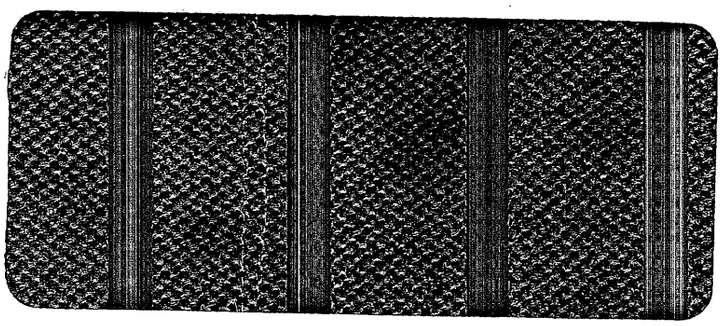

WCR

SWORDFISH-1

(W686)

ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.

102 pages
7 enclos.

OIL and GAS DIVISION

WELL COMPLETION REPORT

SWORDFISH-1
GIPPSLAND BASIN, VICTORIA.

R. G. Bellis

April, 1977

C O N T E N T S

APPENDICES

ENCLOSURES

Geological Cross Section B-B' (Post Swordfish-1)

Swordfish-1 Time Depth Curve

Swordfish-1 Sonic Calibration Curve

Well Completion Log-Swordfish-1

ATTACHMENT

Swordfish-1 Core Lab Well Report

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ESSO AUSTRALIA LTD.
COMPLETION REPORT

I WELL DATA RECORD

Date April 1977

LOCATION

WELL NAME	STATE	PERMIT or LICENCE	GEOLOGICAL BASIN	FIELD
SWORDFISH-1	VICTORIA	VIC. P-1	GIPPSLAND	N.F.W.C.

CO-ORDINATES	Lat.	Long.	X	Y	MAP PROJECTION	GEOGRAPHICAL DESCRIPTION
Surface	38°23'36.063"	148°00'24.007"	587910	5750046	AMG Zone 55	2 miles NE of Salmon-1
Bottom Hole						

ELEVATIONS & DEPTHS

ELEVATIONS	WATER DEPTH	TOTAL DEPTH	
Ground	213'	M.D. 8100'	Avg.Angle Straight hole
KB 83'		T.V.D.	
RT	PLUG BACK DEPTH	REASONS FOR P.B.	
Braden Head	364'	Abandonment	
Top Deck Platform			

DATES

MOVE IN	RIG UP	SPUDDED
December 19, 1976	December 20, 1976	December 21, 1976
RIG DOWN COMPLETE	**RIG RELEASED**	**PROD.UNIT - Start Rigging Up**
January 18, 1977	January 20, 1977	
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
Australian Odeco P/L	Ocean Endeavour	Semisubmersible drilling vessel

TOTAL RIG DAYS	DRILLING AFE NO.	COMPLETION NO.	TYPE COMPLETION
32	236-003		

LAHEE WELL CLASSIFICATION		
	Before Drilling	New field wildcat
	After Drilling	Unsuccessful new field wildcat with no hydrocarbon shows.

R. G. Bellis
Geologist

II(a) INITIAL PRODUCTION TEST - Not applicable.

II(b) FORMATION INTERVAL TESTS

FIT # 1 7950' TOOL FAILURE
Hydrostatic initial 4202.17 psia
Temperature 180°F

FIT # 2 7950' TOOL FAILURE
Hydrostatic initial 4199.6 psia

FIT # 3 7950'
Recovered 22000 cc mud filtrate and formation water.

Open tool for main chamber for 20 min., shut in for 5 min.; 12000 ppm Cl^-, 120 ppm NO_3^-, R_{mf} 0.31 @ 75°F.

HP initial hydrostatic	(psia)	4196
sampling	(psia)	1300
final shut in	(psia)	3425
final hydrostatic	(psia)	4199.8
formation porosity		20%

FIT # 4 6810 TOOL FAILURE

FIT # 5 6810'
Recovered 22000 cc mud filtrate and formation water.

Open tool for main chamber for 15 min., shut in for 5 min.; 8000 ppm Cl^-, 120 ppm NO_3^-, R_{mf} 0.434 @ 78°F.

HP initial hydrostatic	(psia)	3580.9
sampling	(psia)	2937
final shut in	(psia)	2941
final hydrostatic	(psia)	3576.8
temperature (max. recorded)		180°F
formation porosity		24%

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

INTERVAL	HPF	TOTAL SHOTS	SERVICE COMPANY
612-614	4	8	SCHLUMBERGER for squeeze cement plug

R.G. Bellis
Geologist

IV CASING - LINER - TUBING RECORD

Type	Size	Weight	Grade	Thread	No. Joints	Amount	Depth
Pile Joint	26"	670 #	-	CC	1	35.16	322
Cross Over	20"	135 #	X-52	JV-CC	1	42.63	365
Conductor Casing	20"	94 #	X-52	JV	8	346.87	712
Float Shoe	22"	-	-	WELD	1	2.10	714
Casing Hanger	13-3/8"	-	-	BUTT	1	2.30	299
Pup Joint	13-3/8"	-	-	BUTT	1	5.30	305
Surface Casing	13-3/8"	54.5#	K-55	BUTT	67	2634.02	2939
Float Collar	13-3/8"	-	-	BUTT	1	1.72	2940
Float Joint	13-3/8"	54.5#	-	BUTT	1	35.61	2976
Float Shoe	13-3/8"	-	-	BUTT	1	1.05	2978

V CEMENT RECORD

String	20" Conductor Csg.	13-3/8" Surface Csg.	
Type of Cement	Aust. 'N' Neat	Aust. 'N' Neat	
Number of FT^3	1180	1110	
Average weight of slurry	15.6 ppg	15.6 ppg	
Cement Top	Sea Floor	1500'	
Casing Tested with	500 psi	1500 psi	
Number of Centralizers	6	10	
Number of Scratchers	-	-	
Stage Collar etc.	-	-	
Remarks	-	-	

VI SUBSURFACE COMPLETION EQUIPMENT - not applicable.

G.W. WEYBURY
Engineer

Well Completion Report

WELL SWORDFISH-1

VII SAMPLES, CONVENTIONAL CORES, SW CORES

INTERVAL	TYPE	RECOVERED	INTERVAL	TYPE	RECOVERED
768-1540 1540-3040 3040-8100	5 sets of washed and dried and 1 set of unwashed cutting samples.	30' intervals 20' intervals 10' intervals	60 sidewall cores were attempted, 58 were recovered. A detailed list and description is attached.		
768-8100	One set of composite canned cuttings sealed at 100' intervals.				

VIII WIRELINE LOGS AND SURVEYS Incl. FIT)

Type & Scale	From To	Type & Scale	From To
ISF-Sonic Run 1 2"& 5"= 100'	714 - 3008	FIT #1	7950
		FIT #2	7950
FDC-Cal Run 1	715 - 3004	FIT #3	7950 (valid test)
GR 2" & 5" = 100'	300 - 3004	FIT #4	6810
FDC/CNL/GR/Cal Run 1 2" & 5" = 100'	2983 - 8091	FIT #5	6810 (valid test)
		See II(b) for detailed description of FIT's	
ISF-Sonic Run 2 2" & 5" = 100'	2980 - 8089	CST #1	6604 - 8083
HDT Run 1	2980 - 8092	CST #2	3200 - 6587
Velocity Survey 25 shots	3124 - 7955 12 levels	A detailed list and description of SWC's is attached.	

R. G. Bellis
Geologist

IX(a)

STRATIGRAPHIC TABLE

AGE	FORMATION/HORIZON/ZONE	DRILL DEPTH	SUBSEA DEPTH
	Seafloor	296'	213'
Recent-Pliocene	Jemmy Point Formation	296 - 1220	213 - 1137
Miocene	Gippsland Limestone	1220 - 6083	1137 - 6000
Late Miocene		1220 - 2081	1137 - 1998
Mid Miocene		2081 - 5678	1998 - 5595
	Base of high velocity channel	4076	3993
	Mid Miocene Seismic marker	5678	5595
Early Miocene		5678 - 6393	5595 - 6310
Early Miocene-Early Oligocene	Lakes Entrance Formation	6083 - 6560 1854.1	6000 - 6477
Late Oligocene		6393 - 6520	6310 - 6437
Early Oligocene		6520 - 6571	6437 - 6488
Early Oligocene -Eocene	Gurnard Formation	6560 - 6712	6477 - 6629
Early Olig.-Paleocene	Latrobe Group	1883.4 6560 - 8100	6477 - 8017
Early Olig.-Late Eocene	Upper N. asperus Zone	6560 - 6571	6477 - 6488
Late Eocene	Middle N. asperus Zone	6571 - 6619	6488 - 6536
Middle Eocene	Lower N. asperus Zone	6619 - 6712	6536 - 6629
Early Eocene-Paleocene	"Coarse Clastics"	6712 - 8100	6629 - 8017
Early Eocene	P. asperopolus Zone	6712 - 7268	6629 - 7185
	Upper M. diversus Zone	7268 - 7576	7185 - 7493
Early Eocene-Late Paleocene	Lower M. diversus Zone	2303 7576 - 7981	7493 - 7898
Late Paleocene	Upper L. balmei Zone	2432 7981 - 8100	7898 - 8017

R. Bellis
Geologist.

IX(b) DESCRIPTION OF LITHOLOGICAL UNITS

SWORDFISH-1

296-768	No samples were collected, gamma ray log indicates limestones.
768-1600	Skeletal Marl - light grey, very calcareous, firm aggregates, abundant skeletal material, especially bivalves and bryozoa, benthonic forams, occassionally pyritic.
1600-2360	Silty calcarenite- light grey, firm micritic, glauconitic, poorly sorted, fossil forams.
2360-3050	Marl - micritic, silty, light grey, soft-firm, very fossiliferous (bryozoa, forams - planktonic and benthonic, ostracoda, occasional molluscs) glauconite (pelletal, rarely pyritic skeleton fragments and marly matrix.
3050-3210	Calcarenite - light to medium grey, moderately firm, silty, slightly glauconitic, clayey matrix.
3210-3780	Interbedded marl - calcarenite - medium grey, soft-firm, very silty to marly, slightly glauconitic, trace pyrite, forams.
3780-4076	Calcarenite: - light-medium grey, soft-firm, silty, minor clay, glauconite occasionally abundant, minor fossils, pyrite occasionally abundant, minor fossils, pyrite occasionally abundant.
4076-6040	Calcareous shale - medium to dark grey, soft-firm, slightly silty, common pyrite, glauconite, very calcareous, pyrite often replacing fossils, abundant forams.
6040-6083	Calcareous shale - Calcarenite - medium-dark grey, firm, silty, glauconite, pyrite, fossils, some grades to calcarenite - firm - friable.
6083-6560	Calcareous shale - medium-dark grey, firm to medium hard, very calcareous, silty in part, pyrite, glauconite, forams.
6560-6712	Silty sandstone - olive grey, firm to hard, silt to pebble grain size, poorly sorted subrounded quartz, trace pyrite on some surfaces, very glauconitic, micaceous, some carbonaceous material, no shows, tight.
6712-7160	Sandstone - quartz clear medium granules, mainly coarse - very coarse, well rounded, well sorted, some mica and pyrite, good porosity and permeability, no shows.
7160-7495	Interbedded coal, shale and siltstone with minor sandstone Coal - black, vitreous, bleeding gas Shale-siltstone - medium brown - dark grey, firm to hard, carbonaceous Sandstone - medium to very coarse grains, sub angular, clear quartz, well sorted, some ? dolomitic cement, no shows.
7495-8100	Interbedded sandstone, siltstone, shale and minor coal Sandstone - loose quartz grains, moderate to very coarse grain size, subangular to subrounded, moderate to well sorted, no shows. Siltstone - medium grey and brown, minor clay, carbonaceous material, firm to soft, moderately sorted. Shale - dark brown-grey, very carbonaceous, firm micaceous, some silty. Coal - black, vitreous

X. GEOLOGICAL AND GEOPHYSICAL ANALYSIS (Pre-Drill Prognosis vs. Actual Results)

PREDRILL PROGNOSIS

Structure

The pre-drill concept of the Sworfish Prospect was that of a simple anticlinal structure with closure mapped on both the top of Latrobe Group and intra-Latrobe horizons. The structure was considered as part of a southwestern extension of the regional Tuna-Marlin anticline which provided NW-SE rollover. North closure was provided by a sharp syncline associated with a local E-W shear fault, while downwarp onto a normal fault to the south completed the closure.

Seismic velocities played a major part in the definition of the Swordfish propsect. The Salmon-1 and Cod-1 wells were drilled on seismic time highs in the area but a strong velocity gradient induced by high velocity Miocene channel fill sediments was interpreted to have displaced the true structural crest to a location 2.2 miles NE of Salmon-1. At this location, a 3.5 square mile top of Latrobe Group closure having 180 feet of vertical relief was mapped.

Closure on a intra-M.diversus horizon was estimated at 290 feet over an area of 7.4 square miles.

The predicted structural tops were:

		Subsea
Eocene	Latrobe Group (Gurnard formation)	6250'
Eocene	"Coarse Clastics"	6380'
Eocene	Top of M.diversus Marker	6770'
Eocene	Mid M.diversus Marker	7080'

Stratigraphy

By interpolation from the Salmon-1 and Cod-1 wells, the Latrobe Group to be drilled at Swordfish-1 was expected to consist of three major units. The upper unit was predicted to contain high quality braided stream and point bar sands interbedded with interdistributary shales, siltstones and coals - (this section includes sandstones Zones 1, 2 and 3). It was expected that each zone of porous and permeable sand would have a good chance of being sealed by the interbedded shale and coal units. Beneath this section, a predominantly fine grained interval was expected, consisting of alternating siltstones, shales and coals with minor thin, crevasse splay and point bar sands. In the third unit, point bar sands

sands of up to 40 feet in thickness, interbedded with siltstones, shales and coals were anticipated.

Swordfish-1 Objective

1) To test the sands at the top of the Latrobe Group "Coarse Clastics" which would be sealed by either the Gurnard Formation or the marls and mudstones of the Lakes Entrance and Gippsland Formations.

2) To test the intra-Latrobe sands which would be sealed by interbedded shale, siltstone and coal units.

RESULTS

Structure

The Top of the Latrobe Group was encountered at -6477' which was 227 feet deep to prediction. Almost all this error can be accounted for in the normal moveout velocity prediction. The error was created by raypath distortion on both the N-S and E-W sets of seismic lines. The distortion results from two main causes. On the dip lines, the relief of the base of the high velocity Miocene channel which runs over Swordfish-1 was the cause, while on the strike lines, where the channel base is effectively flat lying, the presence of high velocity Miocene wedges above the channel base caused the distortion. Thus raypath distortion was present on both the N-S and E-W lines, causing anomalously low normal moveout velocities which were,circumstantially, consistent on the strike and dip lines. This led to depth prediction which were too shallow.

The velocity error at the Top of the Latrobe Group was carried down at the intra-Latrobe horizons and accounts for depth predictions at the Top of the Coarse Clastics and the Mid M.diversus marker which were also too shallow.

The velocity error has resulted in Swordfish-1 being drilled on the northern flank of a NW-SE trending syncline in a position where there is no closure at either the top of Latrobe or the intra-Latrobe horizons and consequently no trapped hydrocarbons.

Stratigraphy

The stratigraphy encountered in the well was essentially as predicted. The well penetrated the upper section completely - viz. the braided streams and point bars of Zones 1, 2 and 3 separated by interdistributary shales, siltstones and coals, and reached total depth in the predominantly fine grained interval dominated by shales, siltstones and coals with minor thin crevasse splay and point bar sands. Sandstone Zone 4 was

not intersected by the well.

The thickness variation of the sands in Zones 1, 2 and 3 between Swordfish-1, Salmon-1 and Cod-1 is interpreted to be due to stream channel migration with consequent variable erosion of the alluvial plain shales, siltstones and coals. The isopach between the bases of alluvial deposits remains essentially constant between the three wells.

Palynological data from Swordfish-1 prompted a revision of Salmon-1 data and as a result the P.asperopolus - Upper M. diversus boundary has been lowered to about the middle of the alluvial deposit between sandstone Zones 1 and 2. Similarly, the Lower M.diversus - Upper L.balmei boundary has been lowered, to beneath a shale which is the W.hyperacantha dinoflagellate zone.

