. balmei* and *A. homomorphum* Zones in a memorandum by Partridge (March 3, 1989) actually come from the Kingfish-A1 Platform well. This error was caused by the name change of the original wildcat well from Kingfish A-1 to Kingfish-1. The samples were from 8049ft, 8058ft and 8076ft.
- 2) Four conventional cores were cut in Kingfish-1 between 7509 to 7622ft. Palynological samples have only been processed from Core-4 between 7592-7622ft to provide a Lower *M. diversus* Zone age for the reservoir section.
- 3) Only three sidewall cores were recovered from the Latrobe Group and these were reported on by Dettmann (1967a). The limited spore-pollen assemblages recorded allow only SWC-5 at 7934ft to be dated as no younger than the Upper *L. balmei* Zone based on the presence of the eponymous species *Lygistepollenites balmei*. The remaining rock sample and palynological slides from these samples could not be located for re-analysis and are probably lost.
- 4) The Upper *L. balmei* Zone cannot be delimited in Kingfish-1 due to the lack of index species among the limited assemblages recorded.
- 5) All cutting samples examined are contaminated by abundant spores, pollen and dinoflagellates caved from the Lakes Entrance Formation.

- 6) The common presence of the dinoflagellate *Glaphrocysta retiintexta* in cutting sample from 8430-40ft and its rare presence in underlying sample from 8440-50ft is the basis for assigning a Lower *L. balmei* Zone age to these samples. This dinoflagellate is consistent and often common in the *E. crassitabulate* Zone and a correlation of low confidence is possible to this zone.

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TABLE-1: PALYNOLOGICAL ANALYSES IN KINGFISH-1

SAMPLE* TYPE	DEPTH (FEET)	PALYNOLOGIST	SPORE-POLLEN ZONES	CONFIDENCE RATING
Core-4	7595-98'	MED	Lower <i>M. diversus</i>	1
Core-4	7598'	LES, PRE	Lower <i>M. diversus</i>	1
Core-4	7598-601'	MED	Lower <i>M. diversus</i>	1
Core-4	7600'11"	ADP	Lower <i>M. diversus</i>	1
Cuttings	7740-50'	PRE	Indeterminate	
SWC-6	7884'	MED	Indeterminate	
Cuttings	7890-900'	LES, PRE	Lower <i>M. diversus</i>	3
Cuttings	7900-10'	PRE	Indeterminate	
SWC-5	7934'	MED	<i>L. balmei</i>	2
Cuttings	8010-20'	LES	Indeterminate	
SWC-4	8113'	MED	Indeterminate	
Cuttings	8200-10'	LES	<i>L. balmei</i>	3
Cuttings	8280-90'	ADP	Indeterminate	
Cuttings	8290-300'	ADP	Indeterminate	
Cuttings (1)	8320-30'		Not Processed	
Cuttings (2)	8330-40'	ADP	<i>L. balmei</i>	
Cuttings (3A)	8340-50'	ADP	<i>L. balmei</i>	3
Cuttings (3B)	8340-50'	ADP	Indeterminate	
Cuttings (4)	8400-10'	ADP	Indeterminate	
Cuttings (5)	8430-40'	ADP	Lower <i>L. balmei</i>	3
Cuttings (6)	8440-50'	ADP	Lower <i>L. balmei</i>	3

* Numbers in brackets refer to samples collected from DITR Core Store.

MED = M.E. Dettmann
 LES = L.E. Stover
 PRE = P.R. Evans
 ADP = A.D. Partridge

(ADP210)

P A L Y N O L O G Y D A T A S H E E T

B A S I N : GIPPSLAND

ELEVATION: KB: +31 ft GL: -253 ft

WELL NAME: KINGFISH-1

TOTAL DEPTH: 8451 ft

A G E	PALYNOLOGICAL ZONES	H I G H E S T D A T A					L O W E S T D A T A				
		Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	<i>T. pleistocenicus</i>										
	<i>M. lipsis</i>										
	<i>C. bifurcatus</i>										
	<i>T. bellus</i>										
PALEOGENE	<i>P. tuberculatus</i>										
	Upper <i>N. asperus</i>										
	Mid <i>N. asperus</i>										
	Lower <i>N. asperus</i>										
	<i>P. asperopolus</i>										
	Upper <i>M. diversus</i>										
	Mid <i>M. diversus</i>										
	Lower <i>M. diversus</i>	7595	1				7900	3	7601	1	
	Upper <i>L. balmei</i>	7934	2								
	Lower <i>L. balmei</i>	8430	3				8450	3			
	LATE CRETACEOUS	Upper <i>R. longus</i>									
Lower <i>R. longus</i>											
<i>T. lilliei</i>											
<i>N. senectus</i>											
<i>T. apoxyexinus</i>											
<i>P. mawsonii</i>											
<i>A. distocarinatus</i>											
EARLY CRET.	<i>P. pannosus</i>										
	<i>C. paradoxa</i>										
	<i>C. striatus</i>										
	<i>C. hughesi</i>										
	<i>F. wonthaggiensis</i>										
	<i>C. australiensis</i>										

COMMENTS: All depths in feet.
Sample at 7934 ft is no younger than Upper *L. balmei* Zone.
A dinoflagellate association dominated by *Glaphrocysta retintexta* occurs in cuttings between 8430-50 ft.

- CONFIDENCE RATING:
- 0: SWC or Core, Excellent Confidence, assemblage with zone species of spores, pollen and microplankton.
 - 1: SWC or Core, Good Confidence, assemblage with zone species of spores and pollen or microplankton.
 - 2: SWC or Core, Poor Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.
 - 3: Cuttings, Fair Confidence, assemblage with zone species of either spores and pollen or microplankton, or both.
 - 4: Cuttings, No Confidence, assemblage with non-diagnostic spores, pollen and/or microplankton.

NOTE: If an entry is given a 3 or 4 confidence rating, an alternative depth with a better confidence rating should be entered, if possible. If a sample cannot be assigned to one particular zone, then no entry should be made, unless a range of zones is given where the highest possible limit will appear in one zone and the lowest possible limit in another.

DATA RECORDED BY: L.E. Stover/A.D. Partridge DATE: 1971, 1975

DATA REVISED BY: A.D. Partridge DATE: October, 1989.

VELOCITY SURVEY

VELOCITY SURVEY

DEPT. NAT. RES & ENV



PE903359

RE-NAMED
(AUG. 1968)
KINGFISH 1

ESSO KINGFISH A-1

By

R.J. Steele

RE-NAMED
(AUG 1968)
KINGFISH 1

A. INTRODUCTION

Esso Australia contracted Western Geophysical Co. to perform the velocity survey. Under the contract, Western agreed to furnish the following:

1. Instruments -

- a. SSC Model GCE101 Pressure Sensitive Well Geophones
- b. Twelve SIE GA-11 Amplifiers, Input Switching and Power Supply
- c. Western 30 Channel Camera
- d. Three 12 volt Batteries and Charger
- e. Portable Developing System
- f. Two 300 volt Blasters
- g. Three Kaar TR 327 CB Radios
- h. Two RC-5 Remote Control Units for Shooters Radio
- i. Two TA-12 Break Amplifier Units
- j. Adequate spare parts

2. Personnel -

One Marine Shooter, M. Blaize and one Instrument Operator, J.A. Rassmussen.

3. Shooting Boat -

One licensed shooting boat - "Wendy Marie".

All equipment and personnel were assembled by May 20, 1967 and the survey was made on May 21, 1967.

B. SURVEY PROCEDURES

The sea was rough during the survey and the high level of rig noise is presumably responsible for a low signal-noise ratio on the water-break traces of several of the records.

1. Shot Positioning -

The orientation of Glomar III was E-W during the survey. A buoy was positioned at 1000 feet on either side of the boat along a line passing N-S through the well site. Exact shot offsets were obtained from water arrivals at a geophone located in the moonpool.

2. Shot Size -

The powder was packed in 25 lb. cans. Shots 1 - 7 were each 25 lbs. Shots 8 - 9A were 50 lbs.

3. Well Geophone Positioning

All depth measurements were made using the Schlumberger depth indicator. To minimize rig noise the marine riser was disconnected from the derrick floor and lowered to the casing top. The cable was clamped with a T-bar device which rested on the casing top at each geophone position in an attempt to de-couple from the appreciable rig movement.

4. Time -

The first charge was set off at 2:45 pm. and the last at 6:20 pm. The survey took about four hours of rig time to complete.

5. Instrumentation -

The seismic instruments were set up in the mud room of Glomar III.

The survey records consist of seven traces. Traces 1 - 4 recorded the well-phone break at four different recording levels. Traces 5 and 6 recorded the water arrival at the reference geophone in the moonpool. The time-break was recorded on trace 7.

C. RESULTS

Out of a total of fourteen shots made at six different levels only nine were considered usable. A casing-break and noisy time-breaks rendered the remaining five unusable. The first nine shots were set off near the northern buoy as the well-phone was lowered into the hole while the remaining five were shot near the southern buoy as the well-phone was withdrawn.

The principal problems encountered in the survey were:

1. High amplitude static obscuring the time-breaks transmitted by A.M. from the shooting boat.
2. A high noise level on the water break trace resulting from rig noise in the rough seas.
3. A sudden decrease in the response of the well-phone at 8208 feet (KB). This was compensated for by increasing the size of the explosive charge from 25 lbs. to 50 lbs. for shots 8 - 9A.

The quality of the usable records was considered fair-good. All the records are included in the folder of this report.

The final check-shot times and the integrated sonic times are compared in the error chart (Fig. 1) which shows them to be in good agreement.

D. CONCLUSION

The velocity survey was successful in tying the integrated Sonic Log to absolute time values.

