WELL COMPLETION REPORT
HAPUKU - 1

Esso Australia Ltd. December, 1975

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WELL COMPLETION REPORT

HAPUKU - 1

GIPPSLAND BASIN,
VICTORIA.

Esso Australia Ltd.

S. Benedek
December, 1975.

HAPUKU-1 WELL COMPLETION REPORT

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HAPUKU-1 WELL COMPLETION REPORT

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Well Completion Log - Hapuku-1

ESSO STANDARD OIL (AUSTRALIA) LTD.

COMPLETION REPORT

I WELL DATA RECORD

Date November, 1975

LOCATION

WELL NAME	STATE	PERMIT or LICENCE	GEOLOGICAL BASIN	FIELD
HAPUKU-1	VICTORIA	VIC.P-1	GIPPSLAND	

CO-ORDINATES	Lat	Long.	X	Y	MAP PROJECTION	GEOGRAPHICAL DESCRIPTION
Surface	38°33'20.063"S	148°32'56.282"E	634,967mE	5,731,388mN	AMG Zone 55	11.5 miles SE of Mackerel-3.
~~Bottom Hole~~						

ELEVATIONS & DEPTHS

ELEVATIONS	WATER DEPTH	TOTAL DEPTH	Avg.Angle
Ground KB 28' 8-53 RT Braden Head Top Deck Platform	1260' 384-05	M.D. 11,974' 3649.68 T.V.D.	Straight Hole
	PLUG BACK DEPTH	REASONS FOR P.B.	
	1355'	ABANDONMENT	

DATES

MOVE IN	RIG UP	SPUDDED
JUNE 16, 1975	JULY 7, 1975	JULY 7, 1975
RIG DOWN COMPLETE	**RIG RELEASED**	**PROD.UNIT - Start Rigging Up**
AUGUST 11, 1975	SEPTEMBER 12, 1975	-
PROD.UNIT - Rig Down Complete	**I.P. ESTABLISHED**	
-	-	

MISCELLANEOUS

OPERATOR	PERMITTEE or LICENCEE	ESSO INTEREST	OTHER INTEREST
ESSO	HEMATITE PETROLEUM P/L.	ESSO EARNING 50%	

CONTRACTOR	RIG NAME	EQUIPMENT TYPE
ATWOOD OCEANICS AUST.P/L	"REGIONAL ENDEAVOUR"	FLOATING DRILLING VESSEL

TOTAL RIG DAYS	DRILLING AFE NO.	COMPLETION NO.	TYPE COMPLETION
71	235-002		

LAHEE WELL CLASSIFICATION		
	Before Drilling	WILDCAT
	After Drilling	UNCOMMERCIAL OIL DISCOVERY

S.BENEDEK

Geologist

II. INITIAL PRODUCTION TEST - Not Applicable

II(a) FORMATION INTERVAL TESTS

F.I.T. # 1 9334' MUD RUN

Rec. 4000 cc mud, sand and grit. Trace fluorescence in sand, pad damaged, flowline plugged, HP gauge did not work.

Hydrostatic initial	4979 psi
Flow pressure	42 psi
Hydrostatic final	4979 psi

F.I.T. # 2 9352'

Recovered 22,000 cc water with rainbow.

Open tool for main chamber for 20 min., segregator for 5 min. Recovered 22,000 cc of water, .2 cuft. of gas, chamber pressure 2500 psi, 10,000 ppm Cl R .42 Ω 70°F, water has emulsified hydrocarbon bright yellow white fluorescence. Steam still sample.

C_1 10,000, C_2 6,000, C_3 5,000, I.but. 600, n.but. 1,200, C_5 100.
Single Amerada pressure:

Hydrostatic initial	4984 psi
Flow initial	4043 psi
Flow final	4048 psi
Shut in main chamber	4079 psi
Hydrostatic final	4963 psi

F.I.T. # 3 9259' MUD RUN

Recovered full chamber of mud and sand.

Hydrostatic initial	4921 psi
Flow pressure	4919 psi

F.I.T. # 4 9296' MUD RUN

Recovered full chamber, 10,500 cc of mud, sand.
Trace oil and gas slowly breaking out. Quartz, pyrite, glauconite,
Steam Still:

C_1 600, C_2 1,100, C_3 4,500, I.but 1,800, n.but. 2,800, C_5 900.
Mud weight 10.1 lb, Cl 6200 ppm, R .68 Ω 70° HP pressures.

Hydrostatic initial	4950 psi

When opening the tool apparently lost seal, pressure fluctuated 2000-4900 indicating plugging, after 3-4 min. pressure settled to 3979 psi and decreased to 3927 psi opened segregator, lost seal 4949 psi.

F.I.T. # 5 9306'

4 x .020" choke 22,000 cc chamber, monel segregator No. 2909, reverse fired. Rec. 53.7 cu/ft. of gas, 8800 cc of oil-filtrate emulsion, honey yellow coloured with bright bluish white fluorescence on recovery, settled out to approx. 60% oil dark brown coloured, 51°API 47° pourpoint and 40% filtrate. The fluid was very waxy and foaming. 2800 cc mud, filtrate and wax.
Gas: C_1 120M, C_2 120M, C_3 28M, C_4 12M, C_5 1300.

The tool was set in 27 sec. Chamber filled in 15 min. Open segregator after 20 min. Sealed segregator 4.5 min. Pressures: Surface pressure on chamber 1875 psi.

HP initial hydrostatic	4972 psi
initial flow	3731 psi
final flow	3642 psi
shut in	4072 psi
segregator	4073 psi
final hydrostatic	4967

The pressure built up rapidly.

II(a) FORMATION INTERVAL TEST cont'd

F.I.T. # 6 9258'

4 x .020" choke reverse fired, HP gauge did not operate.
Rec. 63.2 cu/ft. of gas
9250 cc of oil-filtrate emulsion
2000 cc of mud-filtrate-wax emulsion
Physical description and properties are similar to the oil recovered from FIT-5.
Oil is 53.6° API at 60°F pourpoint 48°F
Water: Cl 5200 ppm, R. 55 Ω at 75°F.
The fluid appeared to settle out to 60% oil 40% filtrate.
Gas: C_1 140-160M, C_2 55-120M, C_3 16500-32500, C_4 5400-12000, C_5 600-1300.

Pressures: Chamber pressure on surface 1725 psi.

Amerada:	Hydrostatic initial	4937 psi
	Flow	3489-3614 psi
	Shut in chamber	4043
	Shut in segregator	1185-1226 psi
	Hydrostatic final	4927 psi

F.I.T. # 7 9332' MUD RUN

The formation appeared to be tight and lost seal after 3 min.

Hydrostatic initial	4974 psi
Flow pressure	255 psi
Hydrostatic final	4963 psi

F.I.T. # 8 9322'

Reverse fired:HP gauge did not work.
Recovered 4.7 cu/ft. of gas, 19000 cc of water with thick foaming waxy oil scum on the surface.
200 cc of settled out oil still foaming.
Cl 5300 ppm R .6 Ω of 74°F indicate filtrate.

Pressures: Chamber pressure 700 psi

Amerada:	Initial hydrostatic	4979 psi
	Initial flow	3719 psi
	Final flow	3714 psi
	Shut in chamber	3954 psi
	Shut in segregator	3985 psi
	Final hydrostatic	4958 psi

F.I.T. # 9 11,550'

21,500 cc of water and 50-80cc of waxy oil emulsion.
Water had good yellow fluorescence, the oil had light blue fluorescence. Water is mud filtrate based on the 168 ppm NO3 content.

Set tool	2039 hrs.	Initial hydrostatic	6090 psi
Open tool	2044 hrs.	Initial flow	4937 psi
		Final flow	5112 psi
Open segretator	2100 hrs.	Segregator flow	5112 psi
Shut segretator	2103 hrs.		
Off the Wall	2104 hrs.	Final hydrostatic	6080 psi

Pressures on Hewlett Packard gauge: Choke 4 x .020".

F.I.T. # 10 11,506'

Recovered 6 cf. of gas, 19,750 cc of water, 10 cc of waxy oil eumulsion.
Water had very strong light yellow fluorescence, the oil had strong blue white fluorescence. Nitrate 181 ppm.

Set tool	0223 hrs.	Initial hydrostatic	6080 psi
Open tool	0225 hrs.	Initial flow	5089 psi
Shot shape charge	0240 hrs.	Final flow	5101 psi
Open segretator	0247 hurs		
Closed segretator	0251 hrs.		
Off the wall	0252 hrs.	Final hydrostatic	6067 psi

III. PERFORATING RECORD (Prod. test, Completion, DST,)

INTERVAL	HPF	TOTAL SHOTS	SERVICE COM.
3840 - 3842	4	8	SCHLUMBERGER for squeeze cement plug.

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Geologist

IV CASING - LINER - TUBING RECORD

Type	Size	Weight	Grade	Thread	No. Joints	Amount	Depth
KB Elevation Above Casing Head.							1277.00
	24"	PILE JOINT				35.95	1312.95
	20"	129#	x52	JV/CC	1	35.37	1348.32
	20"	94#	x52	JV	8	293.83	1642.15
	20"	129#	x52	JV	1 + Float Shoe	39.60	1681.75
KB Elevation Above Hanger							1282.00
	13-3/8"	54.5#	J-55	Butt.	Pupjoint+Hanger	6.45	1288.45
	13-3/8"	54.5#	K-55	Butt.	41	1599.39	2887.84
	13-3/8"	68#	J-55	Butt.	2	75.50	2963.34
	13-3/8"	68#	N-80	Butt.	32	1243.50	4206.84
	13-3/8"				Float Collar	1.60	4208.52
	13-3/8"	54.5#	Butt.		1+Float Shoe	42.60	4251.12
KB Elevation Above Hanger							1280.00
	9-5/8"				Pupjoint+Hanger	5.60	1285.60
	9-5/8"	47#	N-80	Butt.	226	8729.21	10014.81
	9-5/8"	47#	N-80	Butt.	Float Collar + Jnt.+Float Shoe	42.03	10056.84

V CEMENT RECORD

String	20"	13-3/8"	9-5/8"
Type of Cement	1100 sks. Aust.N.	710 sks. Aust N. 250 sks. Aust.N.+1%Ca Cl_2	800 sks Aust.N + 0.4% HR-4.
Number of FT^3	1298	1133	944
Average weight of slurry	15.6 ppg	15.6 ppg	15.6 ppg
Cement Top	Sea Floor	Temp. Survey 2850'	Temp. Survey 8450'
Casing Tested with	300 psi	1500 psi	3000 psi
Number of Centralizers	7	10	39
Number of Scratchers	-	-	-
Stage Collar etc.	-	-	-
Remarks		Tested formation to 13.5 ppg mud equivalent.	Tested formation to 12.7 ppg mud equivalent.

VI. SUBSURFACE COMPLETION EQUIPMENT - Not applicable

Engineer

WELL HAPUKU-1

VII SAMPLES, CONVENTIONAL CORES, SW CORES

INTERVAL	TYPE	RECOVERED
1740 - 3390	5 sets of	30' intervals
3390 - 4300	washed and	20' "
4300 - 4420	dried and	30' "
4420 - 7560	one set of	20' "
7560 - 8120	unwashed	10' "
8120 - 8530	cutting	20' "
8530 - 8820	samples	10'
8820 - 9000		20'
9000 - 11,974		10'
1740 - 11,974	One set of composite canned cuttings sealed at 100' intervals.	

INTERVAL	TYPE	RECOVERED
9245 - 9288	Core	43' 100%
9288 - 9325		37' 100%
9325 - 9369		44' 100%

It was attempted to shoot 120 sidewall cores detailed list and description is attached.

VIII WIRELINE LOGS AND SURVEYS Incl. FIT)

Type & Scale	From To
ISF-Sonic 2" & 5"=100'	4291 - 1682
FDC(Gamma-Gamma) 2"& 5"=100'	4296 - 1682
Temperature Log 2" =100'	2090 - 4100
ISF Sonic 2"&5"=100'	10076 - 4252
FDC-CNL 2"&5"	10081 - 4252
HDT	10080 - 9100
HDT	9300 - 4252
Temperature Log 2"=100'	7500 - 9950
ISF-Sonic 2"&5"=100'	11957 - 10025
FDC-CNL 2"&5"=100'	11963 - 10025
HDT	11962 - 10025
VELOCITY SURVEYS	4450 - 10115 16 Levels
	10200 - 11964 5 levels

Type & Scale	From To

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IX.

STRATIGRAPHIC TABLE

AGE	FORMATION	DRILL DEPTH	SUBSEA DEPTH
	Seafloor	1288'	1260'
RECENT-PLEISTOCENE		1288 - 1995'	1260 - 1967'
PLIOCENE	Gippsland Limestone	1995 - 7450'	1967 - 7422'
LATE MIOCENE		7450 - 7858'	7422 - 7830'
	Base of high velocity	7858'	7830'
MID MIOCENE		7858 - 9060'	7830 - 9032'
	Mid Miocene Marker	8290'	8262'
EARLY MIOCENE		9060 - 9177'	9032 - 9149'
EOCENE	Lakes Entrance Fm.	9177 - 9222'	9149 - 9194'
EOCENE-LATE CRETACEOUS	Latrobe Group	9222 - 11,974'	9194 - 11946'
EOCENE		9222 - 9231'	9194 - 9203'
PALEOCENE	Upper L.balmei Zone	9231 - 9287'	9203 - 9259'
PALEOCENE	Lower L.balmei Zone	9287 - 9406'	9259 - 9378'
PALEOCENE?	Undifferentiated	9406 -9708'	9378 - 9680'
LATE CRETACEOUS	T. longus Zone	9708 - 9878'	9680 - 9850'
LATE CRETACEOUS	T. Lilliei Zone	9878 - 11,974'	9850 - 11,946'

PAY ZONE	OIL		
	Gross	Net	
9222 - 9310	80	26	
9310 - 9350	40	26	Transition Zone

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IX(a)

DESCRIPTION OF LITHOLOGICAL UNITS

HAPUKU - 1

1288 - 1740	No samples were collected, gamma ray log indicated limestones.
1740 - 2140	Calcarenite, light green-grey, firm, fine to medium with silty matrix.
2140 - 2670	Marl, light grey, very soft, fossiliferous, interbedded and grading to calcarenite in parts.
2670 - 3960	Marl, light green-grey, soft to slightly firm, very slightly silty, fossiliferous in parts.
3960 - 4820	Marl, light grey, soft to slightly firm, silty. With thin bands of calcarenite, green-grey, firm to hard, moderately calcareous, poorly sorted, very fine to fine, to some medium, fossiliferous in places, grading into limestone, light olive green to grey, hard massive, fossiliferous, becoming glauconitic.
4820 - 5570	Marl, light grey, slightly firm to soft, silty, fossiliferous, with grain size increase grading to calcarenite - calcisiltite light grey, firm, fossiliferous.
5570 - 7150	Marl to calcisiltite - calcarenite, light grey, soft to hard fossiliferous, glauconitic. Interbedded with dolomitic limestone, olive grey, hard, massive.
7150 - 7858	Calcilutite to Marl, light to medium grey, subfissile to fissile, fossiliferous, glauconitic, compacts into limestone in places.
7858 - 8290	Marl, light grey, soft fossiliferous, glauconitic.
8290 - 9177	Shale, calcareous claystone, grading to siltstone towards base, light olive grey, soft to slightly firm, subfissile micaceous, pyritic, fossiliferous.
9177 - 9222	Sandstone, very fine to silt size, and loose medium to coarse grains. Olive grey to buff, non calcareous, glauconitic, quartz grains are clear and well rounded.
9222 - 9231	Sand mainly quartz, glauconitic, fine to very coarse mainly fine to medium, subrounded to subangular, common pyrite cement.
9231 - 9708	Sandstone, dark olive grey, friable to hard, cemented, fine to pebbly predominantly fine, moderate to well sorted, with floating grains of coarse material, micaceous, glaucontic, pyritic, varing clay matrix. Irreguarly cemented by calcite, siderite and/or dolomite, cement material concentrated in randomly dispersed nodules.
9708 - 9878	Sand, clear to white, some slightly frosted, quartz, loose coarse to very coarse, moderately sorted, subangular to subrounded, glauconitic, pyritic. Interbeds of sandstone with clay matrix and glauconite concentrations.
9878 - 10,290	Sandstone, very light grey, fine to 2 mm size, very poorly sorted, coarse grains tend to float in fine grained matrix of very fine grained silicious material with glauconite and trace pyrite. Quartz grains are clear to slightly milky and subrounded. Interbedded calcareous shale to siltstone, medium dark grey, firm to moderately hard, glauconitic, with a trace of pyrite, carbonaceous, micaceous.
10,290-10,515	Siltstone, dark grey, firm to friable, sandy. Composed of quartz, with mica, glauconite, carbonaceous material,

.../2

IX (a) Description of Lithological units cont'd

and pyrite. Well rounded, very coarse to granule size quartz grains, are dispersed through the siltstone. Interbedded - interlaminated quartz sand, unconsolidated coarse to granule size, well rounded, pyritic. Some sand beds are dolomite cemented and very hard.

10,515-11,500 Siltstone to shale, dark grey, carbonaceous, alternating with sandstone, medium to granule, frequently dolomite cemented. Interbedded coal, black, vitreous to dull, hard, brittle and fissile.

11,500-11,974 Sandstone, medium grey, fine-medium to coarse grained, poorly sorted, angular. Composed of quartz and lithic fragments, pyritic, and in parts dolomite cement.

X. GEOLOGICAL ANALYSIS

(Pre-drill Prognosis vs. Actual results)

PRE-DRILL PROGNOSIS

The pre-drill concept of the Hapuku structure was that of a large northeast-southwest trending anticline at the primary objective horizon, the top of Latrobe unconformity. A deeper unconformity, interpreted to be M.diversus (lower Eocene) in age was interpreted as an erosional surface cutting into both Paleocene and Upper Cretaceous sediments. Structure of the Upper Cretaceous section was difficult to map, as the resolution of deep seismic data deteriorates rapidly to the north and east of the Hapuku area. However, northwest-southeast reversal was evident on all lines crossing the feature and both northeast and southwest dip segments could be mapped with confidence on key lines over the prospect. Several tensional growth faults were interpreted to cut the structure at right angles, extending upwards to the M.diversus unconformity.

The Hapuku-1 well was drilled to test three objectives:

1) The sands at the top of Latrobe, the unconformity being sealed by overlying Miocene shales.

2) The sands immediately below the M.diversus unconformity, sealed by possible overlying Eocene shales.

3) Interbedded sands in the Upper Cretaceous sequence bounded by faults.

The predicted structural tops were:

		SUBSEA
Eocene	Latrobe Group	9290'
Early Eocene	M.diversus unconformity	9830'
Late Cretaceous	T. lilliei zone	9830'

RESULTS

Structure

Post-drill evaluation of the well data confirmed the structural interpretation for both the Top of Latrobe (87' high to prediction) and the top of the T.lilliei (20' low to prediction). However the horizon previously interpreted to be the M.diversus unconformity is currently interpreted as a depositional paleoslope.

Stratigraphy

The major discrepancy between predicted stratigraphy and that penetrated by the well, concerns the sequence above the T.lilliei horizon, where instead of the predicted M.diversus predominantly fine-grained sediments, the well encountered a Paleocene section consisting essentially of both good and poor quality sandstones with minor siltstone.

The Paleocene section penetrated in the well is extremely thin, but is considered to be a complete and continuous section, and thus a result of sediment starvation rather than erosion of a much thicker sequence. The lack of sediments of Eocene, Oligocene and Early Miocene ages at Hapuku-1 is also thought to represent sediment starvation rather than structural growth and erosion.

X. GEOLOGICAL ANALYSIS cont'd

Hydrocarbon Occurrence

Hydrocarbons were encountered within generally poor quality sandstones immediately below the Top of Latrobe unconformity, with an interpreted 26' of net oil sand occurring between 9222' and 9310' where an interpreted sharp increase in water saturation occurs. The zone between 9310' and 9350', referred to as a transition zone also contains 26' of net oil sand with very high water saturations, and thus it probably could not be considered to be recoverable oil. This horizon was the primary objective of the well.

The secondary objective, predicted to occur below the interpreted M. diversus unconformity, was not present due to the sequences encountered (see Stratigraphy).

The tertiary objective, interbedded Upper Cretaceous sands, was tested below a silty-coaly cap rock sequence. Traces of oil were recovered from formation interval tests but no economical significance could be established. Absence of significant accumulations in this section was probably due to the lack of thick shales, necessary for sealing at the faults.

WELL COMPLETION REPORT

HAPUKU-1

APPENDIX 1

AMDEL EXAMINATION OF SANDSTONES

amdel
The Australian Mineral Development Laboratories

Flemington Street, Frewville, South Australia 5063
Phone Adelaide 79 1662, telex AA82520

Please address all correspondence to Frewville,
In reply quote: MP3/178/0

16 October, 1975

Esso Australia Ltd.,
127 Kent Street,
SYDNEY, 2000.

Attention: Mr. S. Benedek.

REPORT MP 933/76 - Hapuku-1

YOUR REFERENCE:	Letter dated SB/September 19, 1975.
MATERIAL:	7 Rocks
IDENTIFICATION:	S 173 - S 179
DATE RECEIVED:	24 September, 1975
WORK REQUIRED:	Petrography
TITLE:	Examination of Sandstones

Investigation and Report by: Dr. B.G. Steveson

Officer in Charge, Mineralogy/Petrology Section: Dr. K.J. Henley,

K.J. Henley

for F.R. Hartley,
Director.

aps.

EXAMINATION OF SANDSTONES

Sample: S 173; (TS C14900) Core #1 9300'

Rock Name:

Calcareous sandstone

Hand Specimen:

A grey friable sandstone which has a fine-grained clastic texture. The hand specimen has a somewhat mottled appearance due to the presence of relatively large crystals of calcite.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Calcite	45-50
Quartz	45
Feldspar	5
Glauconite	1-2
Kaolinite	1
Opaques	< 1
Muscovite	< 1
Tourmaline	trace

The rock consists principally of detrital grains of quartz and feldspar embedded in large irregular crystals of calcite which commonly include several of the detrital grains.

Quartz and feldspar form equant grains which range in size from approximately 0.05 mm to 0.25 mm with an average grainsize of about 0.1 mm. The grains are commonly subangular but this is likely to be the result of partial corrosion by calcite rather than a feature of the original detrital sediment. One or two quartz grains have skeletal appearance and such delicate grains would not have been transported; also some of the feldspar grains have a deep penetration of calcite and again such irregular grains would not have survived transport. From the textural data and from the overall abundance of calcite it is concluded that some of the original detrital material has been replaced by the calcite. The feldspar in the rock consists of both plagioclase and untwinned potassium feldspar and both minerals are fairly fresh.

Muscovite, glauconite, tourmaline and opaques are all accessory to minor components of the detrital fraction of the rock and in general, these minerals occur as grains less than 0.1 mm in size. The muscovite forms fairly well-defined flakes some of which are somewhat corroded whereas the glauconite and

tourmaline form equant, compact grains which have rather smooth outlines. One glauconite grain is about three times longer than it is wide but this is rather exceptional and most of the glauconite grains have a rather pelletal appearance.

Apart from one or two patches of relatively coarse-grained kaolinite (which is interpreted as a partly replaced, early authigenic mineral) the rock is cemented solely by calcite; this mineral occurs as irregular equant crystals most of which are between 0.6 mm and 1.5 mm in size. The calcite is fairly clear and unaltered and, as mentioned above, there is evidence that the calcite has replaced not only any original cement but also some of the original detrital material also.

Because of the partial destruction of the original detrital texture of the rock it is not possible to comment usefully on the environment of deposition of the sample except to indicate that the rock contains some feldspar but otherwise appears to have considerable chemical maturity. The rock contains trace amounts of coarse-grained, and hence authigenic, kaolinite and it is likely that this mineral developed during early diagenesis of the rock but was subsequently almost completely replaced by calcite. Extensive calcite cement which occurs in this rock may be interpreted either as being derived from percolating pore waters (derived from an external source) or have been the result of recrystallisation of nearby detrital carbonate grains. Unless there are thick limestone deposits associated with this sample it appears somewhat more likely that the carbonate in this rock was derived from percolating pore waters in which dissolved carbonate ions were present to an unusually great extent.

Sample: S 174; TS C14901. Core #3 9329'

Rock Name:

Glauconitic sandstone

Hand Specimen:

A massive friable rock which consists of relatively coarse-grained fragments of quartz and glauconite, poorly cemented together by dark material. Examination of the sample under a binocular microscope reveals the presence of some very fine-grained (?authigenic) pyrite.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Quartz	65-70
Glauconite	15
Clay	5-10
Feldspar	5-7
Biotite	trace - 1
Pyrite	trace - 1
Tourmaline	trace
Zircon	trace

The sample is an ill-sorted glauconitic sandstone which consists largely of detrital grains with only a little argillaceous matrix; glauconite is present as relatively large aggregates which probably grew and were deposited in the (marine) environment of deposition.

The largest detrital grains intersected in the thin section are more than 2 mm in size and there is a complete gradation from these large grains down to numerous fragments of quartz which are of silt grade. As a result, therefore, the rock is notably ill-sorted and there is a completely random arrangement of grains of different size and the rock shows no evidence of, for example, graded bedding. The quartz and feldspar grains are angular and subangular and some feldspar grains, particularly, have a distinctly elongate shape. Much of the feldspar in the rock is untwinned and hence is most likely to be a potassic variety. The quartz shows little or no undulose extinction and is the common "plutonic" variety. Together the quartz and feldspar grains comprise approximately three-quarters of the volume of the rock; other detrital minerals observed in the thin section are tourmaline, zircon and biotite. The last-named mineral forms small flakes several of which have been distorted by compaction of adjacent quartz grains.

Glauconite is present as equant but commonly somewhat irregular patches which are as much as 0.8 mm in diameter. It appears most likely that the glauconite has developed in the environment in which the majority of the grains were deposited and has suffered a little corrosion and fragmentation during final deposition stages alongside the quartz and feldspar grains. The glauconite patches are neither as smoothly round as would be expected if they had grown after deposition but on the other hand they are not so fragmented and reduced in size as would be expected if they had been transported any considerable distance. The glauconite in the rock was identified by X-ray diffraction techniques and the mineral provides a reliable indicator of a shallow marine environment of deposition.

The remainder of the material in the rock consists of intergranular clay which is poorly defined in thin section. Much of the material has a turbid grey to brown colour and is dark between crossed nicols.

The rock contains a moderate amount of opaque material, some of which occurs as very fine irregular granules but some also shows square or nearly square outlines and this material is interpreted as being pyritic. In one place in the thin section an aggregate of dusty opaques is associated with abundant glauconite and it is likely that this feature represents a relatively large patch of pyrite which has been partially replaced. The idiomorphic to sub-idiomorphic shape of some of the pyrite crystals indicates that this mineral is authigenic and this, in turn, suggests a reducing environment during the diagenesis of the rock.

In summary, therefore, the rock is an ill-sorted sandstone which contains a moderate amount of feldspar; the detrital grains are generally angular to subangular. The sample contains glauconite and authigenic pyrite. These together indicate that the environment of deposition was probably shallow marine and (possibly subsequently) of a reducing nature. The sample is probably not a turbidite since it contains only a small proportion of clay matrix.

Sample: S 175; TS C14902 SWC #50 9221'

Rock Name:
Sideritic, glauconitic, sandstone.

Hand Specimen:
A dark brown, rather friable sandstone which contains spots and patches of a dark green colour.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	35-40
Siderite	20-25
Clay	20-25
Glauconite	10-15
Feldspar	2-5
Lithic fragments	< 2
Iron oxides/hydroxides	1
Biotite	< 1

Siderite, glauconite and clay are abundant intergranular components of this rock and together they are more abundant than the detrital components which consist principally of quartz, feldspar and biotite. It is likely that the sediment as originally deposited contained abundant clay and that some of this material has been replaced by authigenic siderite.

The quartz and feldspar grains are notably ill-sorted and range in size up to about 1.5 mm. The largest grains of quartz are sub-round to round but quartz grains less than 0.3 mm in size are commonly sub-round to sub-angular. The average grainsize of the quartz and feldspar grains is probably about 0.3 mm. The most abundant grain type is single crystals of quartz which show little or no undulose extinction. For the most part quartz grains have sharply defined boundaries against the clay matrix and the authigenic minerals and there is no direct evidence of post-depositional replacement of the quartz. Much of the feldspar in the rock is slightly turbid untwinned material which is probably orthoclase or microcline. Generally the feldspar crystals are less than 0.3 mm in size and most are subangular to subround. Plagioclase grains are subordinate in abundance to grains of potassium feldspar. Together the quartz and feldspar comprise less than 50% of the total volume of the rock and hence these grains do not provide an efficient framework for the rock and it is concluded either that the original sediment contained abundant detrital clay (this hypothesis is preferred) or, that a relatively large proportion of the quartz and feldspar has been replaced during diagenesis.

Glauconite comprises 10-15% of the sample and occurs as bright green patches which range in size from about 0.1 mm to 0.5 mm. Much of the glauconite occurs as relatively equant sub-round to sub-angular patches which have a very fine-grained granular texture. Variation in the shades of green within some of these glauconite patches give them somewhat lobate appearance such as characterises glauconite formed authigenically from (?)gelatinous material. Some grains show various intermediate stages in the alteration of biotite to glauconite and there can be no doubt that some, if not all of the glauconite in the rock has developed at the expense of detrital biotite. One grain, in particular, consists of about 80% of biotite with pale green glauconite developed along specific cleavage traces. The detrital nature of the biotite is shown by the kinking of the cleavage plane traces.

Siderite (identified by X-ray diffraction methods) is present in the rock as small equant xenomorphic crystals which are generally about 0.03 to 0.05 mm in size. These small crystals of siderite are widely and thickly scattered throughout the intergranular material of the rock. It is likely that the siderite has developed in the sample and has probably replaced some original detrital clay matrix. In one or two places in the rock the siderite is particularly concentrated in elongate patches but in general siderite is characterised by its even distribution throughout the thin section.

Original detrital clay is represented by a pale brown material which is dark between crossed nicols and which occurs between the minerals described above. The clay is particularly associated with siderite and these two minerals now form much of the matrix of the sample. One or two patches of similar clay material have rather well-defined outlines and it is suggested that these patches are derived from the alteration of fine-grained lithic fragments.

In summary, therefore, the rock is a notably immature and clayey sediment which has undergone extensive authigenesis with the development of glauconite (partly after biotite) and siderite. These two minerals together indicate that diagenesis occurred in a reducing marine environment of deposition.

Sample: S 176; TS C14903 SWC # 42 9638'

Rock Name:

Immature feldspathic sandstone

Hand Specimen:

An extremely friable grey sandstone in which no bedding can be seen. The largest fragment of the sample contains distinctive green spots and reflecting cleavage of colourless mica.

X-ray Diffraction Results:

The results of an X-ray diffraction study of a sample of this rock are as follows:

Quartz	dominant
Feldspar (orthoclase >> albite)	subdominant
Mica	accessory
Chlorite	trace
Pyrite	trace

Thin Section:

An optical estimate of the constituents gives the following:

	%
Quartz	60-70
Feldspar	< 10
Chlorite	5-7
Glauconite	7-10
Muscovite	10
Biotite	2-5
Opaques	< 2

This is a fine-grained, rather immature sandstone which contains muscovite, chlorite (identified by bulk X-ray diffraction methods), biotite and glauconite (identified by X-ray diffraction powder photography).

Detrital quartz and feldspar occur as equant subangular to angular grains which have an average size of about 0.1 mm. The grains are fairly well compressed together in many parts of the rock although there are some patches of intergranular material which are as much as 0.2 mm in diameter. Many of the detrital grains have been fractured and a moderate proportion of the feldspar grains show some evidence of partial chemical alteration also. Even so, this alteration of the feldspar has resulted in only a faint turbidity and in many grains relics of the original feldspar twinning can still be seen.

Muscovite and biotite were components of the original detritus from which the rock was derived. Flakes of both minerals have been compressed during compaction of the rock but it can be seen that originally these minerals formed flakes which were up to 0.2 mm in length. Some flakes of biotite have deep brown shades and show a marked pleochroism and hence appear to be only slightly altered whereas other flakes of this mineral have a paler brown colour and show reduced pleochroism and it is inferred that these are partly altered flakes which have suffered degradation during diagenesis.

Glauconite forms distinctive pale green patches which have irregular shapes and appear to be distorted by compression between the more rigid quartz and feldspar grains. The largest patches of glauconite are 0.3 mm in diameter. There is no direct evidence in the thin

section of the origin of the glauconite except in one or two places where green phyllosilicates occur in the cleavage traces of biotite. In these places the green mineral is rather speckled with opaque and semi-opaque material and it is not possible to distinguish whether or not this mineral is glauconite or chlorite; however, the rather lobate and irregular shapes of the glauconite patches are not inconsistent with an origin from the alteration of biotite nor with an origin depending on the aggregation of this mineral from (?) gels. The rather irregular shapes of some patches of glauconite (where the glauconite occurs in the intergranular spaces between several quartz grains) suggests that this mineral is not of detrital origin. Chlorite in the rock is generally associated with the alteration of detrital biotite.

In brief, therefore, the rock is a fine-grained feldspathic sandstone which contains authigenic chlorite and glauconite.

Sample: S 177; TS C14904. SEC #37 9875'

Rock Name:
Argillaceous sandstone

Hand Specimen:
An extremely friable dark grey sandstone which contains a few relatively large flakes of mica in an otherwise featureless material.

X-ray Diffraction Results:
The results of an X-ray diffraction examination of the sample is as follows:

Quartz	dominant
Feldspar(orthoclase >> albite)	subdominant
Mica	accessory
Chlorite	accessory
Pyrite	trace to accessory

Thin Section:
An optical estimate of the constituents gives the following:

	%
Muscovite) Chlorite	45
Quartz	40
Feldspar	10
Opaques	3-5
Biotite	2
Glauconite	< 1
Zircon	trace

This rock is an ill-sorted sandstone about half the volume of which consists of argillaceous matrix material. The detrital grains have a very wide size range and there is some evidence of a bimodal grainsize distribution.

The largest detrital grain intersected in the thin section is a quartz crystal more than 2 mm in length and there appears to be a population of grains which have an average grainsize of about 1 mm and a grainsize range of 0.8 to 2 mm. Most of the quartz and feldspar in the rock, however, are present as grains 0.1 to 0.4 mm in size. The large detrital grains are commonly subround and grains belonging to the finer-grained population are generally sub-angular. Feldspar grains show a moderate amount of alteration (probably more than in S 176) and many of the feldspar grains are more or less brown in plane-polarised light due to the presence of fine-grained alteration products. Most of the feldspar in the rock is untwinned orthoclase.

Biotite is a minor component of the detrital fraction of the rock and occurs as somewhat altered and distorted flakes which are generally less than 0.3 mm in length. Although much of the biotite is partly altered there is no evidence of the association of chlorite with the biotite.

Glauconite is present in this rock only to a limited extent and the mineral comprises less than 1% of the total volume of the sample. Small pools of a fine-grained granular glauconite are widely dispersed through the samples and most of these have a compact and rounded appearance and provide no direct evidence of their mode of origin.

The most abundant intergranular material is brown in plane-polarised light and consists of muscovite, chlorite and opaque and semi-opaque material. Under crossed nicols flakes of muscovite up to about 0.05 mm in length can be seen but much of the material is very fine-grained and is rather dark between crossed nicols. The relative proportions of muscovite and chlorite cannot be determined with any precision but both minerals probably are more abundant than the opaque and semi-opaque material which comprises less than 5% of the volume of the rock. The matrix material is fairly homogeneous throughout the area of the thin section and it is likely that this material represents a primary argillaceous matrix which has been at least partly recrystallised during diagenesis. Most of the opaque material in the rock occurs as granular, dusty patches or as irregular blebs and it is likely that this material has been derived either from circulating waters or, more likely, from the degradation of ferruginous detrital material.

Zircon and rutile are trace detrital components of the rock.

This sandstone contains a rather poorly sorted detrital fraction and there is some evidence of bimodality in the grainsize distribution;

furthermore, the grains have been only briefly transported and altered and feldspar and biotite have survived weathering, transport and deposition. The sediment contains an abundant primary argillaceous matrix which now consists of iron-stained muscovite and chlorite. A small amount of glauconite is present in the rock and this indicates that the sample was deposited in marine (probably shallow-marine) conditions. Diagenesis has probably been hampered by the abundance of argillaceous matrix (which inhibits the circulation of pore water).

Sample: S 178; TS C14905 SWC # 109 10,813'

Rock Name:

Argillaceous feldspathic sandstone.

Hand Specimen:

A pale grey fine-grained sandstone which is extremely friable.

X-ray Diffraction Results:

The results of an X-ray diffraction examination of a sample of this rock are as follows:

Quartz	dominant
Feldspar (orthoclase >> albite)	subdominant
Mica	accessory
Kaolinite	accessory
Siderite	accessory
Pyrite	trace

Siderite in the listing above refers to an unusual carbonate mineral which cannot be unambiguously identified by X-ray diffraction techniques; the main diffraction line is at 2.76Å. The material could be a magnesian siderite, a calcian magnesite or a calcium-iron magnesite.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Quartz	65
Feldspar	5-10
Muscovite	10
Kaolinite	10
Carbonate	5
Opaques	2
Lithic fragments	< 5

This rock has a well-defined clastic texture and it is a feldspathic sandstone which contains fairly abundant primary and argillaceous matrix and a little authigenic carbonate.