APPENDIX 1

WELL COMPLETION REPORT

SWORDFISH-1

APPENDIX 1

SAMPLE DESCRIPTIONS

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
768- 790		Mainly cement and shoe, but abundant bryozoa, mullusca & occasional benthonic forams.
790- 820		As above, slightly more forams.
820- 850		Cement and shoe less noticeable, 70% micritic limestone (small aggregates), abundant skeletal material.
850- 880		As above.
880- 910		As above, some planktonics in micritic portion.
910- 940		As above.
940- 970		Cement and shoe now quite small except for occasional large grains of shoe. Abundant soft aggregate of micritic material above.
970-1000		As above
1000-1030		As above, abundant white molluscan fragments.
1030-1060		As above
1060-1090		As above.
1090-1120		As above.
1120-1150		As above, some bryozoan fragments pyritic/limonitic.
1150-1180		As above, slightly firmer aggregate.
1180-1210		As above.
1210-1240		As above
1240-1270		As above
1270-1300		Firm aggregate of marl/micr lst v. calcareous, light grey, abundant skeletal material, especially bivalve & bryozoa, Benthonic forams, occasionaly planktonic.
1300-1330		As above, occasional gastropods.
1330-1360		As above
1360-1390		As above
1390-1420		As above.
1420-1450		Firm aggregate marl/micritic limestone very calcareous, light grey abundant skeltal material, mainly bryozoa & forams (benthonic) occasional bivalve; occasionally pyritic
1450-1480		As above, tr. glauconite
1480-1510		As above, abundant glauconite
1510-1540		As above, slight decrease in glauconite
1540-1560		As above
1560-1580		As above, further decrease in glauconite

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
1580-1600		As above
1600-1620	90%	Silty limestone light grey, firm very calcareous, some glauconite pellet - very small. Light amount of matrix
	10%	Fossil fragment - bryzoan, mollusc rare forams.
1620-1640	90%	Silty Limestone - as above, micritic, poorly sorted forams more common.
	5%	Fossil Fragment.
1640-1660	90%	Silty limestone as above
	5%	Fossil Fragment
		Tr. Marl-soft light grey glauconitic
1660-1680	95%	Silty Limestone - as above
	5%	Fossil Fragment
	Tr	Marl - as above
1680-1700	100%	Silty Limestone as above
	Tr	Fossil fragments, forams mollusc.
	Tr.	Marl
1700-1720	100%	Silty limestone as above
	Tr	Fossil fragment
	Tr	Marl - most lost during washing
1720-1740	100%	Silty limestone as above
	Tr	Fossil Fragment
	Tr	Marl - soft light grey glauconite
1740-1760	100%	Silty limestone as above
	Tr	Fossil Fragment
	Tr	Marl - as above
1760-1780	95%	Silty limestone as above
	5%	Marl as above
	Tr	Fossil Fragment
1780-1800	100%	Silty Limestone - light grey, firm micritic, glauconitic, poorly sorted, fossil forams.
	Tr	Marl - light grey, soft, glauconitic
	Tr	Fossil fragment-bryzoa mollusc forams
1800-1820	95%	Silty limestone as above
	5%	Marl - as above
	Tr	Fossil fragment
	Tr	Siltstone dark grey slightly calcareous firm, micaceous, glauconitic.
1820-1840	100%	Silty limestone as above
	Tr	Marl as above
	Tr	Fossil Fragment as above
1840-1860	100%	Silty limestone - as above
	Tr	Fossil fragment - as above
1860-1880	100%	Silty limestone - as above
	Tr	Fossil fragment.
1880-1990	100%	Silty limestone as above glauconite more abundant
	Tr	Fossil fragment

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
1900-1920	100%	Silty Limestone - as above
	Tr	Fossil Fragments
1920-1940	100%	Silty limestone - as above not as glauconitic
	Tr	Fossil Fragments
1940-1960	100%	Silty limestone - as above
	Tr	Fossil Fragments - as above
	Tr	Marl - as above
1960-1980	95%	Silty limestone - light grey, firm glauconitic, poorly sorted fossilferous miritic
	5%	Marl very light grey; very soft glauconitic.
	Tr	Fossil Fragments, forams, molluscs.
1980-2000	100%	Silty limestone - as above
	Tr	Fossil fragments - as above
2000-2020	100%	Silty limestone - as above
	Tr	Marl - as above
	Tr	Fossil Fragment as above
2020-2040	95%	Silty Limestone - as above
	5%	Marl - as above
	Tr	Fossil Fragments
2040-2060	100%	Silty limestone - as above
	Tr	Marl as above
	Tr	Fossil Fragment
	Tr	Pyrite
2060-2080	100%	Silty limestone - as above
	Tr	Fossil Fragment - forams, molluscs
2080-2100	100%	Silty limestone as above
	Tr	Fossil fragments as above
2100-2120	95%	Silty limestone as above
	5%	Marl - as above
	Tr	Fossil frags.
2120-2140	95%	Silty limestone - as above
	5%	Marl - as above
	Tr	Fossil Fragments
2140-2160	100%	Silty limestone - light grey, firm, poorly sorted, fossilferous some glauconite, micritic.
	Tr	Marls - light grey to blue, some glauconite, very soft.
	Tr	Fossil Fragments - Molluscs, forams, ostracodes, bryozoa
2160-2180	95%	Silty limestone - as above
	5%	Marl - as above
	Tr	Fossil Fragments
2180-2200	100%	Silty limestone - almost no glauconite
	Tr	Fossil fragments
2200-2220	100%	Silty limestone - as above
	Tr	Marl - as above 50% coarse sample
	Tr	Fossil Fragments

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
2220-2240	80% 20% Tr	Silty Limestone - more glauconite Marl - as above Fossil Fragments.
2240-2260	100% Tr Tr	Silty limestone - as above not much glauconite Marl Fossil Fragments.
2260-2280	90% 10%	Silty limestone - as above Marl.
2280-2300	75% 25% Tr	Silty limestone - as above Marl - as above Fossil fragments
2300-2320	95% 5% Tr	Silty limestone - light grey, frim micritic rare glauconite fossilferous Marl - light blue grey, soft some glauconite Fossil fragments - mollusc, ostracoda foram.
2320-2340	95% 5% Tr	Silty limestone - as above Marl - as above Fossil fragments - as above
2340-2360	100% Tr	Silty limestone - as above Fossil fragments
2360-2380	90% 10% Tr	Silty limestone - as above Marl - as above Fossil Fragments
2380-2400	100% Tr Tr	Silty limestone - as above Marl - as above Fossil fragments
2400-2420		Limestone, micritic, silty, light grey, soft-firm, very fossilferous (bryozoa, foram, planktonic and benthonic, ostracoda, occasional mollusc), glauconite (pelletal), rarely pyritic skeleton fragments & marly matrix, mostly lost in washing.
2420-2440		As above, tr sparry calcite.
2440-2460		As above, slightly more marl.
2460-2480		As above
2480-2500		As above, no spry calcite
2500-2520		As above
2520-2540		As above
2540-2560		As above
2560-2580		Limestone, light grey, micritic, silty, soft-firm, very fossilferous (bryozoa, foram, ostrac.) occasional pelletal, glaucinite, marly matrix
2580-2600		As above
2600-2620		As above

SAMPLE DESCRIPTIONS GILES/ELLIOTT

SWORDFISH - 1

DEPTH	%	DESCRIPTION
2620-2640		Limestone, light grey, soft-firm, silty, slight glauconite, very fossilferous (mainly bryozoa & forams - benthonic & planktonic). Tr. vein clacite with rare pyrite; tr. quartz grains - medium to coarse, sub - well rounded. Soft marly matrix.
2640-2660		As above
2660-2680		As above, decrease in fossil content
2680-2700		As above
2700-2720		Limestone, light grey, generally firm, silty, slight - very slight glauconite, fossiliferous (mainly forams, benthonic, some ostracodes); marly matrix. 5% Calcite, brown, very hard crystalline.
2720-2740		As above, 10% calcite
2740-2760		As above, no calcite
2760-2780		As above
2780-2800		As above
2800-2820		Limestone, light grey, firm, silty, slightly glauconitic, slightly fossiliferous, slightly pyritic fossiliferous, marly matrix.
2820-2840		As above, slightly softer.
2840-2860		As above
2860-2880		As above
2880-2900		As above, tr crystalline calcite, very hard, light brown.
2900-2920		Limestone, light grey, soft-firm, slightly marly, fossiliferous (mainly forams), slightly glauconitic. Tr. crystaline calcite, pink-light brown, very hard.
2920-2940		As above
2940-2960		As above
2960-2980		As above
2980-3000		As above
3000-3020		Limestone, light grey, soft-firm, slightly-marly, slightly fossiliferous (mainly benthonic forams & bryozoa), slightly glauconitic.
3020-3040		As above
3040-3050		As above T.D. 3050 17½" hole.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

3020 13 $^{3}/_{8}$" casing at 2978'

DEPTH	%	DESCRIPTION
3020-3030	100%	Cement
3030-3040	90%	Limestone, light grey, firm silty, marl matrix, slightly fossilferous.
	10%	Cement
3040-3050	100%	Limestone, very light grey, soft, very clayey, silty, cement
3050-3060	80%	Calcarenite, light grey, silty, slight-moderately firm, slightly glauconitic.
3060-3070	50%	Calcarenite as above
	50%	Marl - very light grey, slightly silty, soft, few fossils to 1mm diam.
3070-3080	60%	Calcarenite as above
	40%	Marl as above
3070-3080	40%	Calcarenite, light grey, silty, moderately firm, slight glauconitic, clayey matrix.
	60%	Marl as above
3080-3090	50%	Calcarenite, light grey, silty as above
	50%	Marl as above
3090-3110	50%	Calcarenite as above
	50%	Marl very light grey, slightly silty, soft, few fossils mainly forams.
3110-3120	20%	Calcarenite as above
	80%	Marl - very light grey, slightly silty, soft, few fossils
3120-3130	80%	Calcarenite as above
	20%	Marl as above
3130-3140	80%	Calcarenite as above
	20%	Marl as above
3140-3150	50%	Calcarenite, light grey - medium grey, slightly-moderately firm, silty, slightly glauconitic.
	50%	Marl, very light grey, soft, slightly silty, minor fossils.
3150-3170	90%	Calcarenite as above
	10%	Marl as above
3170-3180	80%	Calcarenite as above
	20%	Marl as above
3180-3190	80%	Calcarenite, medium grey, moderately firm, silty, slightly glauconitic.
	20%	Marl very light grey, soft, slightly silty, rare fossils.
3190-3200	80%	Calcarenite as above
	20%	Marl as above with several large foraminifera.
3200-3210	80%	Calcarenite medium grey, moderately firm, very silty, slightly glauconitic.
	20%	Marl very light grey, soft-gummy, silty & sandy forams.
	Tr	Large forams - 1 mm diam.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
3210-3220	80% 20% Tr	Calcarenite as above Marl as above forams up to 2 mm diam.
3220-3230	 Tr	Limestone light-medium grey, silty to marly, soft & gummy to moderately firm. Fossilferous - forams mainly. Slightly glauconitic. Terrigenous residue very fine clay/quartz medium to dark grey. Forams
3230-3240	 Tr	Limestone light - medium grey, soft-firm, very silty to marly. Slightly glauconitic. Tr. dark speckled grains - pyritic ? foraminiferous. Suspect sediment in situ is mainly soft marl & these samples are the firmer interbeds. Calcite - white - tan, moderately hard.
3240-3250		Limestone as above more softer gummy material.
3250-3260		Limestone as above - 30% light grey soft marl.
3260-3270		Limestone as above - 30% light grey soft marl. Varying content of marl is function of amount of washing.
3270-3280		Limestone light-medium grey - soft-firm, very silty to marly. Tr. glauconitic. Tr. dark grains, forams soft light grey gummy marl up to 30%. Tr white hard calcite.
3280-3290		Limestone as above Tr calcite as above
3290-3300		Limestone as above Tr calcite Tr loose forams - 1 mm diam.
3300-3310		Limestone, light medium grey, soft-moderately hard, very silty-marly, Tr. glauconit, pyrite, dark grains, forams tr. calcite - white, hard.
3310-3320		Limestone as above A few chips with more than usual glauconite giving medium - dark grey green colour.
3320-3330		Limestone light-medium grey, soft-moderately hard, very silty-marly, tr. glauconite, pyrite, dark grains, forams tr. calcite white, hard.
3330-3340		Limestone as above
3340-3350		Limestone as above
3350-3360		Limestone as above
3360-3370		Limestone light-medium grey, soft-moderately hard, very silty-marly. Tr. glauconite, pyrite, dark grains. Fossiliferous, mainly forams.
3370-3380		Limestone as above perhaps slightly more glauconitic
3380-3390		Limestone as above slightly more glauconitic.
3390-3410		Limestone light-medium grey, soft moderately hard very silty-marly. Common glauconite in tr amounts. tr dark grains. Fossiliferous, mainly forams.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
3410-3430		Limestone as above. Increase drilling rate & smoother drilling. More marl (- 40%) light grey soft-easily broken up than usual (function of washing?).
3430-3440		Limestone light-medium grey, soft-medium hard, very silty-marly. Tr. glauconite, pyrite, dark grains. Fossils. (-30% marl as above).
3440-3450		Limestone as above
3450-3460		Limestone as above.
3460-3470		Limestone as above
3470-3490		Limestone, light-medium grey, soft-medium hard, very silty-marly. Tr. glauconite, dark grains (organic material?) Tr. Fossils, mainly forams (-30% soft light grey marl still)
3490-3500		Limestone as above (-30-40% marl)
3500-3510		Limestone as above (-20% marl)
3510-3520		Limestone light-medium grey, soft-firm, very silty-marly Tr. glauconite, dark grains (-15% marl).
3520-3530		Limestone as above
3530-3540		Limestone light-medium grey, soft-firm, very silty-marly, Tr. glauconite, dark grains (organic material?) tr. forams, fossils.
3540-3550		Limestone as above
3550-3560		Limestone as above
3560-3570		Limestone light-medium grey, soft-moderately hard, very silty-marly
3570-3580		Limestone as above
3580-3600		Limestone light-medium grey, soft-moderately hard, very silty-marly (silty chips are harder). Tr. glauconite dark grains, tr. pyrite, fossils, mainly forams. tr. calcite white hard.
3600-3620		Limestone as above
3620-3630		Limestone as above.
3630-3650		Limestone. light-medium grey, soft-firm, very silty-marly. Tr. glauconite, dark grains, tr. pyrite. forams. Actual marl -15%.
3650-3660		Limestone as above
3660-3670		Limestone as above
3670-3680		Limestone light-medium grey, soft-moderately hard, mostly firm, very silty-marly. Tr. glauconite dark grains. forams.
3680-3690		Limestone as above
3690-3700		Limestone as above