ESSO KINGFISH #1

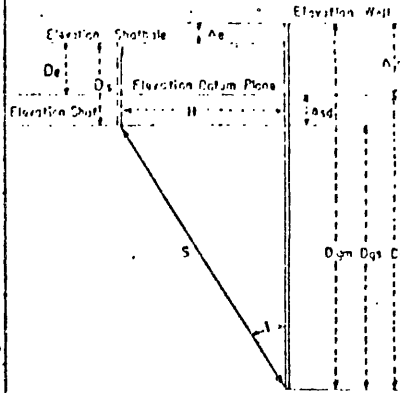
VELOCITY SURVEY ERROR CHECK

Figure I

<u>Depth</u> <u>Rel.S.L.</u>	<u>Av. Vertical</u> <u>Travel Time</u> <u>(Check Shots)</u>	<u>Ti Check</u> <u>Shots</u> <u>(Sec.)</u>	<u>Ti Sonic</u> <u>Log</u> <u>(Sec.)</u>	<u>(Millisecs.)</u>	<u>Depth</u> <u>Interval</u> <u>(Ft.)</u>	<u>Error</u> <u>(Microsec</u> <u>per Ft.)</u>
3759	454					
		.048	.049	- 1	610	- 2
4369	502					
4369	502					
		.112	.111	+ 1	1399	+ 1
5768	614					
5768	614					
		.071	.069	+ 2	671	+ 3
6439	685					
6439	685					
		.103	.102	+ 1	1007	+ 1
7446	788					
7446	788					
		.060	.063	- 3	731	- 4
8177	848					

4 18 of 18

Shothole information: - Elevation, Distance & Direction from Well										Company		Well		Elevation		Total Depth		LOCATION									
										ESSO EXPLORATION AUSTRALIA INC.		KINGFISH #1		31' 8451'		8451'		Coordinates		Section, Township, Range		County		Area or Field			
																LAT 38°35'50"S		GIPPSLAND BASIN, VICTORIA				LONG 148°12'35"E DATUM: MEAN SEA LEVEL					
Record Number	Shot	Time of Shot	Dgm	Ds	Ius	Itr	T			Dgs	H	TAN i	Cos i	Tgs	Δsd	Δsd V	Tgd	Tgd Average	Dgd	ΔDgd	ΔTgd	Vi Interval Velocity	Va Average Velocity	Elevation Shot	Elevation Well		
							Reading	Priority	Grade																		
1	A	14-45	2531																								
COMPLICATED BY CASING - BREAK																											
2	A	15-15	3790	5	.001	.213	.471	D	G	3154	1065	.284	.962	.453	5	.001	.454	.454	3759	610	.048	12,710	8280				
3	A	15-50	4400	5	.001	.217	.516	D	F	4364	1035	.249	.970	.501	5	.001	.502	.502	4369	1399	.112	12,490	8700				
4	A	16-20	5799	5	.001	.236	.625	D	G	5763	1180	.204	.980	.613	5	.001	.614	.614	5768				9370				
4A	A	16-25	5799	5	.001	.238	.626	D	G	5763	1190	.206	.980	.613	5	.001	.614	.614									
5	A	16-40	6470	5	.001	.232	.695	D	G	6434	1160	.180	.984	.684	5	.001	.685	.685	6439	671	.071	9450	9400				
6	A	16-50	NOI	SY				TIME BREAK																			
6A	A	17-00	7477	5	.001	.239	.798	D	G	7441	1195	.161	.987	.788	5	.001	.789	.788		1007	.103	9780					
9	B	18-20	7477	5	.001	.199	.794	D	G	7441	995	.134	.991	.787	5	.001	.788	.788	7446				9450				
9A	B	18-30	7477	5	.001	.220	.796	D	G	7441	1100	.148	.989	.787	5	.001	.788	.788									
7	A	17-15	8208					NO ISY TIME - BREAK																			
8	B	17-30	8208					NO ISY TIME - BREAK																			
8A	B	17-40	8208					NO ISY TIME - BREAK																			
8B	B	17-50	8208					MISFIRE																			
8C	B	17-55	8208	5	.001	.183	.852	D	F	8172	915	.112	.994	.847	5	.001	.848	.848	8177				9640				



Dgm = Geophone depth measured from well elevation
 Dgs = " " " " shot
 Dgd = " " " " datum
 Ds = Depth of shot
 De = Shothole elevation to datum plane
 H = Horizontal distance from well to shothole
 S = Straight line travel path from shot to well geophone
 Ius = Uphole time at shothole
 T = Observed time from shothole to well geophone
 Itr = " " to reference geophone
 Δe = Difference in elevation between well & shothole
 Δsd = " " " " shot & datum plane
 Δsd = Ds - De
 Dgs = Dgm - Dsd Δe; tan i = $\frac{H}{Dgs}$
 Tgs = cos i T; Vert. travel time from shot elev to geophone
 Tgd = Tgs + $\frac{\Delta sd}{V}$ = " " datum plane
 Dgd = Dgm - Δsd
 Vi = Interval velocity = $\frac{\Delta Dgd}{\Delta Tgd}$
 Va = Average = $\frac{Dgd}{Tgd}$

Surveyed by: WESTERN
 Date: 21 MAY 1967
 Weathering Data:

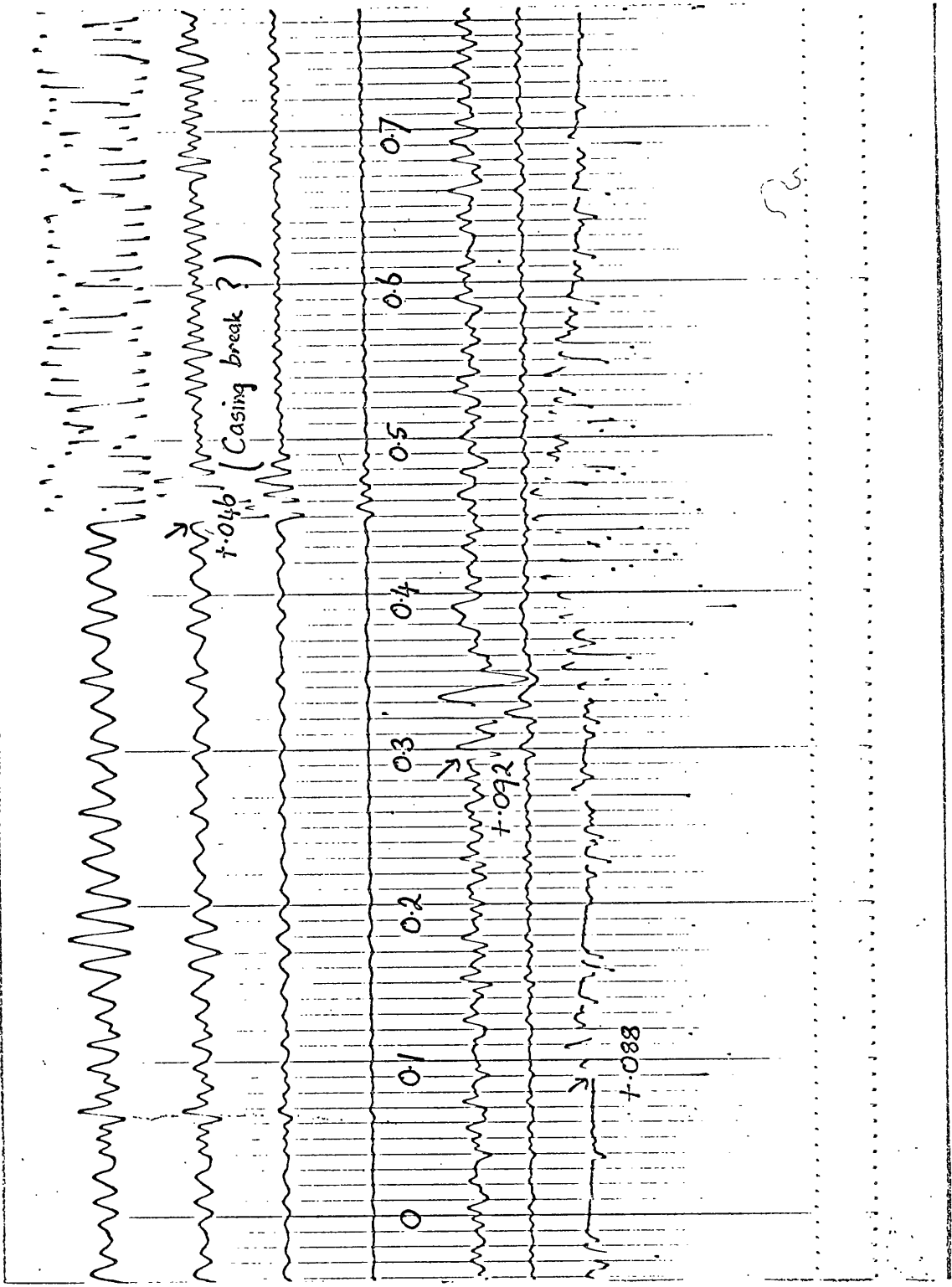
Casing Record
 3500'

Kingfish #1
SHOT 1.

OFFSET 1000' N.