For the most part the detrital grains of quartz and feldspar are moderately well-sorted and range in size from about 0.05 mm to 0.3 mm; however, the thin section contains one grain which is about 1.2 mm in length. In general, the average grainsize is about 0.15 to 0.2 mm. The quartz and feldspar grains have equant shapes and most are sub-angular to sub-round. Fracturing of the grains is prevalent and most grains contain at least one irregular fracture. Much of the feldspar in the rock is untwinned orthoclase and only one or two grains in the whole thin section show polysynthetic twinning of plagioclase. A few patches of rather dusty dark material are 0.1 to 0.2 mm in size and have fairly well-defined outlines; these have been assumed to be partly altered lithic fragments derived from fine-grained, ferruginous rocks (either sedimentary or volcanic). These grains are only a minor component of the rock and do not exceed 5% in abundance.

The rock contains a moderate amount of a homogeneous fine-grained matrix. In plane-polarised light this matrix has a pervasive brown colour but between crossed nicols it appears that the matrix consists of a moderately birefringent phase (muscovite) and a phyllosilicate with a very low birefringence (kaolinite). The relative proportions of these two minerals are rather difficult to assess but they are probably present in subequal amounts. The muscovite in a few places forms fairly well-defined flakes up to about 0.1 mm in length but, for the most part, the matrix has a rather fine-grained texture. A few muscovite flakes which are particularly well-defined were probably part of the sand-grade detrital fraction of the rock but most of the muscovite in the rock is present as very fine-grained material.

The carbonate phase occurs as anhedral crystals between the grains of quartz and feldspar; the largest crystals intersected in the thin section are about 0.15 mm in size and most of the carbonate is fairly well-crystallised and is clear in plane-polarised light. There is evidence in the thin section that the carbonate has replaced some of the detrital quartz, in that carbonate has penetrated in irregular masses and has apparently isolated fragments of quartz which have a common extinction position. It is likely that the carbonate represents a relatively late phase in the diagenesis of the rock and presumably represents the occurrence of relatively alkaline conditions of diagenesis in which kaolinite and quartz were relatively unstable. The composition of the carbonate is discussed in the section dealing with the X-ray diffraction results.

With respect to the gamma radiation associated with samples S 176-S 178; all three samples contain dusty opaque material which could be carbonaceous (as opposed to ferruginous and may be uraniferous. No other features of the rocks suggest an origin for the radioactivity.

Sample: S 179; TS C14906. Sample from junk basket, taken at 11,974' T.D.

Rock Name:
Dolomitic sandstone.

Hand Specimen:
A compact grey sandstone which has a fairly coarse clastic texture.

Thin Section:
An optical estimate of the constituents gives the following:

	%
Quartz	60
Feldspar	5
Dolomite	35
Chert	< 2

The identification of dolomite was checked by X-ray diffraction powder techniques.

This rock consists essentially of clastic grains of quartz and feldspar in a monomineralic dolomite cement.

The largest grain intersected in the thin section is 3 mm in length and belongs to a population of grains which have an average size of about 1 mm; these grains constitute about 20% of the rock. Quartz and minor chert are present but feldsar is not represented among these grains. Most of these large grains are round to sub-angular and they are probably derived from a sedimentary source rock. Grains of the finer-grained population are 0.05 to 0.3 mm in size and are sub-round to sub-angular. Feldspar is present as slightly altered and turbid untwinned (?)orthoclase and polysynthetically twinned plagioclase (the former predominates) and many grains of feldspar are sub-angular. It is likely that the detrital grains have only suffered minor replacement by authigenic dolomite. Some grains of feldspar have re-entrant angles and some serrate margins and, in a few places, dolomite occurs in fissures through grains, in general, however, only a small proportion of the detritus has been removed during cementation and the grain-size distribution and grain shapes are essentially those of the sediment.

Dolomite forms a random granular mosaic of clear, well-defined crystals which have a crystal size commonly of about 0.1 mm. No other cement or matrix is present in the rock and hence it is not possible to determine whether the dolomite replaced a pre-existing phase or was deposited directly from percolating pore-waters.

The sample is an immature, feldspathic sandstone (sub-arkosic) cemented wholly by authigenic dolomite. The presence of this mineral indicates that, at one stage in the deposition of the rock, the pore-waters were relatively enriched in carbonate.

WELL COMPLETION REPORT

HAPUKU-1

APPENDIX 2

SAMPLE DESCRIPTIONS

HAPUKU #1 SAMPLE DESCRIPTIONS BELLIS/KEMP

11-21/7/75.

DEPTH	%	DESCRIPTION
		20" casing shoe at 1682 feet. Bit #2 3AJ + 17½ underreamer BOB 1725 hours. Reamed rat hole. Drilling with gel and seawater.
1740-1770	100	Cement cavings, 25 units gas on H/W
1770-1800	60	Calcarenite, light green-grey, firm, fine to medium, silty matrix, calcareous.
	40	Cement cavings
		Trace shell fragments
1800-1830	70	Calcarenite, as above, soft to firm
	30	Cement cavings
		Trace shell fragments
1830-1860	60	Calcarenite, as above
	40	Cement cavings
		Trace shell fragments, some gastropods
1860-1890	60	Calcarenite, as above
	40	Cement cavings,
		Trace shell fragments and foraminifera
1890-1920	70	Calcarenite, as above.
	30	Cement cavings
		Trace shell fragments
1920-1950	100	Calcarenite, as above
		Trace cement cavings
		Trace shell fragments
1950-1980	100	Calcarenite, as above
		Trace cement cavings
		Trace shell fragments
1980-2010	100	Calcarenite, as above
		Trace cement cavings
		Trace shell fragments
2010-2040	100	Calcarenite, as above
		Trace cement cavings
		Trace shell fragments
2040-2070	100	Calcarenite, light green-grey, moderately firm to firm, very fine to medium grain, fossiliferous in part, silty matrix, calcareous
		Trace cement cavings
		Trace shell fragments, and fossils.
2070-2100	100	Calcarenite, as above
		Trace cement cavings
		Trace shell fragments and fossils.
2100-2130	100	Calcarenite, as above
		Trace cement cavings
		Trace shell fragments and fossils
2130-2160	100	Calcarenite, as above, good porosity, low permeability
		Trace marl, light grey, very soft, very calcareous
		Trace cement cavings
		Trace shell fragments and fossils
2160-2190	60	Marl, as above
	40	Calcarenite, as above
		Trace shell fragments and fossils

DEPTH	%	DESCRIPTION
2190-2220	40	Marl, as above
	60	Calcarenite, as above
		Trace shell fragments
2220-2250	70	Calcarenite, as above
	30	Marl, as above
		Trace cement
		Trace shell fragments and fossils
2250-2280	70	Calcarenite, as above
	30	Marl, as above
		Trace cement cavings
		Trace shell fragments, fossils including gastropods & foraminifera
2280-2310	80	Calcarenite, as above
	20	Marl, as above
		Trace cement
		Trace shell fragments and fossils, as above
2310-2340	70	Calcarenite, light green grey, moderate-firm, fine to medium, silty calcareous, fossiliferous in part
	30	Marl, light grey, very soft, calcareous
		Trace cement cavings
		Trace shell fragments and fossils, as above
2340-2370	50	Calcarenite, as above
	50	Marl, as above
		Trace cement cavings
		Trace shell fragments and fossils, as above
2370-2400	50	Calcarenite, as above
	50	Marl, as above
		Trace cement cavings
		Trace shell fragments and fossils, as above
2400-2430	50	Calcarenite, as above, but tends to hard
	50	Marl, as above
		Trace cement cavings
2430-2460	40	Calcarenite, as above
	60	Marl, as above
		Trace cement cavings
2460-2490	20	Calcarenite
	80	Marl, as above, but tending to light green-grey
2490-2520	20	Calcarenite, as above
	80	Marl, as above
2520-2580	10	Calcarenite, as above
	90	Marl, as above
		Trace shell fragments and fossils
2580-2610	10	Calcarenite, as above
	90	Marl, as above
		Trace fossils
2610-2640	10	Calcarenite, as above
	90	Marl, as above
		Trace fossils
2640-2670	80	Marl, light green grey, soft to slightly firm, very calcareous,
	20	Calcarenite, light green grey, hard tending to [illegible] in part, silty, calcareous
		Trace fossils, as above

HAPUKU #1 SAMPLE DESCRIPTIONS BELLIS/KEMP

11-21/7/75.

DEPTH	%	DESCRIPTION
2670-2700	100	Marl, as above Trace Calcarenite, as above Trace fossils
2700-2730	100	Marl, as above Trace Calcarenite, as above Trace fossils
2730-2760	100	Marl, as above, fossiliferous in part Trace Calcarenite, as above Trace fossils
2760-2790	100	Marl, light green grey, soft-slightly firm, very slightly silty, very calcareous, fossiliferous in part
2790-2820	100	Marl, as above
2820-2850	100	Marl, as above Trace calcarenite
2850-2880	100	Marl, as above Trace calcarenite, as above
2880-2910	100	Marl, green to gr.grey, soft, sticky, very calcareous
2910-2940	100	Marl, as above
2940-2970	100	Marl, as above
2970-3000	100	Marl, as above Trace Calcarenite, as above
3000-3030	100	Marl, as above Trace calcarenite Trace fossils and shell fragments
3030-3060		As above
3060-3090	100	Marl, as above, slightly firm to soft Trace fossils and shell fragments
3090-3120		As above
3120-3150		As above
3150-3180	100	Marl, as above Trace calcarenite, as above Trace shell fragments and fossils
3180-3210	100	Marl, green grey, soft, some slightly firm, fossil inclusions, very calcareous Trace calcarenite, green grey, hard, firm to medium, poor sorting, moderately calcareous Trace fossils
3210-3240		As above
3240-3270	100	Marl, as above Trace fossils
3270-3300	100	Marl, as above, appears more silty Trace fossils

HAPUKU #1 SAMPLE DESCRIPTIONS BELLIS/KEMP

11-21/7/75.

DEPTH	%	DESCRIPTION
3300-3330	100	Marl, as above, greenish greey, soft, very calcareous, silty, fossiliferous Trace fossils
3330-3360	100	Marl, as above Trace calcarenite, as above, small inclusions of glauconite Trace fossils including coral; glauconite
3360-3390		As above
3390-3420	90 10	Marl, as above, firming up slightly Calcarenite, as above Trace fossils
3420-3450	90 10	Marl, as above Calcarenite, as above Trace fossils, large percentage of forams
3450-3480	100	Marl, as above Trace calcarenite, as above Trace fossils
3480-3510	100	Marl, as above Trace calcarenite Trace fossils
3510-3540	90 10	Marl, as above, light grey Calcarenite, as above Trace fossils
3540-3570	90 10	Marl, as above Calcarenite, glauconitic, as above Trace fossils
3570-3600	90 10	Marl, light grey, soft to slightly firm, very calcareous, some fossils included Calcarenite, light green-grey, poorly sorted, very fine to medium grained, calcareous, rare glauconite, minor silt, cement cavings moderately abundant
3600-3630	80 20	Marl, as above Calcarenite, as above
3630-3660	90 10	Marl, as above Calcarenite, as above
3660-3690	100	Marl, as above Trace calcarenite, as above Trace shell fragments and fossils mainly foraminifera
3690-3720	90 10	Marl, as above Calcarenite, as above Trace shell fragements and fossils, as above
3720-3750		As above
3750-3780	100	Marl, as above
3780-3810		As above
3821		POH re-run #2 OSC-3AJ new 17½" UR. Trip gas 85 units. Trip CO_2 5M+

HAPUKU #1 SAMPLE DESCRIPTIONS BELLIS/KEMP

11-21/7/75.

DEPTH	%	DESCRIPTION
3810-3840	90	Marl, as above, green grey
	10	Calcarenite, green grey, very fine to fine, calcarenite, silty
		Trace fossils
3840-3870	90	Marl, as above
	10	Calcarenite, as above
		Trace fossils, mainly forams
3870-3900	100	Marl, as above
		Trace calcarenite, as above
		Trace fossils, mainly forams
3900-3930	90	Marl, light grey, soft some slightly firm, silty
	10	Calcarenite, as above
		Trace fossils
3930-3960	100	Marl, as above
		Trace calcarenite, as above
		Trace fossils
3960-3990	90	Marl, light grey, soft to slightly firm, very calcareous, silty
	10	Calcarenite, green grey, firm to hard, moderately calcareous, poorly sorted, very fine to fine some medium, fossil inclusions
		Trace fossils, mainly forams
		Trace lignite
	20' samples	
3990-4020		As above
4020-4040	100	Marl, as above
		Trace calcarenite, as above
		Trace fossils
4040-4060	90	Marl, as above
	10	Calcarenite, as above
		Trace fossils
4060-4080		As above
4080-4100	80	Marl, as above
	10	Calcarenite, as above
	(10	Lignite, black, dark brown streak, clayey - additive to mud but is coarse 1-3mm)
		Trace fossils, as above
4100-4120	80	Marl, as above
	20	Calcarenite, as above
		Trace fossils, as above
		Minor lignite, as above
4120-4140	80	Marl, as above
	20	Calcarenite, as above
		Trace fossils, as above
		Minor lignite, as above
4140-4160	80	Marl, as above
	20	Calcarenite, as above
		Trace fossils, as above
		Minor lignite, as above
		Trace limestone, light to dark green, hard

DEPTH	%	DESCRIPTION
4160-4180	80	Marl, as above
	10	Calcarenite, as above
	10	Limestone, light olive green to light olive grey, hard, massive but with minor inclusions and fossils
4180-4200	80	Marl, as above
	10	Calcarenite, as above
	10	Limestone, as above
		Trace fossils
4200-4220	90	Marl, as above
	10	Calcarenite, as above
		Trace Limestone, as above
		Trace fossils
4220-4240	80	Marl, light grey, soft to slightly firm, very calcareous, slightly silty
	20	Calcarenite, light green grey, hard moderately calcareous, fossil inclusions, poorly sorted, very fine to medium grain
		Trace fossils
		Trace limestone, light olive green, hard
4240-4260	80	Marl, as above
	10	Calcarenite, as above
	10	Limestone, as above
4260-4280	80	Marl, as above
	10	Calcarenite, as above
	10	Limestone, as above
4280-4300		As above
4300		½ hour circulating; dummy trip to casing; circulate out casing. Trip gas = 60 units; 14/7/75 trip prior to setting casing. Trip gas = Log and set casing 13th to 18th. 13-3/8" casing shoe at 4246'. 18/7/75 R.I.H. with bit No. 4 X3A and drill out shoe at 0330 hours. No leak off on test to 13.5#/gal. equiv.
4300-4330	90	Marl, light grey, soft, very calcareous, slightly silty, fossils included, predominately foraminifera
	10	Calcarenite, medium light grey, moderately hard to firm, very fine to silty, poorly sorted, fossils included, trace glauconite, silty in places
		Abundant cement cavings
4330-4360	100	Marl, as above
		Trace calcarenite, as above
		Minor cement cavings
4360-4390	90	Marl, as above
	10	Calcarenite, as above
		Minor cement cavings
4390-4420	100	Marl, as above
		Trace calcarenite, as above
		Trace cement cavings
4420-4440	100	Marl, as above
		Trace calcarenite, as above
		Trace cement

HAPUKU #1 SAMPLE DESCRIPTIONS BELLIS/KEMP

11-21/7/75.

DEPTH	%	DESCRIPTION
4440-4460	70	Marl, light grey, soft to slightly firm, very calcareous, fossils included - mainly foraminifera, slightly silty in part
	30	Calcarenite, medium light grey, moderately firm, very fine to fine poorly sorted, silty in part, fossils included, rare glauconite. Trace cement cavings
4460-4480	80	Marl, as above
	20	Calcarenite, as above
		Trace cement cavings
4480-4500	80	Marl, as above
	20	Calcarenite, as aobve
4500-4520	80	Marl, as above
	20	Calcarenite, as above
4520-4540	50	Marl, as above
	50	Calcarenite, as above
		at 4540 approximately 105 units H.W. chromatograph showed it to be all C_1 (methane)
4540-4560	40	Marl, as above
	30	Calcarenite, as above, but increase silt content
	30	Limestone, light olive green, hard, fossiliferous, trace glauconite
4560-4580	60	Marl, as above
	30	Calcarenite, as above
	10	Limestone, as above
4580-4600	70	Marl, as above
	30	Calcarenite, as above
		Trace fossils
4600-4620	80	Marl, light grey, soft to slightly firm, very calcareous, fossils mainly foraminifera included, slightly silty
	20	Calcarenite, medium-light grey, moderately hard to firm, calcareous, silty in part, fossils mainly foraminifera included, trace glauconite, very fine
		Trace cement cavings
4620-4640		As above
4640-4660	80	Marl, as above
	20	Calcarenite, as above
4660-4680	90	Marl, as above
	10	Calcarenite, as above
		Trace limestone, light olive green, hard, massive, minor fossils
4680-4700	100	Marl, as above
		Trace calcarenite, as above
		Trace limestone, as above
4700-4720		As above
4720-4740		As above
4740-4760	100	Marl, as above
		Trace calcarenite, as above
		Trace fossils mainly forams

DEPTH	%	DESCRIPTION
4760-4780		As above
4780-4800		As above
4800-4820		As above
4820-4840	100	Marl, light grey, slightly firm to soft, very calcareous, silty and up to medium grain size, fossil inclusions Trace Calcarenite, light grey, firm, very calcareous, very fine to silty, up to medium fossil inclusions, poorly sorted, possibly a calcisiltite with large inclusion - subtle difference! NOTE : Marl and "Calcarenite" appear very similar only difference really is induration (+ grain size?) Trace fossils, mainly forams some almost black giving the marl and calcarenite a speckled appearance.
4840-4860	100	Marl, light grey, very calcareous, soft to slightly firm, silty, up to medium fossil inclusion Trace calcarenite, light to light medium grey, very calcareous, very fine to silty, poorly sorted, up to medium fossil inclusion, firm to hard Trace fossils, mainly forams
4860-4880	100	Marl, as above Trace Calcarenite, as above Trace fossils, as above
4880-4900	100	Marl, as above Trace Calcarenite, as above, green-grey Trace fossils
4900-4920	90 10	Marl, as above Calcarenite, green grey, as above Trace fossils
4920-4940	100	Marl, as above Trace Calcarenite, as above Trace fossils
4940-4960		As above
4960-4980	90 10	Marl, as above Calcarenite, as above Trace fossils
4980-5000	90 10	Marl, as above Calcarenite, as above Trace fossils
5000-5020	100	Marl, green grey, as above Trace calcarenite, green grey, as above Trace fossils
5020-5040		As above
5040-5060		As above
5060-5080	100	Marl, as above Trace calcarenite, as above Trace fossils At 5121' POOH to change bit. Bit #4 drilled 821' in 12.1 hours i.e., 67'/hour over interval

HAPUKU #1 SAMPLE DESCRIPTIONS BELLIS/KEMP

11-21/7/75.

DEPTH	%	DESCRIPTION
		R.I.H. with bit No. 5 X3A. Trip gas 110 units
5080-5100		No sample (did not circulate out before tripping)
5100-5120	50	Marl, light grey, soft to slightly firm, very calcareous, fossils included, slightly silty in part
	50	Calcarenite, medium light grey, moderately hard to firm, calcareous, silty in part, fossils included, very fine grain, generally poorly sorted, rare glauconite
5120-5140	40	Marl, as above
	60	Calcarenite, as above
5140-5160	70	Marl, as above
	30	Calcarenite, as above
		Trace cement cavings
5160-5180	60	Marl, as above
	40	Calcarenite, fossils mainly foraminifera
5180-5200	60	Marl, as above
	40	Calcarenite, as above
5200-5220	70	Marl, as above
	30	Calcarenite, as above
5220-5240	70	Marl, as above
	30	Calcarenite, as above
5240-5260	60	Marl, as above
	40	Calcarenite, as above
5260-6280	60	Marl, light grey, slightly firm, very calcareous, fossils mainly foraminifera included (some dark in colour), slightly silty in part
	40	Calcarenite, medium light grey to light olive grey, moderately firm occasionally moderately hard, very calcareous, fossils mainly foraminifera included (some dark in colour), very fine grained, poorly to moderately sorted, N.B. only grain size, induration and colour vary between Marl and Calcarenite.
5280-5300	50	Marl, as above
	50	Calcarenite, as above
5300-5320	50	Marl, as above
	50	Calcarenite, as above
5320-5340	50	Marl, as above
	50	Calcarenite, as above
5340-5360	70	Marl, light grey, some green grey, very calcareous, soft to firm, fossil included up to medium grain size.
	30	Calcarenite, green grey to light olive grey, firm to hard, very calcareous, very fine to silty with up to medium grain inclusions mainly forams
		Trace fossils, mainly forams
5360-5380	70	Marl, as above
	30	Calcarenite, as above
5380-5400	70	Marl, as above
	30	Calcarenite, as above

HAPUKU #1 SAMPLE DESCRIPTIONS BELLIS/KEMP

11-21/7/75.

DEPTH	%	DESCRIPTION
5400-5420	60	Marl, as above
	40	Calcarenite, as above
5420-5440	70	Marl, light grey, as above
	30	Calcarenite, light grey to green grey, as above
		Trace fossils, forams
5440-5460	80	Marl, as above
	20	Calcarenite, as above
		Trace fossils
5460-5480		As above
5480-5500	90	Marl, as above
	10	Calcarenite, as above
		Trace fossils
5500-5520	80	Marl, as above
	20	Calcarenite, as above
		Trace fossils
5520-5540	70	Marl, as above
	30	Calcarenite, as above
		Trace fossils
5540-5560	80	Marl, as above
	20	Calcarenite, as above
		Trace fossils
5560-5580	60	Marl, as above
	30	Calcarenite, as above
	10	Dolomitic Limestone, olive grey, hard, massive
5580-5600	90	Marl, light grey to green grey, soft to firm, very calcareous, fossil included, mainly forams
	10	Calcarenite, green grey, firm to hard, very fine, silty, very calcareous, fossil included mainly forams
		Trace Dolomitic limestone, olive grey, very hard, massive, slow fizz in cold acid
		Trace fossils, mainly forams
5600-5620	100	Marl, as above
		Trace calcarenite, as above
		Trace fossils
5620-5640	100	Marl, as above
		Trace calcarenite, as above
		Trace fossils
		At 5691' POOH for new bit. Bit #4 drilled 570' in 8.9 hours. Bit #5 X3A T.G. = 128. 18000ppm C_1.
5640-5660		No returns
5660-5680		No returns
5680-5700	80	Marl, as above
	20	Calcarenite, as above
		Trace dolomitic limestone, as above
		Trace fossils

DEPTH	%	DESCRIPTION
5700-5720	70	Marl, as above
	30	Calcarenite, as above
		Trace dolomitic limestone, as above
		Trace fossils
5720-5740	80	Marl, as above
	20	Calcarenite, as above
		Trace fossils
		Trace dolomitic limestone, as above
5740-5760	80	Marl, as above
	20	Calcarenite, as above
		Trace dolomitic limestone, as above
		Trace fossils
5760-5780	70	Marl, as above
	30	Calcarenite, as above
		Trace dolomitic limestone, as above
		Trace fossils
5780-5800	90	Marl, light grey to green grey, soft to firm, very calcareous, fossils included mainly forams
	10	Calcarenite, green grey to light olive grey, firm to hard, very fine, silty, very calcareous, fossils included mainly forams
		N.B. often little difference between Marl and "Calcarenite" with a range of grain sizes between them.
5800-5820	90	Marl, as above
	10	Calcarenite, as above
5820-5840	90	Marl, as above
	10	Calcarenite, as above
5840-5860	90	Marl, as above
	10	Calcarenite, as above
		Trace dolomitic limestone, light olive green, very hard, massive
5860-5880	90	Marl, as above
	10	Calcarenite, as above
		Trace dolomitic limestone, as above
5880-5900	100	Marl, as above
		Trace calcarenite, as above
5900-5920	100	Marl, as above
		Trace calcarenite, as above
		Trace dolomitic limestone, as above
5920-5940	90	Marl, as above
	10	Calcarenite, as above
		Trace dolomitic limestone, as above
5940-5960	90	Marl, as above
	10	Calcarenite, as above
5960-5980	90	Marl, as above
	10	Calcarenite,
		N.B. Considerable amount of cuttings described as "Marl" tend to a "calisiltite", and grain sizes from clay to fine grain are present in samples.

HAPUKU #1 SAMPLE DESCRIPTIONS BELLIS/KEMP

11-21/7/75.

DEPTH	%	DESCRIPTION
5980-6000	50	Marl, mostly light grey, some light olive grey, slightly to moderately firm, very calcareous, fossils mainly foraminfera included
	40	Calcisiltite, light olive green, moderately firm, some very firm, very calcareous, fossils mainly foraminifera included
	10	Calcarenite, light olive green, moderately firm, ver calcareous, fossils mainly foraminifera included, rare glauconite, very fine grained, moderately well sorted.
		N.B. Colour difference between the clay and silt size samples has allowed the separation into "Mlar" and "Calcisiltite". As before, a range of grain size from clay to fine grain is present.
6000-6020	50	Marl, as above
	50	Calcisiltite, as above
		Trace calcarenite, as above
		Trace dolomitic limestone, light olive green, hard, massive
6020-6040	50	Marl, as above
	50	Calcisiltite, as above
		Trace calcarenite, as above
6040-6060	60	Marl, as above
	40	Calcisiltite, as above
		Trace calcarenite, as above
6060-6080	70	Marl, as above
	30	Calcisiltite, as above
		Trace calcarenite, as above
6080-6100	70	Marl, as above
	30	Calcisiltite, as above
		Trace calcarenite, as above
6100-6120	60	Marl, as above
	30	Calcisiltite, as above
	10	Calcarenite, as above
6120-6140	60	Marl, as above
	30	Calcisiltite, as above
	10	Calcarenite, as above
6140-6160	80	Marl, as above
	20	Calcisiltite, as above
		Trace calcarenite, as above
6160-6180	70	Marl, light grey-light olive grey, slightly firm, very calcareous, fossils mainly foraminifera included
	30	Calcarenite, light olive green, moderately firm, very calcareous, fossils mainly foraminifera included, fine-very fine grain, tends to Calcisiltite in part, moderately well sorted, rare glauconite.
6180-6200	70	Marl, as above
	30	Calcarenite, as above
		P.O.H. 1045 hours at 624 feet. Bit #5. drilled 557 feet in 8.1 hours T.G. = 85 units 10000 C_1 3/3/1-8. New Bit #6 X3A 3 x 18 jets
6200-6220	80	Marl, as above
	20	Calcarenite, as above
6220-6240	90	Marl, as above
	10	Calcarenite, as above
		Trace fossils, mainly forams

DEPTH	%	DESCRIPTION
6240-6260	60	Marl, as above
	40	Calcarenite, as above, rare glauconite inclusions
		Trace dolomitic limestone, olive grey, very hard, slightly calcareous
		Trace fossils
6260-6280	70	Marl, as above
	30	Calcareous, as above
		Trace glauconite
		Trace fossils
6280-6300	80	Marl, as above
	20	Calcarenite, as above
		Trace glauconite
		Trace fossils
6300-6320		As above
6320-6340	80	Marl, as above
	20	Calcarenite, as above
		Trace glauconite included
		Trace fossils, mainly forams
6340-6360	60	Marl, as above
	40	Calcarenite, as above
		Trace fossils
6360-6380	70	Marl, as above
	30	Calcarenite, as above
		Trace fossils
6380-6400	80	Marl, as above
	20	Calcarenite, as above
		Trace fossils
6400-6420	80	Marl, light olive grey to light green grey, soft to firm, very calcareous, fossil included mainly forams
	20	Calcarenite/Calcisiltite, green grey, firm to hard, very calcareous, very fine to silty, fossil included, mainly forams poorly sorted, trace glauconite
		Trace fossils, mainly forams
6420-6440	70	Marl, as above
	30	Calcarenite/, as above
		Trace fossils
6440-6460	60	Marl, as above
	40	Calcarenite/, as above
		Trace fossils
6460-6480	70	Marl, as above
	30	Calcarenite/, as above
		Trace fossils
6480-6500		As above
6500-6520	70	Marl, as above
	30	Calcarenite/, as above
		Trace fossils
6520-6540	70	Marl, as above
	30	Calcarenite/, as above

DEPTH	%	DESCRIPTION
6540-6560	50	Marl, as above
	60	Calcarenite/, as above
6560-6580	40	Marl, as above
	60	Calcarenite/, as above, very hard in places
6580-6590 (end of circulation sample)		
	60	Marl, as above
	40	Calcarenite/, as above
		P.O.H. 0345 hours at 6613 feet, Bit No. 6 drilled 365 feet in 6.7 hours. New bit No. 7 X3A. Trip gas 65 units
6590-6600	50	Marl, as above
	50	Calcarenite/, as above, olive grey to green grey
		Trace fossils
6600-6620	40	Marl, as above
	60	Calcarenite, as above
		Trace fossils
6620-6640	70	Calcarenite, olive grey to green grey, very calcareous, very fine to medium, poorly sorted, firm to hard, fossil included, mainly forams, trace glauconite
	30	Marl, light grey to green grey, soft to firm, very calcareous, slightly silty, fossil included, mainly forams
		Trace fossils, mainly forams
6640-6660	70	Calcarenite, as above
	30	Marl, as above
		Trace fossils
6660-6680		As above
6680-6700		As above
6700-6720	80	Calcarenite, as above
	20	Marl, as above
		Trace fossils
6720-6740	60	Calcarenite, as above
	40	Marl, as above
		Trace fossils
6740-6760	70	Calcarenite, as above
	30	Marl, as above
		Trace fossils
6760-6780	60	Calcarenite, as above
	40	Marl, as above
		Trace fossils
6780-6800		As above
6800-6820	70	Calcarenite, as above
	30	Marl, as above
		Trace fossils
6820-6840	50	Calcarenite, as above
	50	Marl, as above
		Trace fossils
6840-6860	80	Calcarenite, as above
	20	Marl, as above
		Trace fossils

DEPTH	%	DESCRIPTION
6860-6880	70	Calcarenite, as above
	30	Marl, as above
		Trace fossils
6897		P.O.O.H. for bit. Bit No. 7 drilled 284 feet in 9.4 hours
		New bit No. 8 XDG
		22/11/75
		N.B. #8 T.G. = V
6880-6900	85	Calcarenite, olive grey, very calcareous, very fine-fine, moderately sorted, firm-hard, acid residue is light brown chitinous or siliceous skeletal matrix, trace glauconite
	15	Marl, light grey, soft, very calcareous, slightly slity fossiliferous, composition same as calcarenite.
6900-6920	60	Calcarenite, as above, firm to medium grained, more glauconite
	40	Marl, as above
		Trace fossils - large forams. Trace pink-white calcite.
6920-6940	60	Calcarenite, as above
	40	Marl, as above
6940-6960	80	Calcarenite, as above, some poorly sorted with abundant clay sized matrix.
	20	Marl, as above
		Trace fossils.
6960-6980	50	Calcarenite, as above, some poorly sorted and grading to Marl.
	50	Marl, as above
		Minor chips of white vein calcite. Trace fossil fragements.
6980-7000	60	Calcarenite, as above
	40	Marl, as above
7000-7020	70	Calcarenite, light to medium grey, very fine to fine grained, moderate sorting, firm to hard. Acid residue (approx.30%) light brown organic? remains. Trace gluaconite, fossiliferous.
	30	Marl, light grey, soft very calcareous, residue same as calcarenite, fossiliferous.
7020-7040	70	Calcarenite, as above, fossiliferous forams, pyrite growth within one foram shell.
	30	Marl, as above
7040-7060	60	Marl, light grey grading to calcisiltite
	40	Calcarenite, as above
7060-7080	60	Calcarenite, as above,grading
	20	Calcisiltite grading to
	20	Marl as above. Fossiliferous, trace white calcite layers.
7080-7100	50	Calcarenite, very fine to fine, firm to hard, grading to calcilutite.
	50	Marl, soft and waxy, containing small percentage of fine sand size fossil fragments.
7100-7120	75	Calcilutite - Marl, firm to hard, dark olive grey, sub-fissile fracture. More acid residue than above.
	25	Marl, as above.
7120-7140	40	Calcilutite/Marl, as above subfissile to fissile, fossile impressions on some bedding planes.
	60	Marl, soft, as above, some laminated.

DEPTH	%	DESCRIPTION
7140-7160	70	Calcilutite, as above, firm to softer and less fissile than above, minor glauconite.
	30	Marl, soft as above. Minor calcarenite.
7160-7170	80	Calcilutite grading to calcarenite as above, slightly firmer, than previous sample
	20	Marl, as above
		POH to change bit.
7170-7180	70	Calcilutite, as above mainly silt size matrix, light to medium grey, firm to hard, fossils, trace glauconite.
	30	Marl, soft, light grey, fossils, trace glauconite. Trace red siltstone, quartzose, soft non calcareous.
7180-7200		Calcilutite/Marl as above. The firm calcilutite grades into the softer Marl above. Trace red siltstone, as above.
7200-7220	70	Calcilusite/
	30	Marl, as above mainly firm hard subfissile calcilutite grading into smaller amounts of soft marl, trace very fine to fine hard calcarenite. Trace fossils.
7220-7240	50	Calcilutite, as above
	50	Marl, as above
7240-7260	50	Calcilutite/very fine calcarenite, as above
	50	Marl, as above Trace fossils.
7260-7280	60	Calcilutite/very fine calcarenite, as above
	40	Marl, as above Trace fossils
7280-7300	30	Calcilutite, as above
	70	Marl, as above
7300-7320	70	Marl, soft light grey, earthy fossils, trace glauconite.
	30	Calcilutite/very fine calcarenite, as above, mainly firm to hard, some softer, grading to Marl. Composition same as marl.
7320-7340	60	Marl, as above
	40	Calcilutite, as above
7340-7360	70.	Marl, as above.
	30	Calcilutite, to very fine calcarenite, as above
7360-7380	60	Calcilutite-very fine calcarenite, as above, speckled, medium grey, firm to hard, subfissile, platy chips, fossils, trace glauconite.
	40	Marl, as above, light grey, soft, fossils, glauconite.
		P.O.H. New Bit
7380-7400	40	Calcilutite/calcarenite, as above
	60	Marl, as above

DEPTH	%	DESCRIPTION
7400-7420	40	Calcilutite/calcarenite, as above
	30	Marl, as above
	30	Shale, dark red-brown, non calcareous, large fissile platy samples show strong bedding plane lineations (probably flute casts). Smaller ships appear silty - similar to red brown siltstone encountered in small amounts after previous bit change (may be cavings. Some chips only have red coating and are grey inside. Still non-calcareous)
7420-7440	30	Calcilutite/calcarenite as above
	70	Marl, as above
		Trace red siltstone and red brown shale (cavings)
7440-7460	60	Calcilutite/calcarenite, as above
	40	Marl, as above
7460-7480	60	Calcilutite to very fine calcarenite, as above
	40	Marl, as above
		Trace calcite, red siltstone, as above.
		Gastropod? shell fragments.
7480-7500	70	Calcilutite to very fine calcarenite, as above
	30	Marl, as above.
7500-7520	70	Calcilutite to very fine calcarenite, medium grey, speckled, with dark roganic? flecks and trac glauconite grains, firm.
	20	Siltstone, red brown, quartz, firm to soft, very platy, non calcareous. Some grains only have red surface - otherwise grey.
	10	Marl, light grey, soft fossils, trace glauconite.
		Trace calcite,white, good crystals.
7520-7540	80	Calcilutite to very fine calcarenite, as above
	10	Siltstone, as above.
	10	Marl, as above. Minor calcite.
7540-7560	85	Calcilutite to very fine calcarenite, as above
	10	Marl, as above
	5	Siltstone, as above
7560-7570	70	Calcilutite to very fine calcarenite, as above
	20	Siltstone, red to brown, easily broken apart, as above
	10	Marl, as above. Trace calcite.
7570-7580	75	Calcilutite to very fine calcarenite, as above
	20	Marl, as above
	5	Siltstone, as above
		Trace calcite, crystals, white.
7580-7590	80	Calcilutite to very fine calcarenite, as above
	20	Marl, as above
		Minor siltstone, as above, minor calcite as above
7590-7600	20	Calcilutite and very fine calcarenite, mid to dark olive grey. Platy subfissile fracture. Trace glauconite, fossils.
	80	Marl, light grey, soft, puggy.
7600-7610	60	Calcilutite to calcarenite, as above
	40	Marl, as above
7610-7620	70	Calcilutite to calcarenite, as above
	30	Marl, as above
		Fossils - globular forams and ?crinoid stems.
7620-7630	50	Calcilutite to calcarenite, very fine as above
	50	Marl, as above. Fossils as above

DEPTH	%	DESCRIPTION
7630-7640	30	Calcilutite to calcarenite, very fine, as above
	70	Marl, as above.
		Fossils, as above
7640-7650	50	Calcilutite to very fine calcarenite, as above.
	50	Marl, as above
		Fossils, as above
7650-7660	40	Calcilutite and minor very fine calcarenite, mid olive grey, firm to hard, platy, subfissile fracture. Globular forams, traces of glauconite.
	60	Marl, light grey, mainly soft, rare firmer chips show subfissile fragments and ?crinoid fragments.
7660-7670	30	Calcilutite/Calcarenite, as above
	70	Marl, as above
		Fossils as above
7670-7680	20	Calcilutite-Calcarenite, as above
	70	Marl, as above
	10	Siltstone, red brown, fissile mainly silt sized grains. Current lineations on bedding surfaces ?flute casts.
		P.O.H. 7691 to change bit.
		New bit - X.D.G. by mistake
7680-7690	50	Calcilutite to very fine calcarenite, as above
	40	Marl, as above
	10	Siltstone, as above
7690-7700	60	Marl, light grey, soft occasionally firm, fossils, trace glauconite, fine laminations grades to
	40	Calcilutite to very fine calcarenite, light to medium grey, firm to hard, subfissile fracture, fossils. Trace glauconite. Trace shell fragments.
7700-7710	50	Calcilutite to very fine calcarenite, as above
	50	Marl, as above
7710-7720	65	Marl, as above
	35	Calcilutite to very fine calcarenite as above
7720-7730	75	Marl, as above.
	25	Calcilutite to very fine calcarenite, as above
7730-7740	75	Marl, light to medium grey, soft, firm, globular forams, trace glauconite and other dark grains - organic?
	25	Calcilutite to very fine calcarenite, medium grey, firm to hard, subfissile, platy chips, forams, trace glauconite, speckled appearance.
7740-7750	70	Marl, as above, acid residue appr. 50% medium to dark grey to brown.
	30	Calcilutite to very fine calcarenite, as above
		Acid residue approx. 30% medium to dark grey to brown.
7750-7760	75	Marl, as above, fair
	25	Calcilutite to very fine calcarenite as above.
7760-7770	70	Marl, as above, grading to
	30	Calcilutite to very fine calcarenite.
7770-7780	60	Marl, as above
	40	Calcilutite to very fine calcarenite as above

HAPUKU #1 SAMPLE DESCRIPTIONS BELLIS/KEMP

11-21/7/75.