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
3700-3710		Limestone as above
3710-3720		Limestone light-medium grey, soft-moderately hard, very silty-marly. Tr. glauconite, dark grains, forams. Acid residue increasing - dark grey-brown.
3720-3730		Limestone as above.
3730-3740		Limestone light-medium grey, soft-moderately hard but friable chips mainly very silty. Tr. glauconite, dark grains, forams.
3740-3750		Limestone, light-medium grey, soft-moderately hard but friable. v. silty, some marl. Tr. glauconite, forams, dark grains.
3750-60		Limestone as above. Minor marl.
3760-3770		Limestone. light-medium grey, soft-moderately hard, friable silt size grading to very fine sand (i.e. carcarenite). Some fossils replaced by pyrite Minor marl. light grey soft
3770-3780		Limestone as above
3780-3790		Limestone as above. Rock in situ probably contains good portion of softer marl which is washed out.
3790-3800		Limestone as above
3800-3810		Limestone light-medium grey, soft-moderately hard, friable, mainly siltsize, Tr. glauconite, dark grains, forams minor marl light grey soft.
3810-3820		Limestone, light-moderate grey, soft-moderately hard, silty, tr. glauconite & dark grains, minor forams. Tr. marl light grey soft
3820-3830		Limestone, as above tr. marl as above
3830-3840		Limestone as above
3840-3850		Limestone, light-moderately grey, soft-moderately hard, silty tr. sand fine, tr. glauconite & dark grains minor forams
3850-3860		Limestone as above Tr. marl as above
3860-3870		Limestone as above colour light & medium grey Tr. marl, light grey, soft, probably being washed out of samples.
TRIP AT 3884 FT. 1820 HOURS 4/1/77		
3870-3880		Limestone as above
New bit No. 4 X3A, back on bottom 0745 hours 5/1/77. 15 UNITS TRIP GAS		
3880-3890		Limestone, light-medium grey, firm, silty very rare glauconite and dark grains, minor forams Tr. marl light grey, soft
3890-3900		Limestone, as above - with clay. No marl and none coming over shakers.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
3900-3910		Limestone, light-medium grey, clayey, tr. silt, rare forams, firm - portion of sample grades to DOLOMITE, but the description is same as that for Limestone.
3910-3920		Limestone as above tr. glauconite,- no DOLOMITE, clean samples i.e. no MARL.
3920-3930		Limestone as above
3930-3940		Limestone light-medium grey, clayey, tr. silt, minor dark grains, tr. glauconite, rare fossils, firm.
3940-3950		Limestone as above tr. marl, light grey, soft.
3950-3960		Limestone as above tr. marl as above.
3960-3970		Limestone light-medium grey, soft-fir, clayey, tr. silt, minor dark grains & glauconite, rare fossils tr-10% MARL, light grey, soft? cavings.
3970-3980		Limestone as above tr. MARL as above.
3980-3990		Limestone as above tr. MARL as above
3990-4000		Limestone light-medium grey, generally soft minority firm, clayey, tr. silt, dark grains, glauconite, rare fossils tr. MARL
4000-4010		Limestone as above, some chips richly glauconitic, minor forams tr. MARL
4010-4020		Limestone as above
4020-4030		Limestone, light-medium grey, soft minor firm, minor clay, tr. silt, dark grains, some chips highly glauconitic ? chloritic (light green & not nodular), increase in fossils.
4030-4040		Limestone as above
4040-4050		Limestone as above
4050-4060		Limestone very light grey, minor medium grey, soft-firm, minor clay tr. silt tr. dark grains, glauconite occasionally abundant (?chlorite), minor fossils, pyrite occasionally abundant.
4060-4070		Limestone as above.
4070-4080		Limestone very light grey & medium dark grey, medium grey predominates, very light grey. lst has minor glauconite, with tr. pyrite, medium grey. lst is clayey tr.stilt; soft-firm minor fossils Trace MARL - medium light grey, soft. Sample again contains MARL, much of which is probably being washed out.
4080-4090		Limestone as above, pyrite & glauconite occasionally abundant.
4090-4100		Limestone as above
4100-4110		Limestone as above
4110-4120		Limestone very light grey & medium dark grey predominate; tr.glauconite, pyrite, fossils present-abundant tr. MARL.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
4120-4130		Limestone as above
4130-4140		Limestone as above, clay content increasing with a darker colour.
4140-4150		MARL - (Limestone/MARL transitional with increase in clay) medium dark grey, tr. pyrite, tr. glauconite. fossils present, moderately soft-moderately firm. Tr. Limestone medium light grey, tr. pyrite tr. glauconite. Slight increase in drilling rate and background gas approximates the increase in clay to MARL
4150-4160		MARL as above.
4160-4170		MARL as above.
4170-4180		MARL as above - tends to limestone, fossils relatively abundant.
4180-4190		MARL medium dark grey, minor light grey, tr. pyrite, tr. glauconite, fossils present, soft-moderately firm. Tr. limestone medium light grey, firm, tr. pyrite, tr. glauconite.
4190-4200		MARL as above tends to limestone in part (i.e. less clay more crystalline). Tr. limestone as above.
4200-4210		MARL as above tends to limestone. Tr. limestone as above.
4210-4220		MARL tends to limestone, medium dark grey, soft-firm, tr. glauconite, tr. pyrite, rare dark grains, fossils relatively abundant, large amount of insoluble material after treatment with HCI. Tr. limestone, light grey, firm, tr. glauconite, tr. pyrite.
4220-4230		MARL as above
4230-4240		MARL as above
4240-4250		Marl medium-dark grey, soft-firm, silty. Minor pyrite, some of it replacing fossils. Tr. glauconite. Very abundant forams, mainly globular type. Large amount acid insoluble residue - dark grey brown.
4250-4260		Marl as above
4260-4270		Marl as above. Tr. white calcite hard.
4270-4280		Marl as above. Minor light grey firm marl. Tr. calcite.
4280-4290		Marl-med-dark grey, soft-firm, slight silty. Minor pyrite, tr. glauconite. Large amount acid insoluble residue appears to be quartz mainly. Abundant forams. Tr. calcite, white & clear.
4290-4300		Marl as above. Most of the sediment is being lost during washing. Abundant forams. Tr. calcite.
4300-4310		Marl as above.
4310-4330		Marl as above.
4330-4340		Marl medium-dark grey, soft-firm, slightly silty common pyrite, slight trace glauconite. Large amount acid insoluble residue. Pyrite often replacing fossils. Poor recovery-much of the sample lost duri washing. Abundant forams.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
4340-4360		Marl as above.
4360-4370		Marl as above, tr. echinoid spines
4370-4380		Marl as above, tr. calcite white & clear.
4380-4390		Marl medium-dark grey soft-firm slightly silty, common pyrite, tr. glauconite. Very fossiliferous - mainly forams. Tr. calcite white to red brown.
4390-4400		Marl as above.
4400-4410		Marl as above. Some softer light grey marl.
4410-4420		Marl medium-dark grey soft-firm, pyritic. slight tr. glauconite fossiliferous. Minor marl light grey soft gummy. Abundant loose forams. Tr. calcite.
4420-4430		Marl as above more light grey marl.
4430-4440		Marl as above more silty.
4440-4450		Marl medium-dark grey, soft-firm pyrite, slight tr. glauconite, fossiliferous. Minor limestone, light grey very silty soft-firm, friable. tr. glauconite, dark grains. Tr. pyrite, calcite
4450-4460		Marl as above, slightly silty Minor limestone as above
4460-4470		Marl as above; common limestone as above.
4470-4480		Marl medium-dark grey, minor light grey, soft-firm pyritic, silty grading in parts to limestone (as above) tr. glauconite, fossilferous. Abundant forams.
4480-4490		Marl grading to limestone as above medium grey.
4490-4500		Marl med-dark grey, firm, pyritic, Limestone light-medium grey, soft fir, very silty, fossiliferous friable tr. glauconite, pyrite. Fossils abundant.
4500-4510		As above. Some chips of limestone have fine silt size glauconite grains (dark grey).
4510-4520		As above. Marl silty. Minor limestone.
4520-4530		Marl as above. Minor limestone. Tr. glauconite replacing fossils.
4530-4540		Marl. medium-dark grey, soft-firm, silty, pyrite, tr. glauconite. Minor limestone light-medium grey, very silty, very fossiliferous, tr. glauconite, pyrite. Tr. calcite, abundant forams.
4540-4550		Marl as above. Tr. limestone
4550-4560		Marl as above. Tr. limestone as above

SAMPLE DESCRIPTIONS KEMP/BROOKS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
4560-4570		Marl medium-dark grey, soft-firm, silty, tr. fossils, pyrite, glauconite, grades in places to limestone silt size. Abundant forams
4570-4580		Marl as above
4580-4590		Marl as above
4590-4600		Marl as above
	SHORT TRIP - TO SHOE FOR ROTARY REPAIRS SUN	
4600-4610		MARL, medium-dark grey, firm, tr. silt, tr. fossils, abundant foraminifera, tr. pyrite, rare glauconite, Tr. Limestone, light grey, silty tr. pyrite tr. glauconite. - sample contains a large proportion of samples to 5 cm x 2 cm x 2-3 mm; cavings.
4610-4620		MARL medium-dark grey as above and 10% MARL much washing away light grey soft - large chips persist.
4620-4630		MARL as above
4630-4640		MARL medium dark grey & light grey, soft-firm, tr. pyrite very rare glauconite, minor fossils, abundant foraminifera - tends to limestone in part (i.e. less clay, more crystalline) - soft portion washes out.
4640-4650		MARL as above.
4650-4660		MARL as above, minor pyrite
4660-4670		MARL medium dark grey & light grey, soft-firm generally soft, tr. pyrite, very rare glauconite, minor fossils, abundant foraminifera, - soft portion washes out
4670-4680		MARL as above.
4680-4690		MARL as above - tends to limestone
4690-4700		MARL medium dark grey & minor light grey, generally soft minor firm, minor pyrite around or replacing fossils, very rare glauconite, dark grains, softer light grey washing out, fossils present.
4700-4710		MARL as above tends to limestone in part.
4710-4720		MARL as above foraminifera abundant.
4720-4730		MARL moderate-dark grey, minor light grey, soft-minor firm minor pyrite, rare glauconite, tends to limestone in part with decrease in clays and some crystallinity.
4730-4740		MARL as above
4740-4750		MARL as above, generally firm.
4750-4760		MARL moderate-dark grey, firm, tends to limestone in part, glauconite & pyrite absent fossils present with forams predominating.

KEMP/BROOKS

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
4760-4770		MARL as above with rare glauconite
4770-4780		MARL as above.
4780-4790		MARL, medium dark grey, & minor soft light grey, generally firm, rare glauconite & dark grains, fossils (including forams) present. Minor portion tends to limestone.
4790-4800		MARL as above tr. pyrite on or replacing fossils.
4800-4820		MARL as above 50% of sample is soft light grey & actual rock is probably 100% light grey soft as it is being washed out. Samples on the shale shakers are very "gummy".
4820-4830		MARL as above
4830-4840		MARL as above
4840-4850		MARL medium dark grey (40%) and light grey (60%) soft-firm (medium dark grey) with very rare glauconite, tr. dark grains, tr. pyrite. Fossils present.
4850-4860		MARL as above.
4860-4870		MARL as above - pyrite & glauconite absent.
4870-4880		MARL medium dark grey (30%) and light grey(70%). soft-slightly firm, very rare glauconite, fossils present
4880-4890		MARL as above.
4890-4900		MARL - medium dark grey (50%) slightly firm-firm, very rare dark grains & glauconite light grey (50%) soft, probably being washed out, fossils rare.
4900-4910		MARL - as above
4910-4920		MARL - as above
4920-4930		MARL - as above with pyrite replacing some fossils.
4930-4940		MARL medium dark grey - light grey, soft-firm (medium dark grey) rare dark grains, tr. yprite few fossils.
4940-4950		MARL as above, pyritazed fossils present.
4950-4960		MARL as above.
4960-4970		MARL medium dark grey - light grey, soft-firm rare dark grains, tr. pyrite, fossils with foramanifera common
4970-4980		MARL as above
4980-4990		MARL as above fossils abundant
4990-5000		MARL medium dark grey - minor light grey, generally firm, minor dark grains, tr. pyrite, fossils common.
5000-5010		MARL as above

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
5010-5020		Marl medium dark grey, firm, tr. pyrite, dark grains slight tr. glauconite. Abundant marl light grey, soft and gummy. Abundant fossils.
5020-5030		Marl dark grey and light grey as above.
5030-5040		Marl as above
5040-5050		Marl as above
5050-5060		Marl as above
5060-5070		Marl light medium dark grey. light grey marl grades from soft and gummy to soft and is easily washed out. Medium dark grey soft-firm. Tr. pyrite. Rare glauconite fossilferous Tr. buff coloured marl, soft. Abundant forams.
5070-5080		Marl as above
5080-5090		Marl as above
5090-5100		Marl as above mainly medium grey
5100-5110		Marl medium grey, minor light & dark grey, soft, tr. pyrite, fossils very rare glauconite
5110-5120		Marl as above
5120-5130		Marl as above
5130-5140		Marl as above
5140-5150		Marl as above
5150-5160		Marl medium grey minor light & dark grey soft tr. pyrite, fossils very rare glauconite. Tr. loose forams
5160-5170		Marl as above
5170-5180		Marl as above a bit firmer
5180-5190		Marl as above
5190-5200		Marl medium grey, soft, occasionally firm tr. pyrite, fossils very rare glauconite. Tr. forams
5200-5210		Marl as above
5210-5220		Marl as above minor dark grey firm marl.
5220-5230		Marl light dark grey, mainly medium, soft-firm, fossiliferous, tr. pyrite, very rare glauconite grains.
5230-5240		Marl as above
5240-5250		Marl as above
5250-5260		Marl as above
5260-5270		Marl light-dark grey, mainly medium grey, soft-firm, fossiliferous tr. pyrite, rare glauconite grains. Tr. forams.

DEPTH	%	DESCRIPTION
5270-5280		Marl as above
5280-5290		Marl medium dark grey, firm, slightly fossiliferous, rare glauconite grains. Tr. forams.
5290-5300		Marl as above, mainly medium grey.
		P.O.H. to repair engines, test stack, change bit.
1615 5300-5310		TRIP GAS 17 units C_1 Tr. C_2 tr. C_3 B.O.B. 0555. Marl grading to calcareous shale. Acid insoluble residue - 50%, medium-dark grey clay size particles. Light medium grey, soft-firm, tr. pyrite, glauconite, black organic matter, fossils. Tr. forams loose, Tr. calcite, white, buff.
5310-5320		Marl-calcareous shale. Light-medium grey, minor dark grey, soft to mainly firm tr. pyrite glauconite, black organic matter, fossils. Tr. loose forams. Sample over shakers is firmer-less gummy material.
5320-5330		Marl-calcareous shale as above mainly medium grey, greenish grey interbeds.
5330-5340		Marl-calcareous shale. firm medium dark grey as above
5340-5350		Marl calcareous shale as above.
5350-5360		Marl-calcareous shale. medium dark grey, minor soft light grey, generally firm, rare pyrite glauconite, minor fossils
5360-5370		Marl-calcareous shale, as above
5370-5380		Marl-calcareous shale, as above
1638 5380-5390		Calcareous shale, Insoluble acid residue increased to >50% - change from Marl - calcareous shale. very transitional. Medium - dark grey, genera/ly firm, tr. light grey marl soft, fossils present, tr. pyrite.
5390-5400		Calcareous shale as above fossils mainly forams tr. pyrite.
5400-5410		Calcareous shale as above
5410-5420		Calcareous shale as above
5420-5430		Calcareous shale as above
5430-5440		Calcareous shale medium dark grey, generally firm, tr. pyrite minor fossils - mainly forams, tr. light grey soft marl v. rare dark ? organic grains.
5440-5450		Calcareous shale as above
5450-5460		Calcareous shale as above tr. glauconite
5460-5470		Calcareous shale as above tr. pyrite
5470-5480		Calcareous shale medium dark grey, generally firm tr. pyrite, minor fossils - mainly forams, tr. light grey soft. Tr. marl light grey soft.