GEOPHONE 2500'

14-40 21-5-67



RE-NAMED
(AUG. 1968)
KINGFISH 1

8179

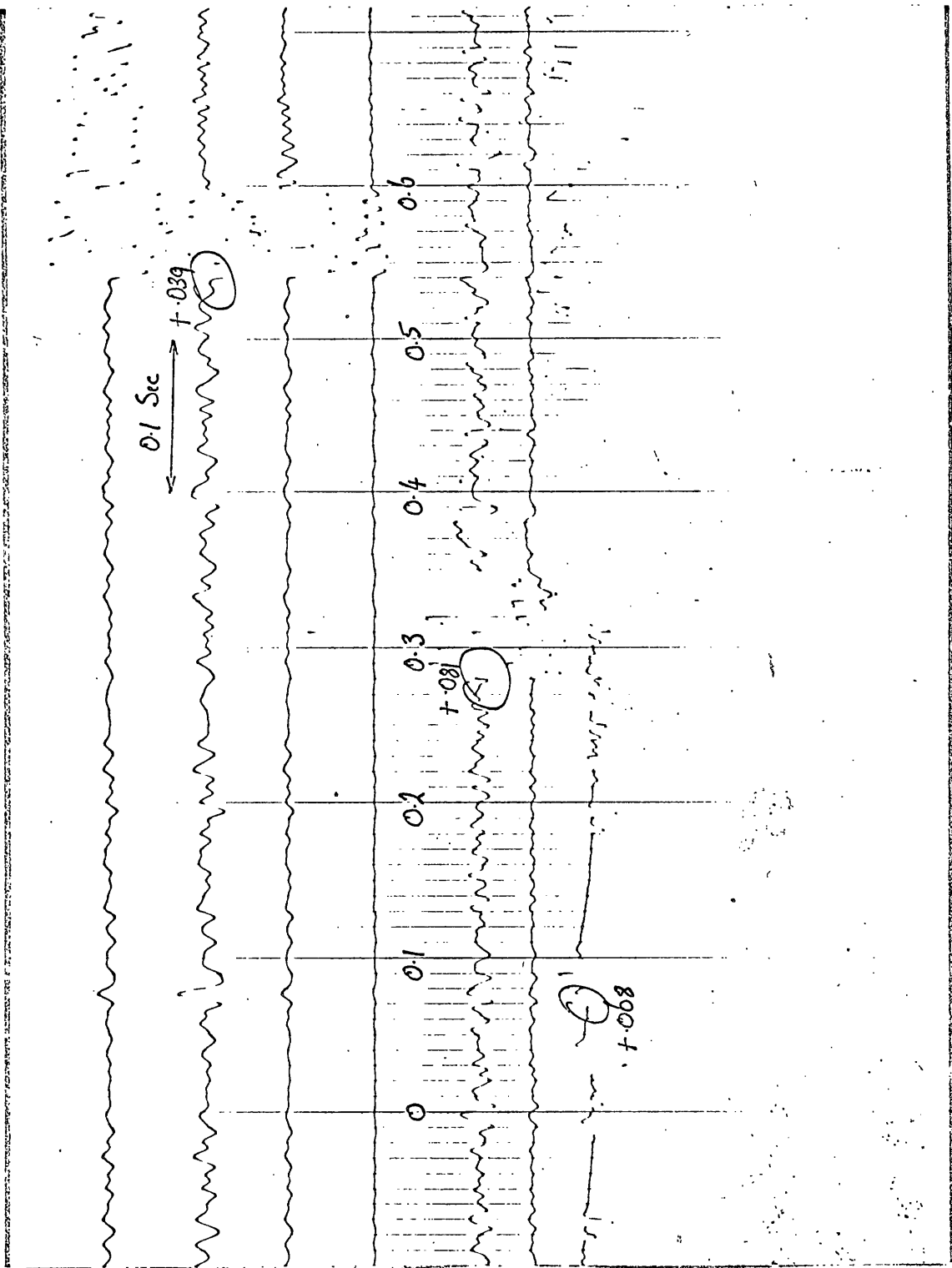
KINGFISH - 1

SHOT 2

OFFSET 1000 N

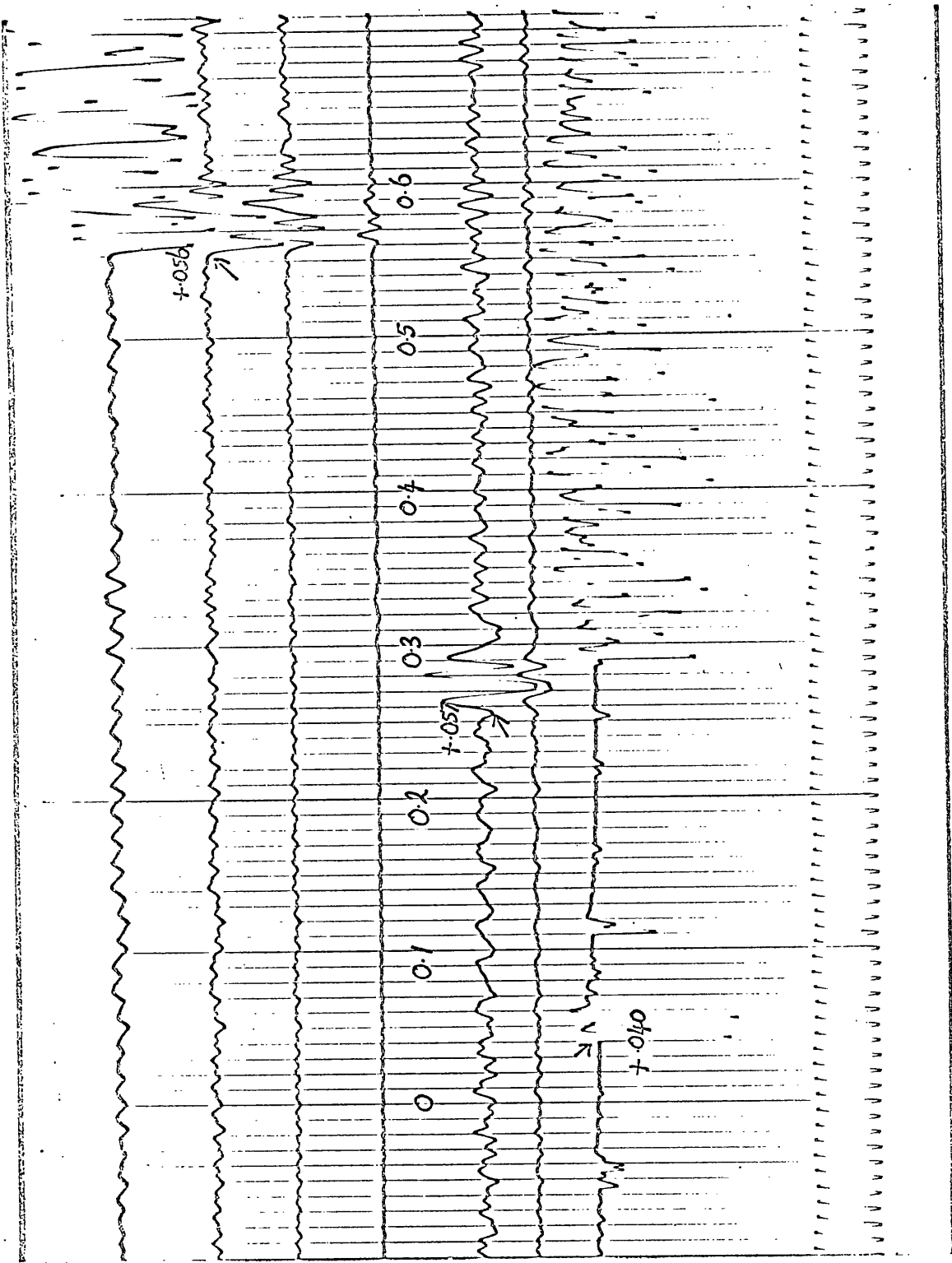
GEOPHONE 3759'

15.15 21-5-67



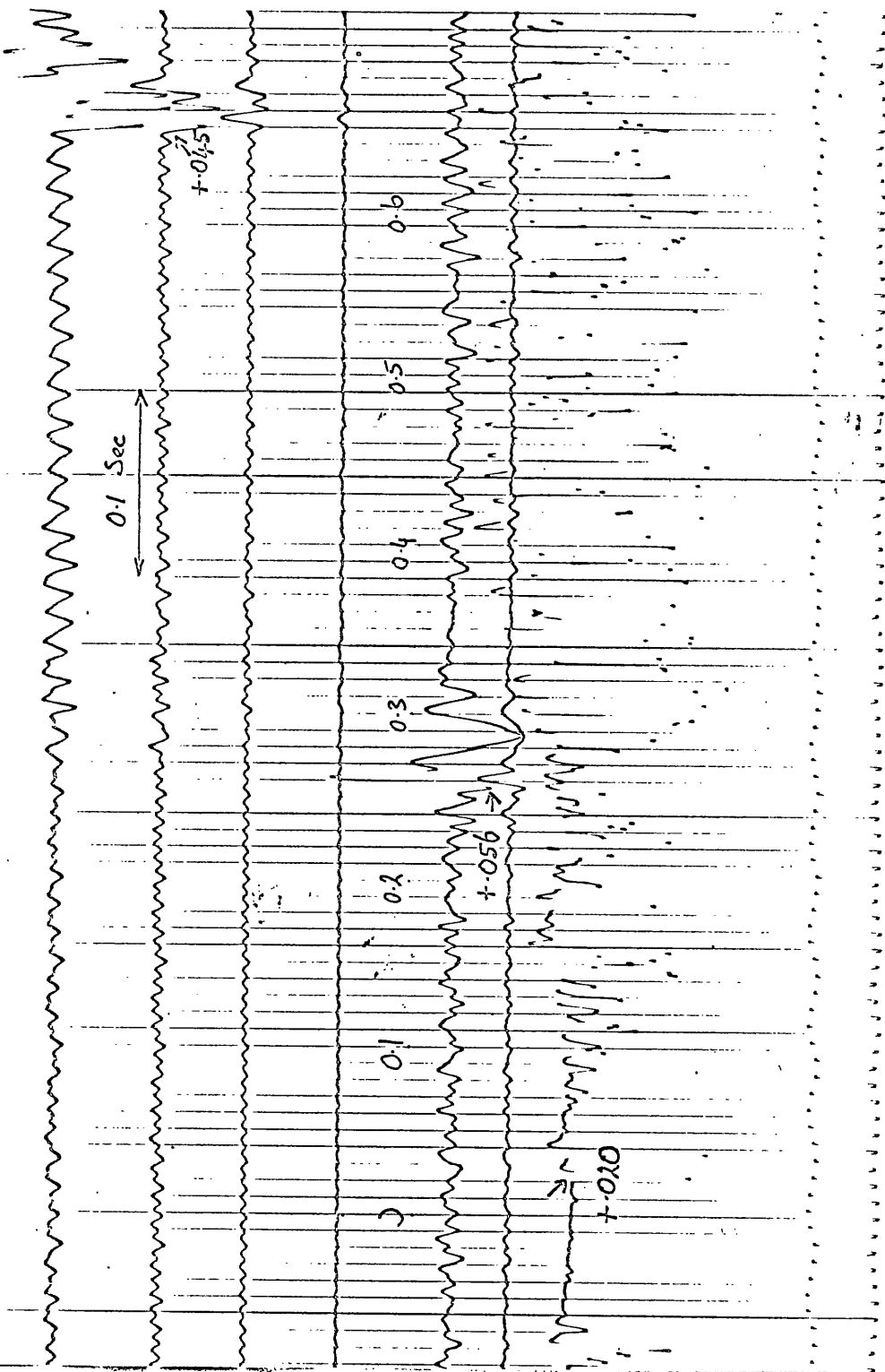
SHOT 3.
OFFSET 1000' N.
GEOPHONE 4369'
15.50 21-5-67