DEPTH	%	DESCRIPTION
7780-7790	60	Marl, as above
	40	Calcilutite to very fine calcarenite, as above
7790-7800	60	Calcilutite to very fine calcarenite, mid to dark olive grey, firm to hard, platy fracture, globular forams. Trace glauconite
	40	Marl, light grey, soft
7800-7810	30	Calcilutite to very fine calcarenite, as above
	70	Marl, as above Trace fossils.
7810-7820	25	Calcilutite to very fine calcarenite, as above
	75	Marl, as above Trace fossils.
7820-7830	25	Calcilutite to very fine calcarenite, as above
	75	Marl, as above Trace fossils.
7830-7840	40	Calcilutite to very fine calcarenite, as above
	60	Marl, as above Trace shell fossil fragemtns, globular forams.
7840-7850	50	Calcilutite to very fine calcarenite, mid to dark olive grey. firm (not as well cemented as similar samples higher in the hole) glauconite traces, globular forams. Trace shell fossil fragments.
7850-7860	50	Calcilutite, as above
	50	Marl, as above
7860-7870	50	Calcilutite to calcarenite, very fine, as above, some hard but mainly firm.
	50	Marl, as above Fossils, as above
7870-7880	40	Calcilutite to very fine calcarenite as above
	60	Marl,
7880-7890	30	Calcilutite to very fine calcarenite, as above
	70	Marl, as above
7890-7900	30	Calcilutite to very fine calcarenite, medium grey, speckled firm to hard, abundant forams, trace glauconite, dark acid insolubles.
	70	Marl, soft, light grey, forams, trace glauconite, faint laminations
7900-7910	80	Marl, as above
	20	Calcilutite to very fine calcarenite, as above, generally not as hard as further up hole.
7910-7920	50	Calcilutite to very fine calcarenite, as above
	50	Marl, as above.
7920-7930	50	Calcilutite to very fine calcareous, as above, light to medium grey.
	50	Marl, as above Up to 50% acid residue in both Marl and Calcilutite, medium to dark brown clays? orgainc material ?
7930-7940	60	Marl, as above
	40	Calcilutite to very fine calcarenite, some hard chips as before up hole.
7940-7950	60	Marl, as above
	40	Calcilutite to very fine calcarenite, as above

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
7950-7960	80	Marl, as above
	20	Calcilutite to very fine calcarenite, as above
7960-7970	80	Marl, as above
	20	Calcilutite to very fine calcarenite, as above, soft to firm.
7970-7980	90	Marl, as above
	10	Calcilutite to very fine calcarenite.
7980-7990	10	Calcilutite mid to dark olive grey, firm, platy fracture, globular forams.
	90	Marl, soft, light grey, abundant clear globular forams.
7990-8000	15	Calcilutite, as above
	80	Marl, as above
	5	Shale, red brown to light grey, mainly silt sized grains? mostly quartz, minor carbonate, current lineations on bedding surfaces.
8000-8010	70	Calcilutite mid to dark olive grey, hard to firm.
	30	Marl, as above
8010-8020	30	Calcilutite, as above
	70	Marl, as above
8020-8030	30	Calcilutite, as above
	70	Marl, as above
8030-8040	40	Calcilutite, as above
	60	Marl, as above
8040-8050	10	Calcilutite, as above
	90	Marl, as above
8050-8060	10	Calcilutite, mid to dark olive grey, firm to hard, subfissile fracture, trace glauconite, globular forams, rare shell fossil impressions (one definite sulcate brachiopod).
	90	Marl, light grey, soft, globular forams, rare shelly fossil impressions.
8060-8070	10	Calcilutite, as above
	90	Marl, as above
8070-8080	10	Calcilutite, as above
	90	Marl, as above
8080-8090	10	Calcilutite, as above
	90	Marl, as above
8090-8100	5	Calcilutite, as above
	95	Marl, as above
8100-8110	10	Calcilutite, as above
	90	Marl, as above
8115		Driller picked drilling break - increased rate.
8110-8120	15	Calcilutite,as above
	85	Marl, as above
8120-8140	5	Calcilutite, as above
	95	Marl, as above
8140-8160	5	Calcilutite, as above
	95	Marl, as above

DEPTH	%	DESCRIPTION
8160-8170	5	Calcilutite, as above
	95	Marl, as above
8170-8190	100	Marl, light grey, soft and tacky, abundant globgerina, trace glauconite, muddy, verging on calcareous-claystone. Minor calcilutite, as above.
8190-8210	100	Marl, as above. Minor calcilutite, as above
8210-8230	95	Marl to calcareous claystone, as above.
	5	Calcilutite, medium grey, firm to hard, subfissile fracture, forams.
8230-8250	95	Calcareous claystone, very soft and muddy, fossils, trace glauconite, very calcereous.
	5	Calcilutite, as above
8250-8270	95	Calcareous claystone, light grey, soft and tacky, as above
	5	Calcilutite, as above
8270-8290	95	Calcareous claystone, as above
	5	Calcilutite to very fine calcarenite, as above.
8290-8310	70	Calcareous claystone to marl, slightly firmer, and less tacky, than above - less clay forams, trace glauconite.
	30	Calcilutite, medium grey, soft to firm, platy, subfissile fracture, forams, trace glauconite.
8310-8330	70	Calcareous claystone to marl, as above
	30	Calcilutite, as above
8330-8350	80	Calcareous claystone, as above
	20	Calcilutite to calcareous shale, medium grey to green, subfissile, firm.
8350-8370	65	Calcareous claystone, light grey, soft and tacky, very calcareous, very fossiliferous, trace glauconite.
	35	Calcareous shale, medium grey to green, subfissile, firm, fossils, trace pyrite, on some surfaces.
8370-8390	60	Calcareous claystone, as above
	40	Shale, calcareous grey to green, as above
8390-8410	55	Calcareous claystone, as above
	45	Shale, as above
8410-8430	70	Calcareous claystone, as above, very calcareous grades to Marl
	30	Shale, as above
8430-8450	75	Shale, as above
	25	Calcareous claystone to marl, as above
8450-8470	50	Shale, as above
	50	Calcareous claystone to marl, as above
8470-8490	60	Shale, olive grey to blue grey, firm to hard and indurated subfissile to subconcoidal fracture, calcareous.
	40	Marl, soft, light grey, globular forams. Trace crinoid stems.
8490-8510	50	Shale, as above
	50	Marl, as above

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
8510-8530	70	Shale, as above
	30	Marl, as above
8530-8540	50	Shale, as above
	50	Marl, as above
8540-8550	60	Shale, as above
	40	Marl, as above
8550-8560	40	Shale, as above
	60	Marl, as above
8560-8570	70	Shale, as above
	30	Marl, as above
8570-8580	50	Shale, olive grey to blue grey, firm to hard, some indurated subfissile to splintery, calcareous.
	50	Marl, light grey, soft, globular forams. Trace shelly fossils
8580-8590	30	Shale, as above
	70	Marl, as above
8590-8600	40	Shale, as above
	60	Marl, as above
8600-8610	40	Shale, as above
	60	Marl, as above
8610-8620	40	Shale, as above
	55	Marl, as above
	5	Calcilutite, mid grey, hard, subfissile, grades into the calcareous shale.
8620-8630	80	Shale, as above
	20	Marl, as above
8630-8640	80	Shale, as above
	20	Marl, as above
8640-8650	70	Shale, as above
	30	Marl, as above
8650-8660	80	Shale, as above
	20	Marl, as above
8660-8670	70	Shale, as above
	30	Marl, as above
8670-8680	60	Shale, as above
	40	Marl, as above
8680-8690	80	Shale, light to medium grey-green, moderately calcareous, firm platy subfissile fracture, pyrite in vugs.
	20	Marl, light grey, soft and tacky, forams acid residue approx. 50% i.e. grades to calcareous claystone.
8690-8700	85	Shale, as above
	15	Marl, as above. Trace pyrite.
8700-8710	70	Shale, as above, mostly medium olive grey, some green.
	30	Marl, mostly firmer than above - like a more clayey calcilutite.
8710-8720	80	Shale, as above
	10	Marl, soft, light grey, fossils,
	10	Calcilutite to very fine calcareous, light grey-brown, firm, friable, grades to shale. Trace pyrite.

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
8720-8730	80	Shale, as above
	10	Marl, as above
	10	Calcilutite-very fine calcarenite. as above. Trace pyrite.
8730-8740	50	Shale, as above
	50	Marl, as above. Minor calcilutite as above
8740-8750	70	Shale, as above
	20	Marl, as above
	10	Calcilutite to very fine calcarenite, as above
8750-8760	70	Shale, as above
	20	Marl, as above
	10	Calcilutite to very fine calcarenite, as above, grades to shale. Trace pyrite.
8760-8770	60	Shale, medium olive grey, some green, firm subfissile, moderately calcareous, trace pyrite in holes.
	25	Calcilutite, light to medium grey, soft - friable, (easily crushable) grades in part to shale. Approx. 50% (+?) acid residue.
	15	Marl, soft, light grey, tacky forams.
8770-8780	70	Shale, as above
	20	Calcilutite to calcareous mudstone, as above
	10	Marl, as above
8780-8790	55	Shale, as above
	30	Calcareous mudstone, as above, grades to shale
	15	Marl, as above
8790-8800	70	Shale, as above
	20	Calcareous Mudstone, as above
	10	Marl, as above
8800-8809	75	Shale, as above
	20	Calcarenous mudstone, as above, gradational between shale & marl.
	5	Marl, as above Trace pyrite.
		P.O.H. @ 8809', new bit XIG
8809-8820	90	Shale, medium grey to grey-green, firm, subfissile, calcareous pyritic.
	10	Calcareous Mudstone, friable , light to medium grey, forams, grades to shale.
8820-8840	80	Shale, as above
	20	Calcareous mudstone, mainly silt size, fossils, firm to soft. Trace large forams, pyrite.
8840-8860	80	Shale, as above
	20	Calcareous mudstone, as above Trace pyrite.
8860-8880	80	Shale, as above
	20	Calcareous Mudstone, as above
8880-8900	90	Shale, as above, siltier and harder
	10	Calcareous mudstone, silt siltsize, as above. Trace pyrite.
8900-8920	90	Shale, as above
	10	Calcareous mudstone, as above Trace pyrite.

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
8920-8940	85	Shale, as above
	15	Calcareous mudstone/marl, as above
8940-8960	85	Shale, as above
	15	Calcareous Mudstone, as above
8960-8980	75	Shale, grey-green to blue grey, firm, subfissile to splintery, calcareous, trace forams
	25	Calcareous mudstone/marl, light grey, soft, globulur forams
8980-9000	60	Shale, as above
	40	Calcareous mudstone, as above
9000-9010	60	Shale, as above
	40	Calcareous mudstone, as above
9010-9020	60	Shale, olive grey-blue grey, firm to hard, subfissile to splintery, calcareous.
	40	Calcareous Mudstone, light grey, soft to firm, dull earthy fracture.
		Trace shelly fossils, including one pyritized crinoid stem.
9020-9030	70	Shale, as above
	30	Calcareous mudstone, as above
9030-9040	70	Shale, as above
	30	Calcareous mudstone, as above
		Trace shelly fossil impressions and forams
9040-9050	60	Shale, as above
	40	Calcareous mudstone, as above
		Trace fossils, as above
9050-9060	60	Shale, as above
	40	Calcareous mudstone, as above
		Trace fossils, as above.
9060-9070	70	Shale, as above
	30	Calcareous mudstone, as above
		Trace fossils, as above
9070-9080	60	Shale, as above
	40	Calcareous mudstone, as above
		Trace fossils, as above
9080-9090	70	Shale, as above
	30	Calcareous mudstone, as above
9090-9100	70	Shale, as above
	30	Calcareous mudstone, as above
9100-9110	70	Shale, as above
	30	Calcareous mudstone, as above
9110-9120	60	Shale, olive grey-dark grey, firm to hard, subfissile to splintery, calcareous.
	40	Calcareous mudstone, light grey to green grey, mainly silt grainsize, very calcareous, soft to firm. Trace shelly fossils and forams. Trace pyrite, commonly replacing fossils.
9120-9130	50	Shale, as above
	50	Calcareous mudstone, as above
		Trace fossils.
9130-9140	50	Shale, as above
	50	Calcareous mudstone, as above.

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
9140-9150	40	Shale, as above
	60	Calcareous Mudstone, as above Trace Fossils, Trace quartz grains, fine to medium grained well rounded white to pink.
9150-9160	60	Shale, as above grades to
	40	Calcareous mudstone, as above
9160-9170	60	Shale, as above
	40	Calcareous Mudstone, as above Trace pyrite, trace glauconitic grains
9170-9180	70	Shale, as above
	30	Calcareous Mudstone, as above.
9180-9190	70	Shale, as above
	30	Calcareous Mudstone, as above
9190-9200	75	Shale, as above
	25	Calcareous mudstone, as above Trace very fine sandstone, very glauconitic, quartz, very calcareous, hard, trace pyrite.
9200-9210	70	Shale, medium grey to grey green, fine, calcareous, subfissile to splintery.
	20	Calcareous mudstone, as above
	5	Sandstone, very fine, tight, buff, very glauconitic, non calcareous. hard, no fluorescence or cut.
	5	Sand, loose, medium to coarse, well rounded, clear. One clear platy grain yellow-white fluorescence, no cut, non calcareous.
9210-9220	75	Shale, as above
	10	Calcareous mudstone, as above
	15	Sand, loose fine to coarse, predominantly medium, well rounded quartz and glauconite
9220-9230	75	Shale, as above
	10	Calcareous mudstone, as above
	15	Disaggregated sand, mainly quartz, fine to very coarse, mainly medium to coarse, subangular to subrounded, mainly subrounded, small grains and coatings of glauconite, traces of pyrite, cement and free cubes.
		Rare specks of fluoresence, not cut.
		DRILLING BREAK 9236'
9230-9240	85	Shale and calcareous mudstone, as above
	15	Sand grains, mainly quartz, fine to very coarse, mainly fine to medium, subrounded to subangular, traces glauconite, common pyrite cement. Rare specks of fluoresence.
		Hot wire gas reading - 216 units C4 700 ppm, C5 Nil.
9245-9288'		CORE #1 CUT, Rec. 43'
9288-9325'		CORE #2 CUT, Rec. 37'
9325-9369'		Core #3 CUT, Rec. 44'
		Hydrocarbon/water contact at about 9352'.
		R.I.H. 1500 hrs. 1/8/75 with XDG

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
9370-9380	90	Cavings, marl and calcareous siltstone
	5-10	Quartz grains, 0.5 to 1 mm, subrounded, some broken, lightly frosted, no shows.
	0-5	Sandstone, Fine grained, verly light grey, quartzose, moderately hard, minor glauconite, moderately sorted, no shows. Trace pyrite.
9380-9390		Last sample prior to hanging off in casing.
	90	90% Cavings, marl and calcareous siltstone
	10	Quartz grains, as above, no shows.
		Trace Sandstone, as above, no shows
		Trace pyrite.
9401 (9403 Totco)		Generator failure due to overheating. Only enough power to pull back into casing. could not circulate B.U.
9380-9390	95	Cavings, marl to calcareous siltstone
Firs sample up	5	Quartz grains,
		Trace Sandstone, as above, trace cement.
		Major drilling break at 9420' circulating up
9390-9400	95	Cavings, marl to calcareous siltstone
	5	Quartz grains. Trace sandstone as above, trace cement
9400-9410	95	Marl - calcareous siltstone, medium grey, calcareous, firm to hard,
	5	Sandstone, fine to medium grained, quartz, glauconite, pyrite, dolomite cement.
		Trace well rounded quartz grains, trace cement.
9410-9420	40	Marl to calcareous siltstone, as above
	10	Sandstone, as above
	50	Quartz sand, unconsolidated, well rounded, medium to well sorted, loose sand grains, very coarse - granulte, trace fluorescence from dolomitized sandstone, trace mineral fluorescence, no cut.
9420-9430	40	Marl - calcareous siltstone, as above
		Trace sandstone as above
	60	Quart sand, as above, good reservoir type sand.
		Trace pyrite, trace glauconite, trace cement.
9430-9440	80	Quartz sandstone, as above
	20	Calcareous siltstone, as above
		pyrite, glauconite, trace dolomite sandstone, as above. trace cement.
9440-9450	40	Quartz sandstone, as above
	60	Calcareous siltstone, as above
		Trace pyrite, trace glauconite, trace dolomitic sandstone as above, trace cement.
9450-9460	50	Quartz sandstone, as above
	50	Calcareous siltstone, as above
		Trace pyrite, trace gluaconite, trace dolomitic sandstone, trace cement.
9460-9470	90	Quartz sandstone, unconsolidated, coars to pebble grained, moderate sorting, rounded to well rounded, trace glauconite, good reservoir.
	10	Calcareous siltstone, medium grey, firm to hard, glauconite with pyrite.
		Trace dolomitic sandstone - quartz, pryite, dolomite cement subangular to rounded, hard, tight.
		Trace cement

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
9470-9480	95	Quartz sandstone, unconsolidated, coarse to pebbly, moderately sorted, rounded to well rounded, trace glauconite, good reservoir.
	5	Calcareous siltstone, edium grey, firm to hard Less than 5% glauconite. NOTE: pittings in sand are infilled with glauconite.
9480-9490	95	Quartz sandstone, as above Less than 5% calcareous siltstone, as above Trace pyrite, glauconite, trace cement.
9490-9500	100	Quartz Sand, as above, pittings in sand are infilled with glauconite, trace calcareous siltstone glauconite, trace pyrite, trace cement.
9500-9510	100	Quartz sand as above Less than 5% Calcareous siltstone, as above glauconite, trace pyrite.
9510-9520	100	Quart sand as above Less than 5% Calcareous Siltstone, as above
9520-9530	100	Quartz sand, as above Less than 5% calcareous siltstone, as above Trace quartz sandstone, hard, tight, cemented glauconite, pyrite. Trace pyrite.
9530-9540	90	Quartz sand, as above
	10	Calcareous siltstone, as above Trace pyrite.
9540-9550	100	Quartz sand, coarse to 2 mm, moderately sorted, moderately well rounded, mostly clear to slightly frosted, many grains broken, occasional glauconite infilling surface pits in grains, no shows. Trace sandstone, very light grey, fine grained, well sorted, glauconite and trace pyrite. Trace Calcareous siltstone and Marl cavings, trace pyritic granules.
9550-9560	50	Quartz sand, as above
	50	Calcareous Siltstones and Marl, cavings Trace sandstone, as above Trace pyritic granules.
9560-9570	50	Quartz sand, coarse to 3mm, moderately sorted, subrounded to (mostly clear) subangular, some broken, occasionally glauconte infilling surface puts in grains, slightly frosted, no shows.
	50	Calcareous silstone and marl, as above, cavings Trace pyritic granules.
9570-9580	50	Quartz sand, as above, tending to white
	50	Calcareous siltstone and Marl, caving Trace pyrite.
9580-9590	70	Quartz sand, as above, no shows
	30	Calcareous siltstone and marl, cavings Trace Sandstone, very light grey, fine grained, glauconite bright yellow fluorescence, slow dull yellow cut.
9590-9600	70	Quartz sand, as above no shows
	30	Calcareous siltstone and marl, cavings Trace sandstone, as above
9600-9610	50	Quartz sand, coarse ot 2 mm, subangular to subrounded, some

DEPTH	%	DESCRIPTION
9600-9610 cont'd		glauconite in pits on surface, mostly white, some clear some slightly frosted, no shows.
	50	Calcareous siltstone and marl, light grey to medium light grey, moderately firm, very calcareous, probably cavings, although hole is supposedly in good condition and returns have a large % of this material. However this material is interbedded with the sand. Trace sandstone very light grey, glauconitic in part, good yellow fluorescence, very slow dull yellow cut
9610-9620	60	Quartz sand, as above, no shows
	40	Calcareous siltstone and Marl, as above
9620-9630	40	Quartz sand, as above, no shows
	60	Calcareous siltstone and marl, as above
		Trace pyrite
9630-9640	40	Quartz sand, as above no shows
	60	Calcareous siltstone and marl, as above
		Trace sandstone, light grey, fine grained as above, no shows
9640-9650	30	Quartz sand, as above no shows
	70	Calcareous siltstone and marl as above
		Trace sandstone, as above, good yellow fluorescence, very slow weak cut.
9650-9660	40	Quartz sand, as above no show
	60	Calcareous siltstone and marl, as above
		Trace siltstone, as above, no shows
9660-9670	30	Quartz sand, loose, coarse to 2 mm, subangular to subrounded, some broken, rare glauconite in pits on surface, moderate sorting, no shows, mostly clear grains.
	70	Calcareous siltstone and Marl, light to medium light grey, moderately firm, very calcareous, ranges from marlie calcareous claystone to calcisiltite to calcareous siltstone. From 9550' on we have had major % of cutting being calcareous siltstone. It is possible that sand may be cavings from that point on.
		Trace sandstone, fine grained, very light grey, glauconite good yellow fluorescence, no cut.
9679-9680	80	Quartz sand, as above, no shows
	20	Calcareous siltstone and marl, as bove
9680-9690	80	Quartz sand, as above, mostly clear graines, no shows some white.
	20	Calcareous siltstone and marl, as above
		Trace sandstone, as above, but no shows.
9700-9710	80	Quartz sand, loose, coarse to 2 mm, subangular to subrounded, some broken, rare glauconite in surface puts on grains, moderately sorted, mostly clear grains, no shows.
	20	Calcareous siltstone and Marl, light to medium light grey, moderately firm, very calcareous, probably cavings.
		Trace sandstone, dark grey, heavily glauconitic, fine grained no shows.
9710-9720	100	Quartz sand, as above, no shows
		Trace calcareous siltstone and marl, as above
9720-9730	100	Quartz sand, coarse to very coarse grained, fewer grains to 2mm, otherwise as above, no shows
9730-9740	90	Quartz sand, loose, subangular to subrounded, rare glauconite moderately sorted, mostly clear some white, some slightly frosted mostly coarse to very coarse grained, 10% to 2 mm.
	10	Calcareous siltstone to marl, light to medium light grey, medium

DEPTH	%	DESCRIPTION
9730-9740 cont'd		firm, probably caving. Trace pyrite.
9740-9750	90 10	Quartz sand, as above Calcareous siltstone to marl, as above Trace pyrite.
9750-9769)	199	Quartz Sand, loose subangular to subrounded, some broken mostly clear, rare white grain and some slightly frosted, rare glauconite in pits on surface, coarse to very coarse, grained, 20% to 2 mm. Trace calcareous siltstone to marl cavings
9760-9770	100	Quartz sands, as above Trace cavings as above
9770-9790	100	Quartz sand, as above Trace cavings, as above, trace pyrite.
9790-9800	100	Quartz sand, loose, subrounded, broken, mostly clear, some white grain, coarse to very coarse, rare 2 mm grains no shows. Trace calcareous siltstone to marl cavings Trace pyrite.
9800-9810	100	Quartz Sand, as above Trace sandstone, very light grey to medium grey, quartzose glauconitic in part, trace pyrite.
9810-9820	100	Quartz sand, coarse to very coarse, rare 2mm grains, subrounded, some broken, generally clear some white grains, well sorted. Trace Sandstone, light to medium grey, glauconitic in part, trace calcareous siltstone and marl, medium grey, moderately firm, cavings.
9820-9830	80 20	Quartz sand, as above Trace sandstone, as above Calcareous siltstone and marl, cavings as above
9830-9840	90 10	Quartz sand as above Calcareous siltstone and marl, cavings as above Trace sandstone, as above, trace pyrite and glauconite grains
9850-9860	90 10	Quartz sand, as above, rare glauconite on surface of grains. Calcareous siltstone and marl, as above Trace sandstone as above, trace yellow fluorescence, very slow weak, dull yellow cut. Trace pyrite and glauconite grains.
9860-9870	30 70	Quartz Sand, as above Calcareous shale-siltstone, cuttings are very splintery (overpressured?). Trace sandstone, as above. Trace glauconite
9870-9880	100	Calcareous shale - siltstone, dark grey, hard, trace glauconite trace pyrite, forams, splintery cuttings (overpressured) trace sandstone as above, dolomite cement 5% trace quartz sand Trace sandstone -siltstone, light grey, firm, glauconite quartz pyrite
9860-9876		Shale was encountered which had the appearance of an overpressured shale. Mud weight was raised accordingly to 10#/gasl.
9876-9880	80% 20	Calcareous shale-siltstone, medium grey to medium dark grey very calcareous. SAnd, quartz, loose, coarse to 2 mm, no show.

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
9880-9890	100	Quartz sand, loose coarse to 2 mm, clear, some slightly frosted grains, subrounded, well sorted, rare glauconite, no shows. Trace (2 grains) Sandstone, light grey, fine to medium grained well sorted, trace glauconite, trace pyrite, dull fluorescence, very low weak cut. Trace calcareous shale/siltstone, as above
9890-9900	90	Quartz Sand, loose, coarse to 2 mm, clear some slightly frosted, subrounded, some broken, moderate sorting, rare glauconite trace pyrite, no shows.
	10	Calcareous shale/siltstone, medium grey to medium dark grey, very calcareous, forams.
9900-9910	90	Quartz sand, as above, rare grains have matrix surrounding them. Matrix is a fine grained sandstone with a siliceous cement, very tight and very hard. No shows.
	10	Calcareous shale/sandstone as above Trace pyrite
9910-9920	70	Sandstone, very light grey, fine to 2 mm, very poorly sorted, tend to have coarse to 2 mm grains in fine grained matrix. Generally large grains isolated, occasionally have matrix attached. Large grains subrounded, clear to slightly milky, rare medium light grey grains. Matrix is fine grained, siliceous cement in part, very tight, trace glauconite, trace pyrite.
	30	Calcareous shale/calcareous siltstone, as above
9920-9930	15	Sandstone, light grey, coarse to 2mm grain in fine grained matrix, siliceous and dolomitic cement in part, subrounded large grains, generally clear to slightly milky, rare medium grey large grains, trace glauconite, trace pyrite, poorly sorted, no shows
	85	Calcareous shale/calcareous siltstone, medium light grey, moderately firm, very calcareous, fossils mainly forams.
9930-9940	15	Sandstone, as above
	85	Calcareous shale/calcareous siltstone, meduum light grey to medium grey, as above.
9940-9950	20	Sandstone, as above, dolomitic cement in part.
	80	Calcareous shale/calcareous siltstone, medium light grey to medium grey, moderately firm, very calcareous, fossils mainly forams
9950-9960	20	Sandstone, as above, dolomitic cement, in part
	80	Calcareous shale/calcareous siltstone as above
9960-9970	10	Sandstone, as above, ?cavings
	90	Calcareous shale/calcareous siltstone, as above
9970-9980	20	Sandstone, as above, no shows
	80	Calcareous shale/calcareous siltstone, as above. Trace pyrite trace glauconite. Trace white soft mineral, with minor black streaks, non calcareous, non dolomitic, tasteless?!
9980-9990	20	Sandstone, as above, no shows
	80	Calcareous shale/calcareous siltstone, as above. Trace pyrite, trace white soft mineral as above.
9990-10,000	60	Calcareous shale/calcareous siltstone, medium grey, very calcareous trace fossils, tends to fine grained in part, glauconite.
	40	Quartz Sand, coarse to 2mm, subrounded, clear to some milky, fine grained sandstone, probably matrix present, this is glauconite, trace pyrite, no shows. Dolomitic cement for matrix in part. Trace white soft mineral, non calcareous, non dolomitic.

HAPUKU #1 SAMPLE DESCRIPTIONS

Bellis/Kemp/Morton/
Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
10,000-10,005		LAST SAMPLE AFTER CIRC. B.U)
	50	Calcareous shale/ calcareous siltstone, as above
	50	Quartz sand, as above, no show
		Trace white soft mineral as above
		BIT #17. J-33
		BIT #16 lasted 4.9 hours and drilled 129'.
10,005-10,010	95	Calcareous shale/calcareous sandstone, medium dark grey, calcareous, firm, trace glauconite, trace pyrite, forams.
	5	Quartz sand, unconsolidated, well rounded to rounded, medium to coarse.
		Trace sandstone, fine grained, medium dark grey, quartz, glauconite, pyrite, silty, poorly sorted, angular to subangular, calcareous. Trace dolomitic sandstone, cavings from above dull white fluorescence.
10,010-10,020	95	Calcareous shale/siltstone, as above
	5	Quartz sand, as above
		Trace sandstone, as above
		Trace glauconite, trace pyrite.
10,020-10,030	95	Calcareous shale/siltstone, as above
	5	Quartz sand, as above
		Trace pyrite, trace glauconite
10,030-10,40	95	Calcareous shale/siltstone, as above
	5	Quartz sand, as above
		Trace pyrite, trace glauconite, trace sandstone, as above
10,040-10,050	30	Calcareous shale/siltstone, medium dark grey, firm to hard, calcareous, trace glauconite, trace pyrite.
	70	Quartz sand, unconsolidated, coarse to pebbly, well rounded rounded, moderately well sorted. Trace pyrite, trace glauconite, trace sandstone, fine grained, silty, poorly sorted, quartz, glauconite, pyrite.
10,050-10,060	30	Calcareous shale/siltstone, as above
	70	Quartz sand, as above
		Trace pyrite, trace glauconite.
		Trace sandstone as above
10,060-10,070	20	Calcareous shale/calcareous siltstone, medium grey to medium dark grey, very calcareous, moderately firm, trace glauconite and trace pyrite, only visible in siltstone portion.
	80	Quartz Sand, unconsolidated, coarse to 3 mm, most grains in very coarse to 3 mm range, subrounded, moderately well sorted, trace pyrite and trace glauconite, on grain surface, 10% grey quartz grains. No shows.
10,070-10,080	100	Quartz sand, unconsolidated, coarse to very coarse, sand, rare granules, subangular to subrounded, mostly clear, some milky and rare medium light grey quartz grains, moderately well sorted, rare glauconite and trace pyrite, no shows.
		Trace calcareous shale/siltstone as above
10,080-10,090	100	Quartz sand, as above, no shows
		Trace calcareous shale/siltstone, as above
10.090-10,100	100	Quartz sand, as above no shows
		Trace calcareous shale/siltstone, as above

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
10,100-10,110	100	Quartz sand, unconsolidated, coarse to very coarse sand, rare granules, subangular to subrounded, mostly clear, some milky and rare medium light grey quartz grains, moderately well sorted, rare glauconite and trace pyrite, no shows. Trace calcareous shale/siltstone, medium dark grey, firm to moderately hard, very calcareous, trace glauconite, trace pyrite, probably cavings.
10,110-10,120		Last sample before logging
	80	Quartz sand, coarse to very coarse grained, rare granules, subangular to subrounded, mostly clear some milky grains, moderately well sorted, trace glauconite, trace pyrite. No shows.
	20	Calcareous shale/calcareous siltstone, medium dark grey, very calcareous, moderately hard in places.
		P.O.H. 1035 hrs. Make 30 stand wiper trip, circulate out P.O.H. Rig up for logging
		Bit #19, J-7 lasted 3.2 hrs. drilled 40'.
10,115-10,120	80	Quartz sand, coarse to granule, predominantly granules many are fractured. Well rounded, clear to milky.
	20	Siltstone, dark grey, sandy, very carbonaceous, micaceous pyritic, friable. Cement cavings
10,120-10,130	40	Quartz sand, coarse to granule, as above, trace pyrite
	60	Siltstone, dark grey, micaceous, pyrite, as above cement cavings.
		Bit # 20 . XDG lasted 3.1 hrs. drilled 13'
		Stopped circulating and pulled out of hole to change bit - no returns between 10,130-10,160.
		Bottoms up sample 20% Quartz sand as above 80% Siltstone as above. Cement cavings
		Ran reverse circulation trip with two junk baskets - no recovery Bit #21 XDV.
		Bottoms up sample. 95% Siltstone, dark grey, firm to hard, quartz, carbonaceous, micaceous, trace pyrite, sandy. 5% Quart sand, coarse to granule, well rounded. Trace quartz sandstone, fine grained, subangular to subrounded, well sorted, pyritic cement in places.
10,167-10,170	90	Siltstone, as above
	10	Quartz sand, as above
10,170-10,180	95	Siltstone, dark grey, firm, quartz, micaceous, carbonaceous, material, pryite, trace glauconite/chlorite?
	5	Quartz sand, unconsolidated, coarse to granule, well rounded, fractured. Trace Quartz sandstone, light grey, fine grained subangular to subrounded, quartz, pyrite, carbonaceous material, glauconite/chlorite, moderately sorted.
10,180-10,190	70	Siltstone, as above
	30	Quartz sand, as above, few quartz grains, with pale blue fluorescence, dull yellow instant cut. NOTE: pipe dope did occur in sample, however this had yellow fluorescence and was different from above. Trace brown residue after cut. Quartz sandstone as above, pyrite, cement in part.

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
10,190-10,200	50	Siltstone, as above
	50	Quartz sand, as above
		Trace quartz sandstone, as above
10,200-10,210		DRILLING BREAK CIRCULATED SAMPLE UP
	90	Quartz sand, as above, pryite, trace glauconite/chlorite?
	10	Siltstone, as above,
		Trace quartz sandstone, as above
10,210-10,220	90	Quartz sand, clear-milky, coarse to granule, moderately well rounded, fractured grains, trace pyrite, chlorite.
	10	Siltstone, dark grey, very carbonaceous, micaceous, pyrite, friable, firm, sandy, grades in part to very fine sandstone.
		Trace very fine sandstone, white, pryitic cement in places
		P.O.H. to change bit. Bit #21 on bottom. Drilled
10,218-10,230	70	Sand, as above
	30	Siltstone, as above, trace chlorite/glauconite
		Trace pyrite.
10,230-10,240	65	Sand, as above
	35	Siltstone, as above, rare quartz grain interbedded in siltstone.
		Lithology: thinly interbedded coarse sand and siltstone
10,240-10,250	50	Quartz sand, unconsolidated, coarse to granule, well rounded, many are fractured, clear to milky,
	50	Siltstone, dark grey, firm, soft, quartz, micaceous, pyrite, carbonaceous, glauconite/chlorite? Sandy in part.
10,250-10,260	60	Quartz sand, as above, trace pyrite cement
	40	Siltstone, as above, quartz grains interbedded in siltstone, coarse grained, well rounded. Siltstone sandy in part, fine grained. Trace sandstone, hard, fine grained, moderately sorted, quartz, pyrite cement inpart, silty in part, moderately well rounded.
10,260-10,270	60	Quartz sand, as above
	40	Siltstone, as above
		Trace sandstone, as above. Trace pyrite.
10,270-10,280	50	Quartz sand, as above
	50	Siltstone, as above
		Trace sandstone, as above
10,280-10,290	50	Quartz sand, as above
	50	Siltstone, as above
		Trace sandstone, as above. Trace pyrite
		Bit #22 XDV 7.1 hrs on bottom. Drilled 102'
		Sample lodged in bit 22 very coarse sandstone, hard, tight, abundant pyritic cement.
		Bit #23 J-33, 5 u.T.G.
10,290-10,300	70	Siltstone, dark grey, firm to friable, quartz, mica, carbonaceous, pyrite, coarse to granule quartz, grains dispersed, thru siltstone (well rounded) sandy in part (fine grained) grains of glauconite/chlorite?
	30	Quartz sand, unconsolidated, coarse to granule, well rounded, many fractured, pyritic cement.
10,300-10,310	70	Siltstone, as above
	30	Sand, as above

DEPTH	%	DESCRIPTION
10,310-10,320	65	Siltstone, as above
	35	Sand, as above
		Formation is thinly interbedded siltstone and heavily pyritized very coarse quartz sandstone.
10,320-10,330	70	Siltstone, as above
	30	Sandstone, medium grained, well sorted, subrounded, trace dolomitic cement.
10,330-10,340	80	Siltstone, as above
	15	Quartz sand, as above
	5	Sandstone, fine to medium grained, white, hard, well sorted, subrounded to rounded, dolomitic and pyritic cement.
10,340-10,350	70	Siltstone, medium to dark grey, carbonaceous, micaceous, pyritic, friable, rare green grains - chlorite, rare very coarse quartz grains inbedded, sandy to bery sand - grades to very fine sandstone.
	20	Sandstone, white to light grey, friable to hard, well sorted subrounded to rounded, some dolomite cement, pyritic.
	10	Quartz grains, loose coarse to granule, fractured, well rounded, predominantly granules. In situ probably hard, sandstone to very coarse to granule, well cemented with pyrite.
10,350-10,360	60	Loose quartz grains, as above
	30	Sandstone, fine grained, as above
	10	Siltstone, as above
10,360-10,370	50	Loose Quartz grains, as above
	40	Sandstone, fine grained, dolomitic, hard, as above
	10	Siltstone, as above
10,370-10,380	50	Sandstone, as above, mineral fluorescence
	40	Loose Quartz grains, as above
	10	Siltstone, as above
10,380-10,390	60	Sandstone, fine to medium grained, light grey, hard, moderately well sorted, subangular to well rounded, tight, dolomitic cement. Grades into
	15	Sandstone, very fine, light to medium grey, hard, dolomitic pyrite, tight.
	20	Loose quartz grains, coarse to granule, fractured grains - originally moderate to well rounded.
	5	Siltstone, dark grey, firm to friable, carbonaceous, micaceous pyritic, non calcareous.
10,390-10,400	50	Sandstone, dolomite cement, as above, mineral fluorescence
	40	Quartz sand, as above
	10	Siltstone, as above
10,400-10,410	40	Sandstone, as above, mineral fluorescence
	50	Quartz sand, as above
	10	Siltstone, as above
		Trace pyrite.
10,410-10,420	30	Sandstone, hard, tight, medium to light grey, fine to coarse poor to moderately sorted, quartz, dolomitic cement (yellow fluorescence), well rounded, trace pyrite cement.
	50	Quartz sand, unconsolidated, coarse to granule, moderately sorted, well rounded, trace pyrite cement, many quartz grains have been fractured during drilling - fractures present prior to drilling are generally filled with pyrite (microcrystalline) quartz, milky to clear.