KEMP/BROOKS

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
5480-5490		Calcareous shale, medium dark grey, firm, tr. dark ? organic matter, tr. pyrite in fossils. Minor calcareous shale, light grey, soft.
5490-5500		Calcareous shale, as above - few forams
5500-5510		Calcareous shale as above
5510-5520		Calcareous shale as above
5520-5530		Calcareous shale medium dark grey, firm, tr. dark ? organic matter, tr. pyrite, tr. fossils forams common. Minor marl light grey soft.
5530-5540		Calcareous shale as above tr. glauconite
5540-5550		Calcareous shale as above
5550-5560		Calcareous shale as above - few chips are heavily glauconitic or pyritic.
5560-5570		Calcareous shale, medium dark grey, firm, tr. pyrite, tr. glauconite. fossils common-mainly forams.
5570-5580		Calcareous shale, as above
5580-5590		Calcareous shale as above
5590-5600		Calcareous shale as above - pyrite common.
5600-5610		Calcareous shale, medium dark grey, firm, tr. pyrite, fossils, common, large quantity of acid insoluble residue - clay size.
5610-5620		Calcareous shale as above - fossils mainly forams
5620-5630		Calcareous shale as above with very rare dark grains
5630-5640		Calcareous shale as above
5640-5650		Calcareous shale medium dark grey, firm, tr. pyrite, fossils common.
5650-5660		Calcareous shale forams common.
5660-5670		Calcareous shale as above minor light grey soft marl.
5670-5680		Calcareous shale as above, tr. limestone, glauconitic, light grey
5680-5690		Calcareous shale, generally medium dark grey, firm, tr. pyrite, tr. glauconite, fossils generally forams.
5690-5700		Calcareous shale medium dark grey, firm tr. pyrite interbedded with (50/50) Marl light grey, very soft, "gummy", fossils present mainly forams.
5700-5710	50% 50%	Calcareous shale as above Marl as above
5710-5720	60% 40%	Calcareous shale as above Marl as above

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
5720-5730	80% 20%	Calcareous shale as above Marl as above
5730-5740	80% 20%	Calcareous shale medium dark grey, firm tr. pyrite, Marl light grey, very soft, "gummy"
5740-5750	100%	Calcareous shale as above Tr. marl as above
5750-5760		Calcareous shale as above Tr. Marl as above - forams common
5760-5770		Calcareous shale,medium dark grey, moderately frim, tr. pyrite very rare glauconite, fossils mainly forams. Trace marl light grey, soft, "gummy"
5770-5780		Calcareous shale as above.
5780-5790		Calcareous shale as above, pyrite locally abundant.
5790-5800		Calcareous shale medium dark grey, slight, very firm, tr. pyrite, glauconite absent, fossils mainly forams Tr. Marl light grey soft "gummy" rare dark grains.
5800-5810		Calcareous shale as above Tr. Marl as above
5810-5820		Calcareous shale as above Minor marl as above
5820-5830		Calcareous shale as above - very few fossils Minor marl as above
5830-5840		Calcareous shale medium dark grey, slight - very firm, pyrite and glauconite rare, but abundant in some chips, fossils present Tr. marl light grey soft,
5840-5850		Calcareous shale, medium dark grey, generally firm, uniform with only tr. of silt, fossils mainly forams present. Tr. marl light grey, soft, Tr. limestone, medium dark grey, firm grades to calcareous shale above.
5850-5860		Calcareous shale as above Tr. Limestone, Tr. marl as above
5860-5870		Calcareous shale as above Tr. Marl as above
5870-5880		Calcareous shale as above Tr. Limestone, Tr. marl as above
5880-5890		Calcareous shale, medium dark grey generally firm, tr. silt, fossils present. Tr. Marl light grey soft
5890-5900		Calcareous shale as above Tr. marl as above Tr. limestone medium dark grey, firm, grades to calcareous shale above.
5900-5910		Calcareous shale as above Tr. marl, Tr. limestone as above.

KEMP/BROOKS

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
5910-5920		Calcareous shale medium dark grey slight-very firm, rare dark grains, minor portion tends to limestone (i.e. less insoluble material). Tr. pyrite
5920-5930		Calcareous shale medium dark grey firm-very firm. tr. pyrite minor limestone i.e. siltier, more fossiliferous. tr. pyrite, forams.
5930-5940		Calcareous shale as above some silty Tr. limestone as above
		PLUGGED FLOW LINE 1500 hrs. TO 0700 hrs
5940-5950		Calcareous shale, medium dark grey frim, tr. pyrite, rare forams
5950-5960		Calcareous shale as above
5960-5970		Calcareous shale medium-dark grey, firm, tr. pyrite, very rare glauconite grains, tr. fossils Minor marl light grey, gummy.
5870-5980		Calcareous shale as above firm-very firm.
5980-5990		Calcareous shale light-dark grey, mainly medium grey, firm-very firm, tr. pyrite, very rare glauconite, tr. fossils. Tr. limestone, light grey silty firm more glauconite grains. Minor marl light grey, gummy.
5990-6000		Calcareous shale as above silty in parts grading to limestone as above
6010-6020		Calcareous shale as above silty. Minor limestone very fine silt size.
6020-6030	70% 30%	Calcareous shale as above Limestone as above
6030-6040	80%	Calcareous shale medium-dark grey, firm silty grading to 20% limestone (calcarenite) light medium grey, firm, friable, very fine silt size. rare tr. glauconite, pyrite, fossils.
6040-6050	80% 20%	Calcareous shale as above grading to Calcarenite calcareous sandstone, very fine, silty as above.
6050-6060		Calcareous shale grading to calcareous siltstone. firm, medium-dark grey, mainly medium grey, tr. glauconite, tr. pyrite, fossils. Minor calcareous sandstone light grey firm, friable, tr. glauconite grains, fossils.
6060-6070		Calcareous shale- calcareous siltstone as above Minor calcareous sandstone very dirty, tr. glauconite grains, light-medium grey, firm-friable.
6070-6080		Calcareous shale-calcareous siltstone as above Minor calcareous sandstone as above Increased glauconite
6080-6090	60% 20%	Calcareous shale medium-dark grey, firm, tr. glauconite, grading to Calcareous siltstone medium grey, argillaceous, tr. glauconite pyrite, fossils grading to 20% calcareous sandstone very fine light grey, firm-medium hard, friable. Tr. glauconite grains very dirty. Tr. pyrite.

KEMP/BROOKS

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
6090-6100	75%	Calcareous shale as above
	15%	Calcareous siltstone as above
	10%	Calcareous siltstone as above
6100-6110	80%	Calcareous shale medium dark grey, medium firm, forams common
	15%	Calcareous siltstone, medium dark grey, medium firm, tr. pyrite
	5%	Sandstone, medium light grey, fine grained, calcareous, clayey, tr.-heavily glauconitic, sub rounded and broken. firm-hard, no flourescence, no cut. tight
6110-6120	70%	Calcareous shale as above
	20%	Calcareous sandstone as above
	10%	Calcareous siltstone as above
6120-6130	60%	shale very calcareous as above tr. pyrite
	20%	sandstone calcareous as above tr. pyrite
	20%	siltstone calcareous as above tr. pyrite
6130-6140	60%	shale medium-dark grey, firm very calcareous, tr. forams, pyrite
	30%	sandstone very calcareous light grey fine grains friable-hard, minor glauconite. Some chips have a lot of glauconite grains.
	10%	siltstone very calcareous medium grey firm tr. pyrite
6140-6150	50%	Limestone granular appearance, tr. quartz pyrite glauconite grains occasionally chip with much glauconite very light grey-moderately hard.
	50%	Shale as above silty at times
6150-6160	50%	Limestone as above very little acid insoluble residue
	50%	Shale as above silty inpart.
6170-6180	40%	Limestone light grey buff granular texture, friable-hard fossiliferous glauconite grains. fine grains.
	60%	Shale very calcareous medium-dark grey, firm tr. glauconite, pyrite silty in parts. tr. pyrite, common forams.
6180-6190	60%	Limestone as above
	40%	Shale as above grading to siltstone
6190-6200	50%	Limestone as above
	50%	Shale - siltstone as above
6200-6210	30%	Limestone buff, friable - hard, granular, tr. - minor glauconite grains, tr. pyrite, fossils
	30%	shale medium-dark grey firm, tr. glauconite, pyrite grades to
	30%	Siltstone very calcareous medium-dark grey as shale
	10%	Sandstone light grey friable, very calcareous, very dirty minor glauconite grains, carbonate matter, pyrite. Tr. glauconite fossils.
1892		
6210-6220	75%	Shale as above grading to siltstone
	25%	Limestone as above
		tr. minor glauconite
		Abundant loose forams (Cavings ?)
6220-6230	90%	Shale as above grading to minor siltstone
	10%	Limestone as above
		Abundant forams, tr. glauconite tr. quartz

KEMP/BROOKS

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
6230-6240	80%	Shale medium-dark grey calcareous soft-firm grades to siltstone
	10%	Sandstone light-medium grey, fine grained, glauconite, carbonate pyrite, calcareous.
	10%	Limestone buff, friable-hard, granular text, tr. glauconite Common forams, tr. glauconite
6240-6250		Shale, calcareous, medium-dark grey, tends to siltstone in part, fossils mainly forams, soft-firm tr. pyrite. Tr. limestone, buff, friable-firm, granular text, glauconite minor to relatively abundant
6250-6260		Shale as above Tr. Limestone as above
6260-6270		Shale as above, isolated glauconite grains, & pyrite relatively common Tr. Limestone as above Tr. Sandstone, calcareous, medium grains, fine grains, glauconite common.
6270-6280	90%	Shale, calcareous, medium-dark grey, tends to siltstone in part, tr. fine sandstone, fossils-mainly forams - abundant minor pyrite firm
	10%	Limestone light grey-buff, granular, glauconite, firm
6280-6290	100%	Shale as above Tr. limestone as above
6290-6300	100%	Shale as above, forams very common Tr. Limestone as above
6300-6310		Shale, calcareous, medium dark grey, firm, minor part tends to siltstone, mainly forams abundant, minor pyrite Tr. limestone light grey-buff, granular, glauconite relatively abundant.
6310-6320		Shale as above Tr. Limestone as above
	10-20%	Abundant loose forams
6320-6330		Shale as above Tr. Limestone as above
	10-20%	Loose forams
6330-6340		Shale medium dark grey, firm-very firm, minor part tends to siltstone, fossils mainly forams abundant (10% sample) minor pyrite Tr. limestone light grey-buff, granular, glauconitic
6340-6350		Shale medium dark grey, firm-very firm, minor part tends to siltstone trace fine grained sand, fossils (forams) abundant (5% sample). Tr. limestone as above
6350-6360		Shale as above (forams slightly less abundant)
6360-6370		Shale as above
6370-6380		Shale as above
6382 T.D. CIRCULATE B.O.B.		B.U. AND TRIP FOR NEW BIT B.U. AT 1930 HRS 8/1/77 0600 HRS 9/1

SAMPLE DESCRIPTIONS KEMP/BROOKS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
6380-6390		Shale medium dark grey, firm very calcareous, tends to siltstone in part Minor limestone buff, hard, massive to granular texture tr. glauconite. Trace sandstone, light-medium grey, firm very calcareous very fine grained. Abundant forams, tr. glauconite, pyrite
6390-6400		Shale as above, slightly pyritic, tr. black carbonate flecks. Trace sandstone as above. Trace forams, glauconite pyrite. No flourescence and/or cut (some minor flourescence).
6400-6410		Shale calcareous, medium dark grey, firm, tends to siltstone in part, Tr. forams, loose glauconite grains, pyrite. Tr. limestone light grey, granular, glauconite. Note forams much less abundant.
6410-6420		Shale as above Tr. limestone as above
6420-6430		Shale as above tends to calcareous siltstone Tr. limestone as above
6430-6440		Shale medium dark grey, slight-very firm, calcareous, tends to siltstone in part very rare very fine grained sand, tr. glauconite tr- minor forams. Tr. limestone, light grey, granular, firm, tr. glauconite.
6440-6450		Shale as above
6450-6460	80% 20%	Shale medium-dark grey, slight-very firm, calcareous, tr. glauconite, tr. minor forams, tends to siltstone, medium brown, calcareous, firm, tr. glauconite
6460-6470	90% 10%	shale as above soft-firm. Siltstone as above tr. fine grained sand, rare chips heavily glauconitic.
6470-6480		Shale as above Tr. siltstone Tr. limestone light grey, granular, firm, tr. glauconite
6480-6490	90% 10%	Shale medium dark grey, slight-very firm, calcareous, tr. glauconite, tr. forams, tends to Siltstone medium brown-medium dark grey, calcareous, firm, tr. pyrite Tr. Limestone medium light grey, granular, clayey, firm minor glauconite, tr. silt and fine grained sand.
6490-6500	80% 20%	Shale as above Siltstone as above Tr. limestone as above very rare loose glauconite grains (slight drill rate increase at this depth but sample is essentially as above)
6500-6510	90% 10%	Shale, medium dark grey, slight-very firm, calcareous, rare pyrite, tr. silt, tr. fossils-forams Siltstone brown medium dark grey, very calcareous transitional shale, clayey, firm. Tr. limestone medium-light grey, granules, clayey minor silt, minor-relatively abundant glauconite.
6510-6520	90% 10%	Shale as above Siltstone as above Tr. limestone as above

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
6520-6530		Shale as above Tr. siltstone as above Tr. limestone as above Rare loose glauconite grains
6530-6540	90% 10%	Shale as above Limestone, medium brown, firm-medium hard, glauconitic, clayey, tr. silt, tr. fine grained sand, granular Tr. limestone light grey, granular, minor glauconite Minor Calcarenite fine s. white friable to hard when cemented. Common glauconite grain.
6540-6550	70% 20% 5%	Shale medium-dark grey, slight-very firm, calcareous, silty in part tr. pyrite, forams. Limestone medium red brown as above Mudstone, ochre, gummy, calcareous. Tr. Calcarenite-limestone white as above Minor glauconite forams
6550-6560	80% 15% 5%	Shale as above Limestone, medium red brown, firm-medium hard, glauconite, clayey, minor silt & fine grained sand. Limestone, white, minor glauconite, granular, hard.
6560-6570	65% 15% 15% 5%	Shale, medium-dark grey, slight-very firm, calcareous, silty in part, tr. pyrite, forams, loose glauconite grains. Limestone medium red brown as above Limestone white as above Mudstone, olive green soft,
6570-6580	90% 5%	Shale medium dark grey, v. calcareous, tr. pyrite, minor fossils Limestone medium red brown firm-hard, minor glauconite.
6580-6590	90% 5% 5%	Shale asabove Limestone medium red brown as above Limestone light grey-white granular, minor glauconite very rare isolated quartz grain, coarse, rounded and broken no flourescence.,
Drilling break at 6595, doubled 5' average drilling rate circulate B.U. samples as before no flourescence.		
6590-6600	80% 10% 10%	Shale, as above Limestone medium dark grey - medium brown as above Limestone light grey as above
6600-6610	50% 50%	Shale medium dark grey, very calcareous, minor fossils Siltstone dark grey, glauconite, slight firm-hard, very clayey, calcareous, minor sand
6610-6620	50% 50%	Shale as above Siltstone as above
6620-6630	50% 30% 20%	Sand, loose quartz grains, rounded & broken, no flourescence or cut. Siltstone, as above hard Shale as above
6630-6640	40% 60%	Sand loose grained quartz coarse-very coarse, clear, well rounded good sphericity, grains often broken. tr. pyrite on surfaces. very fine sandstone-siltstone. medium-dark grey-brown very glauconitic, firm & friable-hard, tight very dirty. No flourescence or cut. Minor shale as above.

KEMP/BROOKS

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
6640-6650	80% 20%	Sand as above Very fine sandstone-siltstone as above
6650-6660	95% 5%	Sand as above occasionally granule Siltstone medium-dark grey brown very glauconitic, tight, firm-hard. No flourescence or cut
6660-6670	100%	Sand loose, quartz coarse-very coarse, well rounded good sorting tr. pyrite on surface. Tr. siltstone as above No flourescence or cut
6670-6680	100%	Sand as above
6680-6690	100%	Sand as above No flourescence or cut
6690-6700	100%	Sand as above
6700-6710	100%	Sand loose quartz mainly coarse - very coarse some fine-medium well rounded, good sorting tr. pyrite on some surfaces. Some very fine dark grey pyritic sandstones adhering to grains. No flourescence or cut. Mud pressure on shakers high, washing out fine grained sand.
6710-6720	100%	Sand as above
Sample from desander.		Sandstone fine grained, well sorted, mostly well rounded clear quartz. Smaller fraction magnetite, glauconite, pyrite. - goes through 60 mesh sieve
6720-6730		Loose sand fine granule, mainly coarse-very coarse as above
6730-6740		Sand as above tr. pyrite. No flourescence or cut. Siltstone-shale dark brown, carbonate, pyrite, soft-firm.
6740-6750		Loose sand as above, some grains have dark brown terruginous stain Tr. siltstone-shale as above occasionally sandy, glauconite.
6750-6760		Loose quartz sand medium-granule, mainly coarse-very coarse, clear, well rounded, well sorted, slight pyrite coatings. Tr. siltstone dark brown as above.
6760-6770		Sand as above. Tr. siltstone, sandy in part
677-6780		Sand as above. Tr. siltstone, dark brown grey, carbonate pyrite, firm. Tr. pyrite, glauconite grains (cavings?)
6780-6790		Sand as above medium-granule mainly very coarse. Tr. siltstone as above Tr. siltstone sandy dark brown grey, glauconitic, firm, cavings ?
Sample which washes through sieve.		Sandstone fine-medium grained clear quartz (well sorted) well rounded, many cracked. Tr. glauconite, magnetite pyrite.
6790-6800		Sand as above. No flourescence. Slight tr. siltstone as above black carbonate laminae.
6800-6810		Sand as above. Tr. siltstone as above, sandy, carbonate laminae
6810-6820		Sand as above. Tr. Cavings assorted
6820-6830		Sand quartz clear medium-granules, mainly coarse-very coarse, well rounded well sorted. Have been getting quite a lot shale, calcareous, medium grey, firm, forams tr. pyrite for some time-Cavings.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
6830-6840		Sand as above
6840-6850		Sand as above
6850-6860		Sand clean quartz medium-granules mainly coarse (-very coarse) well rounded well sorted.
6860-6870		Still sand coarse-very coarse well sorted well rounded minor medium & granule size.
6870-6880		Sand as above (Sample contains 50% Shale, calcareous, medium grey, firm, forams tr. pyrite ? cavings)
6880-6890		Sand as above (? cavings 60% as above)
6890-6900		Sand clean quartz, coarse-granular, well rounded, many broken tr. loose glauconite. grains. (? cavings 50% of sample - Shale, calcareous, medium dark grey)
6900-6910	100%	Sand, as above (cavings as above 60%)
6910-6920		Sand as above - no flourescence - no cut (30% cavings)
6920-6930		Sand as above, tr. pyrite on some grains
6930-6940		Sand, clean quartz, coarse-granular, tr. pyrite on some grains, well rounded - broken (50% sample is ? cavings Shale calcareous, medium dark grey) no flourescence, no cut.
6940-6950		Sand as above (no cut, no flourescence) - 50% sample is cavings - Shale as above
		CIRCULATE B.U. PRIOR TO TRIP FOR NEW BIT AND CHARGE SHALE SHAKERS. B.U. AT 0205 HRS 10/1 B.O.B. 1650 11/1/77. TRIP GAS 20 UNITS
6950-6970		Sand, clean quartz, coarse to granular, loose grains, sub-rounded to sub-angular and broken, very rare, pyrite on surface of grains, no flourescence, no cut Tr. Shale - cavings
6970-6980		Sand, as above
6980-6990		Sand, as above
6900-7000		Sand, clean quartz, coarse-granular, loose grains, subrounded and broken, rare pyrite on surface, no flourescence. Tr. shale calcareous - cavings.
7000-7010		Sand as above Tr. cavings
7010-7020		Sand as above Tr. cavings
7020-7030	50% 50%	Sand as above Coal, black, vitreous, bleeding gas, clayey. Desilter sample contains very fine sand with tr. glauconite, probably caving.