KINGFISH-1



KINGFISH - I

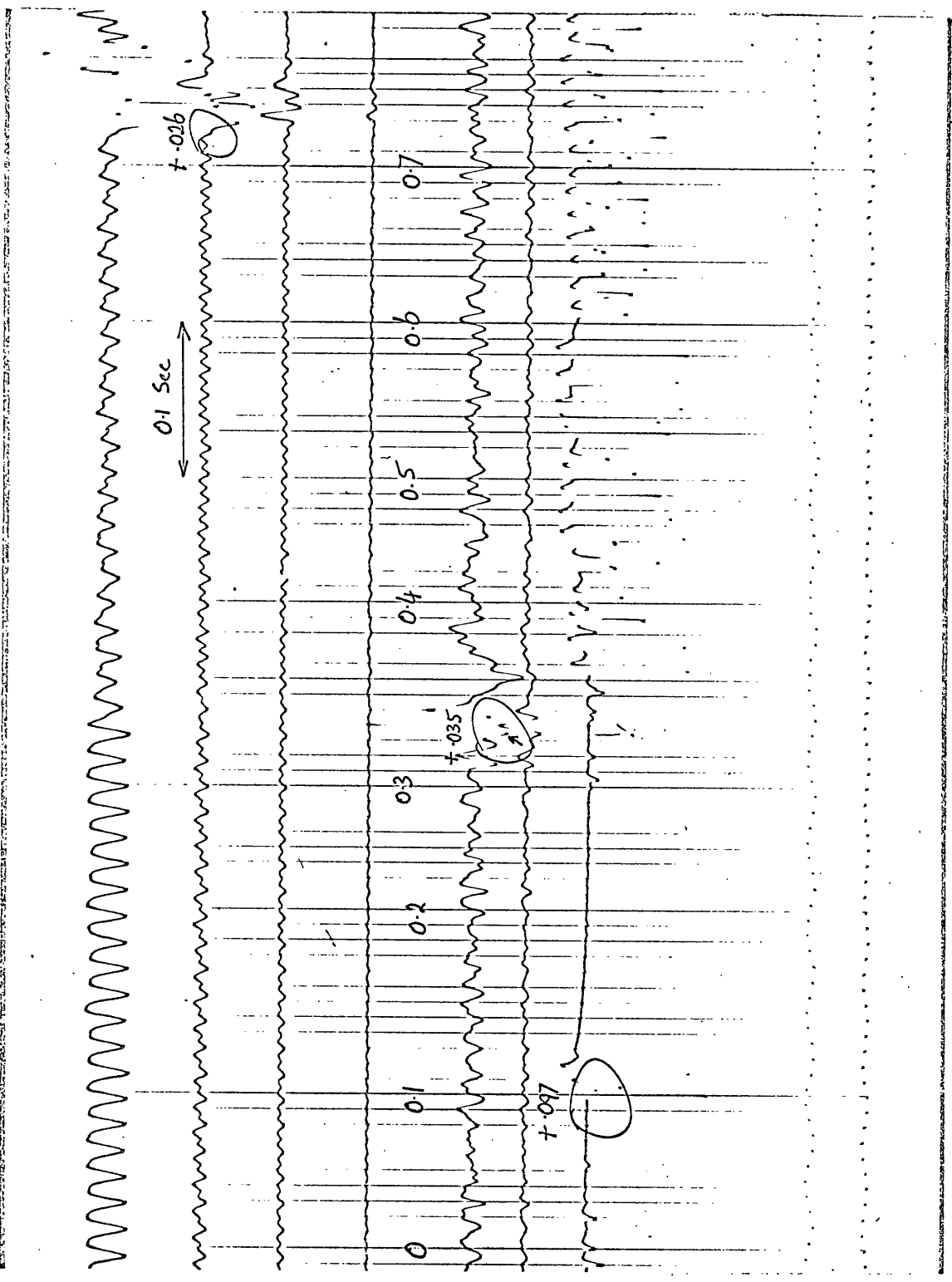
SHOT 4:
 OFFSET 1000' N.
 GEOPHONE 5768'
 16.15 21-5-67