DEPTH	%	DESCRIPTION
10,410-420 cont'd	20	Siltstone, medium to dark grey, soft to firm, quartz, mica pyrite, glauconite/chlorite?, very carbonaceous, coarse to granule, well rounded quartz grains embedded in siltstone: Siltstone grades to very fine sandstone in part. Trace carbonaceous material (coal?)
10,420-10,430	35	Sandstone, as above
	35	Quartz sand, as above
	30	Siltstone, as above, trace carbonaceous material
10,430-10,440	40	Sandstone, as above
	50	Quartz sand, as above
	10	Siltstone, as above, trace carbonaceous material.
10,440-10,450	40	Sandstone, as above
	40	Quartz sand, as above
	20	Siltstone, as above, trace carbonaceous material
10,450-10,460	40	Sandstone, as above
	30	Quartz sand, as above, trace pyrite cement.
	15	Siltstone, as above
	15	Silty sandstone, light grey, fine to coarse, poorly sorted, firm quartz, mica, pyrite, carbonaceous material, glauconi te/ chlorite?, silty. Trace carbonaceous material(coal?)
10,460-10,470	15	Siltstone, dark grey, friable to firm, quartz, mica trace pyrite, very carbonaceous, sandy in part,
	40	Sandstone, light grey, hard, medium to coars-, moderately sorted, quartz, dolomite cement, well to moderately rounded, trace pyrite cement.
	5	Silty sandstone, firm, dark grey, fine to medium, silty quartz, mica, pyrite, carbonaceous, subangular to rounded poorly sorted.
	40	Quartz sand, unconsolidated, trace pyrite, cment, coarse to granule, well rounded, trace coal?
10,470-10,480	15	Siltstone, as above
	50	Quartz sand, as above Trace silty sandstone, as above
	30	Sandstone, as above
	5	Coal, black, shiny, moderately hard. Trace pyrite.
10,480-10,490	20	Siltstone, as above Trace silty sandstone, as above
	25	Sandstone, as above
	40	Quartz sand, as above
	15	Coal, as above Trace pyrite.
10,490-10,500	35	Siltstone, as above
	10	Silty sandstone, as above
	15	Quartz sand, as above
	30	Sandstone, as above
	10	Coal, as above
10,500-10,510	20	Coal, black, firm to hard, shiny,
	10	Quartz sand, unconsolidated, coarse to granule, well rounded
	20	Siltstone,medium to dark grey, firm, quartz, mica, carbonaceous, pryite.
	30	Sandstone, light grey, hard, medium to coars, moderately sorted, subrounded to rounded, quartz, dolomite cement.
	20	Sandstone, medium grey, fine grained, silty hard, dolomitic cement.

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
10,510-10,520		CUTTING GAS C1 500, C2 300, C3 100.
	55	Siltstone, as above
	30	Sandstone, fine grained, silty, hard, as above
	10	Sandstone, medium to occasionally coarse, as above
	5	Quartz sand, as above
		Trace coal.
10,520-10,530		CUTTING GAS C1 11,000, C2 2,000, C3 300.
	95	Coal, black, shiny, hard, bleeding gas
	5	Trace quartz grain, sandstone, medium to coarse, sandstone fine grained, siltstone
10,530-10,540	60	Coal, as above grading to
	30	Siltstone, as above, dark grey to brown, very carbonaceous
	10	Minor sandstone, medium to coarse grained, dolomitic, hard minor sandstone, fine grained, well sorted, subrounded less dolomitic than before, friable in part.
10,540-10,550	50	Siltstone, as above
	35	Sandstone, fine grained, well sorted, subrounded, light grey friable to hard, minor dolomitic cement.
	5	Quartz grains, as above
	10	Coal, as above.
10,550-10,560	30	Siltstone, as above
	30	Sandstone, as above
	20	Coal, as above
	20	Quartz grains, as above
		Trace pyrite.
10,560-10,570	30	Siltstone, as above
	30	Coal,
	20	Sandstone, as above
	20	Quartz grains,
		Trace pyrite
10,570-10,580	50	Siltstone, medium to dark grey to brown, firm, very carbonaceous micaceous, pyrite, non calcareous.
	20	Sandstone, fine grained, light grey, friable to hard, well sorted, subrounded to rounded, variable dolomitic cement. Trace pyrite.
	20	Quartz grains, very coarse, fractured grains, clear to milky, rounded to well rounded, trace pyrite on surfaces.
	10	Coal, black, shiny, firm to hard, bleeding gas
		Minor sandstone, medium to coarse grained, subangular to rounded, white, hard, dolomitic cement.
10,580-10,590	80	Coal, as above
	15	Quartz grains, as above
	5	Sandstone, fine grained, as above
		CUTTING GAS. C1 2,500, C2 200 .
10,590-10,600	30	Siltstone, as above, some medium brown
	30	Sandstone, medium to coarse grained, as above, hard dolomitic.
	10	Coal, as above
		Trace pyrite.

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
10,600-10,610	40	Siltstone, as above
	25	Sandstone, very fine to fine, as above, some clay matrix, as well as dolomite.
	25	Sandstone, very fine to coarse, predominantly medium grained, as above.
	5	Coal, as above
	5	Loose quartz grains, as above.
10,610-10,620	10	Coal, black, firm, lustrous, fissile, with pyrite.
	10	Quartz sand, unconsolidated, coarse to granule, well rounded,
	35	Sandstone, light grey, firm to hard, medium to coarse, moderately sorted, quartz, dolomite cement, tight, shapr contact between sandstone and coal seen in one sample, dull yellow mineral fluorescence.
	45	Siltstone, medium to dark grey, firm to friable quartz, very carbonaceous, mica, sandy in part, pyrite. Trace silty sandstone, medium to dark grey, firm, fine to medium, poorly sorted, subrounded to rounded, silty, quartz, very carbonaceous, mica, pyrite. Trace pyrite.
10,620-10,640	10	Coal, as above
	20	Quartz sand, as above, loose sand grains
	30	Sandstone, as above
	40	Siltstone, as above, very carbonaceous, plant fragments, sandy in part.
10,630-10,640	5	Coal, as above, sharp contact with sandstone, with pyrite.
	20	Loose quartz grains, as above
	60	Sandstone, as above, with mica, pyrite, carbonaceous in part.
	15	Siltstone, as above
10,640-10,650	70	Coal, as above
	10	Siltstone, as above
	10	Sandstone, as above
	10	Loose Quartz sands, as above Trace pyrite.
10,650-10,660	40	Coal, black, lustrous, firm fissile.
	30	Siltstone, brown to dark grey, firm to friable, sandy in part, quartz, very carbonaceous, pyrite, mica, loose quartz sand, coarse to granule, well rounded Trace pyrite cement.
	30	Sandstone, light grey, fine to medium, moderately sorted to well sorted, subrounded to rounded, quartz, silty in part, tight, dolomite cement. Trace Loose quartz grains. White material soft, non calcareous, with trace carbonaceous material.
10,660-10,670	75	Sandstone, as above
	5	Coal, as above
	5	Loose quartz grains, as above
	15	Siltstone, as above Trace pyrite.
10,670-10,680	85	Sandstone, as above, with dull yellow dolomitic mineral fluorescence, no cut. Trace loose quart sand as above.
	5	Coal, as above
	10	Siltstone, as above
		1930 hours, P.O.H. to change bit.

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
10,680-10,690	70	Sandstone, very fine, light grey, hard, dolomitic cement, pyrite, micaceous, carbonaceous, tight, silty.
	20	Sandstone, fine to medium grained, white, hard, dolomitic cement, moderately sorted, subrounded, trace pyrite.
	10	Siltstone, dark grey to brown, very carbonaceous, micaceous, pyrite, friable.
		Desander sample contained a fair amount of pyrrhotite - black magnetic grains.
10,690-10,700	60	Siltstone, as above grading to
	30	Sandstone, very fine, light to medium grey, as above
	10	Sandstone, fine to medium grained, as above
		Trace coal
10,700-10,710	50	Siltstone, as above, sandy grading to
	40	Sandstone, very fine as above, rarely heavily cemented with pyrite
	10	Sandstone, fine to medium grained
		Cutting gas C1 100 C2 -
10,710-10,720	55	Sandstone, very fine, as above, silty, rarely friable
	25	Coal, brittle shiny bleeding gas
	10	Sandstone, fine to medium as above
	10	Siltstone, as above
10,720-10,730'	20	Coal, black, lustrous, shiny, brittle-fissile, bleeding gas
	10	Sandstone, medium grey, fine to medium moderately sorted, subrounded, quartz, dolomitic cement, hard tight.
	30	Silty sandstone, very fine to fine, medium to dark grey, poorly sorted, silty, quartz, carbonaceous, slightly dolomitic.
	40	Siltstone, dark grey, firm to firable, quartz mica, pyrite, very carbonaceous, sandy in part.
		Trace loose quartz grains coarse to granule, well rounded many are fractured.
10,730-10,740	20	Coal, as above
	20	Sandstone, as above
	30	Silty Sandstone, as above
		Trace loose quartz grains
	30	Siltstone, brown to dark grey, as above
10,740-10,750	40	Coal, as above bleeding gas
	5	Sandstone, dolomitic as above
	20	Silty Sandstone, silty, dolomitic as above
	40	Siltstone, very carbonaceous, as above
		Trace loose quartz grains, as above
10,750-10,760	5	Coal, as above, bleeding gas
	10	Sandstone, as above, with pyrite cement in part
	75	Silty Sandstone, as above with pyrite.
	10	Siltstone, as above
		Trace loose quartz grains as above, Trace pyrite.
10,760-10,770	20	Coal, as above
	10	Sandstone, as above
	50	Silty Sandstone, as above
	15	Siltstone, as above
	5	Loose Quartz grains.
		Trace pyrite.
		Cutting Gas Analysis, C1 1100, C2 200.
10,770-10,780	5	Coal, black to brown, brittle to firm, fissile, shiny, bleeding gas.

DEPTH	%	DESCRIPTION
	85	Sandstone, medium to dark grey, fine to coarse, poorly sorted, subrounded to rounded, dolomitic cement, hard, tight, quartz, silty in part, trace pyrite cement, carbonaceous material, sand granule size in part with minor occurrences of sandstone, medium to light grey, fine to coarse, moderately sorted, subrounded to rounded, dolomitic cement.
	10	Siltstone, brown to dark grey, firm to soft, quartz, mica, pyrite very carbonaceous, sandy in part. Trace pyrite. Trace loose quartz grains, coarse to granule, well rounded, many are fractured.
10,780-10,790		Trace coal as above, with pyrite, no cut,
	90	Sandstone, as above
	10	Siltstone, as above
		Loose quartz grains, as above
10,790-10,800	80	Sandstone, as above with trace pyrite cement, dolomite cement with mineral fluorescence, dull, bright yellow, very carbonaceous in part.
	5	Siltstone, as above
	15	Loose quartz sand, as above.
		Trace coal as above
10,800-10,810	70	Sandstone, as above, with fluorescence (mineral)
	5	Siltstone, as above
	25	Loose Quartz sand as above
		Trace Coal, as above. TRace pyrite.
		Cutting gas analysis - zero
10,810-10,820	70	Sandstone, white to light grey, very fine to medium grained, rare coarse grains, generally moderately to well sorted, hard, tight dolomitic cement, pyrite.
	10	Siltstone, dark grey to brown, very carbonaceous, micaceous, pyrite, friable grading to
	10	Coal, black to very dark brown, brittle, bleeding gas.
	10	Loose quartz grains, coarse to granule, clear to milky, subrounded to well rounded, trace pyrite on surfaces.
10,820-10,830	80	Sandstone, as above, some friable
	10	Siltstone, as above dark brown
	10	Loose quartz as above. Trace pyrite.
10,830-10,840	80	Sandstone, as above, abundnat pyrite cement in some chips.
	10	Siltstone, as above
	10	Quartz grains as above
		Trace coal, pyrite.
		Cutting gas - 0
10,840-10,850	70	Sandstone, as above becoming siltier in the finer grained fraction
	25	Siltstone, medium grey, friable, pryite, trace carbonaceous, non calcareous, some medium to dark brown as before
	5	Quartz grains as above.
10,850-10,860	85	Sandstone, very fine, lignt grey, hard to friable, dolomitic cement, pyrite, carbonaceous, micaceous, silty.
	15	Siltstone, as above.
10,860-10,870	80	Sandstone, as above grading to
	15	Siltstone, as above
	5	Loose quartz grains.
		Trace pyrite.
10,870-10,880	80	Sandstone, as above
	20	Siltstone to shale, some bleeding gas. Trace pyrite
		Cutting gas C1 1200, C2 300 C3 -

DEPTH	%	DESCRIPTION
10,880-10,890	85	Sandstone, as above
	15	Siltstone, medium brown to medium grey, as above
		Minor Quartz grains, as above
10,890-10,900	70	Sandstone, light to medium grey, very fine to fine grained, silty in part, generally moderately well sorted, subrounded to well rounded, hard where dolomitic cement, friable, where silty, pyrite, mica, trace carbonaceous grades to
	30	Siltstone, medium grey to medium brown, firm to firable, sandy, pyrite, carbonaceous, micaceous, the brown siltstone is muddier and contains dark carbonaceous cherts.
		Minor loose quartz grains white to clear, coarse to granule, well rounded.
10,900-10,910	60	Sandstone, as above grades to
	40	Siltstone, as above
		Trace loose quartz grains, trace pyrite, trace coal, black, shiny, brittle, fissile.
10,910-10,920	40	Sandstone, as above
	40	Siltstone, as above
	20	Coal, as above, gas bleeding from coal
		Trace loose quartz grains as above, Trace pyrite.
		Cuttings gas analysis C1 600, C2 1300.
10,920-10,930	55	Sandstone, as above, mineral fluorescence
	40	Siltstone, as above
		Trace coal as above
	5	Loose quartz grains, as above
		Trace pyrite.
10,930-10,940	55	Sandstone, as above, with pyrite, and carbonaceous material
	35	Siltstone, as above, very carbonaceous
	10	Coal, as above, bleeding gas
		Trace loose quartz grains, as above
10,940-10.950	50	Sandstone, medium grey, hard, where cemented, firm - soft where silty, fine to medium grained, moderately sorted, quartz, mica, pyrite, carbonaceous in part, dolomite cement, silty in part, tight. Dolomite cement occurs in the clean sands only.
	45	Siltstone, brown to dark grey, soft to firm, sandy in part very carbonaceous, quartz, mica, trace pyrite, massive, Sharp contacts between sand and silt, bleeding gas in parts merging to coal
	5	Coal, black, shiny, brittle, hard, bleeding coal, fissile
		Trace loose quartz sand, coarse to granule, well rounded, clear to milky, many are fractured.
10,950-10,960	55	Sandstone, as above with pyrite cement in part
	45	Siltstone, as above bleeding gas in part
		Trace coal, as above bleeding gas
		Trace loose quartz sand, as above
		Cutting gas analysis C1 500, C2 100
10,960-10,970	50	Sandstone, as above
	50	Siltstone, as above
		Trace Coal as above,
		Trace loose quartz sand as above - pebbly.
		Trace pyrite.
10,970-10,980	50	Sandstone, as above
	45	Siltstone, as above
	5	Coal, as above
		Trace loose quartz sand, as above
		Trace pyrite.

DEPTH	%	DESCRIPTION
10,980-10,990	15	Sandstone, as above
	15	Siltstone, as above
	40	Coal, as above
	30	Loose quartz sand, as above
10,990-11,000	10	Sandstone, medium to dark grey, fine to medium, hard, dolomitic cement in part, silty in part, quartz, poor to moderately sorted.
	30	Siltstone, brown to dark grey, firm, very carbonaceous, sandy in part, mica, pyrite.
	50	Coal, black, shiny, bleeding gas, brittle.
	10	Loose quartz sand, coarse to granule, well rounded.
11,000-11,010	20	Sandstone, medium grey to medium light grey, fine grained hard, dolomitic cement in part, quartzose, moderate sorting, trace pyrite - heavily pyritic in part, no shows, tight.
	10	Siltstone, brown to dark grey, firm, very carbonaceous trace mica.
	30	Carbonaceous shale, medium to dark grey, moderately firm.
	20	Coal, black, vitreous lustre in part, conchoidal fracture, thin fragments burn readily ? cannel coal.
	20	Sand, unconsolidated coarst to 2 mm subangular with many grains broken, trace pyrite on surface of grains, no shows.
11,010-11,020	30	Sandstone, as above, dolomitic, tight
	10	Siltstone, as above
	20	Sand, unconsolidated as above
	30	Shale, medium to dark grey, firm, carbonaceous in part.
	10	Coal, as above, thinly interbedded in Shale in part
11,020-11,030	40	Sandstone, medium to light grey, fine grained, dolomitic cement, well sorted, hard, no shows, tight.
	30	Shale, medium to dark grey, firm, carbonaceous in part, coal thinly interbedded coal - bleeding
	20	Coal, thinly interbedded, conchoidal fracture, dull lustre in part, vitreous lustre in part ?cannel coal
	10	Siltstone, brown, firm thin coaly stringers included
11,030-11,040	30	Sandstone, as above
	20	Shale, brown, firm, silty in part, thin coaly stringers, included.
	50	Coal, and carbonaceous shale, black, conchoidal fracture, brittle, dull lustre in part ?cannel coal - bleeding gas.
11,040-11,050	80	Coal and carbonaceous shale, black, conchoidal fracture, brittle dull lustre in part ? cannel coal - bleeding gas.
	10	Shale, as above
	10	Sandstone, as above
		Cutting gas 6,000 ppm C1 1800 C2
11,050-11,060	60	Coal and Carbonaceous shale, as above
	30	Siltstone, brown, very shaley in part, thin coaly stringers included.
	10	Sandstone, medium to light grey, fine grained, dolomitic cement., well sorted, hard, tight, no shows Coal, bleeding gas
11,060-11,070	45	Carbonaceous shale - medium grey to black grading to coal. brittlem fissile.
	50	Siltstone, grey brown, carbonaceous grading to shale
	5	Sandstone, medium to fine grained, dolomitic cement, white to light grey, moderate to well sorted, hard, clay choked at times. Trace quartz - rounded milky to grey pebbles.

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
11,070-11,080	55	Carbonaceous Shale, as above
	35	Siltstone, as above
	10	Sandstone, as above
		Trace quartz, as above.
11,080-11,090	60	Siltstone, brown as above
	35	Carbonaceous shale, grading to coal
	5	Sandstone, as above.
		Trace quartz as above
		Trace coal - with pyrite or muscovite
11,090-11,100		Siltstone, light tan-brown, carbonaceous grades to shale, soft to very hard, brittle pyrite in palces.
		Shale, carbonaceous grading to coal, dark grey to black bleeding gas at times, no cut.
		Sandstone, fine to medium white to grey, carbonaceous and shaley partings, moderate sorting, rare dolomitic cement, no cut, hard.
		Trace Quartz- rounded milky pebbly.
		Trace coal, fissile, black to dark brown, bleeding gas, no cut
		P.O.H. 11,107'

DEPTH	%	DESCRIPTION
		P.O.H. at 11,107' @ 2220 hours (26/8), Bit 25 drilled 414' in 34.4 hours. New bit No. 25 J44. B.O.B. 0600 hours.
11,100 - 11,110	30	COAL, black, dull and vitreous lustre, good conchoidal fracture, ? canned coal.
	30	SHALE, medium dark grey, very carbonaceous in part, moderately firm, trace mica.
	30	SANDSTONE, medium light grey to medium dark grey, finely grained, dolomitic cement, moderately hard, tends to siltstone in part, no shows, moderately well sorted.
	5-10	SAND, coarse to 3 mm, well rounded to subrounded and often broken, trace pyrite, unconsolidated.
11,100 - 11,120	60	SILTY SHALE, medium dark grey, very carbonaceous in part, very silty in part, firm, trace mica.
	20	COAL, as above.
	15	SANDSTONE, as above.
	5	SAND, as above.
11,120 - 11,130	50	SILTY SHALE, as above, very carbonaceous parts bleeding gas.
	40	SANDSTONE, medium light grey, finely grained, well sorted, dolomitic cement, hard, trace pyrite in part, trace carbonaceous stringers no shows.
	5-10	COAL, as above
	5-10	SAND, coarse to 2mm, unconsolidated, subrounded - broken, trace pyrite.
11,130 - 11,140	3	SHALE, as above, some pyrite.
	30	SILTSTONE - tan-brown, very carbonaceous, soft - hard.
	25	SANDSTONE - white to light grey, fine to medium grain, moderately well sorted, dolomite cement in part, soft to very hard, fair yellow to blue cut with acetone and CC14 (when crushed).
	15	COAL, black to brown, dull to vitreous lustre, conchoidal fracture. TRACE SAND, angular quartz.
11,140 - 11,150		SANDSTONE, scattered dull yellow fluorescence when ground. Dull yellow cut in CC4 when thoroughly ground, good light blue fluorescence with yellow veins in Acetone after 10 minutes.
	30	SHALE, as above.
	30	SILTSTONE, as above.
	30	SANDSTONE, as above.
	10	COAL, as above. TRACE QUARTZ, as above, some red grains also.
11,150 - 11,160	15	COAL, black, conchoidal fracture, dull to vitreous lustre, canned coal.
	30	SILTSTONE, brown to medium dark grey, firm, coaly stringers trace mica, very carbonaceous in part.
	25	SHALE, medium to dark grey, very carbonaceous in part.
	25	SANDSTONE, medium light grey, finely grained, well sorted, dolomitic, pyritic in part, carbonaceous in part, ? rare weathered feldspar, pyritic in part, no fluorescence, no cut in CC14 weak light blue fluorescence in acetone after 10 minutes.
11,160 - 11,170	40	SANDSTONE, as above, no fluorescence, no cut, very weak fluorescence in acetone after 10 minutes.
	40	SHALE, as above.
	10	SILTSTONE, as above.
	10	COAL, as above.
11,170 - 11,180	40	SHALE, medium dark grey, firm, carbonaceous in part.
	10	SILTSTONE, medium dark grey to brown, coaly stringers, firm, very micaceous
	10	COAL, as above.
	40	SANDSTONE, medium to light grey, finely grained, well sorted, slightly dolomitic, moderately firm, hard in places with more

DEPTH	%	DESCRIPTION
		dolomite, clayey, tight, scattered good yellow fluorescence, very slow, weak dull yellow cut in CCl_4, good fluorescence of acetone washing sandstone after 2 - 3 minutes, light blue with yellow vein cuttings gas C_1 8,000 C_2 2,700 C_3 700 C_4
11,180 - 11,190	50	SHALE, medium dark grey, firm, rare silt grains, trace pyrite, trace mica, coaly stringers included - bleeding gas
	10	SILTSTONE, medium dark grey to brown, shaley, rare coaly stringers
	40	SANDSTONE, medium light grey, fine grained, trace dolomite, still very tight, well sorted, ?? siliceous cement in parts, hard to firm with clay. No fluorescence, no cut in tetrabromo ethane, dull blue cut in acetone after washing for 10 minutes.
11,190 - 11,200	50	SHALE, as above
	10	SILTSTONE,
	40%	SANDSTONE, as above, no shows
		TRACE COAL
		TRACE SAND, unconsolidated, coarse to 2mm.
11,200 - 11,210	50	SANDSTONE, as above, no fluorescence, no cut in $C_2H_2Br_4$, good blue cut in acetone after 5 minutes.
	30	COAL, tends to carbonaceous shale in places generally vitreous, conchoidal fracture.
	20	SILTY SHALE, medium dark grey, firm, tends to siltstone in part.
11,210 - 11,220	60	COAL, dull to vitreous lustre, rare conchoidal fracture, thin fragments burn easily, ? cannel coal, bleeding gas
	20	SANDSTONE, medium to light grey, finely grained, dolomitic, silty in parts, no fluorescence, no cut in $C_2H_2Br_4$.
	20	SILTY SHALE, as above
		Cuttings Gas: C_1 22,000 C_2 7000 C_3 1700 C_4 400
11,220 - 11,230	70	COAL, as above
	20	SANDSTONE, as above
	5-10	SHALE, medium to dark grey, firm, carbonaceous in parts.
	5-10	SILTSTONE, medium to dark grey to brown, carbonaceous in parts, firm.
		Cuttings Gas: C_1 19,000 C_2 4500 C_3 900 C_4 100
11,230 - 11,240	50	SANDSTONE, medium to light grey, finely grained, trace pyrite, well sorted,
		SANDSTONE, has rare dull yellow fluorescence when ground, no cut visible in $C_2H_2Br_4$; light blue to yellow fluorescence after washing for 2-3 minutes in acetone.
11,240 - 11,250	60	COAL, as above, some orange fluorescence
	20	SANDSTONE, as above, cut in CCl_4 and Acetone
	10	SILTSTONE, as above
	10	SHALE, as above
11,250 - 11,260	40	SANDSTONE, as above, cut in acetone ? silicified
	20	SHALE, as above
	20	SILTSTONE, as above
	20	COAL, as above
		TRACE QUARTZ, white to yellow rounded
11,270 - 11,280	40	SANDSTONE, as above
	25	SILTSTONE, as above
	10	SHALE, as above
	10	COAL, as above
	5	PYRITE, ? nodular some coal attached
		TRACE QUARTZ, as above

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
11,280 - 11,290	40	QUARTZ, subrounded to rounded, 5.2 mm white quartz all discrete grains.
	30	SANDSTONE, fine to medium grained, light grey, soft to firm, some yellow fluorescence - dolomitic cement some dull blue fluorescence, strong but in acetone (blue) tight as cut in CCl_4
	10	SHALE, brown to dark grey, soft to firm, fissile, carbonaceous
	10	SILTSTONE, brown, carbonaceous, firm TRACE PYRITE, nodules probably from coal
	10	COAL, brown to black, dull to vitreous
11,290 - 11,300	50	QUARTZ, as above
	30	SANDSTONE, as above, no cut in acetone
	10	SILTSTONE, as above
	5	SHALE, as above
	5	COAL, as above
11,300 - 11,310	75	QUARTZ, as above
	10	SANDSTONE, as above, no cut in acetone
	5	SHALE, as above
	5	SILTSTONE, as above
	5	COAL, as above
11,310 - 11,320	90	QUARTZ, as above
	10	SANDSTONE, as above, no cut in acetone TRACE SILTSTONE, as above TRACE SHALE, as above TRACE COAL, as above
11,320 - 11,330	40	COAL, as above
	25	SANDSTONE, as above, no cut in acetone
	20	QUARTZ, as above
	5	SHALE, as above
	10	SILTSTONE, as above
11,330 - 11,340	40	COAL, as above
	15	SHALE, as above
	15	SILTSTONE, as above
	15	SANDSTONE, as above
	15	QUARTZ, as above
11,340 - 11,350	25%	SANDSTONE, as above, some pyrite
	25	COAL, as above
	20	SHALE, as above
	20	SILTSTONE, as above
	10	QUARTZ, as above
11,350 - 11,360	15	COAL, black, dull to vitreous lustre, rare good conchoidal fracture, ignites easily, bleeding gas
	30	SHALE, medium to dark grey, firm, trace mica, coaly stringers included, silty in parts
	15	SILTSTONE, medium to dark grey, firm, trace mica, trace pyrite, coaly stringers included, shaley in parts.
	30	SANDSTONE, medium light grey, finely grained, well sorted, trace to heavily pyritic, carbonaceous streaks in parts, well cemented in part, dolomite but in part ? siliceous (takes up to 10 mins before good reaction with acid), no fluorescence even when crushed, very slow (2 mins) dull yellow cut in CCl_4; light blue to yellow with yellow rim cut after washing in acetone for 5 to 10 mins.
	10	SAND, coarse to 2 mm, unconsolidated broken to pyrite, no shows

DEPTH	%	DESCRIPTION
11,360 - 11,370	35	SHALE, as above
	25	SILTSTONE, as above
	25	SANDSTONE, as above, no fluorescence, no cut in CCl_4; no cut in acetone after 30 mins
	15	SAND, as above
		TRACE COAL
11,370 - 11,380	20	SAND, 0.5 to 2mm, unconsolidated, subrounded but most broken, most clear to slightly milky, dolomitic cement, trace pyrite, no shows
	40	SANDSTONE, medium to light grey, finely grained, well sorted, trace to heavily pyritic, carbonaceous flecks in places, no fluorescence, no cut in CCl_4
	30	SILTSTONE, medium to dark grey to brown, tends to shine in part, trace mica, carbonaceous flecks and stringers
	5-10	COAL, dull to lustreous, ignites easily, some conchoidal fracture
1200 hours [redacted]8/75		
11,380 - 11,390	30	QUARTZ, as above
	20	SANDSTONE, as above
	15	SILTSTONE, as above
	15	SHALE, as above
	20	COAL, as above
		TRACE PYRITE
11,390 - 11,400	50	SILTSTONE, as above
	15	SHALE, as above
	15	COAL, as above
	20	SANDSTONE, as above
		TRACE QUARTZ, as above
11,400 - 11,410	10	SANDSTONE, light to medium grey, some dolomite cement, some glauconite, poor to zero porosity, fine to medium, mainly fine, poor to moderate sorting, some carbonaceous flabs and pyrite
	10	COAL, as above
	70	SILTSTONE, as above
	10	SHALE, dark tan to grey, carbonaceous to coaly in places, hard.
		TRACE QUARTZ
11,410 - 11,420		5,000 C_1 1400 C_2 500 C_3 Cuttings Gas
	20	SANDSTONE, finely grained, medium light grey
	80	SILTSTONE, grey to buff tan, carbonaceous flecks at times
	10	SANDSTONE, light grey, some calcite and dolomite cement, soft to hard, no cut, fairly tight
	10	COAL, black to brown, very shaley
		TRACE QUARTZ
		TRACE PYRITE
11,430 - 11,440	30	SANDSTONE, medium light grey, finely grained, moderately well sorted, slightly to very dolomitic, trace pyrite, some carbonaceous laminae included, moderately firm to hard, rare, good fluorescence, no CCl_4 cut, or acetone.
	30	SHALE, medium dark grey, slightly silty, carbonaceous, trace mica, trace pyrite
	10	COAL, black, tends to carbonaceous shale in part
		TRACE SAND, unconsolidated 0.5 - 2 mm, broken grains
11,440 - 11,450	30	SANDSTONE, as above, rare fluorescence dull to yellow, very slow, very dull cut in CCl_4 very pale dull blue fluorescence after 5 mins washing in acetone, rare medium grained, poorer sorting in part.