KEMP/BROOKS

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
7030-7040	80%	Coal as above, H.W. to 8 units
	20%	Sand as above Tr. Siltstone, medium brown, firm tr.mica
7040-7050	10%	Sand, clean quartz, coarse-granular, subrounded & broken, rare pyrite, no flourescence.
	60%	Coal, black, vitreous, bleeding gas, clayey
	30%	Siltstone, light medium brown, firm, clayey, carbonate in part. Decrease Hot Wire with slight stain
7050-7060	20%	Sand, clean, loose, coarse-granular, gr. pyrite, subrounded and broken
	60%	Siltstone clayey, carbonate, medium light grey-brown, tends to shin part,
	20%	Coal as above Tr. Sandstone, very fine grained, medium brown, carbonaceous clayey, - tight no flourescence, no cut.
		Circulate B.U. at 7066' on drilling break !
7066' Sample	90%	Sand, clean, loose, coarse-granular, tr. pyrite, subrounded & broken. no Flourescence
	10%	Coal as above, Tr. Siltstone as above
7060-7070	90%	Sand as above no flourescence
	10%	Coal as above Tr. Siltstone medium-dark brown, clayey, carbonaceous flecks and laminae
7080-7090	100%	Sand as above - most broken Tr. Siltstone as above
7090-7100	100%	Sand, very clean, quartz, loose grains, coarse-very coarse rare granular, subrounded - angular (broken) tr. Shale/Siltstone cavings
7100-7110	100%	Sand as above Tr. cavings
7110-7120	100%	Sand, very clean quartz, loose grains coarse-very coarse, subrounded, - angular (broken) tr. cavings.
7120-7130	100%	Sand, as above
7130-7140	100%	Sand as above
7140-7150	100%	Sand, very clean quartz, loose grains, coarse-very coarse, minor medium & granular size, subrounded-angular(broken)
7150-7160	70%+	Coal black, vitreous, large chips (up to 1cm)
	30%	Sand as above ? caving Tr. siltstone, medium brown, clayey, tends to shale in parts, carbonaceous & coaly laminae & flecks.
7160-7170	50%	Coal as above (small chips only)
	40%	Siltstone medium brown as above
	10%	Sand as above ? cavings
7170-7180	80%	Siltstone medium brown-dark grey as above
	20%	Coal as above (Sample consists of 50% sand as above, no flourescence or cut, - cavings).

SAMPLE DESCRIPTIONS KEMP/BROOKS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
7180-7190	60%	Sand quartz clean - medium very coarse, mainly coarse, well sorted, sub-angular-well rounded
	20%	shale, medium-dark brown-dark grey, firm, carboraceous, pyrite
	10%	Siltstone medium-dark brown, carbonaceous, pyrite to mica
	10%	Coal black vitreous.
		Tr. very fine sandstone, carbonaceous laminae, white-light grey moderately strong, sub-angular-sub-rounded, very pyritic in parts.
7190-7200	50%	Sand as above
	30%	Shale medium-dark brown as above grading to
	10%	Siltstone medium-dark brown as above
	5%	Coal as above some conchoidal fractures
	5%	Siltstone very fine as above.
7200-7210	90%	Coal black shiny Not bleeding gas, tr. flourescence from medium brown resin soft.
	10%	Sand as above medium-very coarse
		Minor shale and siltstone as above
7210-7220	60%	Coal as above
	20%	Sand medium-very coarse, mainly coarse, clear quartz. well sorted sub-well rounded.
	15%	Shale light-medium brown fir, tr. pyrite, carbonaceous grading to dark brown, common black carbonaceous matter
	5%	Siltstone very fine, light grey, friable well sorted, sub-rounded, clayey. Laminae of siltstone, carbonaceous matter
7222		Circulated up. 1 unit gas only
7230-7240	95%	Sand medium-granular, mainly very coarse, clear quartz, rounded-well rounded, well sorted, No flourescence or cut.
		Minor shale-siltstone as above)?
		Minor coal as above)
7240-7250	95%	Sand as above No flourescence or cut
		Minor shale-siltstone, Coal as above
7250-7260	60%	Sand as above
	25%	Coal as above
	15%	Shale-siltstone as above
7260-7270	50%	Shale, medium brown-dark grey-brown, medium brown-firm to hard, tr. carbonaceous, dark grey-brown, firm, hard common carbonaceous flecks
	40%	Sand clean quartz. coarse-granular, mainly very coarse, well rounded, well sorted.
	10%	Coal black. tr. siltstone very fine light grey, carbonaceous flecks, friable to very hard when cemented by pyrite.
7270-7280	60%	Sand as above
	30%	Shale to Siltstone as above
	10%	Coal to very carbonaceous shale
		Tr. siltstone very fine light grey carbonaceous laminae friable, clean apparent good Ø good sorting.
7280-7290	90%	Coal grading to shale-very carbonaceous
	10%	Sand loose medium-granule, mainly coarse as above
7290-7300	100%	Coal grading in part to very carbonaceous shale.
		Minor loose sand as above.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
7300-7310	60%	Shale dark grey-black firm-very hard, very carbonaceous grading to dirty coal.
	20%	Shale dark brown firm-very hard carbonaceous
	20%	Coal. Tr. pyrite
7310-7320	40%	Coal
	30%	Shale dark grey-black grading to dirty coal as above
	30%	Shale dark brown as above
7320-7330	90%	Coal
	10%	Sandgrains clear quartz.
7330-7340	75%	Coal black, some dirty, dull
	25%	Shale dark brown-grey-black grading to coal
7340-7350	70%	Coal
	20%	Siltstone medium brown soft-firm, carbonaceous speckled
	10%	Sand clean quartz, coarse-granules mainly coarse well rounded, well sorted.
7350-7360	55%	Shale dark grey grading to coal
	20%	Coal
	10%	Siltstone dark brown carbonate, gr. pyrite, firm
	10%	Siltstone white medium-fine grained, well sorted hard tight cemented with calcite strong gold mineral flourescence. no cut.
7360-7370	50%	Shale dark grey, firm, carbonate flecks,
	30%	Coal black, vitreous, clayey minor part tends to carbonate shale
	10%	Siltstone dark brown, carbonate, tr. pyrite, firm
	10%	Siltstone as above, good mineral flourescence
7370-7380	50%	Shale as above
	40%	Coal as above bleeding gas
	10%	Siltstone as above Tr. Siltstone as above
7380-	10%	Siltstone white, fine-medium grained, hard, tight, cemented with calcite-strong mineral flourescence (no cut)
	40%	Coal, black, dull, minor clay in part
	50%	Shale medium light grey-brown, minor silt, tr. carbonate flecks & laminae Tr. sand, quartz, clear, coarse-very coarse, subrounded-angular (broken).
		CIRCULATE B.U. BEFORE TRIP FOR NEW BIT. NEW BIT 8 x 1G, Back on bottom 2000 hours 12/1/77 7386'
7380-90		Siltstone very light grey-white, generally medium grained, minor flourescence & cut grains, angular-subangular - moderate well sorted, calcite cement, very hard, tight, good mineral flourescence, no cut. (drilling rate showed to < 10'/hr, sample contains much other material, probably cavings. Sand, loose quartz, medium-very coarse grains, sub-angular - broken ? cavings, Shale, medium brown-dark grey, firm, carbonaceous flecks & laminae, silty - tends to siltstone in part, Coal cavings.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
7390-7400		Siltstone as above - sample contains 70% loose sand grains, 50% is cemented, good yellow flourescence from matrix - no cut - mineral flourescence.
7400-7410	90%	Siltstone as above loose sand mainly
		Shale dark grey, calcareous, - ? cavings
	10%	Shale brown, carbonate in part
		Coal - cavings.
7410-7420	90%	Siltstone - cream to very light grey to white; medium-fine grained; coarse sand grains formed as fractured single grains; hard; subangular-rounded, moderate-well sorted; carbonate and pyrite cement; good mineral flourescence; Single quartz grains are fractured, coarse-medium grained and account for about 50% of siltstone.
	10%	Shale - light grey-medium brown; hard; micaceous, carbonaceous, silty in part.
		Coal - black; cavings ?
		Calcareous shale - calcareous shale; glauconite; glauconitic siltstone. These cavings account for a large amount of the sample.
7420-7430	10%	Siltstone - as above
	90%	Coal - as above. Drill rate pick up.
		Calcareous shale - as above with; for forams; cavings
		tr. Shale - to silt carbonaceous, medium dark brown; firm
7430-7440	5%	Siltstone - as above
	90%	Coal - as above
	5%	Shale - as above
		Calcareous shale - cavings as above
7440-7450		Drill rate decrease to approximately 13'/hr.
	50%	Siltstone - as above
		Coal - as above - probably cavings - drill rate decrease
	50%	Shale - as above
		Calcareous - cavings
7450-7460	10%	Siltstone - loose coarse grains; cemented with pyrite and dolomite in part. Pyrite in pits on surface of some loose quartz grains.
	10%	Coal - black; vitreous; possibly cavings
	80%	Shale - brown; grades to siltstone; carbonaceous; firm-hard
		Calcareous Shale - soft; cavings; loose grains glauconite
7460-7470	80%	Siltstone - loose quartz grains; subangular-well rounded; medium-coarse grained; moderately sorted. Minor cemented sand (dolomite & pyrite).
	10%	Coal - as above
	10%	Shale - carbonaceous as above
		Calcareous Shale - cavings with glauconite nodules.
7470-7480	40%	Siltstone - loose quartz grains; medium-coarse; subangular-rounded; some cemented with dolomite minor pyrite
	30%	Shale - grades to siltstone; brown, carbonaceous
	30%	Coal - as above
		Calcareous Shale and Glauconite nodules - cavings
7480-7490	50%	Siltstone - as above
	25%	Coal - as above
	25%	Shale - as above
		Calcareous mudstone - cavings

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
COMMENCE TO PULL BIT 0650 HRS AT 7523' DRILLER (7516' CORE LAB ADJUSTED TO 7523') BACK ON BOTTOM 1615 13/1		
7490-7500	50%	Siltstone, loose quartz, clear-medium-coarse, sub-angular - sub-rounded, minor part of sample with white ? domomitic cement.
	50%	Shale, brown - dark grey, carbonaceous, silty, grades to siltstone in part, firm, Calcareous shale & coal cavings.
7500-7510	60%	Siltstone - loose quartz grains and minor dolomite cemented
	20%	Coal - black
	20%	Shale - brown, carbonaceous as above
		Calcareous shale and glauconite nodules - cavings. Some dolomite cemented sand contains glauconite and is possibly cavings from Gurnard ?
TRIP GAS: 2160 PPM C2: 184 PPM C3: 84 PPM		
7510-7520	30%	Siltstone - loose quartz grains as above with minor pyrite
	50%	Coal - as above (cavings?)
	20%	Shale - dark brown, firm carbonaceous
		Calcareous shale, cement, and glauconite to cavings
7520-7530	70%	Siltstone - Loose quartz grains
	10%	Shale - dark brown, firm carbonaceous
	20%	Coal
		Calcareous shale, cement and glauconite; forams; are cavings
7530-7540	80%	Siltstone - loose quartz grains, well rounded - sub-angular, medium-coarse grained; moderately-well sorted, minor dolomite cemented grains
		tr. White Mica - minor flakes white mica
	10%	Shale - dark brown, carbonaceous, firm.
	10%	Coal - black;
		Calcareous shale; cement and glauconite cavings
7540-7550	90%	Siltstone - loose quartz grains, well rounded-subangular, medium-coarse grained; moderately-well sorted
		tr. White Mica - minor scattered flakes
		tr. Shale - dark brown carbonaceous
	10%	Coal - as above
		Calcareous shale, cement and glauconite cavings
7550-7560	90%	Siltstone - loose quartz grains as above
	5%	Shale - dark brown as above
	5%	Coal - as above
		tr. White Mica - as above
		Calcareous shale cement and glauconite cavings.
7560-7570	10%	Siltstone - loose grains as above
		tr. Shale - dark brown as above
	90%	Coal - as above
7570-7580	50%	Siltstone - loose grains, medium-coarse; moderate-well sorted subangular - rounded.
	50%	Coal - black, vitreous
		tr. Shale - dark brown, carbonaceous firm.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
7580-7590	70%	Siltstone - loose quartz grains
	20%	Shale - dark brown, very carbonaceous, grades to silt
	10%	Coal - as above; white mica - tr. flakes
		Calcareous shale, cement and glauconite cavings
7590-7600	50%	Siltstone - loose quartz grains; medium-coarse; moderate-well sorted; subangular - sub-rounded; minor fine-medium grained cement sandstone.
	30%	Shale - dark brown - white; firm; very carbonaceous
	15%	Siltstone - white-brown; soft-firm, very carbonaceous;
	5%	Coal - black vitreous
7600-7610	50%	Siltstone - loose grains as above
	15%	Shale - dark brown - white; firm; very carbonaceous
	15%	Siltstone - white-brown; soft-firm, very carbonaceous, micaceous
	20%	Coal - black vitreous
		Tr. white mica-flake
		tr. glauconite - cavings
7610-7620	90%	Siltstone - loose grains medium-coarse grained; as above
	5%	Shale - very carbonaceous as above
	5%	Siltstone - white-brown as above
		tr. Coal
		tr. White mica - flakes; tr. pyrite; tr. glauconite
7620-7630	90%	Siltstone - loose quartz grains; medium-coarse; moderate-well sorted; subangular-sub-rounded; tr. pyrite;
	5%	Shale - dark brown-grey firm-soft
	5%	Siltstone - grey-dark brown firm.
		tr. white mica; tr. coal, tr. glauconite - cavings.
7630-7640	100%	Siltstone - loose quartz grains as above
		tr. Shale as above; tr. siltstone as above; tr. coal
7640-7650	80%	Siltstone - loose quartz grains as above tr. pyrite
	10%	Shale - dark brown; very carbonaceous; firm
	10%	Siltstone - white -grey; very carbonaceous; firm
		tr. Coal; tr. glauconite
7650-7660	60%	Sand, loose quartz grained, clear, moderate-very coarse, subangular-subrounded, moderate-well sorted, no flourescence, no cut,
	40%	Shale, dark grey-brown, carbonate, firm, minor part silty
		Tr. siltstone, medium grey, fine grained, clayey, firm, poorly sorted, no flourescence or cut.
7660-7670	70%	Siltstone dark grey-brown, clayey, carbonate, firm minor coaly flecks.
	20%	Sand as above
	10%	Shale as above
7670-7680	70%	Siltstone as above
	20%	Shale as above
	10%	Sand as above
		Tr. siltstone, medium grey-white, fine-medium grained, clayey, firm-soft, poorly sorted, no flourescence or cut
7680-7690	70%	Siltstone medium-grey & brown, clayey, carbonate, firm, minor coaly flecks.
	20%	Shale medium-grey & brown, silty, grades to siltstone as above
	10%	Siltstone, medium light grey, fine grained, clayey in part, poorly sorted, no flourescence or cut.