81 to 6

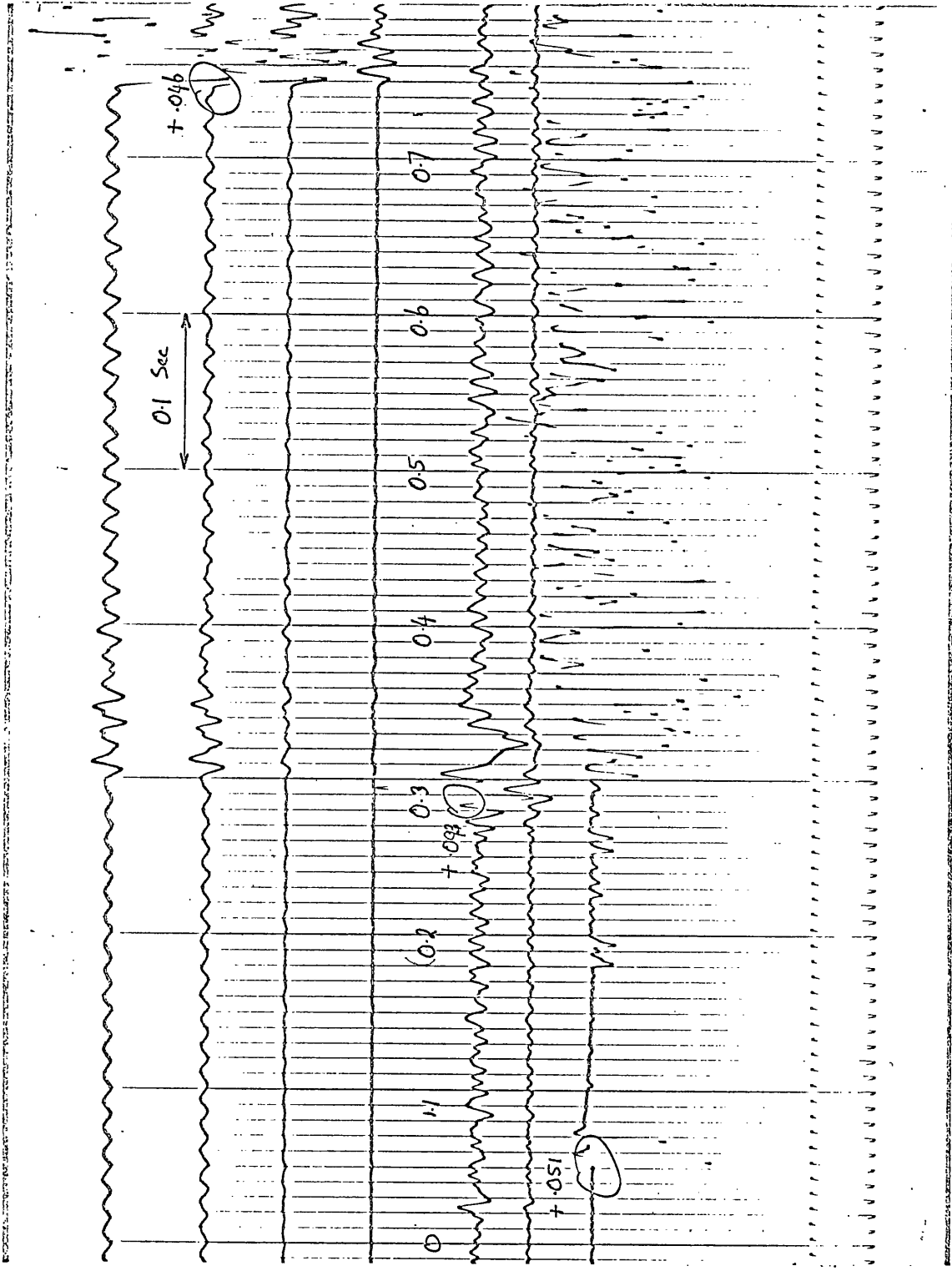
KINGEISH - I

SHOT 4A
 OFFSET 1000' N
 GEOPHONE 5768'
 16.25 21-5-67



KINGFISH - 1

SHOT 5.
OFFSET 1000' N.
GEOPHONE 6439'
16-40 21-5-67



10 of 18

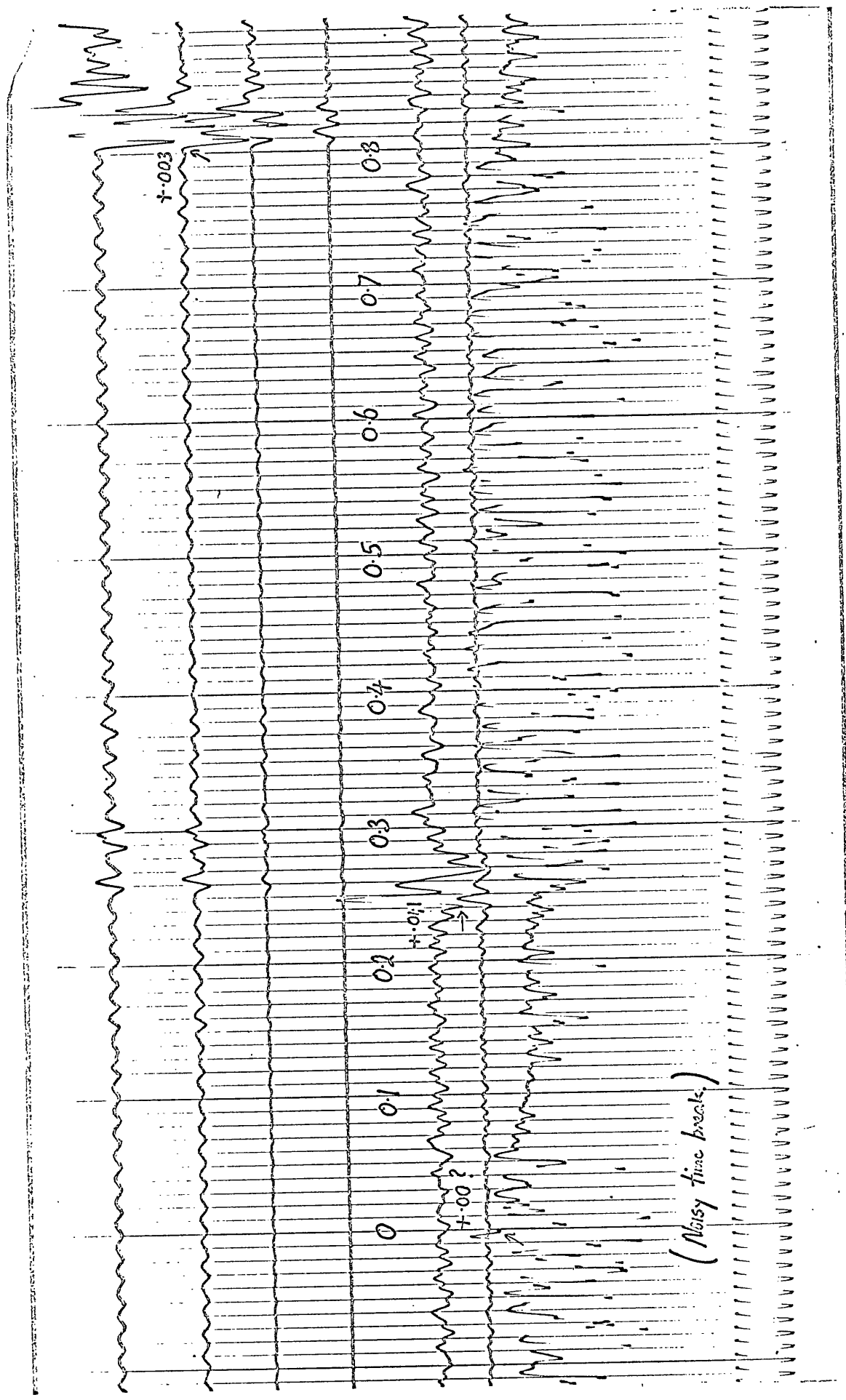
KINGFISH - 1

SHOT 6.

OFFSET 1000' N.

GEPHONE 7446'

16.50 21-5-67



(Naisy time break.)

12 of 18

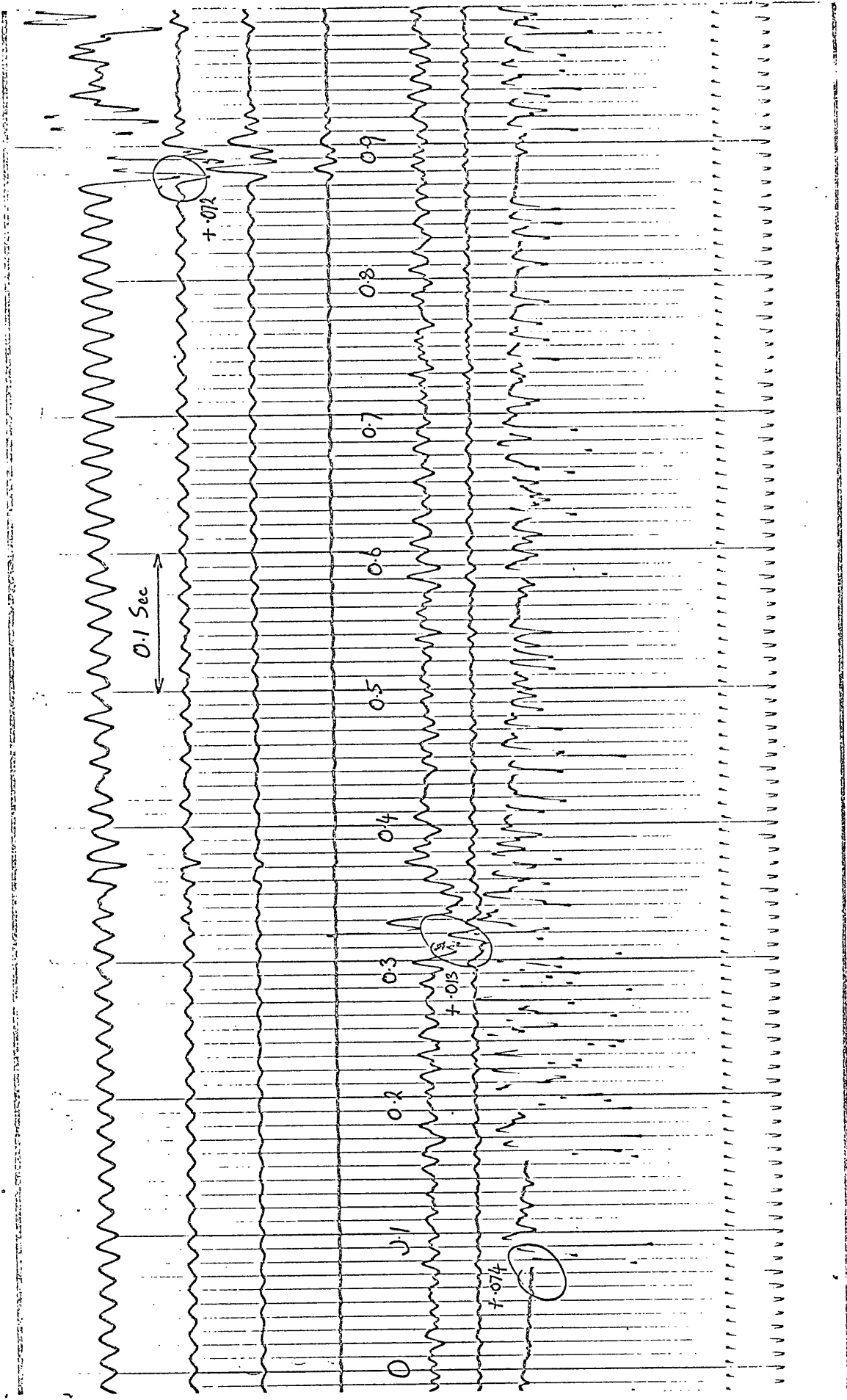
KINGFISH - I

SHOT 6A

OFFSET 1000' N

GEOPHONE 7446'