DEPTH	%	DESCRIPTION
11,440 - 11,450	30	SHALE, as above
	30	SILTSTONE, as above
	10	COAL, as above
		TRACE SAND, as above
11,450 - 11,460	40	SANDSTONE, medium light grey, finely grained, well sorted, quartzose, rare buff grains, ? feldspar, trace pyrite, trace carbonaceous, dolomitic cement tight, moderately firm to hard, low to very low, visible porosity, no fluorescence, no cut in CCl_4, slow very dull blue yellow cut in acetone
	30	SHALE, medium dark grey, trace mica, carbonaceous, trace coal, moderately firm,
	20	SILTSTONE, medium dark grey to brown, trace pyrite, trace carbonaceous
	10	SAND, unconsolidated, 0.5 - 2 mm, grains broken
11,460 - 11,470	40	SANDSTONE, as above, dolomitic, trace fluorescence, no cut in CCl_4 or acetone
	30	SHALE, as above
	20	SILTSTONE, as above
	5-10	SAND, as above
	5-10	COAL, as above
11,470 - 11,480	40	SANDSTONE, medium light grey, finely grained, well sorted, quartzose, very rare buff grains, ? feldspar, trace pyrite, trace carbonaceous, dolomitic cement, tight, moderately firm to hard, trace fluorescence, no cut
	60	SILTSTONE, medium dark grey, shaley, trace mica, pyrite, carbonaceous in places
		TRACE COAL, TRACE SAND, as above
11,480 - 11,490	50	SANDSTONE, as above rare medium grained and rare poor sorting,no shows
	50	SILTSTONE, as above, coaly stringers included
		TRACE COAL, TRACE SAND, as above
11,490 - 11,500	50	SANDSTONE, as above, rare good yellow fluorescence, no cut in CCl_4, or acetone
	40	SILTSTONE, as above, shaley in parts
	10	SAND, as above
		TRACE COAL
11,500 - 11,510	50	SANDSTONE, as above
	50	SILTSTONE, as above
		TRACE QUARTZ, as above
		TRACE COAL,
11,510 - 11,520	40	SANDSTONE, medium grey, poorly sorted, fine to medium, angular quartz some lithic fragments, firm poor to no porosity ? dolomitic cement, some pyritic cement some carbonaceous flecks
	50	SILTSTONE, dark tan to dark grey, slightly carbonaceous, firm to hard
	10	SHALE, dark grey, slightly carbonaceous
		TRACE QUARTZ
		TRACE COAL
11,520 - 11,530	50	QUARTZ/SANDSTONE, poorly sorted, medium to coarse cement, pyrite, milky quartz
	20	SANDSTONE, as above
	30	SILTSTONE, as above
		TRACE SHALE, as above
		TRACE COAL
11,530 - 11,540	60	QUARTZ, as above
	20	COAL, black, vitreous lustre
	10	SANDSTONE, as above
	10	SILTSTONE, as above

DEPTH	%	DESCRIPTION	
11,540 - 11,550	80	QUARTZ, pyrite cement, as above	
	10	SANDSTONE, as above, some dolomitic cement, no cut	
	10	SILTSTONE, as above	
		TRACE COAL, as above	
		TRACE PYRITE, possibly from pores in the quartz/sandstone	
11,550 - 11,560	80	QUARTZ, as above	
	10	SANDSTONE, as above	
	10	SILTSTONE, as above	
		TRACE COAL, as above	
		TRACE PYRITE, as above	
11,560 - 11,570	50	QUARTZ, as above	
	30	SILTSTONE, as above	
	20	SANDSTONE, as above	
		TRACE COAL	
		TRACE PYRITE	
11,570 - 11,580	90	QUARTZ, as above	Not much sample coming
	10	SILTSTONE, as above	over shale shaker?
		TRACE COAL, as above	Blown away by wind
		TRACE SANDSTONE, as above	
11,580 - 11,590		No sample - washed from shaker	
11,590 - 11,600	70	SAND, unconsolidated, coarse to 2 mm, subrounded to subangular, most grains broken, clear to slightly milky, trace pyrite on surface of grains, cement rarely seen - but it pyritic where present in sample, rare dull yellow fluorescence with slow dull yellow cut.	
	15	SILTSTONE, medium dark grey, clayey - tends to shale in part, carbonaceous and coaly inclusions, trace mica, trace pyrite	
	5	COAL, black dull to vitreous	
	10	SANDSTONE, finely grained, medium light grey, dolomitic, trace mica, trace carbonaceous	
11,600 - 11,610	70	SAND, as above, no shows	
	15	SILTSTONE, as above	
	5	COAL, as above	
	10	SANDSTONE, as above	
11,610 - 11,620	60	SAND, as above no shows	
	25	SILTSTONE, as above	
	10	SANDSTONE, as above, rare, good fluorescence, slow dull yellow cut.	
	5	COAL	
		P.O.H. 0715 hrs, Bit No. 26 drilled ft. in ? 34.1 hours New bit, J33 No. 27, B.O.B. 1715 hours	
11,620 - 11,630	50	SAND, loose grains, 0.5 - 2 mm, subangular to subrounded, most broken, trace pyrite on grains, grains clear to slightly milky, shows contaminated by pipe dope	
	30	SILTSTONE, medium dark grey to brown, clayey in part, carbonaceous fragment including micas part tends to silty shale, trace mica, trace to very carbonaceous	
	20	SANDSTONE, medium light grey, finely grained, moderately sorting, trace carbonaceous, trace to heavily pyritic, dolomitic cement, moderately to very firm, shows contaminated by pipe dope	
11,630 - 11,640	100	SILTSTONE, as above	
		TRACE SANDSTONE, as above	
		TRACE SILTSTONE, as above	
		TRACE COAL, TRACE PYRITE	
11,640 - 11,650	60	SILTSTONE, as above	
	20	SANDSTONE, as above , rare dull yellow flour., no cut	
	20	SAND, as above	
		TRACE PYRITE	

DEPTH	%	DESCRIPTION
11,650 - 11,660	85	SILTSTONE, as above
	15	SANDSTONE, as above
		TRACE SAND, as above TRACE PYRITE
11,660 - 11,670	70	SILTSTONE, as above, no cut
	30	SANDSTONE, as above, no cut
		TRACE QUARTZ, as above
		TRACE PYRITE, as above
11,670 - 11,680	60	SILTSTONE, as above
	20	SANDSTONE, as above
	20	QUARTZ, as above
		TRACE PYRITE
11,680 - 11,690	80	SANDSTONE, fine to medium grained, light to medium grey, angular, moderately to poor sorting, very dolomitic, tight, with porosity, no cut in CCl_4 or Acetone hard, strong dull to bright yellow fluorescence
	10	SILTSTONE, tan, brown, light grey carbonaceous some mica, soft pyritized in part
	10	QUARTZ, 5 - 4 subrounded to rounded, clear to milky
		TRACE PYRITE
11,690 - 11,700	90	SANDSTONE, as above, strong dolomite fluorescence, some pyrite cement
	10	QUARTZ - as above, some pyrite cement
		TRACE PYRITE
		TRACE SILTSTONE, as above
11,700 - 11,710	80	SANDSTONE, as above, flour. dolomite
	10	QUARTZ, as above
	10	SILTSTONE, as above
		TRACE SILTSTONE, greenish, some glauconite, 3 or 4 specimens of ? Globorotalia soft
		TRACE PYRITE, as above
11,710 - 11,720	40	SANDSTONE, as above, yellow -flour - dolomite
	50	QUARTZ, as above, angular
	10	SILTSTONE, as above
		TRACE PYRITE, as above
11,720 - 11,730	60	SANDSTONE, medium light grey, finely grained, subangular to subrounded, moderate sorting, dolomite cement, tight, very low porosity, trace pyrite, moderate to very firm good yellow fluorescence, no cut in CCl_4, good light blue to yellow cut in acetone after 5 minutes.
	30	SAND, loose, 0.5 - 3 mm, subrounded to subangular, clear to milky, trace pyrite, no shows
	10	SILTSTONE, medium dark grey, clayey, carbonaceous flecks in part, trace mica
11,730 - 11,740	50	SANDSTONE, medium light grey, finely grained, moderate sorting, subangular to subrounded, dolomite, rare carbonaceous inclusions, trace pyrite, good yellow fluorescence, no cut, slightly cut in acetone mineral fluorescence
	30	SAND, loose grains, 0.5 - 2 mm, subangular, many broken, clear to slightly milky, trace pyrite
	20	SILTSTONE, medium dark grey to brown, very clayey, trace carbonaceous
		TRACE COAL
11,740 - 11,750	45	SANDSTONE, as above, rare medium grained with poorer sorting
	35	SAND, as above
	20	SILTSTONE, as above
		TRACE COAL

HAPUKU #1 SAMPLE DESCRIPTIONS Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
11,750 - 11,760	80	SANDSTONE, as above, good mineral fluorescence
	10	SAND, as above
	10	SILTSTONE, as above
		TRACE COAL
11,760 - 11,770	85	SANDSTONE, as above, good mineral fluorescence - no fluorescence after thoroughly dissolving dolomite in acid
	15	SILTSTONE, as above
		TRACE SAND, as above
		TRACE COAL
11,770 - 11,780	80	SANDSTONE, medium light grey, finely grained, rare to medium grained moderate to poor sorting, dolomite, rare carbonaceous included, trace pyrite, very low porosity - shows contaminated
	15	SILTSTONE, medium to dark grey to brown, very clayey, trace carbonaceous, trace to heavily pyritic
	5	COAL - bleeding gas
11,787		5 units gas, sample taken - as above - good mineral fluorescence with no cut
11,780 - 11,790	90	SANDSTONE, as above, good mineral fluorescence, no cut
	10	SILTSTONE, as above
		TRACE COAL
11,790 - 11,800	80	SANDSTONE, as above, good mineral fluorescence, no cut
	20	SILTSTONE, as above
		TRACE SAND, as above
		TRACE COAL
11,800 - 11,810	90	SANDSTONE, light grey, finely grained, dolomitic, trace pyrite, trace carbonaceous, good mineral fluoresence
	10	SILTSTONE, dark grey, clayey, tends to shale in part, trace carbonaceous, trace mica
11,810 - 11,820	90	SANDSTONE, as above
	10	SILTSTONE, as above
		TRACE PYRITE
11,820 - 11,830	80	SANDSTONE, as above
	10	SILTSTONE, as above, coally layers
	10	COAL, black vitreous lustre
		TRACE PYRITE
11,830 - 11,840	90	SANDSTONE - light grey dolomite good mineral fluorescence medium grey ? calcite cement no flour
		No cut, finely grained, dull cut after 10 minutes
	10	SILTSTONE, as above
		TRACE COAL, as above
11,840 - 11,850	100	SANDSTONE, as above
		TRACE COAL
		TRACE SILTSTONE
		TRACE QUARTZ - milky pebbles
11,850 - 11,860	90	SANDSTONE, as above no cut
	10	SILTSTONE, as above
		TRACE QUARTZ
		TRACE COAL
		TRACE PYRITE

DEPTH	%	DESCRIPTION
11,860 - 11,870	90	SANDSTONE, as above, cut some dull blue fluorescence after 1 hour
	10	SILTSTONE, as above
		TRACE QUARTZ
		TRACE COAL
		TRACE PYRITE
11,870 - 11,880	100	SANDSTONE, fine to medium grained, light to medium grey, poorly sorted, dolomite cement, flourescence, yellow dull to strong, no porosity, pyritic rarely carbonaceous, no cut.
		TRACE SILTSTONE, tan to grey, carbonaceous, micaceous
		TRACE QUARTZ, pebbly, milky
		TRACE PYRITE
11,880 - 11,890	90	SANDSTONE, finely grained, rare medium grains, generally moderately well sorted, poorly sorted with medium grains, dolomite cement, trace pyrite rare carbonaceous, very low porosity, good yellow fluorescence, mineral no cut
	5	SILTSTONE, medium grey, carbonaceous in part, trace mica, trace pyrite
	5	COAL,
		TRACE SAND, loose, 0.5 to 2 mm, clear to milky, subrounded, broken
11,890 - 11,900	80	SANDSTONE, as above, trace to heavily pyritic, mineral fluorescence
	10	SAND, as above, probably has fine grained dolomite sandstone as matrix or these large grains scattered through sandstone in which case sorting is poor
	5	SILTSTONE, as above
	5	COAL
11,900 - 11,910	80	SANDSTONE, as above
	10	SAND, as above
	5	SILTSTONE, as above
	5	COAL, as above
11,910 - 11,920	80	SANDSTONE, medium light grey, predominantly finely grained with 10% coarse to 2mm grains, about 5% are loose grains, other 5% are cemented with dolomite and finely grained, poorly sorted, trace pyrite, rare carbonaceous flecks, subangular, good mineral fluorescence, no cut, fluorescence dissipates after dissolving in acid
	15	SILTSTONE, medium grey, carbonaceous in part, trace coaly stringers, trace mica, trace pyrite
	5	COAL
11,920 - 11,930	75	SANDSTONE, medium light grey, finely grained with 5% coarse to 2mm grained dolomitic, poorly sorted, some large grains loose, subangular to subrounded, -race pyrite, trace carbonaceous, good mineral fluorescence, no cut, hard, tight
	10	SILTSTONE, medium light grey to brown, firm, trace mica, very carbonaceous and coaly
	15	COAL
11,930 - 11,940	65	SANDSTONE, as above
	15	SAND, loose, 0.5 to 2mm, subangular to subrounded, broken trace pyrite
	10	SILTSTONE, as above
	10	COAL
11,940 - 11,950	40	SANDSTONE, as above
	40	SAND, as above
	15	SILTSTONE, as above
	5	COAL

HAPUKU #1 SAMPLE DESCRIPTIONS

Davis/Brooks/Elliott

11/7/75-1/9/75

DEPTH	%	DESCRIPTION
11,950 - 11,960	60	SANDSTONE, good mineral fluorescence, no cut
	15	SAND, no shows
	15	SILTSTONE
	10	COAL
11,960 - 11,970	60	SANDSTONE, as above
	20	QUARTZ, as above
	20	SILTSTONE, as above
		TRACE COAL
11,974	60	SANDSTONE, as above
	10	QUARTZ, as above
	15	COAL, as above
	15	SILTSTONE, as above
		POH - 11,974' at 15.20 hours 1/9/75.

WELL COMPLETION REPORT

HAPUKU-1

APPENDIX 3

VELOCITY SURVEY

VELOCITY SURVEY

Well HAPUKU

Basin GIPPSLAND

INTRODUCTION

Esso personnel G. BLACKBURN, C. KRIEGEL

Contractor VELOCITY DATA PTY. LTD

Supplied (1) Instruments

(2) Personnel

Seismic Observer J. LARSEN

Marine Shooter M. RAVELEIGH

Dynamite NOT USED

(3) Seismic Souce

Gas Gun

Gas Pressures 2:1 ratio

Oxygen 90 p.s.i.

Propane 45 p.s.i.

(3) Licenced Shooting Boat

name

date loaded

date released

Agent

amount of powder lbs

size of cans lbs

number of cans

number of caps

number of boosters

Personnel and Instruments

assembled at SALE, VICTORIA date 5/8/75

boarded (rig) REGIONAL ENDEAVOUR date 5/8/75

date of survey 6/8/75

casing depth 4252 feet

T.D. when shot 10083 feet FTD

water depth 1260 feet

SURVEY PROCEDURE

Weather: sea Strong westerly winds, moderate seas with swell

rig movement slight

rig noise slight

Hydrophones: number two

depth below sea level 1) 28ft. 2) 30 ft ft

position 1). five feet above spark gun

2). in moon pool

Shot Positioning and Charges:

marker buoys (number not used

(distance

(direction

charge depth ft

number of shots charge size lbs.

number of shots charge size lbs.

number of misfires

amount of powder used lbs

Gas gun

Number of pops per level 2,3

amount of powder dumped .....lbs

Well-phone positioning :

T-bar .....NOT USED.....

number of depths ...SIXTEEN.....

Time: first shot .....0340.....

last shot .....0802.....

rig time ...5 hours 38 minutes.....

RESULTS

Quality of records (good .....31.....
(fair .....2.....
(poor .....-.....
(not used ...1.....

Comparison of Interval Times with sonic log

/Δ/average ...0.446.....microsec/foot

/Δmax/ .....2.....microsec/foot

CONCLUSION

Reliability of T-D curve .....GOOD.....

COMMENTS:

Good quality records combined with a low noise level has resulted in a very reliable T.D. curve.

Field record No. 1 was under-exposed during developing and consequently was not used.

NOTE : There is a 30 ft. difference between the depths of the millisecond pips and the depths shown on the sonic log between depths 4250ft.-10,100 ft. This difference has been taken into account in interpreting this log.

VELOCITY SURVEY ERROR CHECK

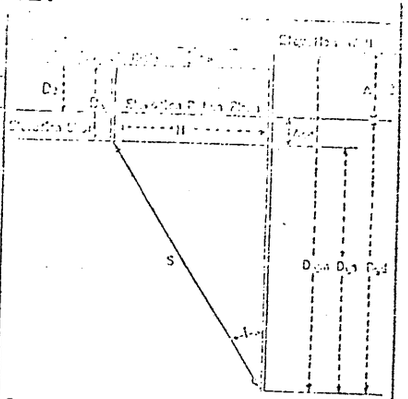
Depth Rel.S.L.	Av.Vertical Travel Time (check shots)	Ti Check Shots (sec.)	Ti Sonic Log (sec.)	△ (Millisecs.)	Depth Interval (ft.)	Error (Microsec per ft.)
4422	.633					
4954	.680	.047	.046	+1	532	1.98
4954	.680					
5492	.727	.047	.045	+2	538	3.70
5492	.727					
6062	.775	.048	.048	0	570	0
6062	.775					
6536	.817	.042	.041	+1	474	2.10
6536	.817					
7044	.858	.041	.040	+1	508	2.00
7044	.858					
7502	.892	0.34	.036	-2	458	4.40
7502	.892					
7928	.928	.036	.035	+1	426	2.30
7928	.928					
8256	.961	.033	.032	+1	328	3.00
8256	.961					
8750	1.016	.055	.055	0	494	0
8750	1.016					
9081	1.050	.034	.034	0	331	0
9081	1.050					
9192	1.060	.010	.011	-1	111	9.00

VELOCITY SURVEY ERROR CHECK

Depth Rel.S.L.	Av.Vertical Travel Time (check shots)	Ti Check Shots (sec.)	Ti Sonic Log (sec.)	△ (Millisecs.)	Depth Interval (ft.)	Error (Microsec per ft.)
9192	1.060					
9261	1.068	.007	.006	+1	69	14.50
9261	1.068					
9382	1.076	.009	.010	-1	121	8.30
9382	1.076					
9861	1.118	.042	.042	0	479	0

Company: ESSO EXPLORATION AUSTRALIA INC. Well: HAPUKU-1 Elev.: 28' Gr. Elev.: 10083' Location: 38°33'21.042"S 148°32'56.058"E Gippsland Basin, Victoria Datum: M.S.L.

									Dgs	H	Dsd	Cos i	Tgs	Δed	Δed/v	Tgd	Tsd	Dgd	ΔDgd	ΔTsd	Vi	Vu
2	0345	4450	35	.007	.028	.626	D	G	4387	139	.0317	.9995	.626	35	.007		.633	4422				6986
1	0340	4450	"	"	–	–	D	NU	OFFSET NOT SIGNIFICANT													
33	0600	4982	"	"	.028	.673	D	G														
34	0802	4982	"	"	.028	.672	D	C					.673				.680	4954	532	.047	11319	7285
31	0745	5520	"	"	.027	.719	D	G														
32	0747	5520	"	"	.027	.720	D	G					.720				.727	5492	538	.047	11446	7554
29	0735	6090	"	"	.027	.768	D	G														
30	0737	6090	"	"	.027	.768	D	G					.768				.775	6062	570	.048	11875	7822
27	0720	6564	"	"	.028	.810	D	G														
28	0725	6564	"	"	.029	.809	D	G					.810				.817	6536	474	.042	11286	8000
25	0705	7072	"	"	.027	.850	D	G														
26	0707	7072	"	"	.028	.852	D	G					.851				.858	7044	508	.041	12390	8210
23	0655	7530	"	"	.027	.885	D	G														
24	0657	7530	"	"	.029	.885	D	G					.885				.892	7502	458	.034	13471	8410
3	0400	7956	"	"	.027	.921	D	G														
4	0402	7956	"	"	.026	.920	D	G					.921				.928	7928	426	.036	11833	8543
5	0404	7956	"	"	.026	.921	D	C														
21	0640	8284	"	"	.026	.954	D	G											328	.033	9939	
22	0642	8284	"	"	.027	.954	D	G					.954				.961	8256				8591
19	0625	8778	"	"	.027	1.009	D	G											494	.055	8982	
26	0627	8778	"	"	.027	1.009	D	G					1.009				1.016	8750				8612
17	0612	9109	"	"	.027	1.042	D	G											331	.034	9735	
18	0614	9109	"	"	.027	1.043	D	G					1.043				1.050	9081				8649
6	0450	9220	"	"	.028	1.053	D	G											111	.010	11100	
7	0452	9220	"	"	.027	1.052	D	F					1.053				1.060	9192				8672
8	0454	9220	"	"	.027	1.053	D	G														
15	0605	2989	"	"	.028	1.060	D	G											69	.007	9857	
16	0607	9289	"	"	.027	1.060	D	G					1.060				1.067	9261				8671
13	0555	9410	"	"	.027	1.069	D	G											121	.007	13444	
14	0557	9410	"	"	.027	1.068	D	G					1.069				1.076	9382				8719
11	0530	9889	"	"	.028	1.111	D	F											479	.042	11405	
12	0537	9889	"	"	.028	1.110	D	G					1.111				1.118	9861				8820
9	0510	10060	"	"	.027	1.123	D	G											171	.012	14250	
10	0512	10060	"	"	.027	1.122	D	G					1.123				1.130	10032				8878



Dgs = Depth to depth measured from well elevation
Dss = " " " " shot "
Dgd = " " " " datum "
Ds = Depth of shot
Dsd = Shotpoint elevation to datum plane
H = Horizontal distance from well to shotpoint
S = Straight line travel path from shot to well geophone
Tss = Uphole time at shotpoint
T = Observed time from shotpoint to well geophone
Ts = " " " to reference ; plane
Δe = Difference in elevation between well & shotpoint
Δsd = " " " " shot & datum plane
Δed = Ds-De
Dgs = Dgs- Dst Δe ; Tgd = $\frac{H}{D_{gs}}$
Tgs = cos i Tsd Vertical time from shot elev. to geophone
Tgd = Tgs $\pm \frac{\Delta sd}{V}$ " " " datum plane "
Dgd = Dgs - Δed
Vi = Interval velocity = $\frac{\Delta D_{gd}}{\Delta T_{sd}}$
Vu = Average = $\frac{D_{gd}}{T_{gd}}$

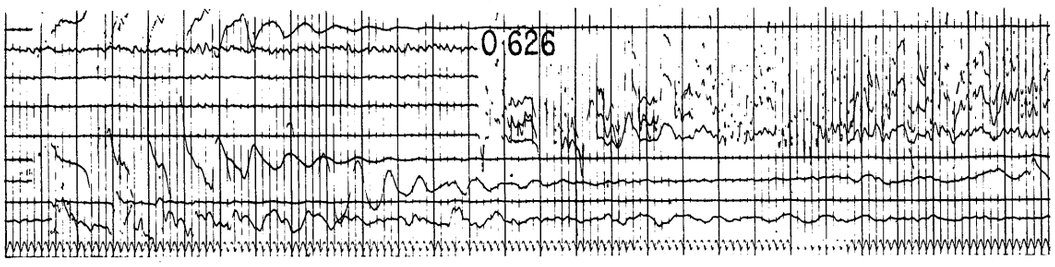
Surveyed by: VELOCITY DATA
Date: August 5, 1975
Weathering Data:

Casing Record
4252 ft. K.B.

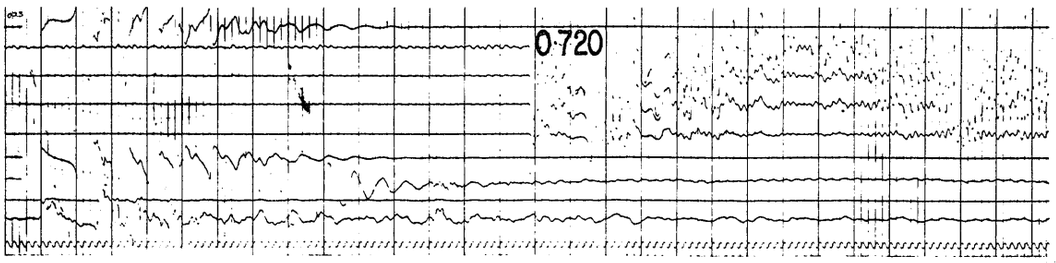
P.S.G. 1971/0213

HAPUKU - 1
(First Survey)
WELL VELOCITY RECORD
5/8/75

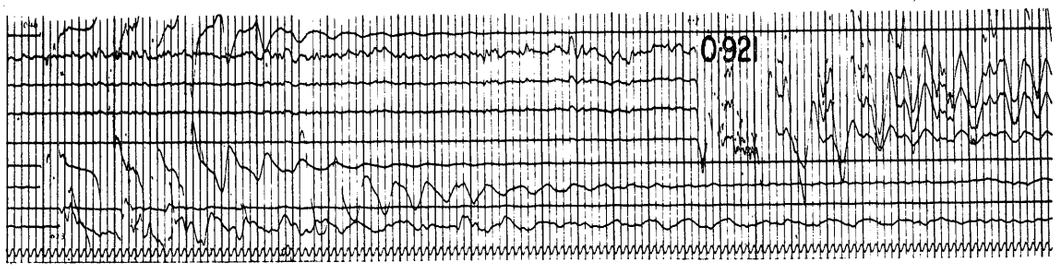
Rec. No. 2
4450' K.B.
T. 0345 hrs.



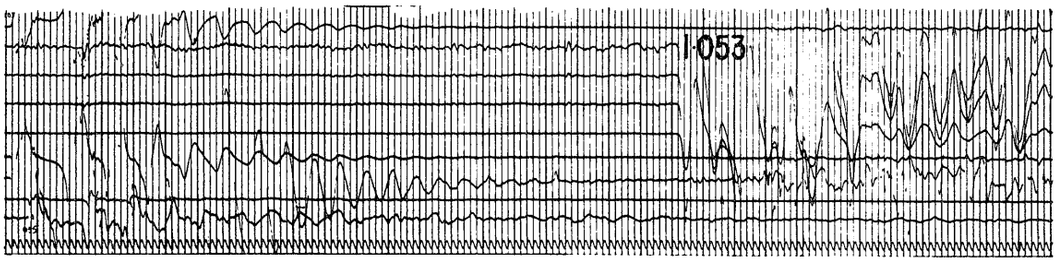
Rec. No. 32
5520' K.B.
T. 0747 hrs.



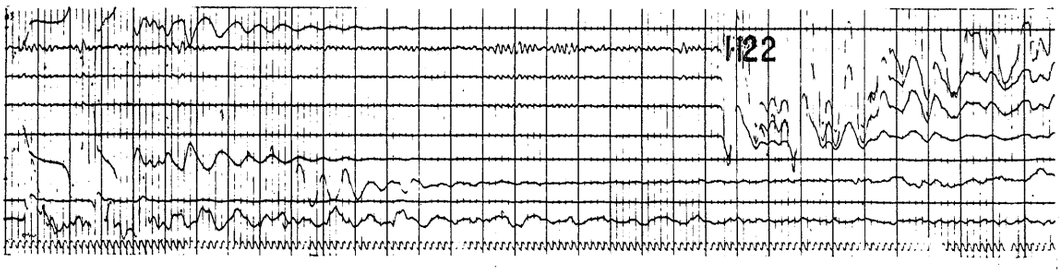
Rec. No. 3
7956' K.B.
T. 0400hrs.



Rec. No. 6
9220' K.B.
T. 0450 hrs.



Rec. No. 10
10,060' K.B.
T. 0512 hrs.



Dwg 1764/OP/

VELOCITY DATA PTY. LTD.
PO Box 141, Kenmore, Queensland, 4069
Telephone (072) 78 4860 (Office)
(072) 93 1514 (Field Operations)

DATE OF SURVEY 6th August 1975.
CLIENT Esso Australia Ltd.
WELL Hapuku No 1

OBSERVERS REPORT

ENERGY SOURCE Gas Gun RECORDING INSTRUMENTS RA-uGW LOGGER Schlumberger. Suaco
GEOPHONES: WELL WLS-1000 REFERENCE MP-3 SEA FLOOR REFRACTION
REFERENCE SENSOR OFFSET Apr 120 ft DEPTH DRILL SHIP Regina du Pacifique SHIP HEADING
WEATHER Overcast SEAS Squalls

SHOT DEPTH	RECORD / BEARING	CHARGE	SHOT DEPTH	SHOT LOCATION	SHOT OFFSET	AMPLIFIER GAIN AMP.	AMPLIFIER GAIN ATT	TIME	COMMENTS
50	1	15	35			2.	-20	0400	Record # 1 well arrivals reversed
-50	2	15	35			2.	-20.	0405	
25(	3.	15	35			2	-5.	0430	
=	4	15	35			2	-5	0432	
756	5.	15	35			2	-5.	0434	
220	6	20	35			2	-0	0450	
220	7	20	35			2	-0	0452	
220	8.	20	35			2	-0	0454	
060	9	20	35			2	-10	0510	
2060	10	30	35			2	-0.	0512	
									Welder disconnected oxygen supply
889	11	20	35			2	-6	0535.	Lost time 20 mins.
889	12	20	35.			2.	-6.	0537	
410	13	20	35			2	-5	0555	
410	14	15	35			2	-5.	0557	
	15	15	35			2	-0	0605	
289	16.	15	35			2	-0.	0607	
109	17	15	35			2	-0	0612	
109	18	15	35			2	-0	0614	
778	19	15	35			2	-0	0625	
778	20	15	35			2	-0	0627	
284	21	10	35			2	-0	0640	
284	22	10	35			2	-0	0642	
530	23	15	35			2	-5	0655	
530	24	10	35			2	-5	0657	
072	25	15	35			2	-10	0705	
072	26	10	35			2	-10	0707	
564	27	10	35			2	-15	0720	
564	28	15	35.			2	-15.	0725	
090	29	10	35			2	-25	0735	
090	30	15	35			2	-25	0737	
520	31	10	35			2	-20	0745.	
520	32	15	35			2	-20	0747	
982	33	10	35			2	-20	0800	
982	34	10	35			2	-20	0802	

NUMBER OF RECORDS 34 EXPLOSIVES USED: CAPS 0 PRIMERS EXPLOSIVE
DEPART BRISBANE 06.5 15th August RETURN BRISBANE OBSERVER

VELOCITY SURVEY

Well ....HAPUKU-1 - Second Survey..

Basin ...GIPPSLAND.....

INTRODUCTION

Esso personnel .P. GRIFFITHS/H.C. KRIEGEL.....

Contractor .....VELOCITY DATA PTY. LTD.,.....

Supplied (1) Instruments

(2) Personnel

Seismic Observer ..D. LAYSON.....

Marine Shooter .....——.....

Dynamite .....NOT USED.....

(3) Seismic Souce

Gas Gun

Gas Pressures ....2.:.1 ratio

Oxygen .....90 psi.....

Propane .....45 psi.....

(3) Licenced Shooting Boat

name .....

date loaded .....

date released .....

Agent .....

.....

amount of powder ..... lbs

size of cans ..... lbs

number of cans .....

number of caps .....

number of boosters .....

Personnel and Instruments

assembled at .LONGFORD.....date...2/9/75.....

boarded (rig)..REGIONAL.ENDEAVOUR date...2/9/75.....

date of survey.2/9/75.....

casing depth...10059'.KB.....

T.D. when shot.11964'.KB..... FTD .....11964' KB.....

water depth....-1260'.....

SURVEY PROCEDURE

Weather: sea .CALM.....

rig movement ..MINIMAL.....

rig noise .....MINIMAL.....

Hydrophones: number .....TWO.....

depth below sea level .(1).35..(2).30....ft

position ..(1) in moonpool.....

.(2) 5 feet above gas gun.....

Shot Positioning and Charges:

marker buoys (number .....

(distance .....

(direction .....

charge depth ..... ft

number of shots ..... charge size..... lbs.

number of shots .....charge size..... lbs.

number of misfires .....

amount of powder used ..... lbs

Gas gun

amount of powder dumped .....lbs.

Well-phone positioning :

T-bar .....

number of depths ....16.....

Time: first shot .....1220.....

last shot .....1447.....

rig time .....3 hours.....

RESULTS

Quality of records (good ...11.....
(fair ....3.....
(poor ....—.....
(not used ..2.....

Comparison of Interval Times with sonic log

/△/average .....3.....microsec/foot

/△max/ .....6.8.....microsec/foot

CONCLUSION

Reliability of T-D curve .....good.....

COMMENTS:

Shothole Information:- Elevation, Distance & Direction from Well

Company: ESSO EXPLORATION AUSTRALIA INC.

Well: HAPUKU-1

Elevation (Derrick Floor): 28'

Total Depth: 11936

LOCATION

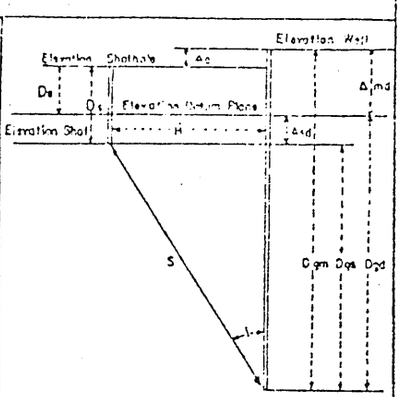
Coordinates: 38°33'21.042"S 148°32'56.058"E

Section, Township, Range: GIPPSLAND BASIN, VICTORIA

County / Area or Field

DATUM : MSL

Record Number	Shothole Number	Time of Shot	Dgm	Ds	tus	tr	T Reading	T Polarity	T Grade	Dgs	H	TAN I	Cos I	Tgs	Δsd	Δsd/V	Tgd	Tgd Average	Dgd	ΔDgd	ΔTgd	Vi Interval Velocity	Vo Average Velocity
1	12	1220	10075	35	.007	.028	1.121	D	G					1.121	35	.007		1.128	10047				8907
2		1225	10075	"	"	.027	1.121	D	G														
3		1240	10200	"	"	.028	1.131	D	G					1.132				1.139	10172	125	0.011	11364	8930
4		1242	10200	"	"	"	1.132	D	G														
5		1250	10440	"	"	"	1.148	D	G					1.148				1.155	10412	240	0.016	15000	9015
6		1252	10440	"	"	"	1.147	D	G														
15		1445	10805	"	"	"	1.178	D	G					1.178				1.185	10777	365	0.030	12167	9095
16		1447	10805	"	"	"	1.178	D	G														
7		1308	11267	"	"	"	—	D	NU											462	0.040	11550	
8		1310	11267	"	"	.027	1.218	D	F					1.218				1.225	11239				9175
9		1312	11267	"	"	"	1.218	D	G														
10		1320	11668	"	"	"	1.255	D	F											401	0.033	12152	
11		1322	11668	"	"	.026	1.251	D	G					1.251				1.258	11640				9253
12		1325	11668	"	"	.028	1.252	D	F														
13		1330	11964	"	"	"	1.268	D	G					1.268				1.275	11936	296	0.017	17412	9362
14		1332	11964				—	—	NU														



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 shotpoint

S = Straight line travel path from shot to well geophone

tus = Uphole time at shotpoint

T = Observed time from shotpoint to well geophone

tr = " " " to reference geophone

Δe = Difference in elevation between well & shotpoint.

Δsd = " " " " shot & datum plane

Δsd = Ds - De

Dgs = Dgm - Ds ± Δe ; $\tan I = \frac{H}{Dgs}$

Tgs = cos I x Vert. travel time from shot elev to geophone

Tgd = $Tgs \pm \frac{\Delta sd}{V}$ " " " " datum plane " "

Dgd = Dgm - Δmd

Vi = Interval velocity = $\frac{\Delta Dgd}{\Delta Tgd}$

Vo = Average " = $\frac{Dgd}{Tgd}$

Surveyed by: VELOCITY DATA

Date: SEPTEMBER 2, 1975

Weathering Data:

Casing Record

10059' KB

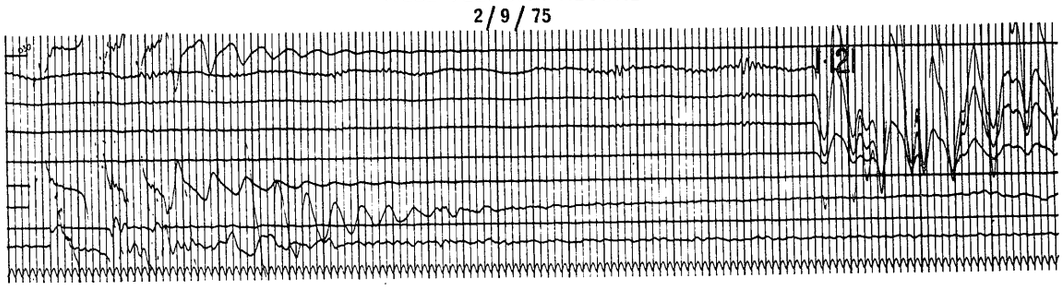
DWG 1107/OP/3

VELOCITY SURVEY ERROR CHECK

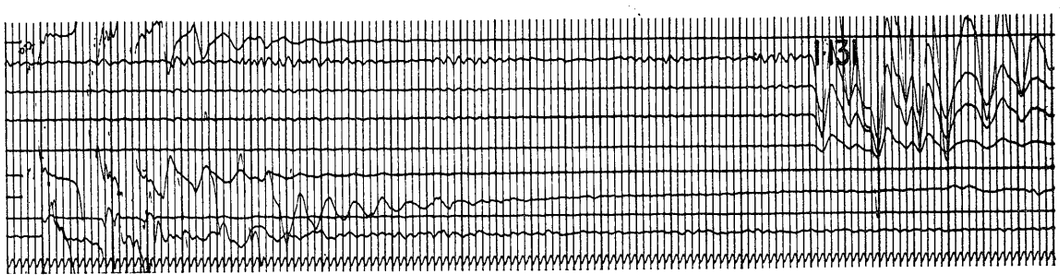
Depth Rel.S.L.	Av.Vertical Travel Time (check shots)	Ti Check Shots (sec.)	Ti Sonic Log (sec.)	△ (Millisecs.)	Depth Interval (ft.)	Error (Microsec. per ft.)
10047	1.128	.011	.011	0	125	0
10172	1.139					
10172	1.139	.016	.017	-1	240	4.2
10412	1.155					
10412	1.155	.030	.029	+1	365	2.7
10777	1.185					
10777	1.185	.040	.038	+2	462	4.3
11239	1.225					
11239	1.225	.033	.033	0	401	0
11640	1.258					
11640	1.258	.017	.019	-2	296	6.8
11936	1.274					

HAPUKU - 1
(Second Survey)
WELL VELOCITY RECORD
2/9/75

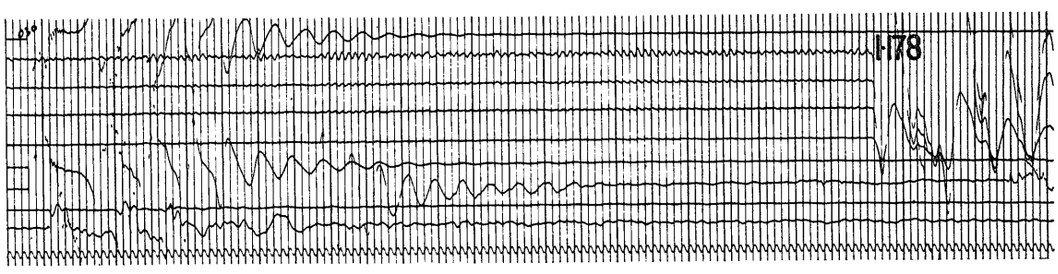
Rec. No. 1
10,075' K.B.
T. 1220 hrs.



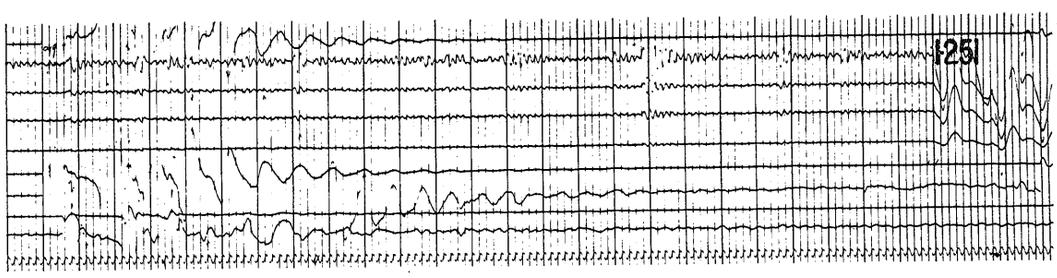
Rec. No. 3
10,200' K.B.
T. 1240 hrs.



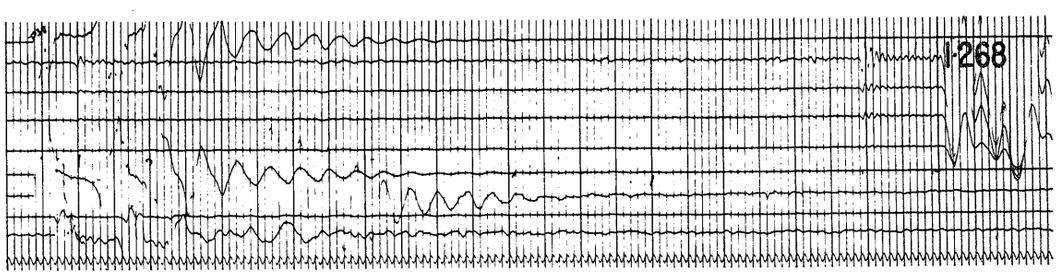
Rec. No. 16
10,805' K.B.
T. 1447 hrs.



Rec. No. 11
11,668' K.B.
T. 1322 hrs.