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
7690-7700	100%	Coal, black, vitreous, no clay, Tr. Siltstone, Shale, Siltstone as above
7700-7710	90%	Coal
	5%	Shale as above
	5%	Siltstone as above
7710-7720	30%	Coal, black vitreous, minor carbonaceous shale
	30%	Siltstone, dark grey & brown, carbonaceous/coaly laminae v. clayey in part, very carbonaceous in part
	10%	Shale, medium-dark grey, minor carbonaceous
	10%	Siltstone, medium-light grey-white, fine grained, minor clay, minor carbonaceous material, no flourescence.
7720-7730	40%	Coal
	40%	Siltstone as above
	30%	Shale as above very carbonaceous in part
	10%	Siltstone as above no flourescence, no cut
7730-7740	90%	Coal
	10%	Shale/siltstone as above Tr. siltstone as above Tr. loose quartz sand grains.
7740-7750	25%	Sand, loose medium-very coarse, subangular (broken) moderately sorted, no flourescence or cut
	30%	Siltstone, medium grey, clayey, minor carbonaceous minor fine grained sand in part, firm
	40%	Coal
	5%	Siltstone light grey, fine medium grained, clayey, carbonaceous firm-soft.
7750-7760	50%	Siltstone, medium grey & light brown, clayey, minor carbonaceous firm
	50%	Siltstone light grey-medium grey, fine-very fine, clayey, moderately sorted, firm,low visible porosity no flourescence or cut. Tr. Coal Tr. loose quartz and grains.
7760-7770	50%	Sand, loose clear quartz grains, medium-very coarse, subangular - sub-rounded, moderate sorting, no flourescence, no cut.
	40%	Siltstone medium grey & brown, clayey, carbonaceous, firm minor part tends to shale
	10%	Siltstone as above Tr. coal ? cavings
7770-7780	60%	Sand as above
	20%	Siltstone as above
	20%	Coal black tends to carbonaceous shale in part Tr. siltstone as above.
7780-7790	70%	Sand as above, no flourescence
	20%	Siltstone, light grey, fine grained, minor clay cement, tr. minor carbonaceous, moderately sorted, no flourescence. no cut.
7790-7800	70%	Coal
	30%	Sand loose, clean, quartz, medium-very coarse, subangular-subrounded, moderate sorting, no flourescence, no cut. Tr. siltstone as above

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
7800-7810	80%	Sand - medium-coarse; loose quartz grains, moderately sorted subangular - subrounded;
	5%	Siltstone - white-light grey; quartz; silt matrix fine-very fine grained; moderately sorted; subangular
	10%	Coal - black, vitreous
	5%	Siltstone - dark brown; micaceous, carbonaceous; firm.
7810-7820	60%	Sand - loose quartz grains as above
	30%	Siltstone - white-light grey; firm as above
	10%	Coal - as above
		tr. Siltstone - dark brown as above
		tr. pyrite
7820-7830	40%	Sand - loose quartz grains as above
	30%	Siltstone - white-light grey; firm, silty matrix as above
	10%	Coal - as above
	20%	Siltstone - dark brown-light grey as above
		tr Shale - dark brown; very carbonaceous; micaceous
		tr. pyrite
7830-7840	40%	Sand - loose quartz grains as above
	40%	Siltstone - white-light grey as above
	20%	Siltstone - as above
		tr. Coal
		tr. Pyrite
7840-7850	40%	Sand- loose quartz grains; moderately sorted; subangular - subrounded.
	40%	Siltstone - white-light grey, firm; quartz; partially cemented very fine-medium; moderately sorted; subangular
	20%	Siltstone - dark brown; firm; carbonaceous
		tr. Shale - dark brown; firm; carbonaceous
		tr. pyrite
		tr. Coal
7850-7860	40%	Sand - loose quartz grains as above
	40%	Siltstone - white-light grey dolomite cement in part
	10%	Siltstone - dark brown as above
	10%	Coal - as above
7860-7870	30%	Sand - loose quartz grains; medium-coarse; as above
	50%	Siltstone - white-light grey; strong mineral fluorescence in part; dolomite cement in part.
	10%	Siltstone - dark brown; carbonaceous; firm as above
		tr. Shale - dark brown carbonaceous; firm
	10%	Coal - as above
7870-7880	60%	Sand - loose quartz grains; medium-very coarse; moderately-poorly sorted; subangular-rounded;
	30%	Siltstone - white-light grey; firm; cemented; quartz; strong mineral fluorescence in part; no cut.
	10%	Siltstone - dark brown, very carbonaceous, firm
		tr. Coal - black, vitreous
		tr. pyrite
7880-7890	40%	Sand - loose quartz grains; moderate-very coarse as above
	30%	Siltstone - cemented; very fine-medium; white-light grey; strong mineral fluourescence; no cut. Tr. pyrite cement.
	20%	Siltstone - dark brown; firm; carbonaceous; micaceous
	10%	Shale - dark brown; firm; carbonaceous
		tr. Coal; tr. pyrite

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
7890-7900	60%	Sand - loose quartz grains; medium-very coarse; as above
	20%	Siltstone - white-light grey; cemented; very fine-medium strong mineral fluorescence; no cut; tr. pyrite cement.
	20%	Siltstone - dark brown; very carbonaceous as above
		tr. pyrite; tr. coal
		tr. shale - as above.
7900-7910	70%	Sand - loose quartz grains; very coarse-medium; subangular-subrounded; moderately sorted.
	20%	Siltstone - fine-medium; cemented; white-light grey; firm
	10%	Siltstone - dark brown; firm; very carbonaceous
		Tr. pyrite; tr. coal
		tr. glauconite - nodules, cavings
7910-7920	30%	Sand - loose quartz grains as above
	40%	Siltstone - white-light grey as above
	30%	Siltstone - dark brown as above
		tr. pyrite
7920-7930	30%	Sand - loose quartz grains as above
	50%	Siltstone - white-brown; cemented; carbonate in part; very fine-fine; as above mineral fluorescence; no cut.
	20%	Siltstone - brown; carbonaceous; firm
		tr. coal
		tr. pyrite
7930-7940	40%	Sand - loose quartz grains as above
	40%	Siltstone - white-light grey, as above
	15%	Siltstone - brown; carbonaceous; firm as above
		tr. pyrite - as cement and individual grains.
	5%	Shale - brown; firm; carbonaceous
7940-7950	50%	Sand - loose quartz grains as above
	30%	Siltstone - white-light grey as above
	20%	Siltstone - brown-light grey; carbonaceous; firm. as above
		tr. Shale - dark brown; firm; carbonaceous
		tr. coal; tr. pyrite
7950-7960	30%	Sand - loose quartz grains; fine-coarse; moderately sorted; subangular to subrounded;
	20%	Siltstone - white-light grey; fine-medium; moderately sorted; subangular;
	40%	Siltstone - dark grey-brown; firm; micaceous; carbonaceous
	10%	Shale - dark grey-dark brown; firm; mecaceous; carbonaceous
		tr. coal
		tr. pyrite
7960-7970	10%	Sand - loose quartz grains as above
	10%	Siltstone - white-light grey as above
	40%	Siltstone - as above
	40%	Shale - as above
7970-7980	80%	Coal, black, vitreous, minor clay
	10%	Siltstone, dark grey-brown, clayey, carbonaceous, minor, firm.
	10%	Shale dark grey-dark brown, minor sand fine grained, minor silt, firm, tr. mica
		Tr. sand as above.

SAMPLE DESCRIPTIONS

MORTON/KEMP

SWORDFISH - 1

DEPTH	%	DESCRIPTION
7980 - 7990	20%	Coal
	30%	Sandstone, medium-light grey fine-medium grained, clayey, minor carbonate firm, no flourescence, no cut, low porosity
	20%	Shale as above
	30%	Siltstone as above
7990 - 8000	50%	Siltstone dark grey-brown, minor clay, carbonaceous, tr. mica, firm, minor sand fine grained.
	30%	Sandstone as above, no flourescence
	20%	Shale dark grey-brown, carbonaceous, minor silt, firm
		Tr. Coal
8000-8010	80%	Coal
	10%	Siltstone as above
	10%	Sandstone, medium light grey, fine-medium grained, clayey, minor carbonate, firm, no flourescence, no cut, low porosity.
8010-- 8020	30%	Coal, black vitreous, little clay
	50%	Shale generally brown, minor silt, carbonaceous, minor coaly flecks
	10%	Siltstone dark grey-brown, carbonaceous in part
	10%	Sandstone medium light grey fine-medium grained-clayey, poor porosity no flourescence
8020 - 8030	80%	Sandstone as above no flourescence or cut
	20%	Siltstone as above
		Tr. Coal, Tr. shale as above
8030-8040	50%	Sandstone as above with approximately 50% of Siltstone loose grains, medium-coarse subangular-subrounded, no flourescence or cut.
	30%	Siltstone as above
	20%	Shale as above
		Coal cavings
8040-8050	60%	Siltstone dark grey-brown, carbonaceous in part, clayey, firm, minor fine grained sand
	20%	Shale, medium-dark grey-brown, carbonaceous, silty
	20%	Sandstone medium light grey, fine-medium grained, minor loose quartz grains medium-coarse, subangular.
		Tr. Coal cavings.
8050-8060	30%	Coal, black minor clay
	40%	Siltstone as above very carbonaceous
	30%	Sandstone as above with minor carbonate laminae
8060-8070	30%	Coal as above
	50%	Siltstone as above
	20%	Sandstone as above no flourescence or cut
8070-8080	30%	Sand - loose quartz grains; medium-coarse, moderately sorted, subangular - rounded, some fractured grains
	20%	Siltstone - fine-very fine; white-grey; quartz; carbonaceous; moderate-poorly sorted; fine matrix; tight; subangular-sub rounded; hard
	40%	Silt- dark grey-dark brown; carbonaceous; firm;
	10%	Shale - dark brown; firm-hard; carbonaceous
		Tr. Pyrite - as a cement and as individual grains
		Tr. Coal; tr. white mica. tr. glauconite - cavings

SAMPLE DESCRIPTIONS

SWORDFISH - 1

DEPTH	%	DESCRIPTION
8080-8090	20%	Sand - loose quartz grains as above
	30%	Siltstone - tight as above
	30%	Silt - dark grey-dark brown - as above
	10%	Shale - carbonaceous as above
	10%	Coal - as above
		Pyrite - as above
8090-8100	30%	Sand - loose quartz grains, coarse-medium, moderately sorted; subangular-rounded; many fractured grains.
	30%	Siltstone - hard tight; very fine-fine; silty matrix white-dark grey; carbonaceous
	20%	Siltstone - dark grey-dark brown; carbonaceous; firm
	10%	Shale - dark brown - black; carbonaceous; hard
	10%	Coal - black vitreous
		tr. Pyrite; tr. White mica; tr. glauconite
		T.D. 8100

APPENDIX 2

WELL COMPLETION REPORT

SWORDFISH-1

APPENDIX 2

VELOCITY SURVEY

VELOCITY SURVEY

Well ..Swordfish-1.....

Basin .Gippsland.....

INTRODUCTION

Esso personnel .....G.M. Evans, M.P. Lynn.....

Contractor .....Velocity Data Pty. Ltd.....

Supplied (1) Instruments

(2) Personnel

Seismic Observer .John Larsen....

Marine Shooter ...Ray Doyle.....

Dynamite .....—.....

(3) Seismic Souce

Gas Gun

Gas Pressures .....

Oxygen .....45 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 .Sale.....date .10/1/77.....

boarded (rig) Ocean Endeavour..... date..11/1/77.....

date of survey..15-16/1/77.....

casing depth...2978 feet KB.....

T.D. when shot..8100 feet KB..... FTD .8100feet KB....

water depth....213 feet (296' KB)

K.B. 83'

SURVEY PROCEDURE

Weather: sea ..calm with slight swell.....

rig movement .slight.....

rig noise ....considerable.....

Hydrophones: number ....two.....

depth below sea level ..each at thirty....ft

position 1) .10 feet above bottom of gun...

2) next to marine riser.

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

Number of pops per level: 2 (except 3 at 6712' KB)

amount of powder dumped .....lbs.

Well-phone positioning :

T-bar .....

number of depths ..12.....

Time: first shot .....2105 hrs.....

last shot .....0125 hrs.....

rig time .....4 hrs 20 mins.....

includes downtime:
1 hr 30 mins - velocity tool
40 mins - gun

RESULTS

Quality of records (good ...23.....
(fair ....2.....
(poor .....
(not used .....

Comparison of Interval Times with sonic log

/△/average .....5.8.....microsec/foot

/△max/ .....13.2.....microsec/foot

CONCLUSION

Reliability of T-D curve ..Excellent.....

COMMENTS: At different stages of the survey, both the velocity tool and the gas gun failed to operate. After the first and shallowest level was shot at 2105 hrs, the lock-in arm of the tool failed to wind in, although the motor was running freely. After slowly pulling the tool out of the hole, it was found that a cog had slipped along its shaft. Shooting resumed at the next deepest level at 2300 hrs.

From 0015 hours to 0055 hrs the gas gun was repaired after it failed to work.

The records were considered to be of good quality except two which were slightly affected by rig noise.

VELOCITY SURVEY ERROR CHECK

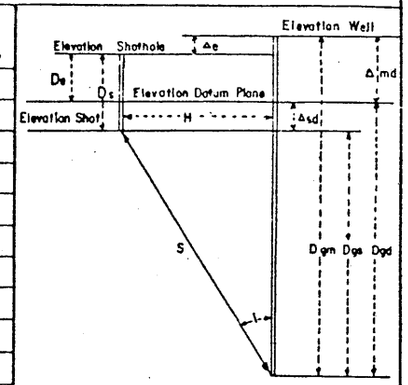
Depth Rel. S.L.	Av. Vertical Travel Time (check shots)	Ti Check Shots (sec.)	Ti Sonic Log (sec.)	(Millisecs.)	Depth Interval (ft.)	Error (Microsec per ft.)
3041	0.373					
3503	0.420	0.047	0.041	+6	462	13.0
3503	0.420					
3993	0.458	0.038	0.041	-3	490	6.1
3993	0.458					
4429	0.505	0.047	0.047	0	436	0
4429	0.505					
4858	0.552	0.047	0.044	+3	429	7.0
4858	0.552					
5532	0.628	0.076	0.073	+3	674	4.5
5532	0.628					
6128	0.685	0.057	0.058	-1	596	1.7
6128	0.685					
6477	0.722	0.037	0.034	+3	349	8.6
6477	0.722					
6629	0.737	0.015	0.013	+2	152	13.2
6629	0.737					
6962	0.765	0.028	0.029	-1	333	3.0
6962	0.765					
7417	0.809	0.044	0.044	0	455	0.0
7417	0.809					
7872	0.852	0.043	0.040	+3	455	6.6

Shothole Information:- Elevation, Distance & Direction from Well

Company: ESSO EXPLORATION AUSTRALIA INC.
Well: SWORDFISH-1
Elevation (Derrick Floor): 83'
Total Depth: 8100' KB

LOCATION
Coordinates: 38° 23' 36".063S 148° 00' 24".007E
Section, Township, Range
County
Area or Field: Gippsland Basin, Victoria
DATUM: M.S.L.