13:00 21-5-67



13 of 18

KINGFISH-1

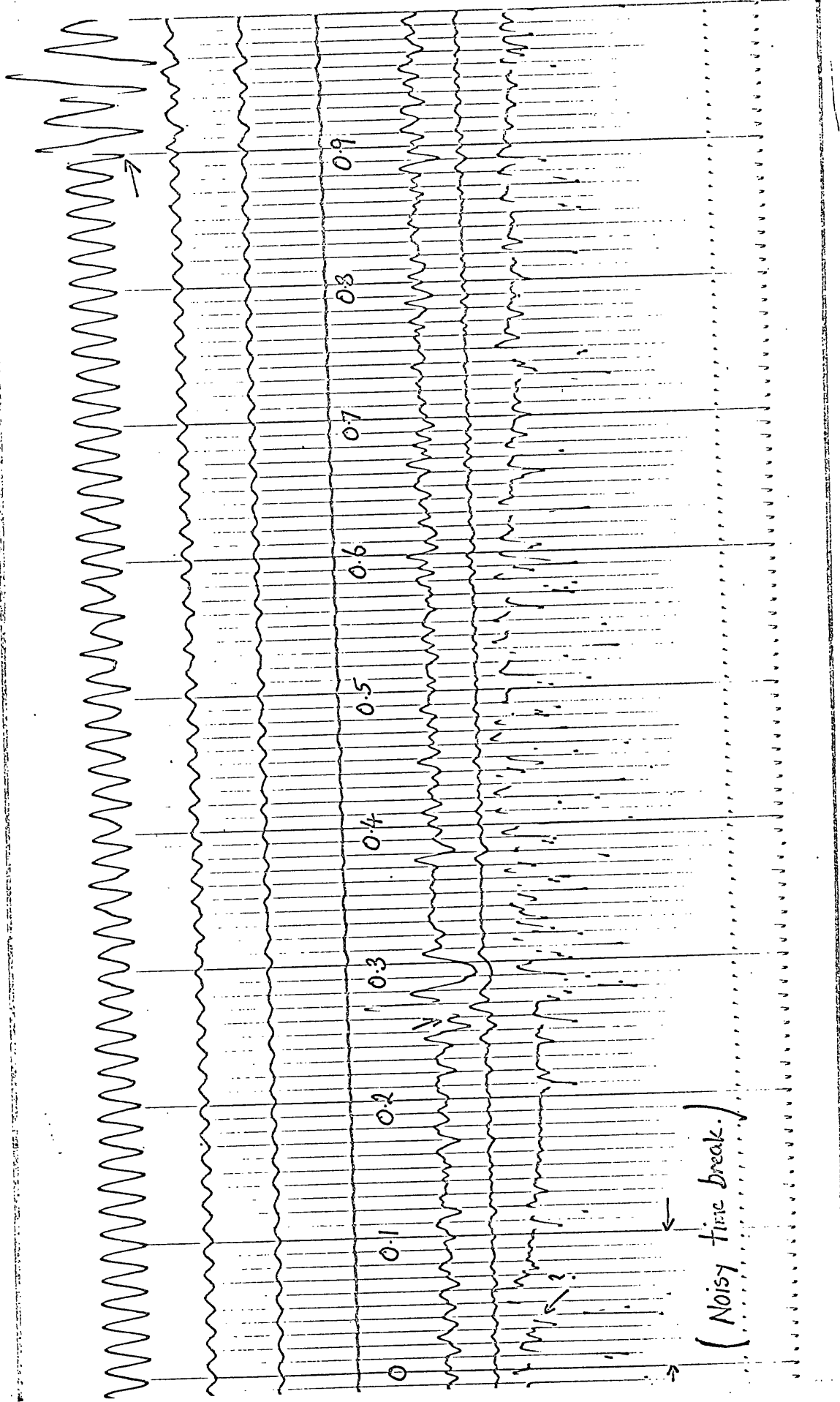
SHOT

OFFSET 10

GEOPHONE 811.

17.15

21-5-67



14 of 18

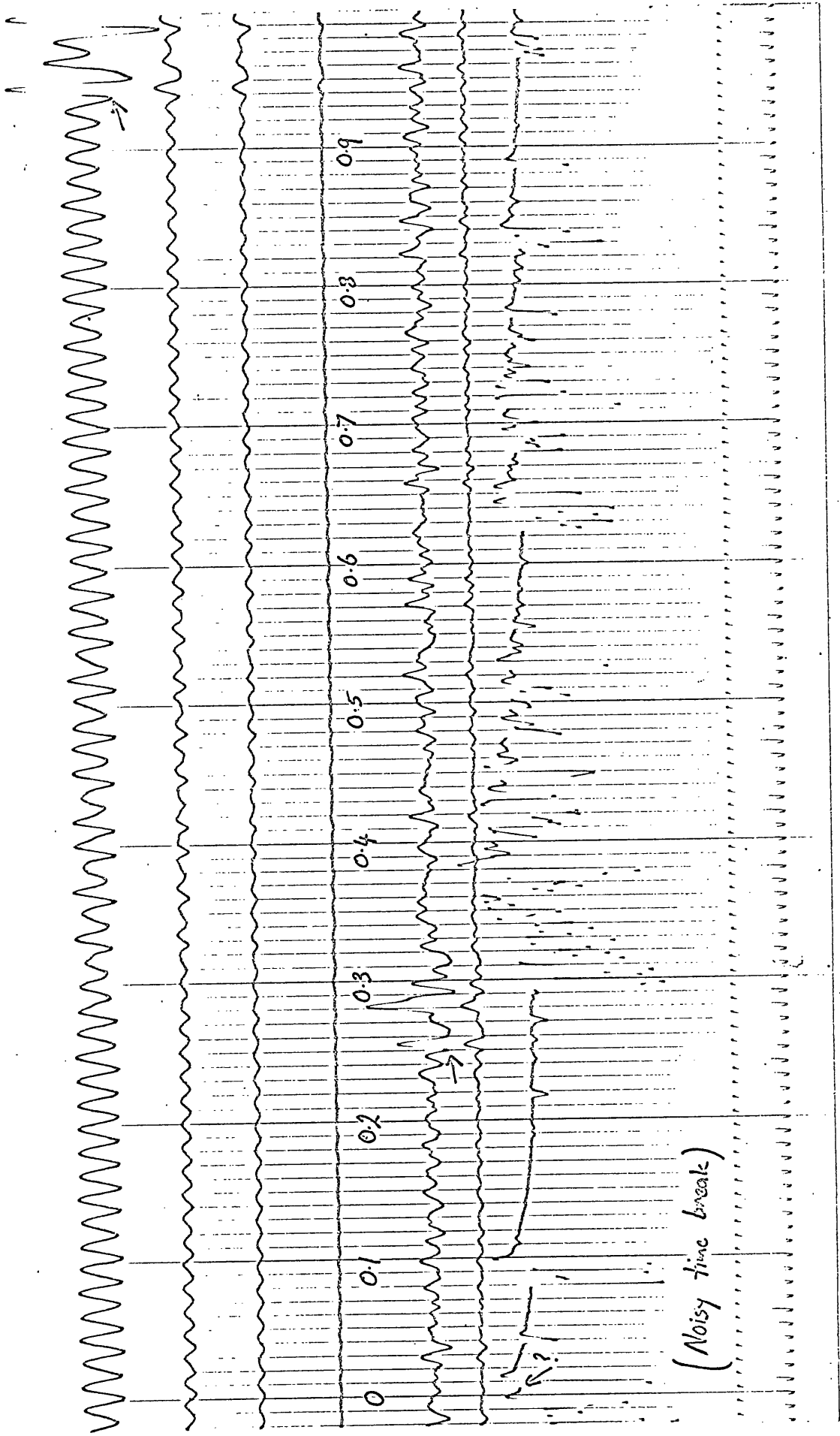
KINGFISH-1

SHOT 8.

OFFSET 1000' S.

GEOPHONE 81'

17.30 21-



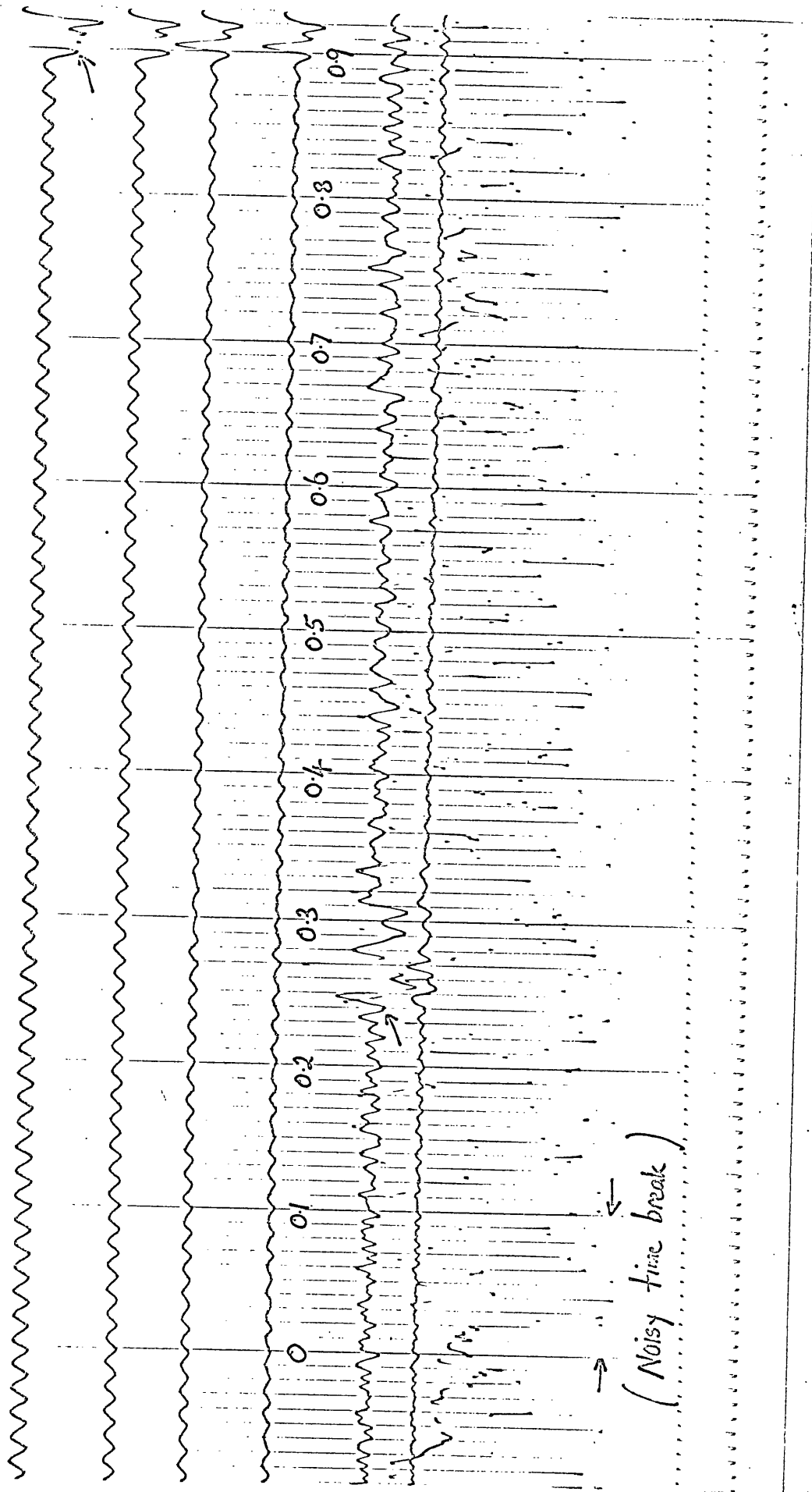
(Noisy time break)

SHOT 8A

OFFSET 1000' S.