Rec. No. 13
11,964' K.B.
T. 1330 hrs.



Dwg. 1764/OP

ENERGY SOURCE [illegible] Gun

VELOCITY DATA PTY. LTD.

PO Box 141, Kenmore, Queensland, 4069
Telephone (072) 78 4860 (Office)
(072) 93 1514 (Field Operations)

DATE OF SURVEY: 2nd September 1975
CLIENT: Esso Australia Ltd.
WELL: [illegible] #1, 2nd Survey

OBSERVERS REPORT

ENERGY SOURCE Gas Gun RECORDING INSTRUMENTS RA-44W LOGGER Schlumberger [illegible]
GEOPHONES: WELL WAS-1000 REFERENCE MP-3 SEA FLOOR REFRACTION
REFERENCE SENSOR OFFSET DEPTH 35 ft DRILL SHIP [illegible] SHIP HEADING
WEATHER Fine SEAS Calm

GEO DEPTH	Record (BEARING)	CHARGE	SHOT DEPTH	SHOT LOCATION	SHOT OFFSET	AMPLIFIER GAIN Att	AMPLIFIER GAIN Gain	TIME	COMMENTS
675	1	200	35			-5	2	1220	
675	2	200	35			-5	2	1222	
200	3	20	35			-10	2	1240	
200	4	20	35			-10	2	1242	
440	5	20	35			-5	2	1250	
440	6	20	35			-5	2	1252	
267	7	20	35			-10	2	1308	Casing Rattling in Rec. 5 Noisy
267	8	20	35			-5	2	1310	
267	9	20	35			-5	2	1312	
668	10	20	35			-10	2	1320	
668	11	20	35			-10	2	1322	
668	12	30	35			-5	2	1325	
964	13	30	35			-5	2	1430	
964	14	30	35			-5	2	1432	
805	15	30	35			-10	2	1445	
[illegible]5	16	30	35			-10	2	1447	

Recording instruments removed from Regional Endeavour. 3-9-75

BRG
AJR
HER

NUMBER OF RECORDS 16 EXPLOSIVES USED: CAPS PRIMERS EXPLOSIVE
DEPART BRISBANE RETURN BRISBANE OBSERVER [signature]

APPENDIX-4

PALYNOLOGICAL ANALYSIS OF HAPUKU-1, GIPPSLAND BASIN.

by

ALAN PARTRIDGE

Palaeontological Report: 1975/13

September 30, 1975

INTRODUCTION

The zones recognised in Hapuku-1 are summarized below. The determinations are based on the examination of 14 cutting samples and 44 core and sidewall core samples. At total depth (T.D.) the well was still within the Late Cretaceous *T. lilliei* Zone.

As expected the section penetrated by Hapuku-1 contained some surprises. The section contained an exceptionally thick *T. lilliei* Zone overlain by condensed *T.longus* and *L. balmei* Zones. On top of this is 36 feet of glauconitic siltstone which can be divided into 10 to 15 feet of probable early Eocene at the base, overlain by 20-25 feet of Late Eocene to basal Oligocene Upper *N.asperus* Zone which represents the thickest and only unequivocal occurrence of this zone as yet found in any of the wells in the offshore portion of the Gippsland Basin.

All productive samples above the *T.lilliei* Zone contain dinoflagellates and the Paleocene dinoflagellate zones contain the most diverse and abundant dinoflagellate assemblages of this age found in the basin. The basic frequency information on spore-pollen and dinoflagellates is summarized on the chart accompanying this report for the youngest part of the Latrobe Group. The high percentage of dinoflagellates and of gymnosperms relative to other spore-pollen illustrated suggests that the depositional enviornment is marine and well distant from the shoreline. Consideration of the sharpness of the dinoflagellate zone boundaries, depositional rates and lithology suggests the presence of a number of disconformities.

SUMMARY

AGE	ZONES (Spore-pollen&Dinoflagellates)	DATA & RATING (depth in feet) Highest	Lowest
Miocene	*P. tuberculatus*	9160 (3)	9182 (0)
	UNCONFORMITY		
Late Eocene - basal Oligocene	Upper *N.asperus*	9200 (0)	9221 (0)
	DISCONFORMITY		
Eocene	Zone undifferentiated	9227 (2)	9227 (2)
	UNCONFORMITY		
Late Paleocene	Upper *L.balmei/ W. homomorpha*	9236 (0)	9265 (0)
	DISCONFORMITY		
middle Paleocene	Lower *L.balmei/ E.crassitabulata*	9290 (0)	9346 (0)
	DISCONFORMITY		
Early Paleocene (Danian)	Lower *L.balmei T.evittii*	9358 (0)	9400 (0)
	? UNCONFORMITY		

.../?

Summary cont'd

AGE	ZONES (Spore-pollen&Dinoflagellates)	DATA & RATING Highest	(depth in feet) Lowest
Late Cretaceous (Maastrichtian)	*T.longus/D.druggii*	9700 (1)	9810 (1)
	DISCONFORMITY		
Late Cretaceous (Maastrichtian to Campanian)	*T. lilliei*	9875 (2)	11,930 (1)

ANALYSIS OF ZONES

Tricolporites lilliei Zone [Top 9875' (2) alternate 10,022' (1) to Base 11,930 (1)]. The consistant occurrence of the zone species *T.lilliei* plus *Triporopollenites sectilis* and sporadic occurrence of *Gephrapollenites wahooensis*, *Tricolpites waiparaensis*, *Gambierina rudata*, *G. edwardsii* and *Stereisporites regium* indicate that the section can be no older than the *T. lilliei* Zone. In general the spore-pollen are in low concentration with respect to other organic material in the preparations and as a consequence diversity is also low. The preservation in general is poor owing to pyrite pitting of the fossil exines.

Acritarchs, algae and dinoflagellates are present in samples at 9875; 10,022; 10,068 and 10,450 feet. However they are not well preserved and except for *Deflandrea pachyceros* at 9875 feet, and the algae *Palambages spp.* (9875 & 10,068 feet) and *Botryococcus sp.* (10,068 feet) they can only be identified as *Baltisphaeridium spp (sensu lato)*. These occurrences are significant however as it is the first time possible marine indicators have been identified from the *T. lilliei* Zone in the Gippsland Basin. Nevertheless a fresh water lacustrine environment cannot be excluded for this limited assemblage.

Tricolpites longus Spore/Pollen Zone and *Deflandrea druggii* Dinoflagellate Zone [9700' (1) to 9810' (1)].

The three samples referred to these zones contain very limited assemblages, which is not unexpected considering the sandy lithologies of the sidewall cores. The age dating is based on fragmented speciments of the dinoflagellates *Deflandrea druggii* and *D. conorata* and the presence of the pollen *Triporopollenites sectilis* and *Tricolporites lilliei* (at 9750 feet and 9810 feet). The pollen indicated that the section is no younger than the *T. longus* Zone.

Some difficulty is experienced in picking the *T.longus/T.lilliei* boundary in this well as one of the usual criteria has broken down. Normally there is a marked change in the ratios of *Nothofagidites spp* to *Gambierina spp.* across this boundary with high values of *Nothofagidites spp.* in the *T.lilliei* Zone but virtual absence from the *T. longus* where there is a corresponding increase in *Gambierina spp.* Applying this criteria (see frequency) distribution chart) the sample at 9750 feet is obviously in the *T.longus*

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Zone while those at 10,022 and 10,068feet belong to the *T. lilliei* Zone. The two intervening samples could be placed in either zone so the boundary is taken at the base of the occurrence of genuine marine dinoflagellates.

Lygistepollenites balmei Zone [Upper 9236' (0) to 9265' (0) Lower 9290' (0) to 9400' (0)]

This zone is readily recognised on its spore-pollen content which also substantiates the separation between the Lower and Upper subzones. However, most assemblages are composed of over 50% dinoflagellates (see Palynological frequency chart). They are the richest dinoflagellate assemblages found so far in the Paleocene of the Gippsland Basin and allow further subdivision of the *L.balmei* Zone into three subzones which have been recognised elsewhere in the basin. Although most samples contained dinoflagellates which was suprising considering the coarse grained lithology not all productive samples contained enough material for confident zone identification or counting.

Dinoflagellate Zones in *L.balmei* Zone.

Wetzeliella homomorpha Zone [9236' (1) to 9265' (1)]

This zone containing the lowest dinoflagellate percentages and diversity is recognised on occurrence of the zone species *W. homomorpha*. Other dinoflagellates present include *Adnatosphaeridium retiintextum*, *Achomosphaera septatum*, *Svalbardella australina* and *Deflandrea medcalfi*.

Eisenackia crassitabulata Zone [9290'(1) to 9346' (1)]

This zone is characterised by abundant *Adnatosphaeridium retiintextum* and lesser abundances of *Eisenackia crassitabulata* and *E. sp cf. circumtabulata*. Other dinoflagellates present include *Cladopyxidium septatum*, *Cyclonephelium vitilare*, *Deflandrea bakeri*, *D. dilwynensis* and *Svalbardella australina*

Trithyrodinium evittii [9358' (1) to 9400 (1)]

In this zone *Palaeoperidinium pyrophorum Deflandrea spp* and *Adnatosphaeridium reiintextum* are the most dominent forms. Other species present are *Deflandrea speciosa*, *D.palaeocenicus n.sp D.bakeri*, *D.dilwynensis*, rare *Eisenackia crassitabulata*, *Hystrichokolpoma mentitum*, *Gonyaulacysta sp.*, *Palaeostomocystis laevigata*, *Spinidinium spp.*, *Svalbardella australina* and *Trichodinium hirsutum*.

The sidewall core at 9638 feet contains a high dinoflagellate percentage (see Palynological Frequency chart) and is thus most similar to samples from the overlying *L. balmei* zone. However the assemblage contains only long ranging spore-pollen and dinoflagellates, plus a few undescribed dinoflagellates which have not previously been recorded and therefore the sample cannot be confidently referred to either the underlying or overlying zones.

Eocene (Zone undifferentiated) [9227' (2)]

The probable presence of Early Eocene is suggested by the recovery of a very limited dinoflagellate assemblage from a single sidewall core. The few spore-pollen observed in the preparation were not of age significant. Cuttings from this level upon preparation were found to be dominated by

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material caved from overlying Miocene, so it is unlikely that this determination can be improved on.

The dinoflagellate assemblage consists of:

Achomosphaera septatum

Adnatosphaeridium retiintextum

Cordosphaeridium bipolare

? Diphyes colligerum

Operculodinium centrocarpum

Thalassiphora pelagica

Wetzeliella homomorpha

? W. hyperacantha

The most likely age for this assemblage is certainly Lower *M.diversus* Zone but since none of the species are actually restricted to that zone and considering the possibility that there may be some reworking the assemblage is best left as undifferentiate Eocene. The maximum thickness for this unit can only be 15 feet.

Upper *Nothofagidites asperus* Zone [9200' (0) to 9221 (0)]

This zone was originally defined on negative evidence, being the interval following the extinction of many typical Eocene species and prior to the first appearance of the spore *Cyatheacidites annulatus* (Stover & Partridge, 1973).

It has not previously been confidently identified in the offshore portion of the Gippsland Basin. However the samples from Hapuku-1 placed in this zone conform to the original definition and although there is still not a single fossil known which is restricted to this zone the assemblages obtained were diverse and in terms of a combination of characters quite distinctive. The total assemblages show good agreement with others recorded from onshore.

Gippsland Basin and from the Bass Basin
Important spore-pollen identified include:

Aglaoreidia qualumis	*9200'*
Foveotriletes palaeoquetrus	*9200'*
Kuylisporites waterbolkii	*9200', 9221'*
Nothofagidites falcatus	*9200', 9209', 9218'*
Proteacidites rectomarginis	*9200', 9209'*
P. stipplatus	*9200'*
Tricolpites leuros	*9209'*
Triporopollenites chnosus	*9200'*

The dinoflagellate component of the assemblages is more diverse than other Upper *N.asperus* Zone samples examined and includes:

Cordosphaeridium inodes	*9200', 9221'*
Deflandrea heterophlycta	*9218'*
Homotryblium sp.cf. H.tasmaniense	*9200', 9209', 9218'*
Hystrichokolpoma rigandae	*9200'*
Hystrichosphaeridium capricornum	*9218', 9221'*
Nematosphaeropsis balcombiana	*9200, 9209'*
Phthanoperidinium coreoides	*9221'*
P. delicatum	*9221'*
Systematophora placacantha	*9200', 9221'*

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Proteacidites tuberculatus [9160' (3) to 9182' (0)]

The presence of the spore *Cyathcacidites annulatus* in the sidewall core at 9182 feet indicates an age no older than the above zone. The foraminifera extracted from this sidewall core were indeterminate because of partial dissolution and or diagenesis however the spore-pollen and dinoflagellate assemblage obtained is not inconsistant with the Zone F (late Early Miocene) age obtained from the lowest sidewall core containing datable foraminifera at 9150 feet.

DISCUSSION OF UNCONFORMITIES

A number of unconformities and/or disconformities are postulated in the Latrobe Group section penetrated in this well. The higher ones between the *P. tuberculatus* Zone (Miocene) and the Upper *N. asperus* Zone (late Eocene - basal Oligocene) and between the Eocene and the *L. balmei* Zone (Paleocene) are obvious because of the marked age differences.

The other breaks are more subtle and correspond to section missing across zone boundaries. Thus a complete sequence of zones is still present.

The two lowest breaks between the *T.longus/T.lilliei* and *L.balmei/T.longus* Zones are partially inferred from seismic and electric log correlation. Because the breaks are at zone boundaries it is uncertain how much section or time is missing. On the basis of environments interpreted from the palynological examination however there are distinct increases in percentages of dinoflagellates across both boundaries concurrent with decreases in depositional rate (see Palynological Frequency chart).

Likewise the two ther disconformities postulated between the three dinoflagellate zones recognised by within the *L. balmei* Zone are characterised by distinct zone changes and overall slow depositional rates. For these zones, assuming that there was continuous deposition, would give depositional rates between 0.3 cm/1000 years and 2.5 cm/1000 years. And these are the maximum rates!

They are anomalous depositional rates because they are less than what is considered as average rates for pelagic sedimentation in the ocean determined from the Deep Sea Drilling Project (D.S.D.P) and which has a range of between 1 to 5 cm/1000 years.

Considering that the *T.longus* and *L.balmei* Zones are dominated by coarse to often pebbly sands it would be difficult to rationalize the slow depositional rates with the lithology without the recognition of disconformities.

In addition the presence of a disconformity between the *E. crassitabulata* and *W. homomorpha* Zones could be an explanation for the origin of the dolomite cementation of the sandstones in the *E. crassitabulata* Zone.

Understanding the environmental setting of these sands in the *T.longus* and *L.balmei* Zones is more difficult however. Any explanation must consider a) absense of foraminifera or other marine fossils aside from dinoflagellates; b) the presence of disconformities;c) the very coarse lithologies recorded ; d) the lack of any obvious reworking of spore-pollen or dinoflagellates between zones.

The high percentage of dinoflagellates to spore-pollen particularly in *T.evittii* and *E. crassitabulata* Zones as well as high ratio of gymnosperm pollen to angiosperm pollen and spores suggest an offshore environment a considerable distance from the shore line. These features are consistant with one of the few environmental trends recognised in studies of distribution of spore-pollen

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and microplankton in present day marine sediments. (See Cross, et.al. 1966; Traverse & Ginsburg 1966). The trends are that the ratio of dinoflagellates to spore-pollen increase offshore and that among the spore-pollen, gymnosperm pollen increases preferentially with respect to the rest of the taxa because the gymnosperm pollen float more readily and longer as a consequence of their morphology and therefore can be transported further offshore.

Even though it appears to be an offshore marine environment the lack of any other marine fossils is difficult to explain. Especially the lack of foraminifera although their absence may be related to the coarse grained lithology which is ± implying a high energy environment. However the latter interpretation is inconsistant with the presence in the sands of dinoflagellates and spore-pollen which would be expected to be winnowed out in a high energy environment.

The possibility that the sands were emplaced by turbidity currents or a grain flow or represent slump deposits is also considered unlikely as they lack the coarser derived terrestrial plant fragments and recycled palynomorphs which are typical of palynological preparations from such deposits. Further, such an explanation is not helped by the presence of a complete sequence of zones even though they may be separated by disconformities.

Overall the sequence in the Paleocene in Hapuku-1 shows more similarity with the wells on, as with Dart-1, or adjacent to, as with Moray-1 the stable north and south platforms rather than the closer wells to the north east such as Albacore-1 and Mackerel-1. This suggests that we may have a different provenance for these units in Hapuku-1 and related to this may be that the sands from these areas are only available as specific times.

REFERENCES

Cross, A.T., Thompson, G.G. & Zaitzeff, J.B., (1966). Sources and distribution of palynomorphs in bottom sediments, southern part of Gulf of California. Marine Geology vol. 4. pp 467-524.

Stover, L.E. & Partridge, A.D. (1973). Tertiary and Late Cretaceous spores and pollen from the Gippsland Basin, Southeastern Australia. Proc. Roy. Soc. Vict. vol. 85 pt. 2: 237-286.

Traverse, A. & Ginsburg, R.N., (1966). Palynology of the surface sediments of Great Bahama Banks as related to water movement and sedimentation. Marine Geology 4 (6): 417-459

SAMPLES ANALYSED

SAMPLE	DEPTH IN FEET	ZONE
Cuttings	9110 - 20	Barren, mineral charcoal only.
Cuttings	9160 - 70	*P.tuberculatus* Zone
SWC 55	9182	*P.tuberculatus* Zone
SWC 53	9200, K,B.	Upper *N.asperus* Zone
SWC 52	9209	Upper *N.asperus* Zone
SWC 51	9218	Upper *N.asperus* Zone
SWC 50	9221 P,	Upper *N.asperus* Zone
Cuttings	9220 - 30	Indeterminate, dominated by material caved from *P.tuberculatus* Zone
SWC 49	9227	Eocene, undifferentiated but pre - Upper *N.asperus*
Cuttings	9230 - 40	Indeterminate, dominated by material caved from *P.tuberculatus* Zone.
SWC 48	9236	Upper *L.balmei/W.homomorpha* Zones
Core - 1	9250	Upper *L.balmei/W.homomorpha* Zones
Core - 1	9265	Upper *L.balmei/W.homomorpha* Zones
Core - 1	9274½	Indeterminate, very low yield.
Core - 2	9290	Lower *L.balmei/E.crassitabulata* Zones.
Core - 2	9309	Barren, mineral charcoal and woody material only.
Core - 2	9321	Lower *L.balmei/E.crassitabulata* Zones.
Core - 2	9329	Lower *L.balmei/E.crassitabulata* Zones
Core - 3	9346	Lower *L.balmei/E.crassitabulata* Zones
Core - 3	9358	Lower *L.balmei/T.evittii* Zones
Core - 3	9364 ½	Lower *L.balmei/T.evittii* Zones
Core - 3	9369	Lower *L.balmei/T.evittii* Zones
SWC 47	9400	Lower *L.balmei/T.evittii* Zones
SWC 46	9460	SWC contaminated.
SWC 45	9524	Barren
SWC 42	9638	Very low yield, zone indeterminate.

Samples Analysed cont'd

SAMPLE	DEPTH IN FEET	ZONE
SWC 40	9700	*T.longus/D.druggii* Zones
SWC 39	9750	*T.longus/D.druggii* Zones
SWC 38	9810	*T.longus/D.druggii* Zones
Cuttings	9870 - 80	Indeterminate, preparation dominated by drilling mud contamination
SWC 37	9875	*T.lilliei* Zone
SWC 36	9918	Indeterminate, SWC contaminated.
SWC 34	9968	Barren
SWC 33	10,022	*T.lilliei* Zone
Cuttings	10,030 - 40	*T.lilliei* Zone
SWC 32	10,031	SWC contaminated with Oligocene-Miocene fossils.
SWC 31	10,068	*T.lilliei* Zone
Junk Basket return	from trip to 10,115	*T.lilliei* Zone
SWC 119	10,200	*T.lilliei* Zone
SWC 116	10,385	*T.lilliei* Zone
SWC 115	10,450	*T.lilliei* Zone
Coal Cuttings	10,520 - 30	*T.lilliei* Zone
SWC 112	10,643	*T.lilliei* Zone
SWC 110	10,766	*T.lilliei* Zone
Coal Cuttings	10,980 - 90	*T.lilliei* Zone
SWC 106	11,033	*T.lilliei* Zone
SWC 105	11,100	*T.lilliei* Zone
SWC 104	11,175	*T.lilliei* Zone
Coal Cuttings	11,320 - 30	*T.lilliei* Zone
SWC 102	11,334 P	*T.lilliei* Zone
SWC 101	11,400	*T.lilliei* Zone
Cuttings	11,500 - 10	*T.lilliei* Zone
SWC 97	11,648	Barren, mineral charcoal only.
Cuttings	11,660 - 70	*T.lilliei* Zone
SWC 95	11,743	*T.lilliei* Zone
Coal Cuttings	11,820 - 30	*T.lilliei* Zone
SWC 91	11,930	*T.lilliei* Zone
Cuttings	11,940 - 50	*T.lilliei* Zone

Samples analysed cont'd

SAMPLE	DEPTH IN FEET	ZONE
Cuttings	11,970 - 74	*T.lilliei* Zone

Recycled spore-pollen are indicated by

K: Early Cretaceous

B: *L.balmei* Zone species

P: Permian

BASIN GIPPSLAND BASIN DATE September 25, 1975

WELL NAME HAPUKU-1 ELEVATION K.B. +28'

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
OLIG-MIO.	P. tuberculatus	9160	3	9182	0		9182	0			
EOCENE	U. N. asperus	9200	0				9221	0			
	M. N. asperus										
	L. N. asperus										
	P. asperopolus										
	U. M. diversus										
	M. M. diversus										
	L. M. diversus										
PALEO-CENE	U. L. balmei	9236	0				9265	0			
	L. L. balmei	9290	0				9400	0			
LATE CRETACEOUS	T. longus	9700	1				9810	1			
	T. lilliei	9875	1				11,743	1	11,970	3	
	N. senectus										
	C. trip./T.pach.										
	C. distocarin.										
	T. pannosus										
EARLY CRETACEOUS											
PRE-CRETACEOUS											

COMMENTS:

Wetzeliella homomorpha Dinoflagellate Zones 9236' (1) to 9265'(1)

Eisenackia crassitabulata Dino. Zone 9290' (1) to 9346'(1)

Trithyrodinium evittii Din. Zone 9358' (1) to 9400'(1)

Deflandrea druggii Dino. Zone 9700' (1) to 9810'(1)

Undifferentiated Eocene occurs in SWC at 9227'

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: ALAN PARTRIDGE DATE September 25, 1975

DATA REVISED BY: _____ DATE _____

FORM No R 315 12/72

WELL COMPLETION REPORT

HAPUKU-1

APPENDIX 5

FORAMINIFERAL SEQUENCE - HAPUKU-1

By David Taylor

PE900501

This is an enclosure indicator page.
The enclosure PE900501 is enclosed within the container PE902283 at this location in this document.

The enclosure PE900501 has the following characteristics:

ITEM_BARCODE	= PE900501
CONTAINER_BARCODE	= PE902283
NAME	= Palynological Frequency Chart
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= DIAGRAM
DESCRIPTION	= Palynological Frequency Chart(enclosure from WCR) for Hapuku-1
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W685
WELL_NAME	= HAPUKU-1
CONTRACTOR	=
CLIENT_OP_CO	= ESSO AUSTRALIA LIMITED

(Inserted by DNRE - Vic Govt Mines Dept)

FORAMINIFERAL SEQUENCE

HAPUKU # 1

by DAVID TAYLOR

Paleontology Report 1975/14 September 25, 1975.

SUMMARY

The HAPUKU # 1 well intersected a thick section of prograding Plio/Pleistocene carbonates (drilled thickness of + 5055'). This is the thickest section of Pliocene known in the Gippsland Basin; and for that matter, in southern Australia. The Plio/Pleistocene biostratigraphic sequence present in FLOUNDER # 5 (Taylor, 1975) was repeated in HAPUKU and the adopted zonation was found to be valid, though correlation with the European stratotype needs reconsideration with the availability of the detailed discussion of Stainforth et al (1975).

The Miocene section is severely abbreviated and the base of progradation between 7650 and 7900 is marked by the absence of Zone C and dramatic change in the benthonic components. In many other Gippsland sections the massive progradation took place during the mid Miocene in Zones C and/or D-1. The basal zones of the Miocene and most, if not all, of the Oligocene zones are absent in Hapuku.

The biostratigraphic sequence in HAPUKU # 1 is summarized below:-

AGE	Minimal Depth Zone	Multi Association Zones	Depth in Hapuku # 1 Top		Base
PLEISTOCENE					
--?--?--?--		A-2	?		2110
	A	A-3	2150	to	3700
PLIOCENE		A-4	3800	to	6250
		B-1	6450	to	7050
--?--?--?--	B				
LATE MIOCENE		B-2	7450	to	7650
		D-1	7900	to	8270
MID MIOCENE	D				
		D-2	8400	to	8800
————	E	?	9030	to	9060
EARLY MIOCENE	F		9150	to	?9182
? EARLY OLIGOCENE or ? LATE EOCENE	? J-2 or K		9200	to	9209

INTRODUCTION

Sixty-two side wall cores were examined between 1995 and 9875. Side wall cores at 9218, 9221, 9236 and 9875 were barren of fauna, as were samples from conventional cores # 1, # 2 and # 3 and a junk basket sample from 10115. Side wall cores from 9172, 9182, 9200 and 9209 contained non-diagnostic faunas. During drilling rotary cutting samples were examined but are not discussed in this report.

All depths cited in this report and listed on charts are in feet as labelled on samples submitted. The depths are below datum of + 28' M.S.L. and the water depth of 1260' is included in the measurement.

Three sheets of Distribution Charts accompany this report.

Sheet 1 shows the distribution of planktonic foraminifera with the basis of biostratigraphic breakdown.

Sheet 2 gives the distribution of benthonic species.

Sheet 3 summarizes the environmental analysis and presents an interpretative model.

Symbols on the charts are as follows:-

°	=	1 - 20 specimens
I	=	over 20 specimens
D	=	dominant (over 40%)
[°] or [I]	=	reworked planktonics or reworked or misplaced benthonics
?	=	dubious identification
cf	=	similar but not identical

BIOSTRATIGRAPHY

LATE EOCENE to EARLY OLIGOCENE:- Side wall cores at 9200 and 9209 contained only arenaceous foraminifera without planktonics. The fauna and lithology are reminiscent of the LAKES ENTRANCE GREENSAND. If this inference is correct and synchronuity of the rock unit maintained seawards, then the samples represent the earlymost Oligocene (J-2) or the latest Eocene (K).

OLIGOCENE to EARLY MIOCENE HIATUS:- Most, if not all, of the Oligocene and the base of the early Miocene are not represented in the biostratigraphic sequence, unless the poorly preserved planktonic faunas at 9172 and 9182 are older than Zone F.

EARLY MIOCENE - ? 9182 - 9150 - ? 9060:- Partial dissolution and/or diagensis have obliterated most taxonomic features on specimens from samples at 9182 and 9172. The side wall core at 9150 contains a slightly better preserved fauna and *Globigerinoides bisphericus* can be positively identified in association with *G. trilobus*. The association is characteristic of the minimal layer Zone F. Preservation is still poor at 9060, but moulds of *Praeorbulina glomerosa* were present without the ultimate *Orbulina* forms. Despite the inability to achieve identification of the *curvus* morphotype, a basal Zone E designation is applied and the early Miocene boundary is placed tentatively at 9060.

MID MIOCENE - ? 9030 - 8800 - 7900:- The side wall core at 9030 is zonally indeterminate, but probably represents the top of Zone E. The next side wall core at 8800 contains a characteristic Zone D-2 fauna with an association of *Orbulina universa* and *Globorotalia peripheroronda*.

The probable base of Zone D-1, at 8270, is faunally indistinct, but at 8100 there is an association of the various morphotypes of *G. mayeri* without *G. peripheroronda*. *G. lenguaensis* occurs at the top of the Zone with *G. mayeri* (S.L.).

As the fauna at 7900 is quite distinct from that in the next highest sample, at 7650, and as 7650 contains *G. acostaensis*, the side wall core at 7900 is regarded as representing the top of the mid Miocene in Hapuku, in accordance with the opinions of Stainforth et al (1975). Previously the mid and late Miocene have not been split in offshore Gippsland, because of lack of definition, but here it is both practical and convenient to distinguish between mid and late Miocene.

MISSING SECTION:- Zone C appears to be absent, as *G. mayeri mayeri* and *G. lenguaensis* are not present in association with *G. miotumida miotumida*. However, there is a 250 foot unsampled interval between the top of D and the base of B. But there is a dramatic change in benthonic components between 7900 and 7650, which suggests that the former represented a deepwater ooze, whilst the latter was at or near the base of a prograding sequence (see below).

Therefore, the supposition of a disconformity is not inconsistent with the environmental interpretation based on benthonic foraminifera.

LATE MIOCENE - 7650 - 7450:- A fairly nondescript fauna, devoid of most globorotalids apart from *G. miotumida miotumida* and *G. miotumida conoidea*. This lack of faunal definition is, in fact, the characteristic of Zone B-2 which is a vague, transitional interval between the diverse Miocene and Pliocene faunas.

PLIOCENE - ? 7050 - 1995 - ? :- As in Flounder # 5, the base of the Pliocene is placed at the initial appearance of *G. miozea conmiozea* and not at the appearance of *G. puncticulata*. This placement is consistent with that related to the Italian stratotype by Stainforth et al (1975) but not with the "traditional New Zealand Pliocene" of Kennett & Watkins (1974).

Between 7050 and 6450 there is a globorotalid fauna dominated by *G. miozea* (S.L.) (including *G. miozea conomiozea*), without the evolutionary descendant forms *G. puncticulata* (S.L.) (Kennett & Watkins, 1974) or elements of the *G. crassaformis* lineage of Lamb & Beard (1972). The evolutionary positions of the sequences place this interval within Zone B-1.

Distinct *G. puncticulata* (S.L.) first appears at 6250 with rare forms reminiscent of *G. aemiliana*. *G. crassaformis* is apparent at and above 5850 with sporadic occurrences of a rather thick shelled form referred to as *G. margaritae*. These ranges are consistent with the definition of Zone A-4 in Flounder # 5 (Taylor, 1975).

Zone A-3 is between 3700 and 2150; the base being marked by the dominant occurrence of *G. inflata*. *G. acostaensis* is replaced by *Neogloboquadrina humerosa* within the zone. *Globorotalia margaritae* was not reported within the interval.

The fauna at 2110 is dominated by *G. inflata* and *Globigerina bulloides*, but contains *Neogloboquadrina dutertrei*, *N. humerosa* and *Globorotalia tosaensis tenuitheca* which indicates the base of Zone A-2 as in Flounder # 5. The highest Hapuku sample at 1995 is still within A-2, so that the Quaternary Zone A-1 was not sampled, though it is no doubt present, above the highest side wall core.

ENVIRONMENT

Data relating to this environmental interpretation is shown on Distribution Chart - Sheet 3, whilst benthonic foraminiferal distribution is given on Sheet 2.

The totally arenaceous fauna in the "greensand", of possible late Eocene and/or early Oligocene age, suggests an anaerobic, lagoonal environment with the probability of reduced salinity waters. Such assumptions are identical for the onshore Lakes Entrance Greensand.

A definite environmental trend during the Mio/Pliocene is clearly shown by the pattern of benthonic foraminiferal distribution on the chart - Sheet 2. This trend, in ascending order, is:-

1) A concentration of deepwater species between 9182 and 7970. These species include *Sigmoidopsis schlumbergi, Gyroidina broekiana, Discammina compressa* and morphologically simple arenaceous forms. Specimen frequency fluctuates but is relatively high and planktonics always comprise over 98% of total fauna. The two deepest samples at 9182 and 9172 contain poorly preserved planktonic faunas which suggest that they had been subjected to partial or, for some species, total dissolution. Both of these samples contain *Cibicides mundulus* which, off Gippsland today, shows preference for depths approaching that of calcium carbonate compensation. Sedimentation evidently took place on the outer continental rise in the early Miocene and on the shallower inner continental rise during the mid Miocene.

2) The interval between 7050 and 3500 is dominated by the lens-shaped *Cassidulina carinata* in relatively poor and small specimen sized benthonic and planktonic faunas. The faunas give the impression that they were size and shape sorted by strong currents. A position on the lower continental slope is assumed.

3) From 3300 to 3196 the dominant species is *Epistominella exigua*, which is common on the present day continental slope.

4) *Virgulina rotundata* and *V. schrebersiana* are usually the common forms between 3096 and 2110, although *Bolivinita quadrilatera* is abundant at 2996 and *Euuvigerina bassensis* and *E. pigmea* dominate at 2110 and 2203.

Although all these species are present in the Jemmys Point Formation at Lakes Entrance (Parr, 1939 and Nicholls, 1968), they are by no means as abundant there as they are in Hapuku or on the modern Gippsland continental slope. Thus a slope position is indicated, which became shallower as is evident by the dominance of *Euuvigerina bassensis* and *E. pigmea* higher in the section.

The trend is from deepwater sedimentation in the early and mid Miocene to a prograded slope sequence in the Pliocene. The fact that Zone C is missing may be due to removal by high energy conditions which are evident at the base of the prograded sequence.

REFERENCES

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Form R 193 3/71

BASIN GIPPSLAND BY David Taylor

WELL NAME HAPUKU-1 DATE Sept. 24, 1975 ELEV. +28'

Foram Zonules

		Highest Data	Quality	2 Way Time	Lowest Data	Quality	2 Way Time
PLEIST.	A_1						
	Alternate						
	A_2	1995	0		2110	0	
	Alternate						
PLIOCENE	A_3	2150	0		3700	0	
	Alternate						
	A_4	3800	0		6250	0	
	Alternate						
	B_1	6450	0		7050	0	
	Alternate						
MIOCENE	B_2	7450	0		7650	1	
	Alternate						
	C						
	Alternate						
	D_1	7900	1		8270	1	
	Alternate	7970	0				
	D_2	8400	0		8800	0	
	Alternate						
	E	9030	2		9060	0	
	Alternate	9060	0				
	F	9150	1		9150	1	
	Alternate						
	G						
	Alternate						
	H_1						
	Alternate						
	H_2						
	Alternate						
OLIGOCENE	I_1						
	Alternate						
	I_2						
	Alternate						
	J_1						
	Alternate						
	J_2						
	Alternate						

COMMENTS:

Zone C missing. SWC at 7650' above foot of progradation. SWC's at 9170', 9182' contain indeterminant planktonic faunas due to partial dissolution and or diagenesis.

Samples at and below 9200' contain no planktonic faunas.

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 zonule, 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 zonule 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 _____

By _____

HAPUKU # 1

HAPUKU-1 SPECIES LIST.