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	Va Average Velocity
1		2105	3124	40	.008	.034	.366	U	G	3001	170	.057	.9983	.365	40	.008	.373	.373	3041				8153
2		2105	3124	40	.008	.034	.366	U	G	"	"	"	"	"	"	"	.373						
																				462	.047	9830	
3		2300	3586	40	.008	.035	.412	D	F	3463	170	.049	.9988	.412	40	.008	.420	.420	3503				8340
4		2300	3586	40	.008	.035	.412	D	F	"	"	"	"	"	"	"	.420						
																				490	.038	12895	
5		2310	4076	40	.008	.035	.450	D	G	Offset not significant				.450	40	.008	.458	.458	3993				8718
6		2310	4076	40	.008	.035	.450	D	G					"	"	"	.458						
																				436	.047	9277	
24		0125	4512	40	.008	.034	.496	D	G					.496	40	.008	.504	.505	4429				8770
25		0125	4512	40	.008	.034	.497	D	G					.497	"	"	.505						
																				429	.047	9128	
22		0115	4941	40	.008	.034	.543	D	G					.543	40	.008	.551	.552	4858				8801
23		0115	4941	40	.008	.034	.544	D	G					.544	"	"	.552						
																				674	.076	8868	
7		2320	5615	40	.008	.035	.620	D	G					.620	40	.008	.628	.628	5532				8809
8		2320	5615	40	.008	.035	.620	D	G					"	"	"	.628						
																				596	.057	10456	
20		0105	6211	40	.008	.034	.676	D	G					.676	40	.008	.684	.685	6128				8946
21		0105	6211	40	.008	.034	.677	D	G					.677	"	"	.685						
																				349	.037	9432	
18		0055	6560	40	.008	.034	.714	D	G					.714	40	.008	.722	.722	6477				8971
19		0055	6560	40	.008	.034	.713	D	G					.713	"	"	.721						
																				152	.015	10133	
9		2330	6712	40	.008	.035	.729	D	G					.729	40	.008	.737	.737	6629				8995
10		2330	6712	40	.008	.035	.729	D	G					"	"	"	.737						
11		2330	6712	40	.008	.035	.729	D	G								.737						
																				333	.028	11893	
16		0005	7045	40	.008	.035	.757	D	G					.757	40	.008	.765	.765	6962				9101
17		0005	7045	40	.008	.034	.756	D	G					.756	"	"	.764						
																				455	.044	10341	
14		2355	7500	40	.008	.035	.800	D	G					.800	40	.008	.808	.809	7417				9168
15		2355	7500	40	.008	.035	.801	D	G					.801	"	"	.809						
																				455	.043	10581	
12		2340	7955	40	.008	.035	.844	D	G					.844	40	.008	.852	.852	7872				9239
13		2340	7955	40	.008	.035	.844	D	G					"	"	"	.852						



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 T = Vert. travel time from shot elev to geophone
Tgd = $Tgs \pm \frac{\Delta sd}{V}$ = " " " " datum plane " "
Dgd = Dgm - Δmd
VI = Interval velocity = $\frac{\Delta Dgd}{\Delta Tgd}$
Va = Average = $\frac{D\,gd}{T\,gd}$

Surveyed by: Velocity Data P/L
Date: 15-16/1/77
Weathering Data:

Casing Record
2978' K.B.

DWG. 1107/OP/3

Swordfish – 1

Well Velocity Record
15-1-77

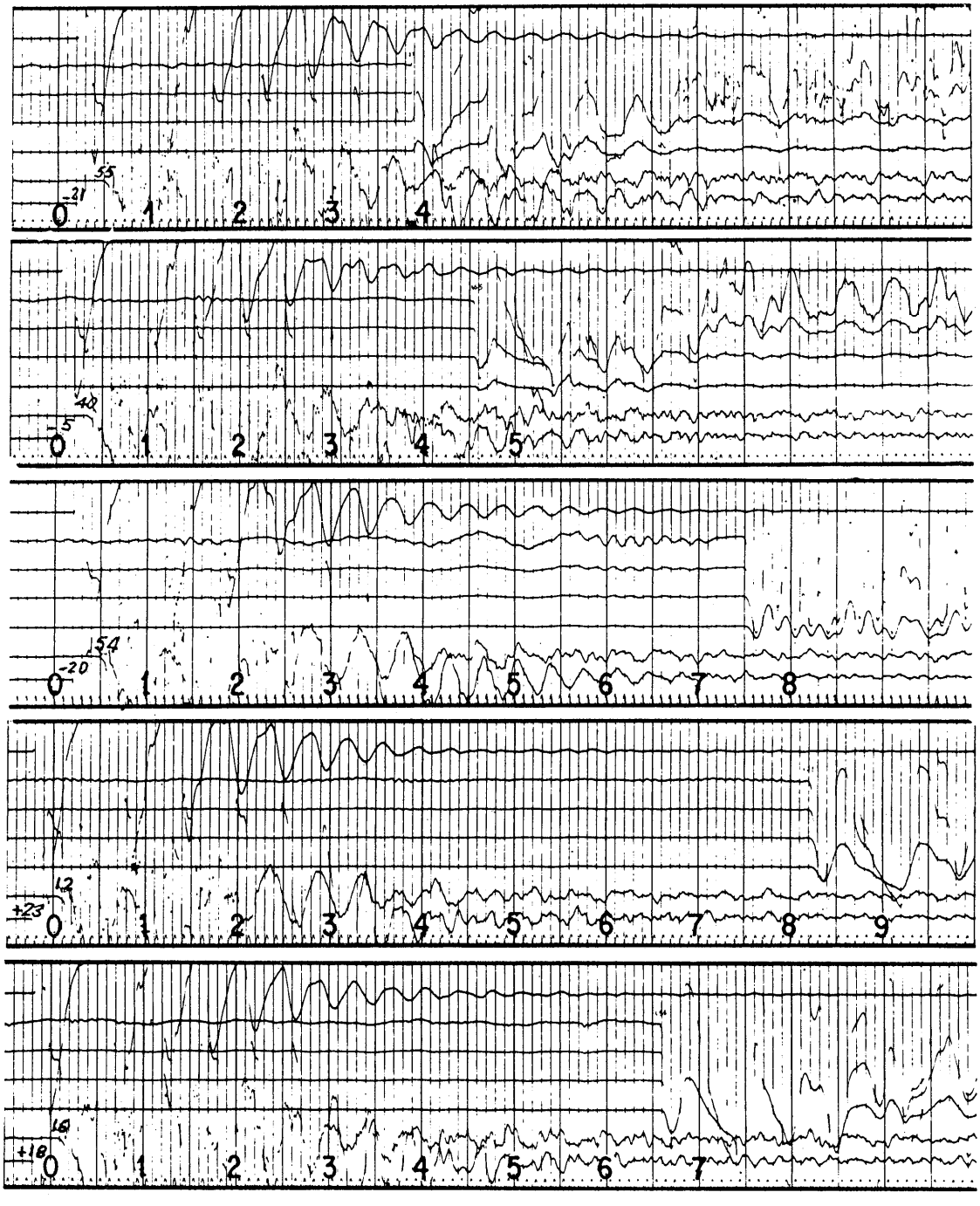
REC. No. 2
K.B. 3124'
T : 2105 hrs.

REC. No. 5
K.B. 4076'
T : 2310 hrs.

REC. No. 9
K.B. 6712'
T : 2330 hrs.

REC. No. 12
K.B. 7955'
T : 2340 hrs.

REC. No. 20
K.B. 6211'
T : 0105 hrs.



Dwg. 1824/OP/1

DATE OF SURVEY 15-1-77

CLIENT ESSO AUSTRALIA LTD

WELL SWORDFISH #1

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

OBSERVERS REPORT

ENERGY SOURCE 3cu ft GasGun RECORDING INSTRUMENTS RS-44 LOGGER SCHLUMBERGER.
GEOPHONES: WELL GeoSpace WLS-1000 REFERENCE MP-3 SEA FLOOR REFRACTION
REFERENCE SENSOR OFFSET 170 ft DEPTH 30 ft DRILL SHIP Ocean Endeavour SHIP HEADING
WEATHER FINE SEAS SLIGHT

KB DEPTH	Rec BEARING	CHARGE	SHOT DEPTH	SHOT LOCATION	SHOT OFFSET	AMPLIFIER GAIN ATT		TIME	COMMENTS
3124	1	15cu	40ft		170ft	-15	2-1	2105.	Motor Drive Coupling came loose in well lock Tool. - Tool winched slowly to surface for repairs.
"	2	15.	"		"	"	"	2106	
3586	3	15	40		170	-30	2-1	2300	
"	4	"	"		"	"	"	2301	
4076.	5	15	40		170	-20	2-1	2310	
"	6.	"	"		"	"	"	2311	
5615	7	15	40		170	-16	2-1	2320	
"	8	"	"		"	"	"	2321	
6712	9	20	40		170	-10.	2-1	2330	
"	10	"	"		"	"	"	2331	
"	11	"	"		"	"	"	2332.	
7955.	12	20	40		170	-0	2-1	2340	
"	13.	"	"		"	"	"	2341	
7500	14	20	40		170	-0	2-1	2355.	
"	15.	"	"		"	-0	"	2356.	
7045.	16	20	40		170	-5	2-1	0005.	16-1-77.
"	17	"	"		"	"	"	0006	
6560.	18	20	40		170	-5	2-1	0055	Ignition problems with gas gun - made minor adjustments to ign
"	19	"	"		"	-0	"	0056.	
6211	20	15	40		170	-0	2-1	0105	
"	21	"	"		"	-0	"	0106.	
4941	22	15	40		170	-10	2-1	0115	
"	23	"	"		"	-10	"	0116.	
4512	24	15	40		170	-15	2-1	0125	
"	25.	"	"		"	"	"	0126.	

SHOOTER / RAY DOYLE.

NUMBER OF RECORDS 25. EXPLOSIVES USED: CAPS NIL PRIMERS — EXPLOSIVE —
DEPART BRISBANE 0600hrs / 10-1-77 RETURN BRISBANE 1900hrs / 16-1-77 OBSERVER

SWORDFISH - 1

DATA USED IN DEVELOPMENT OF TIME-DEPTH CURVE

DEPTH b.s.l.	TIME (secs) CHECK SHOTS	AVERAGE VELOCITY (ft/sec) FROM CHECK SHOTS	INTERVAL VELOCITY (ft/sec) FROM CHECK SHOTS	TIME (sec) CALIBRATED SONIC LOG	AVERAGE VELOCITY (ft/sec) FROM CALIBRATED SONIC LOG	INTERVAL VELOCITY (ft/sec) FROM CALIBRATED SONIC LOG
- 761	-	-		0.1301	5896	
- 997	-	-		0.1625	6135	7099
-1485	-	-		0.2211	6716	8328
-1998	-	-		0.2741	7289	9679
-2548	-	-		0.3280	7768	10204
-3041	0.373	8153		0.3735	8142	10835
-3503	0.420	8340	9830	0.4161	8419	10845
-3993	0.458	8718	12895	0.4583	8713	11611
-4429	0.505	8770	9277	0.5063	8748	9083
-4858	0.552	8801	9128	0.5521	8799	9367
-5532	0.628	8809	8868	0.6270	8823	8999
-6128	0.685	8946	10456	0.6860	8933	10102
-6477	0.722	8971	9432	0.7209	8985	10000
-6629	0.737	8995	10133	0.7347	9023	11014
-6962	0.765	9101	11893	0.7641	9111	11327
-7417	0.809	9168	10341	0.8093	9165	10066
-7872	0.852	9239	10581	0.8506	9255	11017

SONIC CALIBRATION CURVE

In Swordfish-1 the Sonic log has been calibrated against the check shot data. This is a departure from previous procedure and will be continued for all wells drilled post Swordfish-1. A summary of the method follows. (This summary will not be repeated in following well completion reports)

METHOD

The following parameters are to be recorded:-

- depth of checkshot relative to K.B. in feet (D)
- average vertical travel time from checkshot in secs (Tcs)
- average vertical travel time from sonic log in secs (T_L)
- difference between sonic log and checkshot times in millisecs ($\Delta T = T_L - Tcs$)

ΔT is arbitarily set to zero at a checkshot level, i.e. the sonic log is said to be equal to the checkshot. In Gippsland, this is done at the Top of the Latrobe Group. Integrated time pips are counted relative to this Tcs value in order to obtain the T_L values at the appropriate checkshot depths. ΔT can then be calculated at each of these depths.

A plot of ΔT versus depth is constructed (Sonic Calibration Curve - Enclosure). Lines of best fit are fitted to the data points producing a "drift curve". A scatter in the data of about 1 millisec from this line of best fit is often seen and is tolerated as the picking accuracy. Any point with a greater scatter should be checked.

Re-examination of the checkshot record may reveal a poor time pick and in this way, checkshot points can be edited.

The sonic log is calibrated using the linear shift or differential shift methods. Linear shift applies a constant correction to the log for each segment of the drift curve. With differential shift, transit times are scaled on a percentage basis. Lower velocity zones are believed to contribute more integrated time error than do higher velocity zones. Therefore, calibration should be carried out on a basis proportional to transit time (i.e. lower velocities are changed by a greater amount than higher velocities).

SWORDFISH - 1

DATA USED IN DEVELOPMENT OF CALIBRATION CURVE
AND CALIBRATED SONIC LOG.

DEPTH (ft) Rel. KB	DEPTH (ft) b.s.l.	TIME (Secs) SONIC LOG	TIME (Secs) CHECK SHOTS	ΔT (msec) $= T_L - T_{CS}$	TIME (Secs) CALIBRATED SONIC LOG
3124	-3041	0.3855	0.373	+ 12.5	0.3735
3586	-3503	0.4267	0.420	+ 6.7	0.4161
4076	-3993	0.4676	0.458	+ 9.6	0.4583
4512	-4429	0.5145	0.505	+ 9.5	0.5063
4941	-4858	0.5587	0.552	+ 6.7	0.5521
5615	-5532	0.6319	0.628	+ 3.9	0.6270
6211	-6128	0.6899	0.685	+ 4.9	0.6860
6560	-6477	0.7239	0.722	+ 1.9	0.7209
6712	-6629	0.7370	0.737	+ 0.0	0.7347
7045	-6962	0.7655	0.765	+ 0.5	0.7641
7500	-7417	0.8095	0.809	+ 0.5	0.8093
7955	-7872	0.8494	0.852	- 2.6	0.8506

APPENDIX 3

WELL COMPLETION REPORT

SWORDFISH-1

APPENDIX 3

FORMATION INTERVAL TESTS RECORD

CORE LABORATORIES INTERNATIONAL LTD.

LOCATION SWORDFISH # 1

TO P. KEMP/ D. MORTEN

DATE 16-17 JAN. 1977

FROM

COPIES TO

SUBJECT F.I.T. / HP QUARTZ PRESSURE GAUGE RESULTS

1st RUN FAILED DUE TO FIT TOOL FAILURE. HYDROSTATIC PRESSURE RECORDED @ 7950' @ 180°F WAS 4202.17 psia.

2nd RUN FAILED ALSO DUE TO FIT TOOL FAILURE. HYDROSTATIC RECORDED OF 4199.6psia.

3rd RUN SUCCESSFUL, HYDROSTATIC RECORDED WAS 4196psia. A SEAL SET PRESSURE OF 4562psia WAS RECORDED ALSO.

OPEN TOOL/ FILLLING CHAMBER;

1 minute	15 sec.	196	psia
1 "	30 "	910	"
1 "	45 "	1200	"
2 "		1237.5	"
2 "	30 "	1238	"
3 "		1232	"
4 "		1224	"
5 "		1216.5	"
6 "		1212.5	"
7 "		1204	"
8 "		1198	"
9 "		1192	"
10 "		1187	"
11 "		1185	"
12 "		1181	"
13 "		1177.6	"
14 "		1176.5	"
15 "		1174.1	"
16 "		1170.8	"
17 "		1169	"
18 "		1169.8	"
19 "		1167.4	"
20 "		1169.6	"

BUILD-UP PRESSURE :

20 minutes	45 secs.	1339	psia
21 "		1554	"
21 "	30 "	1951	"
21 "	45 "	2490	"
22 "		3000	"
22 "	15 "	3289	"
22 "	30 "	3406	"
22 "	45 "	3421	"
23 "		3422	"
23 "	15 "	3423	"
23 "	30 "	3423	"
23 "	45 "	3423	"
24 "		3423	"
24 "	15 "	3424	"
24 "	30 "	3424	"
25 "		3424.1	"
25 "	30 "	3424.4	"
26 "		3424.8	"
26 "	30 "	3425	"

HYDROSTATIC AFTER PULLING LOOSE.

4199.8 psia.

CORE LABORATORIES INTERNATIONAL LTD.

LOCATION SWORDFISH # 1

TO P. KEMP/ D. MORTON DATE 17/1/77

FROM COPIES TO

SUBJECT F.I.T. / HP QUARTZ PRESSURE GAUGE RESULTS.