GEOPHONE 8177'

17.40 21-5-67



16418

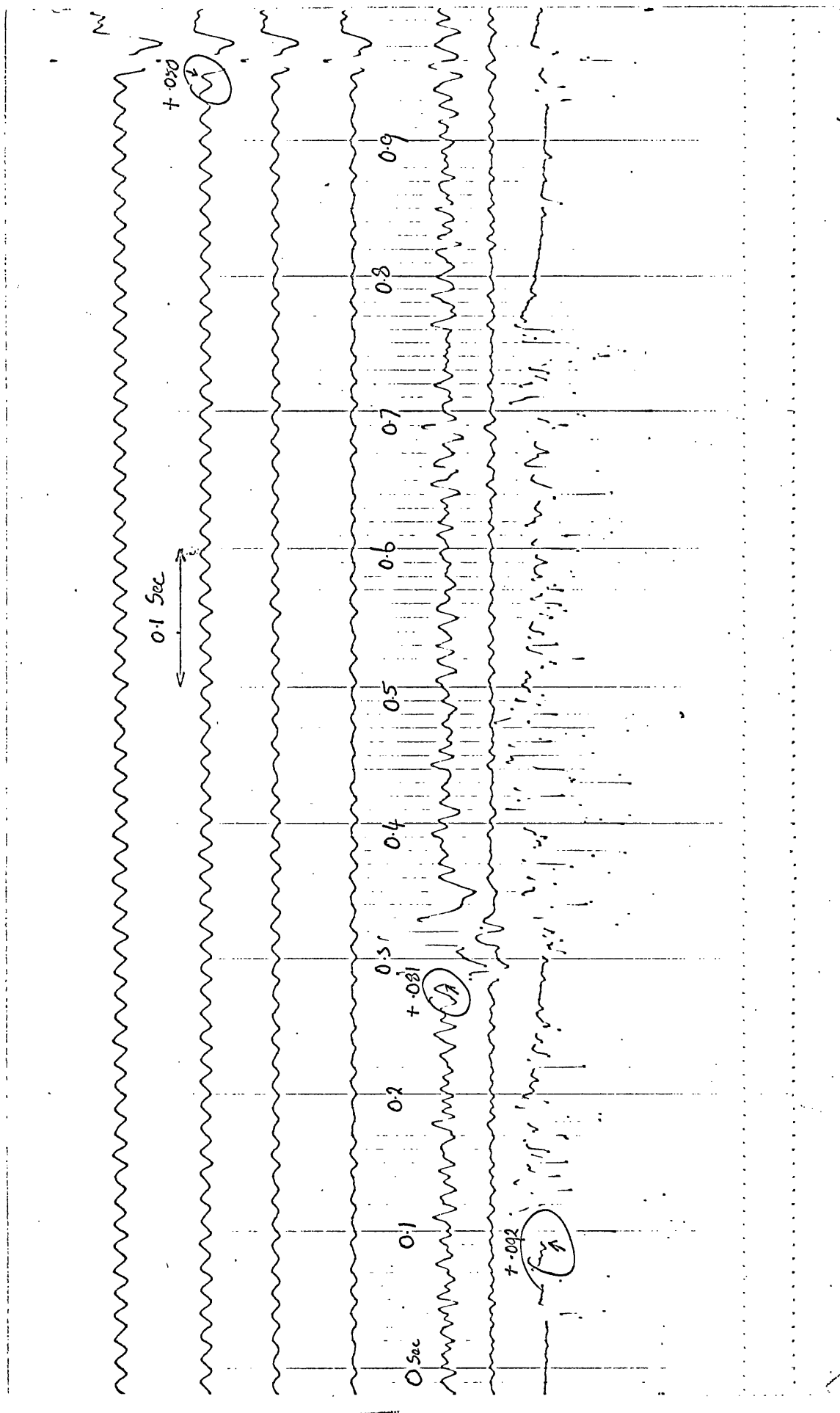
KINGFISH-1

SHOT 8C

OFFSET 1000' S.

GEPHONE 8177'

17-55 21-5-67



81 to 111

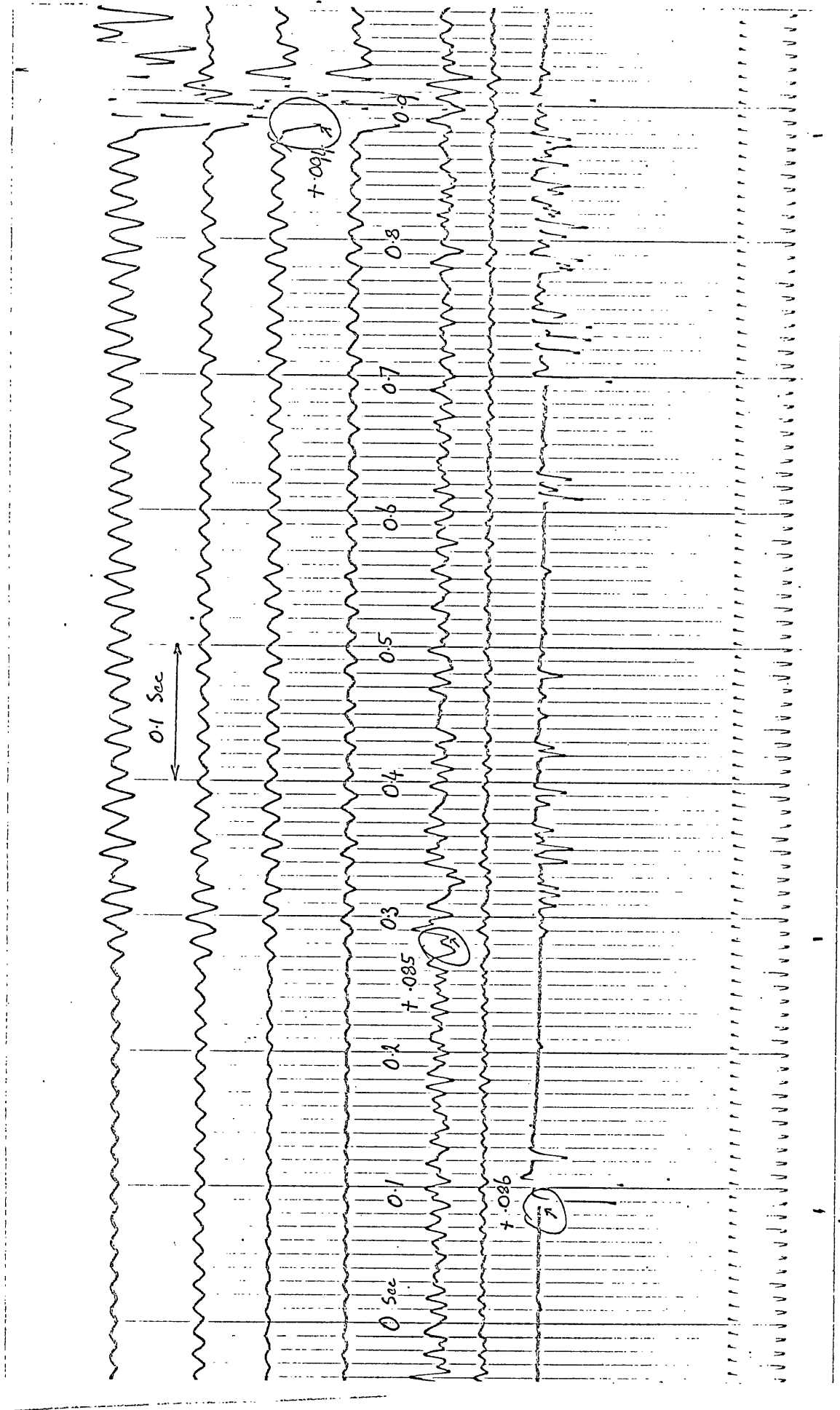
KINGFISH - 1

SHOT 9.

OFFSET 1000' S.