DEPTH of SIDE WALL CORES in feet

1995 2110 2150 2203 2297 2400 2505 2600 2700 2800 2900 2996 3096 3196 3268 3300 3400 3500 3590 3700 3800 3900 4005 4090 4200 4280 4350 4500 4700 4900 5100 5300 5530 5650 5850 6050 6250 6450 6650 6850 7050 7450 7650 7900 7970 8100 8270 8400 8600 8800 9030 9060 9150 9172 9182 9200 9209 9218 9221 9227 9236

N F N F N F N F

PLANKTONICS

1. *Globigerina bulloides*
2. *G. decoraperta*
3. *Globorotalia obesa*
4. *G. inflata*
5. *Globigerinella aequalateralis*
6. *Globorotalia miotumida conomiozea*
7. *G. crassaformis*
8. *G. scitula*
9. *G. tosaensis tenuitheca*
10. *Neogloboquadrina dutertrei*
11. *N. humerosa*
12. *Globigerinoides rubra*
13. *G. obliquus*
14. *Orbulina universa*
15. *Globigerina falconensis*
16. *Globorotalia miotumida conoidea*
17. *G. cf scitula*
18. *G. acostaensis*
19. *G. puncticulata*
20. *Globoquadrina altispira*
21. *Globigerinoides trilobus trilobus*
22. *G. trilobus sacculifera*
23. *Globorotalia miotumida miotumida*
24. *G. puncticulata sphericomiozea*
25. *Neogloboquadrina pachyderma*
26. *Globoquadrina dehiscens* (S.S.)
27. *Globorotalia margaritae*
28. *G. siakensis*
29. *G. cf aemiliana*
30. *G. premenardii*
31. *G. miozea* (S.S.)
32. *G. continuosa*
33. *Globigerina nepenthes*
34. *G. venezuelana*
35. *Globorotalia praescitula*
36. *G. conica*
37. *G. mayeri barisanensis*
38. *G. lenguaensis*
39. *G. mayeri mayeri*
40. *G. mayeri nympha*
41. *Globigerina foliata*
42. *G. woodi woodi*
43. *Globigerinoides bisphericus*
44. *Globorotalia peripheroronda*
45. *Globoquadrina larmeui*
46. *Globigerinoides trilobus* (elongate form)
47. *Globoquadrina advena*
48. *Praeorbulina glomerosa* (S.L.)
49. *Globigerina apertura*
50. indeterminate globigerinids (poor preservation)

SYMBOLS:

o	= 1 - 20 specimens
I	= over 20 specimens
D	= dominant (over 40%)
[o] or [I]	= reworked planktonics or reworked or misplacedbethonics
?	= dubious identification
cf	= similar but not identical
NFF	= no foraminiferal fauna

Depth in feet to base of ZONE	2110	3700	6250	7050	7650	8270	8800	9060	9150	9182	
	A-2	A-3	A-4	B-1	B-2	D-1	D-2	E	F	?	no planktonics

HAPUKU #1 **HAPUKU-1**

SPECIES LIST

DEPTH of SIDE WALL CORES in feet

1995 2110 2150 2203 2297 2400 2505 2600 2700 2800 2900 2996 3096 3196 3268 3300 3400 3500 3590 3700 3800 3900 4005 4090 4200 4280 4350 4500 4700 4900 5100 5300 5530 5650 5850 6050 6250 6450 6650 6850 7050 7450 7650 7900 7970 8100 8270 8400 8600 8800 9030 9060 9150 9172 9182 9200 9209 9218 9231 9227 9236

NNNN
FFFF
FFFF

BENTHONICS

51. *Sphaeroidina bulloides*
52. *Brizalina noblis*
53. *Euuvigerina bassensis*
54. *E. pigmea*
55. *Lenticulina* spp.
56. *Nodosaria* spp.
57. *Notorotalia clathrata*
58. *Brizalina earlandi*
59. *Bolivinita pliozea*
60. *Discorotalia aranea*
61. *Globobulimina pacifica*
62. *Melonis pompiliodes*
63. *Pyrgo* sp. (large)
64. *Textularia semicarinata*
65. *Virgulina rotundata*
66. *V. schrebersiana*
67. *Brizalina pseudobeyrichi*
68. *Bolivinita quadrilatera*
69. *Globobulimina ovata*
70. *Martinottiella communis*
71. *Cassidulinoides* sp.
72. *Epistominella exigua*
73. *Karreriella bradyi*
74. *'Planulina' wullerstorfi*
75. *Bolivina* sp? (striate)
76. *Bulimina submarginata*
77. *Siphouvigerina proboscidae*
78. *Bolivina robusta*
79. *Glandulina* sp.
80. *Hoeglundina elegans*
81. *Triloculina* spp.
82. *Osangularia bengalensis*
83. *Heronallenia* cf. *polita*
84. *Anomalina tasmanica*
85. *Cibicides opacus*
86. *Astrononion* sp. *carter*
87. *Anomalina colligera*
88. *Fissurina* sp.
89. *Florilus* cf. *parri*
90. *Cassidulina carinata*
91. *Anomalina bassensis*
92. *Lagena* spp.
93. *Trifarina bradyi*
94. *Cibicides subhaidingeri*
95. *Euuvigerina miozea*
96. *Notorotalia* cf. *taranakia*
97. *Pullenia bulloides*
98. *Cassidulina subglobosa*
99. *Cibicides thiara*
100. *C. mediocris*
101. *Gyroidina soldani*
102. *Euuvigerina mioschwageri*
103. *Sigmoidopsis schlumbergeri*
104. *Eponides subhaidingeri*
105. *Melonis* sp?
106. *Rosalina* sp?
107. *Ammodiscus* sp (smooth)
108. *Bathysiphon* sp B
109. *Glomospira* spp.
110. *Gyroidina broekiana*
111. *Haplophragmoides* cf *paupera*
112. *Anomalina macroglabra*
113. *Rhabdammina* sp.
114. *Discammina compressa*
115. *Spiroloculina pusillum*
116. *Cibicides mundulus*
117. *Bathysiphon* sp A
118. *Haplophragmoides* cf *incisa*
119. *H. rotundata*
120. *Ammodiscus parri*

SYMBOLS:

o	= 1 - 20 specimens
I	= over 20 specimens
D	= dominant (over 40%)
[o] or [I]	= reworked planktonics or reworked or misplaced bethonics
?	= dubious identification
cf	= similar but not identical
NFF	= no foraminiferal fauna

HAPUKU-1 SPECIES LIST

DEPTH of SIDE WALL CORES in feet

1995 2110 2150 2203 2297 2400 2505 2600 2700 2800 2900 2996 3096 3196 3268 3300 3400 3500 3590 3700 3800 3900 4005 4090 4200 4280 4350 4500 4700 4900 5100 5300 5530 5650 5850 6050 6250 6450 6650 6850 7050 7450 7650 7900 7970 8100 8270 8400 8600 8800 9030 9060 9150 9172 9182 9200 9209 9218 9221 9227 9236

OTHER FAUNA

Echinoid spines
Mollusca frags
Ostracods
Sponge spicules
Fish teeth

INORGANIC MATERIALS

Limonite
Pyrite
Angular quartz
Glauconite
Mica
Coarse rounded quartz + gravel

SYMBOLS:

o = 1 - 20 specimens
I = over 20 specimens
D = dominant (over 40%)

PERCENTAGE PLANKTONIC FORAMINIFERA

100%
50%
0%

RELATIVE SPECIMEN COUNT = o-o-o
and
BENTHONIC DIVERSITY = x-x-x

3000 2000 1000 0
15 10 5 0

DOMINANT BENTHONIC GROUP

EUUVIGERINA
VIRGULINA
EPISTOMINELLA
CASSIDULINA
ARENACEOUS

ENVIRONMENTAL INTERPRETATION	PROGRADING SLOPE	HIGH ENERGY PROGRADING SLOPE	BASE of SLOPE	CONTINENTAL RISE	LAGOONAL	
Depth in feet to base of ZONE	2110	3700	6250	7050 7650	8270 8800 9150	? ?
	A-2	A-3	A-4	B-1 B-2	D-1 D-2 F	

WELL COMPLETION REPORT

HAPUKU-1

APPENDIX 6

WELL LOG ANALYSIS REPORT

by R.B. King

TO

OPERATOR ESSO AUSTRALIA WELL HAPUKU-1 DATE 7th August, 1975

STATE VICTORIA ELEV. 28' KB

DEPTH INTERVAL	POROSITY ESTIMATE	WATER SAT. ESTIMATE	REMARKS
9228 - 9243	-	-	Not effective
9244 - 9249 (6	20.87	45.8	Possibly effective
9250 - 9259 (10	22.88	29.9	Oil and/or gas productive
9260 - 9284	-	-	Not effective
9285 - 9309 (25	18.47	28.9	Oil and/or gas productive
9310 -			
9326 - 9335 (10	24.12	52.3)	
9348 - 9352 (5	24.62	64.6)	The best porosities in the oil - water transition zone
- 9352		)	
9353 - 9512			Water productive

ISF Measured Depths

TESTS:

FORMATION:

LOGS:

COMMENTS:

This summary lists the pertinent results of well log analysis of this well from 9200 - 9700. Although the hydrocarbon type is indefinite there is a possible slight suggestion of the zone 9250 - 9259 carrying gas.

Note that depth values are inclusive.

BY R.B. KING

WELL LOG ANALYSIS REPORT

TO

OPERATOR ESSO AUSTRALIA LTD. WELL HAPUKU #1 DATE 3 SEPTEMBER, 1975

STATE VICTORIA ELEV. 28' KB

DEPTH INTERVAL	POROSITY ESTIMATE	WATER SAT. ESTIMATE	REMARKS
10747-54 (8	16-18	60-65	Probable show
10758-63 (6	16-18	60-65	" "
10779-90 (12	10-12	70-80	Possible show
10791-95 (5	8-10	70-90	" "
10796-01 (6	15-17	60-70	" "
10832-35 (4	14-15	60-65	Probable show
10836-39 (4	6-8	80-90	Possible show
10840-44 (5	17-18.5	55-60	Probable show
10944-47 (4	19-21	45-50	" "
10953-58 (6	20-22	65-70	" "
10966-67 (2	16	Indeterminate	Too thin
10971-72 (2	13.5-14.5	"	" "
10973-77 (5	19-21	55-60	Probable show
10978-82 (5	11-14	75-90	Possible show
11007-17 (11	16-18	50-60	Probable show
11057-60 (4	18-19.5	Indeterminate	Too thin
11063-66 (4	17-19	"	" "
11114-25 (12	13-15	55-60	Probable show
11150-57 (8	19-20	55-60	" "
11180-83 (4	20-22	60-65	" "
11191-05 (15	21-23	65-70	" "
11238-41 (4	15-17	55-60	" "
11242-50 (9	18-20	60-65	" "
11261-02 (42	20-23	75-90	Possible show
ISF Measured depths, inclusive.			

TESTS:

FORMATION:

LOGS:

ISF-SCT,
GR-FDC-CNL

COMMENTS:

The cleaner well developed sandstones in the gross section 10,025 - 11,950 appear water bearing. The section covered by this report 10,700 - 11,300 contains mainly shaley dirty sands. Many of these appear to carry hydrocarbon shows. No zone of commercial significance was observed. Water saturation estimates may be slightly optimistic due to the use of the Schlumberger shaley sand equation.

BY R.R. KING (SEPTEMBER 4, 1975

WELL COMPLETION REPORT

HAPUKU-1

APPENDIX 7

SIDEWALL CORE DESCRIPTIONS

ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

WELL HAPUKU #1 — PAGE 1 OF 6
GEOLOGIST BELLIS/KEMP — ATT 30 REC 26
SERVICE CO SCHLUMBERGER — DATE 14/7/75
IES RUN NO 1 — SWC RUN NO 1

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
1	4280	1¼"	Calc-arenite	slty, glauc	V	gn-gy	sl.fm	vf-f	mod														Strong gas odour
2	4200	3/4"	Marl	minor slty	V	gn-gy	sl.fm	-	-														Moderate gas odour
3	4090	1"	"	sl.slty	V	gn-gy	sl.fm	-	-														Mod. gas odour
4	4005	1"	"	sl.slty	V	gn-gy	sl.fm	-	-														Mod. gas odour
5	3900	3/4"	"	slty,tr. glauc.	V	gn-gy	mod.fm	-	-														Mod. gas odour
6	3800	7/8"	"	sl.slty	V	gn-gy	sl.fm	-	-														Strong gas odour
7	3700	1"	"	mod.slty, gl.	V	gn-gy	sl.fm	-	-														Mod. gas odour
8	3590	1¼"	"	sl.slty	V	gn-gy	sl.fm	-	-														Strong gas odour
9	3500	1"	"	sl.slty	V	gn-gy	sl.fm	-	-														Strong gas odour
10	3400	1¼"	"	tr.glauc, sl.slty	V	gn-gy	sl.fm	-	-														Strong gas odour
11	3300	1½"	"	tr.glauc. sl.slty	V	gn-gy	sl.fm	-	-														Strong gas odour
12	3268	2½"	"	sl.slty.tr glauc.	V	gn-gy	sl.fm	-	-														Strong gas odour
13	3196	1"	"	sl.slty.tr glauc.	V	gn-gy	sl.fm	-	-														Strong gas odour
14	3096	1¼"	"	sl.slty, fossils	V	gn-gy	sl.fm	-	-														Strong gas odour

FORM R 257 3 72

ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

WELL HAPUKU #1 — PAGE 2 OF 6
GEOLOGIST BELLIS./KEMP — ATT 30 REC 26
SERVICE CO SCHLUMBERGER — DATE 14/7/75
IES RUN NO 1 — SWC RUN NO 1

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
15	2996	2"	Marl	sl.slty, fossils	V	gn-gy	sl.fm	vf-f	mod.														V.strong gas odour
16	2900	2"	"	sl.slty. fossils	V	gn-gy	sft. sl.fm	-	-														" " "
17	2800	1½"	"	sl.slty tr glauc.	V	gn-gy	sft. sl.fm	-	-														" " "
18	2700	2"	"	fossils, sl slty	V	gn-gy	sl.fm	-	-														mod. gas odour
19	2600	2"	"	mod. slty	V	gn-gy	sl.fm	-	-														Mod. gas odour
20	2505	2 "	"	tr.fossils sl.slty	V	gn-gy	sft- sl.fm	-	-														Strong gas odour
21	2400	2¼"	"	sl.slty, fossils	V	gn-gy	sft- sl.fm	-	-														Strong gas odour
22	2297	2"	"	sl.slty, fossils	V	gn-gy	sft- sl.fm	-	-														Strong gas odour
23	2208	2"	"	sl.slty, fossils	V	gn-gy	sft- sl.fm	-	-														Mod. gas odour
24	2150	2¼"	"	Fossils, mod.slty	V	gn-gy	sft- sl.fm	-	-														Strong gas odour
25	2110	2¼"	Calc. enite	slty, foss. ils	V	gn-gy	sft.	f-vf	poor														Strong gas odour
26	2000	N	R																				
27	1995	1 "	Marl	sl.slty, fossils	V	gn-gy	sft.	-	-														Strong gas odour
28	1900	N	R																				
29	1796	N	R																				
30	1700	N	R																				

FORM R 257 3 72

ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

WELL HAPUKU-1 | PAGE 3 OF 6
GEOLOGIST MORTON | ATT 30 REC 23
SERVICE CO SCHLUMBERGER | DATE 5/8/75
IES RUN NO 2 | SWC RUN NO 2

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
31	10068	7/8	Ss	Qtz.slty.mica	V	mdkgy	Uncons	f-grnl	p	rd-subr	20%												C_1 200, C_2 300
32	10031	3/4"	Ss	Qtz	-	mltgy	Uncons	f-grnl	p	rd-subr	+15%												C_1 700. C_2 300
33	10020	3/4"	Slst	Qtz,mica,tr. glauc.	-	mdkgy	Firm	Slt	Mod	-	25%-30%												Zero gas
34	9968	1"	Ss	Qtz,mica, pyrite	-	mltgy	uncons-firm	f-m	mod	subr	15%												Zero gas
35	9936	NR																					
36	9918	½"	Sh	Qrz.mica	V	mdkgy	fm	Slt	mod	-	25%-30%												Fragments only- did not buy.
37	9875	1½"	Sltst	Qtz, mica	Sl	dkgy	sft	Slt	mod	-	25%-30%												C_1 200
38	9810	1"	Ss	Qtz,mica, tr.glauc.	Sl	mgy	sft	f-m	mod	srn	20%												Zero gas
39	9750	1¼"	Ss	Qtz. tr.glauc	-	mgy	sft	f-m	mod	rd-srn	15%												Zero gas
40	9700	1¼"	Ss	Qtz.glauc. mica.	-	ltgy	sft-uncons	f-c	mod	rd-srn	15%												C_1 300, C_2 150
41	9685	NR																					
42	9638	1¼"	Ss	Qtz,glauc.	mod	lt gy	sft-fm	f-m	mod	rd-srn	20%												Zero gas
43	9605	NR																					
44	9570	NR																					
45	9524	1¼"	Ss	Qtz,mica glauc,pyrite	-	lt gy	fm-sft	f-m	mod	sa-srnd	20%												C_1 600, C_2 800
46	9460	1½"	Ss	Qtz,glauc. mica,pyr.slty.	Sl	d gy	soft	f-grnl	P	sa-rnd	20%												C_1 300, C_2 100
47	9400	1-1/8	Ss	Qtz.glauc. mica,pyr.silty	Sl	d gy	soft-fm	f - grnl	P	sa-rnd	10%												Zero Gas
48	9236	1"	Ss	Qtz,glauc. mica, pyrite	-	gn-gy	fm	f	mod	sa-sr	+20%	None	30%	Spotty	Weak	Yellow	weak	Dull Yellow					C_1 400

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ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

WELL HAPUKU-1 PAGE 4 OF 6
GEOLOGIST MORTON ATT 30 REC 23
SERVICE CO SCHLUMBERGER DATE 5/8/75
IES RUN NO 2 SWC RUN NO 2

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
49	9227	1"	Slst	Qtz,mica, glauc. pyrite	Sl	ol.gy	fm	silt	mod	-	20%-30%												C_1 300, C_2 200
50	9221	1½"	Ss congl	Qtz,glauc, mica,pyr.slty	sl	ol.gy	fm	f-grnl	P	sa-r	+20%												C_1 300, C_2 700, C_3 200, C_4 800
51	9218	1¼"	SltySs	Qtz,slt,glauc mica,pyrite	sl	ol gy	soft	f-grnl	P	sa-r	25%-30%												
52	9209	1¼"	SltySs	Qtz,Sft.glauc V mica,pyrite		ol.gy	soft	f-m	P	sa-r	25%-30%												
53	9200	2-3/4"	SltySs	Qtz,slt.glauc V mica		ol.gy	fm.	f-m	P	sa-r	25%-30%												
54	9190	NR																					
55	9182	1½"	Slst	Qtz,mica, glauc.pyrite	V	ol.gy	Fm.	Slt	mod	-	25%-30%												
56	9172	2"	Slst	Qtz,mica, glauc.	V	ol.gy	fm	Slt	mod	-	25%-30%												
57	9150	1½"	Slst	Qtz,mica	V	ol.gy	fm	Slt	mod	-	25%-30%												
58	9120	NR																					
59	9089	NR																					
60	9060	1½"	Slst	Qtz. mica, pyrite	V	ol.gy	fm	Slt	mod	-	25%-30%												C_1 1700, C_2 300

FORM R 257 3 72

ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

WELL HAPUKU-1 | PAGE 5 OF 6
GEOLOGIST P. KEMP | ATT 30 REC 26
SERVICE CO SCHLUMBERGER | DATE 5/8/75
IES RUN NO 2 | SWC RUN NO 3

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
61	9600	1"	Sst	Glauc.mica	non	lt.gy	sli.f	f	mod	mod											no show		No gas reading
62	9605	P.O																					~~Tr.dol. cement~~
63	9030	1½"	Sh	Calc.mica	V	Ol.gy Lt.gy	f	-	-	-													Cl 4,500
64	9000	P.O																					
65	8800	N.R	Marl	Calc.	V	lt. ol gy	soft	-	-	-													Cuttings did not buy
66	8600	2"	Sh	Calc.Tr.glauc. Tr. mica	V.	Ol.gy	Sli.f	-	-	-													Cl 16,00 C5 +900
67	8400	2"	Sh	Calc.mica	V	ol.gy	sli f	-	-	-													
68	8270	1¼"	Sh	Calc.mica	V	ol.gy	f	-	-	-													C2 100. C3 50,C4 200
69	8100	3/4"	Marl	Glauc.	V	lt olgy	sli.f	-	-	-													
70	7970	1"	Marl	Mica,sli slty	V	lt olgy	soft	-	-	-													C5 +500
71	7900	1"	Sh	Tr.mica, Tr. glauc.	V	lt olgy	Sli f	-	-	-													
72	7850	N.R	Sh	Tr. glauc.	V	ol.gy	firm	-	-	-													~~Zero gas - did not buy~~
73	7650	1"	Marl	Tr. mica Tr. glauc.	V	lt olgy	sli f	-	-	-													Subfissile, tends to ~~shale~~
74	7450	½"	Marl	Tr.fossils Tr. glauc.	V	gn-gy	soft	-	-	-													
75	7250	N.R																					
76	7050	3/4"	Sh	Tr.fossils Tr. glauc.	V	gn-gy	soft	-	-	-													
77	6850	½"	Marl	Tr.glauc. Tr. mica. sli.silty Tr.forams	v	lt olgy	Soft	-	-	-													
78	6650	3/4	Marl	Sli.silty Tr. fossils	V	lt olgy	Soft	-	-	-													
79	6450	3/4	Marl	Mica,fossils	V	ol gy	Soft	-	-	-													
80	6250	½"	Sh	Tr.mica, Sli.silty Tr. glauc.	V	lt olgy	Firm	-	-	-													C2 100,C3 100,C4 100
81	6050	3/4	Marl	Mica,fossils	V	lt olgy	soft	-	-	-													
82	5850	3/4	Sh	Calc.mica Tr.pyrite	V	ol.gy	M.firm	-	-	-													
83	5650	3/4	Marl	Rare F.gr.qtz mica, fossils	V	lt.olgy	Soft	-	-	-													
84	5530	3/4	Sh	Mica,glauc, Fossils	V	lt.olgy	M.firm	-	-	-													
85	5300	3/4	Sltst	Clayey, Tr. mica.	V	lt olgy	M.firm	-	-	-	40%			Sticky	Dull	Yellow	-	-					Subfissile No cut?mineral Fl.

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ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

WELL HAPUKU-1 PAGE 6 OF 6
GEOLOGIST P. KEMP ATT 30 REC 26
SERVICE CO SCHLUMBERGER DATE 5/8/75
IES RUN NO 2 SWC RUN NO 3

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
86	5100	3/4	Sh	cal.sli.silty	V	lt.olgy	firm	-	-	-													
87	4900	3/4	Sh	silty Tr. glauc	V	lt.olgy	v.firm	-	-	-													Subfissile
88	4700	3/4	Sh	sli.silty	V	gn-gy	sli.f	-	-	-													
89	4500	3/4	Sh	sli.silty	v	gn-gy	sli.f	-	-	-													C4 100, C5 300
90	4350	1¼"	Sh	silty, trace glauc	V	lt.olgy	M.firm	-	-	-													

FORM R 257 3 72

ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

WELL HAPUKU-1 PAGE 1 OF 2
GEOLOGIST A.D.P. & P.V.K. ATT REC
SERVICE CO Schlumberger DATE 3/9/75
IES RUN NO 3 SWC RUN NO 4

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
91	11930	1/8"	SST & SH FRAGS	Carb.py feldspathic		blk-gry	hard	m-c	poor	sa	-		0										v.low rec;2 lithol
92	11886	1"	-																				mudcake
93	11844	PO																					
94	11786	3/4"	SST	Feld.pyr.dol		wh	brittle	mc	poor	sa			0										
95	11743	3/4"	SST	Carb.mica		lg.grey	hard	v.f.	pr.	sa			0										
96	11710	3/8"	SST	Mi,py,clayey		m.lt.gy	firm	f.	poor	-													
97	11648	3/4"	SST	Clayey,mica	-	white lt.gy	soft	f.	good	sr			0										r
98	11600	2"	-																				mudcake
99	11550	¼"	SST	Mi, py	-	m.lt.gy	soft	f.c.	poor	-													
100	11493	½"	SST	Mi, py,carb	-	m.lt.gy	firm	v.f.	good	sr.													
101	11400	½"	SST	Carb,pyr.	-	wh-gry	soft	v.f.	pr.	sr.			0										
102	11334	½"	CLYST	Tr,mi,tr.carb	-	mdkgry	firm	-	-	-													
103	11256	½"	SLTST	V.clayey, Tr.mi,Tr.py.	-	lt.gy	firm	-	-	-													
104	11175	3/4"	CLYST	Tr.mica,py.	-	mdkgry	firm	-	-	-													

FORM R 257 3 72

ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

WELL HAPUKU-1 PAGE 2 OF 2
GEOLOGIST A.D.P. & P.V.K. ATT 30 REC 20
SERVICE CO Schlumberger DATE 3/9/75
IES RUN NO 3 SWC RUN NO 4

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
105	11100	3/4"	SLTST	Clayey,trmi	-	mltgy	firm	-	-	-													
106	11033	½"	CLYST	Silty, trmi	-	mdkgy	firm	-	-	-													
107	10961	3/8"	SH	Trmi, carb	-	mdkgy	firm	-	-	-													
108	10881	NR																					
109	10813	1"	SST	Trclay& mi	-	mltgy	firm	f.	mod.	sbang sbrd	mnr												
110	10766	1"	SST	V.clay,mi,py	-	mgy	soft	vf.f.	poor	sbang sbrd	mnr												
111	10716	NR																					
112	10643	1⅛"	Shale	coally.trmi	-	dkgry	firm	-	-	-													
113	10586	½"	SH	tr, mi	-	mltgy	soft	-	-	-													
114		MF																					
115	10450	½"	Shale	Tr mi,tr py	-	gry	firm	-	-	-													
116	10385	1½"	Shale	Carb.v.mi	-	dkgry	firm	-	-	-													
117	10300	MF																					
118	10224	NR																					
119	10200	½"	SST	Pyr. Chlor.	No	olive grey	soft	f.	mod	s.a.													Rec'd mudcake
120	10,130	MF	SST																				

FORM R 257 3 72

HAPUKU-1 SIDEWALL CORES 31 - 90 DESCRIPTIONS

Peter Kemp
22/8/75

SIDEWALL CORE No.	DEPTH	DESCRIPTION
31	10,068 R 7/8"	SANDSTONE, medium-dark grey, predominantly medium grey in silty matrix, quartzose, larger grains comprise only 20% of sample, subangular some broken and angular poorly sorted, moderately calcareous, trace mica, minor rust brown iron staining, slightly firm, very low visible porosity. C1 200 ppm, C2 300 ppm, no shows.
32	10,031 R 3/4"	SANDSTONE, medium to light grey, very fine to 3 mm grain size, 10% of 2-3 mm grains which are subangular to subrounded, quartzose, very poorly sorted, slightly firm, non calcareous, low visible porosity. C1 700 ppm, C2 300 ppm, no shows.
33	10,022 R 3/4"	SILTSTONE, medium grey, silty to very fine grained, quartzose, well sorted, moderately firm, non calcareous, Trace mica mostly muscovite but rare biotite, Trace glauconite and very rare pyrite, no gas.
34	9,968 R 1"	SANDSTONE, light grey, medium grained, quartzose, subangular, well sorted, clean, slightly firm, trace mica, trace nodular gluaconite, good visible porosity and permeability, no gas and no shows.
35	9,936 N.R.	
36	9,918 N.R.	Calcareous shale cuttings only - did not purchase
37	9,875 R 1½"	SILTSTONE, dark grey, silt grain size, with high clay content, rare quartz grains 1 - 3 mm, subrounded, rare very fine grained glauconite, rare extremely fine nodular pyrite, trace mica - soft - slightly firm, slightly calcareous, C1 200 ppm.
38	9,810 R 1"	SANDSTONE, medium to light grey, very rare 2 mm quartz grains, generally well sorted, moderate clay content, slightly calcareous, soft, trace mica, rare nodular glauconite, fair to poor visible porosity, no gas and no shows.
39	9,750 R 1¼"	SANDSTONE, medium grey, fine grained in silty matrix with rare 1 to 2 mm well rounded, clear to milky quartz grains, poorly sorted, minor clay, rare glauconite, non calcareous, poor visible porosity, no gas and no shows.
40	9,700 R 1¼"	SANDSTONE, light grey, very fine to fine grained, quartzose generally subangular, silty in part, poorly sorted, soft-unconsolidated, chloritic in part, trace biotite mica, dark copper in colour and ? chloritised, trace muscovite mica, poor visible porosity, no shows. C1 300 ppm, C2 150 ppm.
41	9685 N.R.	
42	9638 R 1¼"	SANDSTONE, light grey, fine to very fine grained, rare very coarse sand graine, quartzose,

HAPUKU-1 SIDEWALL CORES 31 - 90 DESCRIPTIONS

Peter Kemp
22/8/75

SIDEWALL CORE No.	DEPTH	DESCRIPTION
42 cont'd	9638	generally well sorted, minor silt, ?chloritic in part (mineral is soft and neither nodular or platy), trace biotite mica, dark copper in colour, soft, non calcareous, no shows, zero gas, poor visible porosity.
43	9,605 N.R.	
44	9,570 N.R.	
45	9,524 R 1½"	SANDSTONE, light grey, fine to very fine grained, silty with minor clay, quartzose, trace mica-both muscovite and coppery biotite, minor ?chlorite, very rare pyrite, soft, non calcareous, no shows poor visible porosity, C1 600 ppm, C2 800 ppm.
46	9,460 R 1½"	SANDSTONE, olive grey, generally medium grained with 20% 2-3mm granules, fine to silty matrix with a high clay content, large grains are well rounded to subrounded, trace glauconite, trace pyrite, very poorly sorted, soft, poor visible porosity, slightly calcareous, no shows C1 300 ppm, C2 100 ppm.
47	9,400 R 1-1/8"	SANDSTONE, olive grey, fine grained with 10% grains to 2 mm large grains are subangular, quartzose, silty, and minor clay matrix, trace nodular glauconite, rare pyrite, low visible porosity, poorly sorted, no shows, zero gas.
48	9,236 R. 1"	SANDSTONE, dark green-grey, very fine grained, quartzose high clay content, slightly calcareous, trace glauconite trace muscovite mica, moderate sorting, moderately firm, spotty weak yellow fluorescence, weak dull yellow cut, C4 400 ppm.
49	9,227 R. 1"	SILTSTONE, olive grey, very clayey, slightly firm, moderate sorting, slightly calcareous, trace nodular glauconite, trace mica, no shows, C1 300 ppm, C2 200 ppm.
50	9221 R. 1½"	SILTSTONE, dark grey, silt grain size, with scattered very coarse grains to 1 mm (10% of sample) subrounded, poorly sorted, trace nodular glauconite, trace platy chlorite and chloritised zones, trace mica, no shows. C1 300, C2 700, C3 200, C4 800.
51	9218' R. 1¼"	SANDSTONE, olive grey, fine grained, 10% grains 1 mm, very clayey, poorly sorted, glauconitic, rare mica, and rare pyrite, slightly firm, no shows, slightly calcareous very low porosity.
52	9209' R. 1¼"	SANDSTONE, olive grey, fine grained, rare grains to 1 mm, very clayey, poorly sorted, nodular glauconite, trace mica, tends to silty claystone in part, very calcareous, soft, very low porosity, no shows.
53	9200' R. 2-3/4"	SILTY CLAYSTONE, olive grey, minor fine grains, very calcareous minor glauconite, trace mica, trace chlorite, fine grained quartz tends to be angular, poorly sorted.

HAPUKU-1 SIDEWALL CORES 31 - 90 DESCRIPTIONS

Peter Kemp
22/8/75

SIDEWALL CORE No.	DEPTH	DESCRIPTION
54	9190' N.R.	
55	9182' R. 1½"	CLAYSTONE, olive grey, very calcareous, slightly silty, very rare glauconite and mica, moderately firm, non-fissile, marine sediment of "deepish" water.
56	9172	CLAYSTONE, olive grey, very calcareous, slightly silty, very rare mica and nodule glauconite, moderately firm, non-fissile, marine sediment.
57	9150' R. 1½"	CLAYSTONE, olive grey, very calcareous, trace silt, rare mica - mainly muscovite, some coppor odour biotite, non-fissile, moderately firm, marine sediment.
58	9120' N.R.	
59	9084' N.R.	
60	9060'	CLAYSTONE, olive grey, trace silt, trace extremely fine, nodular pyrite, trace mica - muscovite, non-fissile, moderately firm. C1 1700ppm, C2 300 ppm.
61	9600 R. 1"	SANDSTONE, light grey, predominantly fine grained, 20% coarse grains, moderate sorting, grains subangular, trace glauconite, trace mica, moderately firm, low visible porosity, no shows, no gas, non calcareous.
62	9605' N.R.	
63	9030' R 1½"	SHALE, olive grey, very calcareous, trace mica, trace pyrite, moderately firm, sub-fissile, C1 4,500.
64	9000' P.O	
65	8800' N.R.	Marl cuttings - did not purchase.
66	8600' R. 2"	SHALE, dark grey with speckled white clay throughout, rare mica, very calcareous, subfissile, moderately firm. C1 1600, C5+ 900.
67	8400' R 2"	SHALE, olive grey, trace mica, trace fossils mainly forams, very calcareous, subfissile, moderately firm.
68	8270' R 1¼"	SHALE, olive grey, trace mica, very calcareous subfissile, moderately firm.
69	8100' R. 3-4"	
70	7970'	CALCAREOUS CLAYSTONE, light olive grey, very calcareous, trace mica, trace silt, soft, non fissile.

HAPUKU-1 SIDEWALL CORES 31 - 90 DESCRIPTIONS

Peter Kemp
22/8/75

SIDEWALL CORE No.	DEPTH	DESCRIPTION
71	7900' R. 1"	SHALE, light, olive grey, very calcareous, trace mica, very rare glauconite, rare medium grained, well rounded quartz grains, subfissile tends to claystone, slightly firm.
72	7750' N.R.	CALCAREOUS SHALE, did not purchase
73	7650' R. 1"	Grey, brown calcareous shale, with angular quartz.
74	7450'	Grey, brown calcareous shale, limonite, angular quartz accessories.
75	7250' N.R.	
76	7050' R. 3/4"	CALCAREOUS CLAYSTONE, light olive grey, very calcareous, soft, non-fissile, trace glauconitic, trace mica.
77	6850' R ½"	Grey micritic limestone, rare angular quartz.
78	6650 R 3/4"	CALCAREOUS CLAYSTONE, light olive grey, very calcareous, soft, non-fissile, trace silt, trace very fine glauconite and mica.
79	6450 R 3/4"	CALCAREOUS CLAYSTONE, olive grey, very calcareous, moderately firm, non-fissile, slightly silty, trace mica, trace fossils.
80.	6250'	SHALE, olive grey, very calcareous, slightly silty, trace glauconite, very rare mica, moderately firm, sub-fissile.
81	6050 R 3/4"	CALCAREOUS CLAYSTONE, light olive grey, trace silt, very calcareous, soft, non-fissile, trace fossils, trace mica.
82	5850 R 3/4"	SILTSTONE, light olive grey, very clayey, very calcareous, trace glauconite, trace fossils, trace mica, moderately firm.
83	5650 R. 3/4"	CALCAREOUS CLAYSTONE, light olive grey, very calcareous trace mica, rare fine grained well rounded quartz grains, soft, non-fissile.
84	5530 R 3/4"	SHALE, light olive grey, very calcareous, silty in part, fossils - mainly forams, trace mica, slightly firm, sub-fissile.
85	5300 R 3/4"	SILTSTONE, light olive grey, very clayey, very calcareous, trace mica, moderately firm, streaky dull yellow fluourescence with no cut - probably mineral fluorescence.
86	5100 R 3/4"	SILTSTONE, light olive grey, very calcareous, very clayey, (tends to shale) moderately firm, trace mica.
87	4900 R 3/4"	SILTSTONE, light olive grey, very calcareous, very clayey (tends to shale) trace mica, trace fossils, very firm.

HAPUKU-1 SIDEWALL CORES 31 - 90 DESCRIPTIONS

Peter Kemp
22/8/75

SIDEWALL CORE No.	DEPTH	DESCRIPTION
88	4700 R 3/4"	CLAYSTONE, light olive grey, very calcareous, very silty, (tends to clayey siltstone), trace fossils, moderately firm, non fissile.
89.	4500 R 3/4"	CLAYSTONE, light olive grey, very calcareous, very silty, (tends to clayey siltstone) trace fossils, moderately firm, non-fissile.
90	4350 R 1¼"	CLAYSTONE, light olive grey, very calcareous, very silty, trace mica, moderately firm, non-fissile, trace glauconite.

HAPUKU-1 SIDEWALL CORES 91 -- 120 DESCRIPTIONS

Attempted 30. Recovered 20.
6 N.R. 3 M.F. 1 P.O.

Peter Kemp
11/10/75

SIDEWALL CORE No.	DEPTH	DESCRIPTION
91	11,930' N.R.	Cuttings only - did not purchase
92	11,886 N.R	
93	11,844' P.O	
94	11,786' R 3/4"	SANDSTONE, light grey, dolomite / fine to medium grained, minor coarse grained, moderately hard, poorly sorted, subangular quartzose grains, most slightly milky, trace to heavily pyritic, trace ? feldspar, no shows.
95	11,743' R. 3/4"	SANDSTONE, medium grey, very fine grained, clayey and silty, moderately sorted, trace carbonaceous, trace mica, trace pyrite, moderately hard, no shows overbank or interdistributory continental dep. environment.
96	11,710 R. 3/8"	SANDSTONE, medium to light grey, fine grained, silty and clayey, poorly sorted, trace micaceous, trace pyrite, moderately firm, continental interdistributary, depositional environment.
97.	11,648' R. 3/4"	SANDSTONE, medium light grey, fine grained, clayey, trace silt, moderate to well sorted, subrounded, slightly firm, trace dolomite, trace muscovite mica, trace copper colour biotite mica, no shows, low visible porosity.
98	11,600 N.R.	
99	11,550 R. ¼"	SANDSTONE, medium to light grey, minor coarse grained, loose or poorly consolidated, trace mica, trace pyrite, sample contaminated with mud cake, soft and friable, poorly sorted, point bar or braided stream depositional environment.
100	11,493 R. ½"	SANDSTONE, medium to light grey, very fine grained, silty, minor clay, trace mica, trace pyrite, trace carbonaceous, moderately well sorted, grains generally subrounded, moderately firm, interdistributory or overbank depositional environment.
101	11,400	SILTSTONE, Medium grey, very clayey in part, minor very fine grained sand fraction, very poorly sorted, trace mica, trace to moderately carbonaceous, very rare feldspathic grains, interdistributary continental depositional environment.
102	11,334' R. ½"	CLAYSTONE, medium to dark grey, trace mica - muscovite and copper colour biotite, trace carbonaceous, subfissile, and tends to shale, non calcareous, moderately firm, overbank continental depositional environment.
103	11,256' R. ½"	SILTSTONE, light grey, very clayey, and tends to silty claystone, trace mica, minor pyrite, minor fine grained sand, poorly sorted, slightly firm, overbank continental depositional environment.
104	11,175	CLAYSTONE, medium dark grey, trace mica-muscovite and copper colour biotite, trace pyrite, subfissile and tends

HAPUKU-1 SIDEWALL CORES 91 -- 120 DESCRIPTIONS

Attempted 30. Recovered 20.
6 N.R. 3 M.F. 1 P.O.

Peter Kemp
11/10/75

SIDEWALL CORE No.	DEPTH	DESCRIPTION
104 cont'd	11,175' R 3/4"	to shale, non calcareous, moderately firm, overbank continental depositional environment.
105	11,100 R. 3/4"	SILTSTONE, clayey, trace mica, moderately firm, noncalcareous, overbank continental depositional environment.
106	11,033 R ½"	CLAYSTONE, medium to dark grey, slightly silty, rare medium grained quartz grain, trace mica, non fissile, moderately firm.
107	10,961 R 3/8"	SHALE, medium to dark grey, trace mica, slightly carbonaceous, fissile, moderately form.
108	10.881 N.R.	
109	10,813 R. 1"	SANDSTONE, medium to light grey, fine grained, minor clay, trace mica, moderate sorting, subangular to subrounded, moderately firm, low visible porosity, crevasse splay or upper point bar depositional environment.
110	10,766 R. 1"	SANDSTONE, medium grey, very fine to fine grained, very clayey, minor carbonaceous matter, trace mica, trace pyrite, poorly sorted, subangular to subrounded, soft, very low visible porosity, crevasse splay or upper point bar depositional environment.
111	10,716' N.R.	
112	10,643 R 1-1/8"	SHALE, medium to dark grey, moderately carbonaceous with coal laminae throughout, fissile, moderately firm, trace mica, interdistributary marsh depositional environment.
113	10,586 R. ½"	SHALE, medium to light grey bands up to 2 mm thick, alternating with medium to dark grey carbonaceous laminae less than 1mm thick, trace mica, subfissile and tends to claystone, slightly firm, interdistributary or overbank continental depositional environment.
114	10,507 M.F.	
115	10,450 R. ½"	SHALE, medium to dark grey, subfissile, trace mica, trace pyrite, moderately firm, overbank continental depositional environment
116	10,385 R. 1½"	SHALE, medium to dark grey, fissile, very micaceous, moderately firm, trace pyrite, trace carbonaceous.
117	10,300 M.F.	
118	10,224' N.R.	
119	10,200 R. ½"	SANDSTONE, olive grey, fine grained, rare medium to coarse grained, moderate to poorly sorted, subangular to subrounded, clayey, heavily chloritic,moderately pyritic, moderate to very firm, trace mica, crevasse splay or upper point bar depositional environment.
120	10,130 N.R.	

WELL COMPLETION REPORT

HAPUKU-1

APPENDIX 8.

FORMATION INTERVAL TEST RECORDS.

F.I.T. RECORD

WELL: HAPUKU-1

GEOLOGIST: McKAY/MORTON/KEMP

DATE: 6/8/75

F.I.T. No. 1 @ 9334 FEET (IES LOG DEPTH)

MUD DATA:

Rmf 0.549 @ 72 °F, Equiv. Cl^- 11,000 ppm (Resistivity)

Cl^- 7000 ppm NO_3^- 138 ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

RECOVERY (MAIN CHAMBER):

(22500 cc)

_____ cft. GAS

_____ cc OIL

_____ cc WATER

4000 cc (MUD

(+

_____ xxx (SAND

SURFACE PRESSURE 0

Sand in chamber flowline chamber piston stuck - had to lay down to empty.

PROPERTIES:

GAS	C_1	C_2	C_3	C_4	C_5	H_2S
	M	M	M			

OIL _____ °API @ _____ °F

Pour Point _____ °F

G.O.R. _____

XXXXX MUD Rmf _____ @ _____ °F, Equiv. Cl^- _____ ppm (Resistivity)

Cl^- 7400 ppm NO_3^- _____ ppm (Titration) M.W. 10.1

PRESSURES:

	Schlumberger	Gauge 23796 Amerada	Agnew Amerada	Hewlett Packard *
Sampling (psi)		42-53		DID
Final Shut-in (psi)		-		NOT
Hydrostatic (psi)		4979		WORK
Sampling Time (Min.)	2½	LOST SEAL		
Shut-in Time (Min)				

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) 148 °F , 148 °F

MAX. DEPTH TOOL REACHED: 9334 Ft.

TIME SINCE CIRCULATION: 12 Hrs.

REMARKS: Segregator 24 dumped. UNSUCCESSFUL TEST-Hewlett Packard did not operate. Lost seal after 2½ mins.-pad badly damaged/washed out. Formation appeared tight (possible flowline plugging in part).

F.I.T. RECORD

WELL: HAPUKU-1

GEOLOGIST: McKAY/MORTON/KEMP

DATE: 6/8/75

F.I.T. No. 2 @ 9352 FEET (GR LOG DEPTH)

MUD DATA:

Rmf 0.549 @ 72 °F, Equiv. ~~XXXX~~NaCl 11,000 ppm (Resistivity)

Cl^- 7000 ppm NO_3^- 138 ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

RECOVERY (MAIN CHAMBER):

0.2 cft. GAS

cc OIL

22,000 cc WATER

cc MUD

cc SAND

SURFACE PRESSURE 250 psi with condensate emulsion Chamber piston stuck when opened Gas breaking out of solution

PROPERTIES:

GAS

	C_1	C_2	C_3	i C_4 n	C_5 +	H_2S
1.	10	6	5	600 1200	100	
2.	~~12~~ M	~~18~~ M	~~30~~ M	~~30M~~ ~~35M~~	~~24M~~	
3.	9	24	80	45M 70M	27M	

Initially no gas readings

OIL ____ °API @ ____ °F

Pour Point ____ °F

G.O.R. ____

WATER Rmf 0.42 @ 70 °F, Equiv. ~~XXXX~~NaCl 14500 ppm (Resistivity)

Cl^- 10,000 ppm NO_3^- ____ ppm (Titration)

PRESSURES:

	Schlumberger	Amerada Gauge 23796	Agnew Amerada	Hewlett Packard *
Sampling (psi)		4045-4048		Did
Final Shut-in (psi)		4079		not
Hydrostatic (psi)		4984		Run H.P.

Sampling Time (Min.) 20 open,

Shut-in Time (Min) ____

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) 150 °F , 151 °F

MAX. DEPTH TOOL REACHED: 9352 Ft.

TIME SINCE CIRCULATION: 15 Hrs.

REMARKS: SEGREGATOR 27 kept. Final shut in 4079,4963 psi, Sampling time 15 min open. SUCCESSFUL TEST, very permeable formation. Recovered fluid contains tr. emulsified ~~condensate, strong fluorescence, gas breaking out of solution~~ with time strong odour. Water Zone

F.I.T. RECORD

WELL: HAPUKU-1

GEOLOGIST: McKAY/KEMP/MORTON

DATE: 6/8/75

F.I.T. No. 3 @ 9259 FEET (GR LOG DEPTH)

MUD DATA:

Rmf 0.549 @ 72 °F, Equiv. ~~XXX~~ NaCl 11,000 ppm (Resistivity)

Cl^- 7000 ppm NO_3^- 138 ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

RECOVERY (MAIN CHAMBER):

_____ cft. GAS

_____ cc OIL

_____ cc WATER

22,000 cc (MUD

_____ ~~cc~~ (+ SAND

MUD RUN

Piston stuck - had to lay down to empty.

PROPERTIES:

GAS	C_1	C_2	C_3	C_4	C_5	H_2S
	M	M	M			

OIL _____ °API @ _____ °F

Pour Point _____ °F

G.O.R. _____

~~WATER~~ Rmf _____ @ _____ °F, Equiv. Cl^- _____ ppm (Resistivity)

MUD Cl^- 6300 ppm NO_3^- _____ ppm (Titration) M.W. 10.1

PRESSURES:

	Schlumberger	Amerada	Agnew Amerada	Hewlett Packard *
Sampling (psi)				4919*
Final Shut-in (psi)				
Hydrostatic (psi)				4921

Sampling Time (Min.) 9

Shut-in Time (Min) _____

*variations indicate possible plugging

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) 154 °F , 154 °F

MAX. DEPTH TOOL REACHED: 9259 Ft.

TIME SINCE CIRCULATION: 19 Hrs.

REMARKS: Segregator not opened during test. UNSUCCESSFUL TEST - did not attain pad seals MUD RUN

F.I.T. RECORD

WELL: HAPUKU-1

GEOLOGIST: McKAY/MORTON/KEMP

DATE: 6/8/75

F.I.T. No. 4 @ 9296 FEET (GR LOG DEPTH)

MUD DATA:

Rmf 0.549 @ 72 °F, Equiv. ~~XXX~~ NaCl 11,000 ppm (Resistivity)

Cl^- 7000 ppm NO_3^- 138 ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

RECOVERY (MAIN CHAMBER):

10500 cc (Large chamber had been sticking)

_____ cft. GAS

_____ cc OIL

_____ cc WATER

10,500 cc (MUD

_____ cc (+ SAND

SURFACE PRESSURE 400 psi

with trace oil, with gas slowly breaking out.

PROPERTIES:

GAS	C_1	C_2	C_3	i	C_4	n	C_{5+}	H_2S	
	600 M	1.1 M	4.5 M	1800		2800	900		Steam Still

OIL ____ °API @ ____ °F

Pour Point ____ °F

G.O.R. ____

~~XXXXXX~~ MUD Rmf .68 @ 70 °F, Equiv. ~~XX~~ NaCl 9500 ppm (Resistivity)

Cl^- 6200 ppm NO_3^- ____ ppm (Titration) MW 10.1

PRESSURES:

	Schlumberger	Amerada	Agnew Amerada	Hewlett Packard *
Sampling (psi)				*
Final Shut-in (psi)				
Hydrostatic (psi)				4950

Sampling Time (Min.) 15 min.

Shut-in Time (Min) ____

*Extremely variable early

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) ____ °F , ____ °F

MAX. DEPTH TOOL REACHED: ____ Ft.

TIME SINCE CIRCULATION: 23 Hrs.

REMARKS: Appeared to lose seal early, but regained - variations in sampling pressure due to flowline plugging. Pressure gradually decreased during sampling/ shut in time. Sand through tool. MUD RUN. ~~Segregator No.2908 Monel~~ H-P 4949 psi, Lost seal opening segregator.

F.I.T. RECORD

WELL: HAPUKU-1

GEOLOGIST: KEMP/McKAY

DATE: 7/8/75

F.I.T. No. 5 @ 9306 FEET (GR LOG DEPTH)

MUD DATA:

Rmf 0.549 @ 72 °F, Equiv. Cl^- Nacl 11,000 ppm (Resistivity)

Cl^- 7000 ppm NO_3^- 138 ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

REVERSE FIRE 4 x 0.020" choke

RECOVERY (MAIN CHAMBER):

53.3 cft. GAS SURFACE PRESSURE 1875 psi

8800 cc (OIL
(+

_____ cc (WATER Emulsion (about 60% OIL 40% FILTRATE)

2800 cc MUD+ WATER + WAX

_____ cc SAND

PROPERTIES:

GAS	C_1	C_2	C_3	C_4	C_5	H_2S
	120-160 M	50-120 M	22-31 M	9500-16000	400-1400	-

OIL 50.4 °API @ 60 °F

Pour Point 47 °F

G.O.R. 831

WATER Rmf .65 @ 74 °F, Equiv. ~~XXX~~NaCl 8800 ppm (Resistivity)

Cl^- 4300 ppm NO_3^- _____ ppm (Titration)

PRESSURES:

	Schlumberger	Agnew Amerada	Amerada	Hewlett Packard *
Sampling (psi)		3635-3646		3731-3642
Final Shut-in (psi)		4058		4072
Hydrostatic (psi)		4958		4972

Sampling Time (Min.) 20 min. open (full after 15 mins).

Shut-in Time (Min) 5

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) 144 °F , 146 °F

MAX. DEPTH TOOL REACHED: 9306 Ft.

TIME SINCE CIRCULATION: 12 Hrs.

REMARKS: SUCCESSFUL OIL TEST -Oil very waxy, very foamy recovery. Emulsified ~~oil/filtrate and wax - caramel coloured oil after separation: brown~~ bright bluish white fluorescence. segregator no.2909 Monel. Amerada - ~~Final shut-in - 4059psi, Hydrostatic 4937 psi, sampling time - 5mins. (full almost immediately) Shut-in-time 5min. H-P 4073 osi, 4967 psi.~~

F.I.T. RECORD

WELL: HAPUKU-1

GEOLOGIST: KEMP/McKAY

DATE: 7-8/8/75

F.I.T. No. 6 RE-RUN @ 9258 FEET (GR LOG DEPTH)

MUD DATA:

Rmf 0.549 @ 72 °F, Equiv. Nacl 11,000 ppm (Resistivity)

Cl^- 7000 ppm NO_3^- 138 ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

REVERSE FIRE 4 x .020" choke

RECOVERY (MAIN CHAMBER):

63.2 cft. GAS SURFACE PRESSURE 1725 psi

9250 cc OIL/FILTRATE/WAX (60% Oil, 40% Water)

cc (WATER

2000 cc (MUD + WAX

cc (SAND

PROPERTIES:

GAS	C_1	C_2	C_3	C_4	C_5	H_2S
	140-160 M	55-120 M	16.5-32.5 M	5400-12M	600-1300	-

OIL 53.6 °API @ 60 °F

Pour Point 48 °F

G.O.R. Approx. 1,500

WATER Rmf .55 @ 75 °F, Equiv.Cl^- _____ ppm (Resistivity)

Cl^- 5300 ppm NO_3^- _____ ppm (Titration)

PRESSURES:

	Schlumberger	Amerada	Agnew Amerada	Hewlett Packard *
Sampling (psi)	3800	3489-3614		DID
Final Shut-in (psi)	4050	4043		NOT
Hydrostatic (psi)	4950	4937		WORK

Sampling Time (Min.) 22 (full after 16 mins).

Shut-in Time (Min) 6

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) 150 °F , 148 °F

MAX. DEPTH TOOL REACHED: _____ Ft.

TIME SINCE CIRCULATION: 16 Hrs.

REMARKS: SUCCESSFUL OIL TEST - very waxy oil, similar to previous test. Segregator probably not full: Hewlett-Packard gauge did not operate (short in cable). Segretator No.2907 Monel. Plugged flowline Sampling 700-1300psi,time 11min. Agnew 1185-1226psi, Hydrostatic 4927 psi. did not fill.

F.I.T. RECORD

WELL: HAPUKU-1

GEOLOGIST: McKAY/KEMP

DATE: 8/8/75

F.I.T. No. 7 @ 9332 FEET (IES LOG DEPTH)

MUD DATA:

Rmf _____ @ _____ °F, Equiv. Cl^- _____ ppm (Resistivity)

Cl^- 7000 ppm NO_3^- _____ ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

REVERSE FIRE. 4 x .020" choke

RECOVERY (MAIN CHAMBER):

MUD RUN

_____ cft. GAS

_____ cc OIL

_____ cc WATER

_____ cc MUD

_____ cc SAND

PROPERTIES:

GAS	C_1	C_2	C_3	C_4	C_5	H_2S
	M	M	M			

OIL _____ °API @ _____ °F

Pour Point _____ °F

G.O.R. _____

WATER Rmf _____ @ _____ °F, Equiv. Cl^- _____ ppm (Resistivity)

Cl^- _____ ppm NO_3^- _____ ppm (Titration)

PRESSURES:

	Schlumberger	Amerada	Agnew Amerada	Hewlett Packard *
Sampling (psi)	500	255-334		DID
Final Shut-in (psi)				NOT
Hydrostatic (psi)	5000	4974		WORK

Sampling Time (Min.) 3 LOST PAD SEAL AFTER 3 MINS.

Shut-in Time (Min) _____

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) 152 °F , 154 °F

MAX. DEPTH TOOL REACHED: _____ Ft.

TIME SINCE CIRCULATION: 21 Hrs.

REMARKS: UNSUCCESSFUL TEST - Pad seal failure after 3 mins. pad badly damaged, port plugged. Formation tight. Hewlett-Packard guage did not work, tool damaged.

Segregator No.16 did not open during test (empty).

F.I.T. RECORD

WELL: HAPUKU-1

GEOLOGIST: McKAY/KEMP

DATE: 8/8/75

F.I.T. No. 8 @ 9322 FEET (IES LOG DEPTH)

MUD DATA:

Rmf _____ @ _____ °F, Equiv. Cl^- _____ ppm (Resistivity)

Cl^- 7000 ppm NO_3^- _____ ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.
REVERSE FIRE : 4 x 0.020" CHOKE

RECOVERY (MAIN CHAMBER):

4.7 cft. GAS SURFACE PRESSURE 700 psi

200 cc OIL

19000 cc WATER including mud from reverse fire.

_____ cc MUD

_____ cc SAND

PROPERTIES:

GAS	C_1	C_2	C_3	C_4	C_5	H_2S
	M	M	M			

OIL _____ °API @ _____ °F

Pour Point _____ °F

G.O.R. _____

WATER Rmf 0.6 @ 74 °F, Equiv. ~~XXX~~ NaCl 9200 ppm (Resistivity)

Cl^- 5300 ppm NO_3^- _____ ppm (Titration)

PRESSURES:

	Schlumberger	Amerada	Agnew Amerada	Hewlett Packard *
Sampling (psi)		3719-3714		DID
Final Shut-in (psi)		? 3954		NOT
Hydrostatic (psi)		4979		RUN

Sampling Time (Min.) 19 OPEN

Shut-in Time (Min) _____

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) 156 °F , 157 °F

MAX. DEPTH TOOL REACHED: _____ Ft.

TIME SINCE CIRCULATION: 24½ Hrs.

REMARKS: SUCCESSFUL TEST - water with scum of waxy oil similar to previous tests.
Pressures not fully built up. Segregator #16 Not opened (kept).
~~(Agnew Final Shutin 3985 psi, Hydrostatic 4958 psi Sampling Time 3 min open.~~

F.I.T. RECORD

WELL: Hapuku-1

GEOLOGIST: P. Kemp

DATE: 3/8/75

F.I.T. No. 9 @ 11,550 FEET (IES LOG DEPTH)

MUD DATA:

Rmf _____ @ _____ °F, Equiv. Cl^- _____ ppm (Resistivity)

Cl^- _____ ppm NO_3^- _____ ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

RECOVERY (MAIN CHAMBER):

_____ cft. GAS

_____ cc OIL

21,500 cc WATER

_____ cc MUD

_____ cc SAND

PROPERTIES:

GAS	C_1	C_2	C_3	C_4	C_5	H_2S
	M	M	M			

OIL _____ °API @ _____ °F

Pour Point _____ °F

G.O.R. _____

WATER Rrf 0.89 @ 67 °F, Equiv. Cl^- 4,200 ppm (Resistivity)

Cl^- 4,000 ppm NO_3^- 168 ppm (Titration)

PRESSURES:

	Schlumberger	Amerada	Agnew Amerada	Hewlett Packard *
Sampling (psi)				4,937
Final Shut-in (psi)				5,112
Hydrostatic (psi)				6,080

Sampling Time (Min.) 17¼

Shut-in Time (Min) 2

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) _____ °F , _____ °F

MAX. DEPTH TOOL REACHED: _____ Ft.

TIME SINCE CIRCULATION: _____ Hrs.

REMARKS: _____

F.I.T. RECORD

WELL: Hapuku-1 .

GEOLOGIST: McKay / Kemp

DATE: 3/9/75

F.I.T. No. 10 @ 11,506 FEET (IES LOG DEPTH)

MUD DATA:

Rmf _____ @ _____ °F, Equiv. Cl^- _____ ppm (Resistivity)

Cl^- _____ ppm NO_3^- _____ ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

RECOVERY (MAIN CHAMBER):

0.6 cft. GAS

10 cc ~~XXX~~ WAXY OIL EMULSION

19,750 cc WATER

_____ cc MUD

_____ cc SAND

PROPERTIES:

GAS	C_1	C_2	C_3	C_4	C_5	H_2S
	M	M	M			

OIL _____ °API @ _____ °F

Pour Point _____ °F

G.O.R. _____

WATER Rrf _____ @ _____ °F, Equiv. Cl^- _____ ppm (Resistivity)

Cl^- _____ ppm NO_3^- 181 ppm (Titration)

PRESSURES:

	Schlumberger	Agnew Amerada	Amerada	Hewlett Packard *
Sampling (psi)				5,089
Final Shut-in (psi)				5,101
Hydrostatic (psi)				6,067

Sampling Time (Min.) 26

Shut-in Time (Min) 1

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) _____ °F , _____ °F

MAX. DEPTH TOOL REACHED: _____ Ft.

TIME SINCE CIRCULATION: _____ Hrs.

REMARKS: _____

AGNEW-GO-WESTERN PTY. LTD.
P. O. BOX 380
SALE, VICTORIA 3850

ESSO AUSTRALIA LIMITED WILDCAT HAPUKU No. 1
SEPTEMBER 2-3, 1975

PURPOSE: OBTAIN SUBSURFACE PRESSURES WITH AMERADA GAUGE AND QUARTZ PRESSURE GAUGE RUN IN TANDEM WITH SCHLUMBERGER FORMATION INTERVAL TESTER.

TOOLS USED: AMERADA 0-10,300 PSI ELEMENT SERIAL No. 9403 12 HOUR CLOCK
QUARTZ PRESSURE GAUGE No. 1410A00109

OPERATION SCHEDULE

HOURS

SEPTEMBER 2, 1975

1430	DEPART LONGFORD
1545	ARRIVE REGIONAL ENDEAVOR
1600	RIG UP FOR F.I.T. No. 9
1920	RUN IN HOLE
2039	SET TOOL @ 11,550'
2041	OPEN TOOL
2100	SEAL CHAMBER AND OPEN SEGREGATOR
2103	SEAL SEGREGATOR. STYLUS ON AMERADA GAUGE BENT WHEN TOOL SET.
2104	UNSEAT PACKER
2105	COME OUT OF HOLE
2200	OUT OF HOLE - RIG DOWN

SEPTEMBER 3, 1975

0001	RIG UP FOR F.I.T. No. 10
0115	RUN IN HOLE
0233	SET TOOL @ 11,506'
0235	OPEN TOOL
0253	FIRE SHAPE CHARGE
0303	SEAL CHAMBER AND OPEN SEGREGATOR
0307	SEAL SEGREGATOR
0309	UNSEAT PACKER
0310	COME OUT OF HOLE
0400	OUT OF HOLE - RIG DOWN
2400	STANDBY - BAD WEATHER

SEPTEMBER 4, 1975

0001	
2400	STANDBY - BAD WEATHER

SEPTEMBER 5, 1975

0830	DEPART REGIONAL ENDEAVOR
0900	ARRIVE HALIBUT PLATFORM

AGNEW-GO-WESTERN PTY. LTD.
P. O. BOX 380
SALE, VICTORIA 3850

ESSO AUSTRALIA LIMITED | WILDCAT | HAPUKU No. 1
SEPTEMBER 2-3, 1975

PURPOSE: OBTAIN SUBSURFACE PRESSURES WITH AMERADA GAUGE AND QUARTZ PRESSURE GAUGE RUN IN TANDEM WITH SCHLUMBERGER FORMATION INTERVAL TESTER.

TOOLS USED: AMERADA 0-10,300 PSI ELEMENT SERIAL No. 9403 12 HOUR CLOCK
QUARTZ PRESSURE GAUGE No. 1410A00109

F.I.T. No. 9 @ 11,550'

HOURS	PSIG	REMARKS
1920	--	RUN IN HOLE
2037	6082	INITITAL HYDROSTATIC
		STYLUS BENT WHEN TOOL SET - NO FURTHER RESULTS.
		MAXIMUM TEMPERATURE: 214°F @ 11,550'

F.I.T. No. 10 @ 11,506'

HOURS	PSIG	REMARKS
03/09/75		
0115	--	RUN IN HOLE
0230	6042	INITIAL HYDROSTATIC
0233	--	SET TOOL
0235	--	OPEN TOOL
0237	5082	
0239	5082	
0241	5082	
0243	5082	
0245	5082	
0247	5082	
0249	5082	
0251	5082	
0253	5082	FIRE SHAPE CHARGE
0255	5082	
0257	5082	
0257	5082	
0259	5082	
0301	5082	
0303	5082	SEAL CHAMBER AND OPEN SEGREGATOR
0305	5077	
0307	5077	SEAL SEGREGATOR
0309	--	COME OUT OF HOLE
	6062	FINAL HYDROSTATIC
		MAXIMUM TEMPERATURE: 215°F @ 11,506'

WELL COMPLETION REPORT

HAPUKU-1

APPENDIX 9

CORE DESCRIPTIONS

ESSO STANDARD OIL (AUSTRALIA) LTD.

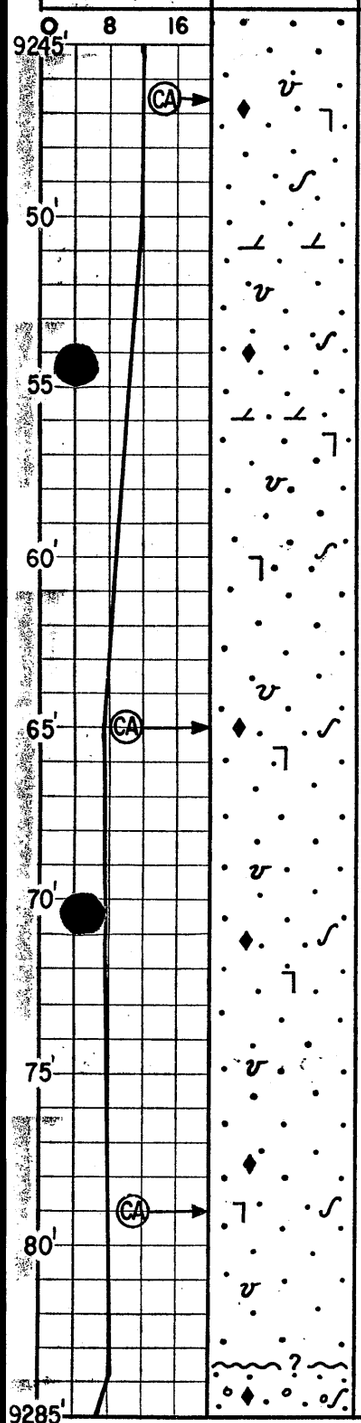
CORE DESCRIPTION

Core No. 1

WELL: HAPUKU-1

Interval Cored 9245-9288 ft., Cut 43 ft., Recovered 43 ft., (100 %) Fm. Gurnard-Latrobe

Bit Type C22, Bit Size 8-15/32" in., Desc. by MORTON/BROOKS Date 30/7/75



Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
			SANDSTONE, dark olive grey, friable to firm, commonly hard fine to granular, predominantly fine grained, moderate to well sorted, subangular to rounded, floating with rounded granules. Abundant glauconitic and pyritic cement - pyrite in well formed cubes. Slightly calcareous at top micaceous. Burrowed throughout. Massive bedding.
			White fluorescence throughout - strong in cleaner sands infilling burrows. Has blotchy appearance overall. Good fast white cut. Good odour throughout.
			More pebbly towards base.
		9283½' - 9288'	SANDSTONE to conglomerate, buff, massive, friable to unconsolidated, very pebbly poorly sorted, glauconitic, pyritic, clay matrix. Fair visible porosity Good odour, strong white fluorescence and fast white cut.

SYMBOLS:

⌐	Mica
∫	Glauconite
♦	Pyrite
∂	Burrows

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 1

WELL: HAPUKU-1

Interval Cored 9245-9288 ft., Cut 43 ft., Recovered 43 ft., (100 %) Fm. Gurnard-Latrobe

Bit Type C22, Bit Size 8-15/32' in., Desc. by MORTON/BROOKS Date 30/7/75

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
0 8 16				
9285'	v ♦ ⌐ ∫			SANDSTONE, as above, pebbles and coarser grains well rounded. burrows infilled with glauconite.
CA				
90'				
				Palynology - 6 samples taken
				CORE ANALYSIS

	9246.5'	9265	9279	9288
Ø	14.8	17.1	22.1	19.6
Sw	64	55	41	39
Perm. (md)	500	7	22	436
NO_3^- (ppm)	168	160	140	176

GAS ANALYSIS (ppm)

	C_1	C_2	C_3	C_4	C_{5+}
9246.5'	200	100	100		
9265'	700	100	200		
9279'	500	3500	1600	5600	1100
9288'	1100	400	1000	500	800

(NO_3^-) is drilling was 110 ppm thus Core 1 invaded.

SYMBOLS

⌐	Mica
∫	Glauconite
♦	Pyrite
v	Burrows

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 2

WELL: HAPUKU-1

Interval Cored 9288-9325 ft., Cut 37 ft., Recovered 37 ft., (100 %) Fm. Latrobe

Bit Type C22, Bit Size 8-15/32" in., Desc. by BROOKS/MORTON Date 30/7/75

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
0 16 32				
9290'				SANDSTONE, fine to medium grained, floating granules, calcareous and dolomitic in part (see adjacent log) non cemented sandstone buff, moderately well sorted, subangular to rounded, very glauconitic and/or chloritic, but less than previous core, micaceous, slightly pyritic, sand firm to friable, Good fluorescence and cut. Cemented part: as above with calcium carbonate and dolomitic cement, very hard and tight.
95'				No fluorescence or cut thus cemented before hydrocarbons trapped. Sandstone as whole is massive, burrowed. Large dolomite nodules show on surface of core as resistant knobs.
9300'				
				Non cemented sand appears to have good visible porosity and permeability. Fine laminae.
05'				
10'				Dolomite nodules smaller than in rest of core.
15'				
20'				Sand more friable, little dolomitic cement.
25'				

SYMBOLS:

⌐	Mica
∫	Glauconite
♦	Pyrite
v	Burrows

REMARKS: Variable fluorescence and cut thoughout in friable non cemented sandstone. Grades from extremely strong white-pale yellow to very weak white. Cut fast to moderately white-pale yellow to white cut. Strong odour. About a dozen samples were taken for Palynology.

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 2

WELL: HAPUKU-1

Interval Cored 9288-9325 ft., Cut 37 ft., Recovered 37 ft., (100 %) Fm. Latrobe

Bit Type C22, Bit Size 8-15/32" in., Desc. by BROOKS/MORTON Date 30/7/75

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology

GAS ANALYSIS:

	C_1	C_2	C_3	C_4	C_{5+}	H_2S
9324'	300	1500	600	2600	800	-
9289'	300	700	100	200	Cst	-

CORE ANALYSIS:

	9289'	9293'	9311'	9319'
Ø	7	13	29	20
Perm. (md)	11	165	184	15
Sw	60	64	24	47
NO_3^- (ppm)	175	212	231	200

These figures may not be representative because sample in homogeneous mud (NO_3^-) was 243 ppm thus Core 2 invaded.

SYMBOLS:

⌐	Mica
∫	Glauconite
♦	Pyrite
∿	Burrows

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 3

WELL: HAPUKU #1

Interval Cored 9325 - 9369 ft., Cut 44 ft., Recovered 44 ft., (100 %) Fm. LATROBE

Bit Type C-22, Bit Size 8-15/72 in., Desc. by MORTON/KEMP Date 1/8/75

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
0, 16, 32				
9325	CA, Q			SANDSTONE, light olive grey - dark green grey, fine to medium grained with up to 20% granules, subangular to rounded, poorly sorted, quartz, glauconite, trace pyrite, good visible Ø and permeability, staining throughout. Dolomite nodule from 9325-26'.
30'	CA, v, ∫, ⌐, ♦			
35'	CA, v, ∫, Q			DOLOMITIC QUARTZ SANDSTONE , medium to light grey, fine to medium grained, quartz,pyrite; glauconite (heavy cementation in burrows), dolomite cement, very hard, very tight.
40'	CA, v, ♦, ∫, O			SANDSTONE, light olive grey, medium to coarse grained, moderate to well sorted, dolomite cementation in part (15-20%), quartz, glauconite, pyrite, subangular to subrounded, occasional well-rounded granules, moderate to good visible Ø and permeability, fluoresence found only in and around dolomite nodules - evidence for flushing weak petroliferous odour.
45'	CA, ⌐, ♦			
50'	CA, ⌐, Q, v, ∫			SANDSTONE, olive grey, fine to medium grained, many floating granules, subangular to rounded (granules well rounded) poorly sorted, quartz, very glauconitic, very pyritic, partly calcareous poor visible Ø and permeability.
55'	∫, O, CA, v, ♦			
60'	CA, ∫, O, CA, Q, v, ♦, ∫			REMARKS: O.W.C. at 9352'. Whole section is highly bioturbated Below 9352' -more glauconitic, more clay prone matrix. 6 samples taken for palynological study.
65'	CA			

SYMBOLS:

- ⌐ Mica
- ∫ Glauconite
- ♦ Pyrite
- v Burrows

ESSO STANDARD OIL (AUSTRALIA) LTD.

CORE DESCRIPTION

Core No. 3

WELL:

Interval Cored 9325-9369 ft., Cut 44 ft., Recovered 44 ft., (100 %) Fm. LATROBE

Bit Type C-22, Bit Size 8-15/72 in., Desc. by MORTON/KEMP Date 1/8/75

Depth & Coring Rate (min./ft.)	Graphic (1" = 5')	Shows	Interval (ft.)	Descriptive Lithology
0, 16, 32				
9365				SANDSTONE, as above, fine to medium grained, many floating granules, subangular to rounded (granules well rounded) poorly sorted, quartz, very glauconitic, very pyritic, partly calcareous poor visible ø and permeability
9370				

CORE #3 ANALYSIS RESULTS

	ø	Perm	C1	C2	C3	C4	C5
9325	13	2					
9328	21	492					
9333	19	137	300	600	2800	4750	900
9336	3	<1	600	500	800	400	500
9341	17	256					
9346	14	756	200	300	450	100	100
9349	20	130	400	800	300	800	400
9357.5	19	63					
9361	18	309					
9362	21	125					
9365	20	478					
9368	16	586					

SYMBOLS:

- ⌐ Mica
- ∿ Glauconite
- ♦ Pyrite
- ∪ Burrows

CORE ANALYSIS REPORT

BAROID WELL LOGGING SERVICE

COMPANY ESSO (AUST.) LTD. COUNTY GIPPSLAND BAS
WELL HAPUKU NO.1 STATE VICTORIA
FIELD WILDCAT TYPE OF CORE CHRIS. C-22 DIAMETER 4"

DEPTH	LITHOLOGY	PERM. md.	POROSITY %	SATURATIONS %PORE SPACE		% GAS BULK VOL.	REMARKS
				OIL	WATER		
9246·5	FINE SAND	500	15	—	64	5	
9265	FINE - MED SAND	7	17	—	55	8	
9219	FINE – MED SAND	22	22	—	41	13	
9288	PBLY. SAND	436	20	—	39	12	
9289	MED SAND	11	7	—	60	3	
9293	MED SAND	165	13	—	64	5	
9311	MED SAND		29	—	24	21	
9319	MED SAND	15	20	—	47	11	
9325	FINE – MED SAND	2	13	—	34	8	
9328	FINE – MED SAND	492	21	—	37	13	
9333	FINE – MED SAND	137	19	—	43	11	
9336	FINE – MED SAND, DOL.	<1	3	—	49	1	
9341	FINE – MED SAND	256	17	—	23	13	
9346	MED – CRSE SAND	756	14	—	25	11	
9349	MED – CRSE SAND	130	20	—	25	15	
9362	MED – CRSE SAND	125	21	—	27	13	
9357·5	FINE – MED SAND	63	19	—	54	9	
9361	FINE – MED SAND	309	18	—	69	5·6	
9365	FINE – MED SAND	478	20	—	59	8	
9368	FINE – MED SAND	586	16	—	73	4	

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PE902284

This is an enclosure indicator page.
The enclosure PE902284 is enclosed within the container PE902283 at this location in this document.

The enclosure PE902284 has the following characteristics:

ITEM_BARCODE	= PE902284
CONTAINER_BARCODE	= PE902283
NAME	= Structure Contour Map Top of Latrobe
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= SEISMIC
SUBTYPE	= HRZN_CONTR_MAP
DESCRIPTION	= Structure Contour Map Top of Latrobe, Post Drill, (enclosure from WCR) for Hapuku-1
REMARKS	=
DATE_CREATED	= 31/10/1975
DATE_RECEIVED	=
W_NO	= W685
WELL_NAME	= Hapuku-1
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE902285

This is an enclosure indicator page.
The enclosure PE902285 is enclosed within the container PE902283 at this location in this document.

The enclosure PE902285 has the following characteristics:

ITEM_BARCODE	= PE902285
CONTAINER_BARCODE	= PE902283
NAME	= Hapuku Prospect Structural Cross Section A-A'
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= CROSS_SECTION
DESCRIPTION	= Hapuku Prospect Structural Cross Section A-A' (enclosure from WCR) for Hapuku-1
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W685
WELL_NAME	= Hapuku-1
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE601427

This is an enclosure indicator page.
The enclosure PE601427 is enclosed within the container PE902283 at this location in this document.

The enclosure PE601427 has the following characteristics:

ITEM_BARCODE	= PE601427
CONTAINER_BARCODE	= PE902283
NAME	= Well Completion Log
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= COMPLETION_LOG
DESCRIPTION	= Well Completion Log (enclosure from WCR) for Hapuku-1
REMARKS	=
DATE_CREATED	= 07/07/1975
DATE_RECEIVED	=
W_NO	= W685
WELL_NAME	= Hapuku-1
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE902286

This is an enclosure indicator page.
The enclosure PE902286 is enclosed within the container PE902283 at this location in this document.

The enclosure PE902286 has the following characteristics:

ITEM_BARCODE	= PE902286
CONTAINER_BARCODE	= PE902283
NAME	= Time Depth Curve
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Time Depth Curve (enclosure from WCR) for Hapuku-1
REMARKS	=
DATE_CREATED	= 05/08/1975
DATE_RECEIVED	= 12/04/1983
W_NO	= W685
WELL_NAME	= Hapuku-1
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)