GEOPHONE 7446'

18-20 21-5-67

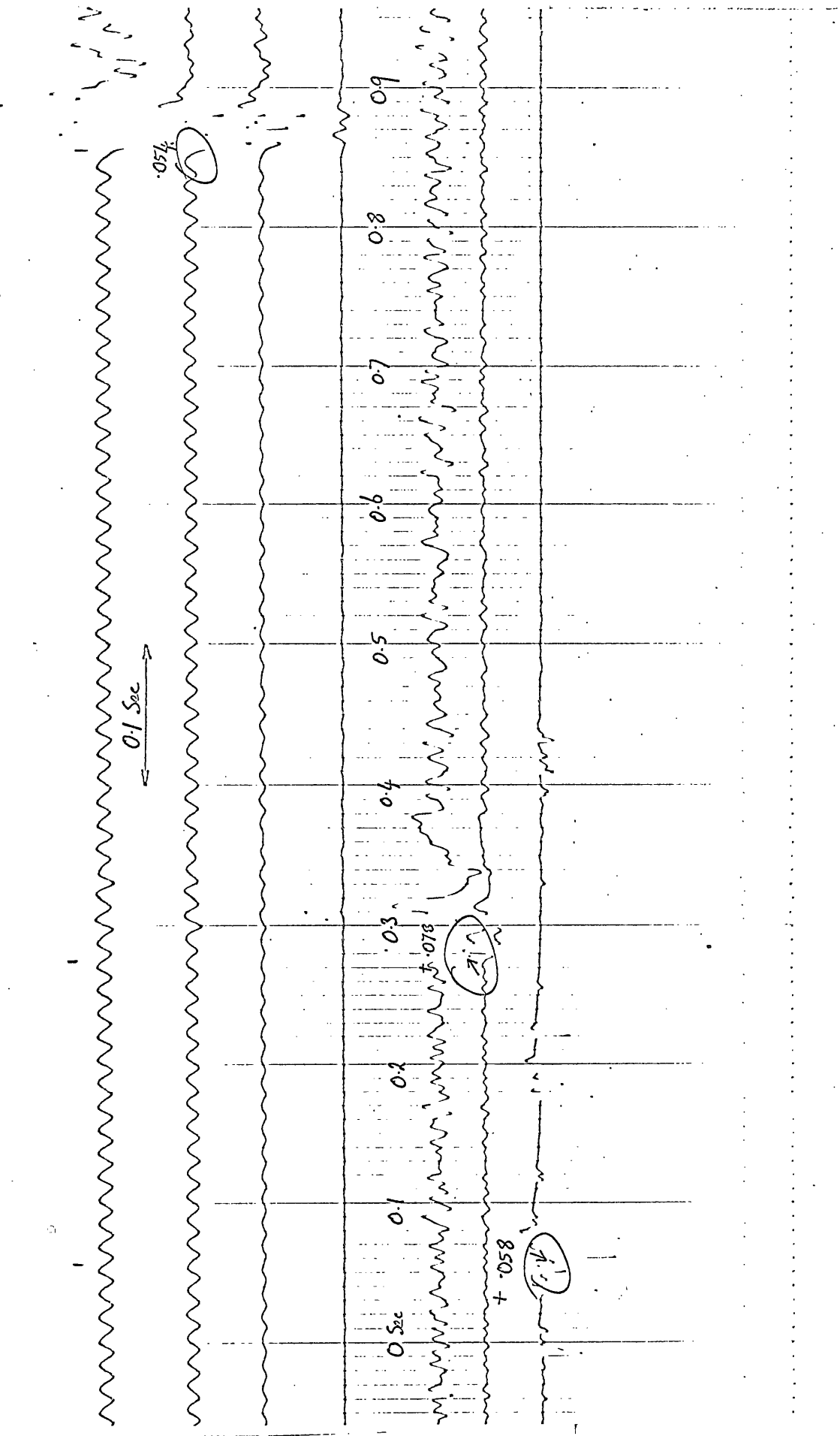


SHOT 9A.

OFFSET 1000' S.

GEPHONE 7446'

18.30 21-5-67



PE601513

This is an enclosure indicator page.
The enclosure PE601513 is enclosed within the
container PE906022 at this location in this
document.

The enclosure PE601513 has the following characteristics:
ITEM_BARCODE = PE601513
CONTAINER_BARCODE = PE906022
NAME = Corelab Grapholog, Core Laboratories
BASIN =
PERMIT =
TYPE = WELL
SUBTYPE = well log
DESCRIPTION = Corelab Grapholog, Core Laboratories
REMARKS =
DATE_CREATED = 28/05/1967
DATE_RECEIVED =
W_NO = W504
WELL_NAME = Kingfish 1
CONTRACTOR = Corelab Grapholog
CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE902906

This is an enclosure indicator page.
The enclosure PE902906 is enclosed within the
container PE906022 at this location in this
document.

The enclosure PE902906 has the following characteristics:

- ITEM_BARCODE = PE902906
- CONTAINER_BARCODE = PE906022
- NAME = Time Depth Curve
- BASIN =
- PERMIT =
- TYPE = WELL
- SUBTYPE = graph
- DESCRIPTION = Time Depth Curve Kingfish 1
- REMARKS =
- DATE_CREATED =
- DATE_RECEIVED =
- W_NO = W504
- WELL_NAME = Kingfish 1
- CONTRACTOR = ESSO
- CLIENT_OP_CO = ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE906024

This is an enclosure indicator page.
The enclosure PE906024 is enclosed within the
container PE906022 at this location in this
document.

The enclosure PE906024 has the following characteristics:

- ITEM_BARCODE = PE906024
- CONTAINER_BARCODE = PE906022
- NAME = Palynological Species List
- BASIN = GIPPSLAND
- ON_OFF = OFFSHORE
- PERMIT = VIC/L7
- TYPE = WELL
- SUBTYPE = CHART
- DESCRIPTION = Palynological Species List for
Kingfish-1 1 of 4
- REMARKS =
- DATE_CREATED = 31/08/1968
- DATE_RECEIVED =
- W_NO = W504
- WELL_NAME = KINGFISH-1
- CONTRACTOR =
- CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE906025

This is an enclosure indicator page.
The enclosure PE906025 is enclosed within the
container PE906022 at this location in this
document.

The enclosure PE906025 has the following characteristics:

ITEM_BARCODE = PE906025
CONTAINER_BARCODE = PE906022
NAME = Palynological Species List
BASIN = GIPPSLAND
ON_OFF = OFFSHORE
PERMIT = VIC/L7
TYPE = WELL
SUBTYPE = CHART
DESCRIPTION = Palynological Species List for
Kingfish-1 2 of 4
REMARKS =
DATE_CREATED = 31/08/1968
DATE_RECEIVED =
W_NO = W504
WELL_NAME = KINGFISH-1
CONTRACTOR =
CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE906026

This is an enclosure indicator page.
The enclosure PE906026 is enclosed within the
container PE906022 at this location in this
document.

The enclosure PE906026 has the following characteristics:

- ITEM_BARCODE = PE906026
- CONTAINER_BARCODE = PE906022
- NAME = Palynological Species List
- BASIN = GIPPSLAND
- ON_OFF = OFFSHORE
- PERMIT = VIC/L7
- TYPE = WELL
- SUBTYPE = CHART
- DESCRIPTION = Palynological Species List for
Kingfish-1 3 of 4
- REMARKS =
- DATE_CREATED = 31/08/1968
- DATE_RECEIVED =
- W_NO = W504
- WELL_NAME = KINGFISH-1
- CONTRACTOR =
- CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE906027

This is an enclosure indicator page.
The enclosure PE906027 is enclosed within the
container PE906022 at this location in this
document.

The enclosure PE906027 has the following characteristics:

ITEM_BARCODE = PE906027
CONTAINER_BARCODE = PE906022
NAME = Palynological Species List
BASIN = GIPPSLAND
ON_OFF = OFFSHORE
PERMIT = VIC/L7
TYPE = WELL
SUBTYPE = CHART
DESCRIPTION = Palynological Species List for
Kingfish-1 4 of 4
REMARKS =
DATE_CREATED = 31/08/1968
DATE_RECEIVED =
W_NO = W504
WELL_NAME = KINGFISH-1
CONTRACTOR =
CLIENT_OP_CO = ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

PE900481

This is an enclosure indicator page.
The enclosure PE900481 is enclosed within the
container PE906022 at this location in this
document.

The enclosure PE900481 has the following characteristics:

ITEM_BARCODE = PE900481
CONTAINER_BARCODE = PE906022
NAME = Palynological Range Chart
BASIN = GIPPSLAND
PERMIT = VIC/L7
TYPE = WELL
SUBTYPE = DIAGRAM
DESCRIPTION = Kingfish-1 Palynological Range Chart.
Enclosure from Well Summary Folder.
REMARKS =
DATE_CREATED =
DATE_RECEIVED = 20/12/1989
W_NO = W504
WELL_NAME = Kingfish-1
CONTRACTOR =
CLIENT_OP_CO = Esso Australia Limited

(Inserted by DNRE - Vic Govt Mines Dept)

PE602034

This is an enclosure indicator page.
The enclosure PE602034 is enclosed within the
container PE906022 at this location in this
document.

The enclosure PE602034 has the following characteristics:

ITEM_BARCODE = PE602034
CONTAINER_BARCODE = PE906022
 NAME = Kingfish 1 completion coregraph log
 BASIN = GIPPSLAND
 PERMIT =
 TYPE = WELL
 SUBTYPE = WELL_LOG
 DESCRIPTION = Kingfish 1 completion coregraph log
 REMARKS =
 DATE_CREATED = 13/05/67
 DATE_RECEIVED =
 W_NO = W504
 WELL_NAME = Kingfish-1
 CONTRACTOR = Core Laboratories Inc
 CLIENT_OP_CO = Esso Australia Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

PE601998

This is an enclosure indicator page.
The enclosure PE601998 is enclosed within the
container PE906022 at this location in this
document.

The enclosure PE601998 has the following characteristics:

ITEM_BARCODE = PE601998
CONTAINER_BARCODE = PE906022
NAME = Kingfish 1 Induction-electrical log
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = WELL_LOG
DESCRIPTION = Kingfish 1 induction-electrical log
REMARKS =
DATE_CREATED = 29/05/67
DATE_RECEIVED =
W_NO = W505
WELL_NAME = Kingfish-1
CONTRACTOR = Schlumberger
CLIENT_OP_CO = Esso Australia Ltd

(Inserted by DNRE - Vic Govt Mines Dept)