BBB

F.I.T. RUN # 5 @ 6810', HYDROSTATIC PRESSURE OF 3580.9psia, TOOL SEAL SET PRESSURE OF 3971'.

FILLING CHAMBER:-

0	sec	2680	psia	10	minutes	2938.2	psia
5	"	2937.9	psia	10	" 30secs	2938.2	psia
30	"	2937.9	"	11	"	2938.4	"
45	"	2937.9	"	11	" 30 "	2938.5	"
1	minute	2937.9	"	12	"	2938.5	"
1	" 15 secs	2937.9	"	12	" 30 "	2938.6	"
1	" 30 "	2937.9	"	13	"	2938.7	"
1	" 45 "	2937.9	"	13	" 30 "	2938.7	"
2	"	2937.9	"	14	"	2939.0	"
2	" 30 "	2937.9	"	14	" 30 "	2941.0	"
3	"	2937.9	"	15	"	2941.1	"
3	" 30 "	2937.9	"	15	" 30 "	2941.0	"
4	"	2937.9	"	16	"	2941.2	"
5	"	2937.9	"	16	" 30 "	2941.1	"
5	" 30 "	2937.8	"	17	"	2941.2	"
6	"	2937.6	"	17	" 30 "	2941.2	"
6	" 30 "	2937.7	"	18	"	2941.2	"
7	"	2938	"	18	" 30 "	2941.2	"
7	" 30 "	2938	"	19	"	2941.2	"
8	"	2938	"	19	" 30 "	2941.3	"
8	" 30 "	2938.1	"	20	"	2941.3	"
9	"	2938.1	"				
9	" 30 "	2938.1	"				

SHUT-IN HYDROSTATIC = 3576.8 psia.

F.I.T. RECORD

WELL: SWORDFISH-1

GEOLOGIST: MORTON/KEMP

DATE: 17/1/77

F.I.T. No. 3 @ 7950 FEET (IES LOG DEPTH)

MUD DATA:

Rmf .45 @ 68 °F, Equiv. Cl^- 14,000 ppm (Resistivity)

Cl^- 5,000 ppm NO_3^- 180 ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

RECOVERY (MAIN CHAMBER):

_____ cft. GAS

_____ cc OIL

22,000 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 .31 @ 75 °F, Equiv. Cl^- 19,500 ppm (Resistivity)

Cl^- 12,000 ppm NO_3^- 120 ppm (Titration)

PRESSURES:

	Schlumberger	Amerada	Agnew Amerada	Hewlett Packard *
Sampling (psi)	1300 psi			1238 psia
Final Shut-in (psi)	3425 psi			3425 psia
Hydrostatic (psi)	4300			4199.8 psia

Sampling Time (Min.) 20

Shut-in Time (Min) 5

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) _____ °F , NOT RUN °F

MAX. DEPTH TOOL REACHED: _____ Ft.

TIME SINCE CIRCULATION: _____ Hrs.

REMARKS: Choke size 1 x 0.02. Probably mixture mud filtrate and formation water. ∅ 19.3

F.I.T. RECORD

WELL: SWORDFISH-1
GEOLOGIST: MORTON/KEMP
DATE: 17/1/77

F.I.T. No. 5 @ 6810 FEET (IES LOG DEPTH)

MUD DATA:

Rmf .45 @ 68 °F, Equiv. Cl^- 14,000 ppm (Resistivity)

Cl^- 5,000 ppm NO_3^- 180 ppm (Titration)

SAMPLE TAKEN AT END OF LAST CIRCULATION.

RECOVERY (MAIN CHAMBER):

_____ cft. GAS

_____ cc OIL

22,000 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 R .434 @ 78 °F, Equiv.Cl^- 12,500 ppm (Resistivity)

Cl^- 8,000 ppm NO_3^- 120 ppm (Titration)

PRESSURES:

	Schlumberger	Agnew Amerada	Amerada	Hewlett Packard *
Sampling (psi)	2975			2937
Final Shut-in (psi)	2975			2941
Hydrostatic (psi)	3560			3577
Sampling Time (Min.)	15			
Shut-in Time (Min)	5			

*Corrected for Atmospheric pressure.

TEMPERATURES: (max. recorded) 180 °F , _____ °F

MAX. DEPTH TOOL REACHED: _____ Ft.

TIME SINCE CIRCULATION: _____ Hrs.

REMARKS: Choke size 1 x 0.02 Probably mixture mud filtrate and formation water. Ø 26.6

APPENDIX 4

PAGE 1 OF 4 ATT 60 REC 58

DATE 25/1/77

ESSO AUSTRALIA LTD.

SIDEWALL CORE DESCRIPTIONS

ISF/SONIC SWC RUN NO 1 2

SERVICE CO SCHLUMBERGER GEOLOGIST MORTON WELL SWORDFISH-1

NO. 1a	DEPTH 1	REC 2	TYPE 3	4	CAL 5	COLOR 6	DEG 7	SIZE 8	SRTG 9	RND 10	CLAY 11	STAIN 12	% RK	DISTR 14	INTEN 15	COLOR 16	INTEN 17	COLOR 18	QUAN 19	COLOR 20	SHOW 21	PROD 22	REMARKS 23
1	8083	NR											NO FLUORESCENCE										
2	8054	3/4"	Slst	Qtz;Carb; mica;laminated		Dk.gry	Firm	Silt							"								Finely laminated carbonaceous siltstone
3	7978	3/4"	Shale	Mica	-	Dk.gry	Firm	Clay							"								
4	7961	½"	Shale	Mica;carb; silty	-	Dk.gry	Firm	Clay							"								
5	7886	3/4"	Slst	Qtz;mica; carb	-	Dk.gry	Soft	Silt							"								
6	7758	½"	Slst	Qtz mica	-	M-ltgy	Soft	Silt							"								
7	7668	½"	Shale	V.Carb;mica	-	Gy-Bl	Firm	Clay							"								
8	7591	1½"	Shale	V.Carb-coaly	-	Bl.	Firm	Clay							"								
9	7468	1½"	Shale	V.Carb;mica; silty	-	Dk.gy	Firm	Clay							"								
10	7440	½"	Shale	V.Carb;mica	-	Bl.mgy	Soft	Clay							"								
11	7344	1"	Silty Shale	V.Carb;mica	-	Bl.	Firm	Clay-Silt							"								
12	7279	1"	Coal	Vitreous	-	Bl.	Hard	-							"								
13	7229	½"	SST.	Carb;mica; Qtz	-	Wh.	Soft	f-m	Poor	Sub rnd													Fine Carbonaceous laminae.
14	7169	¼"	SST.	Qtz;carb; mica silty	-	Dk.gy	Soft	vf-f	Poor	Sub ang-Sub rnd					"								Contaminated - thought to be NO RECOVERY.
15	7070	1"	SST	Qtz;mica	-	Wh.	Soft	f-m	Poor	"					"								
16	7000	¼"	SST	Qtz;Pyrite; Carb;Mica; Shale interbeds	-	Wh.	Hard	f-vf	Well	"					"								Fine carbonaceous shale interbeds.
17	6921	½"	Silty SST	Qtz;carb; mica	-	M-ltgy	Soft	f-vf	Poor	"													

FORM R 257 3.72

WELL COMPLETION REPORT

SWORDFISH-1

APPENDIX 4

SIDEWALL CORE DESCRIPTIONS

PAGE 2 OF 4

ATT 60 REC 58

DATE 25/1/77

ESSO AUSTRALIA LTD.

SIDEWALL CORE DESCRIPTIONS

ISF/SONIC RUN NO 1 & 2 SWC RUN NO 2

WELL SWORDFISH-1

GEOLOGIST MORTON

SERVICE CO SCHLUMBERGER

NO.	DEPTH	REC	ROCK TYPE	MODIFIERS	CAL	COLOR	GRAIN SIZE DEG	GRAIN SIZE	SRTG	RND	CLAY	STAIN	FLUOR/SOLVENT %	FLUOR/SOLVENT DISTR	FLUOR/SOLVENT INTEN	FLUOR/SOLVENT COLOR	CUT FLUOR INTEN	CUT FLUOR COLOR	CUT RESIDUE QUAN	CUT RESIDUE COLOR	SHOW	PROD PROD	REMARKS - CUT
1a	1	2	3	4	5	6	7	8	9	10	11	12	RK	14	15	16	17	18	19	20	21	22	23
19	6785	¾"	Silty SST	Qtz;carb; mica	-	M-dkgy	Soft	f-vf	Poor	"					"								Carbonaceous la
19	6775	1"	SST	Qtz;carb; mica		M-dkgy	Hard	f-m	Mod	"					"								
20	6732	1½"	Silty SST	Qtz;Silt; mica;carb;Pynte	-	Dk.gy	Soft	f-vf	Poorly	"					"								
21	6709	1¼"	Silty SST	Qtz;glauc	tr	Ol.gy	Hard	Pebbly Silt	Poor	Sub rnd													
22	6698	1"	Sandy SLST	Qtz; glauc	-	Ol.gy	Firm	"	"	"													
23	2040.6 6695	3/4"	Silty SST	Qtz. glauc	-	Ol.gy	Hard	"	"	"													
24	6685	"	"	"	-	"	"	"	"	"													
25	6671	"	"	"	-	"	"	"	"	"													
26	2029.3 6658	1"	"	"	-	"	"	"	"	"													
27	2024.7 6643	1¼"	Sandy SLST	Glauc;qtz;	-	"	"	"	"	"													
28	2021 6631	1½"	SLST	Glauc;qtz; mica	-	"	"	-	"	-													
29	6619	1½"																					
30	2012 6604	1½"	Glauc SST	Clauc;carb; mica	-	Gy-Bl	Hard	f-vf	Mod	Sub rnd													
31	2007.7 6587	1½"	"	"	-	"	"	"	"	"													
32	6571	1¼"	Glauc SLST	Glauc;silt	-	Gy-Bl	Firm	Silt	Mod	-													
33	2000.7 6564	1½"	"	"	-	"	"	-	"	-													
34	6560	1½"	Glauc SST	Glauc; silt	-	Gm-gy	"	f-m	"	-													

FORM B 257 3 72

PAGE 3 OF 4

ATT 60 REC 5

DATE 25/1/77

ESSO AUSTRALIA LTD.

SIDEWALL CORE DESCRIPTIONS

SWC RUN NO 1 & 2

ISF/Sonic

MWD RUN NO 2

WELL SWORDFISH-1

GEOLOGIST NORTON

SERVICE CO SCHLUMBERGER

NO.	DEPTH	REC	TYPE	MODIFIERS	CAL	COLOR	GRAIN DEG	GRAIN SIZE	SRTG	RND	BASE CLAY	STAIN	FLUORESCENCE % RK	FLUORESCENCE DISTR	FLUORESCENCE INTEN	FLUORESCENCE COLOR	CUT FLUOR. INTEN	CUT FLUOR. COLOR	CUT RESIDUE QUAN	CUT RESIDUE COLOR	SHOW	PROB PROD	REMARKS - GAS
1a	1	2	3	4	5	6	7	8	9	10	11	12		14	15	16	17	18	19	20	21	22	23
35	6545	1"	Glauc Marl	Glauc	V	Wh-lt gy	Soft Gummy																
36	6450	1 3/4"	Calc shale	Calcareous	V	M-dkgy	Firm																
37	6350	1½"	"	"	"	"	"																
38	6250	1¼"	"	"	"	"	"																
39	6160	1"	"	"	"	"	"																
40	6055	NR																					
41	5950	1½"	"	"	"	"	"																
42	5850	1¼"	"	"	"	"	"																
43	5750	3/4"	"	"	"	"	"																
44	5650	2"	"	"	"	"	"																
45	5550	1½"	"	"	"	"	"																
46	5450	1½"	"	"	"	"	"																
47	5300	2"	"	"	"	"	"																
48	5150	1½"	"	"	"	"	"																
49	5000	2"	"	"	"	Olgy	Hard																
50	4848	1 3/4"	"	"	"	"	"																
51	4650	1½"	"	"	"	"	"																
52	4450	3/4"	"	"	"	"	"																
53	4250	1 3/4"	"	"	"	"	"	Clay															
54	4104	2"	"	"	"	"	"	"															
55	4060	1"	Glauc calc SST	Glauc;Skel-etal frags	V	Ltgy	Soft	f-m	Poor	Ang-ular													
56	4024	3/4"	Calc Shale	Skeletal Frags;glauc	V	Olgy	Firm	Clay	-	-													
57	3770	3/4"	"	"	"	Ltgy	"	"	-	-													

FORM R 257 3.72

WELL SWORDFISH-1

GEOLOGIST MORTON

SERVICE CO. SCHLUMBERGER

ESSO AUSTRALIA LTD.

SIDEWALL CORE DESCRIPTIONS

ISF/Sonic

~~DIL~~ RUN NO 2 SWC RUN NO 2

ATT 60 REC 58

DATE 25/1/77

FORM F 257 3-72

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	FLOUR/SCIENCE % RK	DISTR 14	INTEN 15	COLOR 16	CUT FLUOR. INTEN 17	COLOR 18	CUT RESIDUE QUAN 19	COLOR 20	SHOW 21	PROD PROD 22	REMARKS - GAS 23
58	3550	1 1/8"	Calc	Skeletal	V	Olgy	Firm	Clay															
			Shale	Frags;glauc																			
59	3400	1 1/8"	Calc	Calcareous	V	Olgy	Firm	Silt															
			SLST																				
60	3200	1"	"	Skeletal	V	Olgy	Firm	Silt															
				Frags.																			

APPENDIX 5

WELL COMPLETION REPORT

SWORDFISH-1

APPENDIX 5

FORAMINIFERAL SEQUENCE - SWORDFISH-1

by

David Taylor

FORAMINIFERAL SEQUENCE

SWORDFISH # 1

by DAVID TAYLOR

Paleontology Report 1977/5 February 10, 1977

SUMMARY

The Swordfish # 1 well intersected a marine sequence from uppermost Eocene to Pliocene without any depositional breaks.

INTRODUCTION

Thirty nine side wall cores were examined between 3200 and 6698. No foraminifera were found in side wall cores at 3770, 4060, 6619, 6631, 6643, 6658, 6671, 6685, 6695 and 6698. Twenty nine rotary cutting samples were processed between 760 and 3040 and between 4100 and 4230 and the results incorporated in this report. Four rotary samples from 6490 to 6620 were examined also but as the depths were regarded as unreliable, the results have little significance. All depths cited in this report and listed in accompanying sheets are in feet.

The following sheets accompany this report:-

Distribution Chart Sheet 1 - showing distribution of planktonic foraminifera and the basis of biostratigraphic breakdown.

Distribution Chart Sheet 2 - giving the distribution of benthonic foraminifera.

Distribution Chart Sheet 3 - summarising the environmental analysis and presents an environmental interpretation.

Biostratigraphic Data Sheet

Two Sample Data Sheets

It is noted that the Salmon # 1 biostratigraphic data sheet has been revised.

BIOSTRATIGRAPHY

LATE EOCENE - 6604 to 6571:- Side wall cores contain a few specimens of *Globigerinatheka index* and *Subbotina linaperta* which are typical elements of the New Zealand late Eocene fauna. As this is the first report of *G. index* from Gippsland, it is difficult to place the fauna in the current zonal scheme. In Otway, the top of *G. index* was at the top of Zone L and preceded the top of *S. linaperta* which was at the top of Zone K. Jenkins (1974) disputes these observations as in New Zealand the tops of the ranges of both species were coeval. The fauna is definitely pre-J-2 and may represent Zone K if the sequence of faunal events was more akin to New Zealand than the Otway Basin. As there is no evidence of a depositional break between this late Eocene fauna and the overlying J-2 fauna, it is felt that the Swordfish # 1 late Eocene

assemblage represents Zone K of the Gippsland sequence, although it does not embrace the same biostratigraphic events as Zone K in the Otway Basin. Zone K in Swordfish # 1 can probably be equated with the lower part of the *G. brevis* Zone in New Zealand (Jenkins, l.c.) as it is succeeded almost immediately (= 7 feet between faunas) by Zone J-2 which contains a fauna identical to that in the upper part of the *G. brevis* Zone in New Zealand.

EARLY OLIGOCENE - 6564 to 6545:- Planktonic faunas in side wall cores of "greensand" at 6564 and 6560 include *Globigerina brevis* and *Tenuitella gemma* which are species which did not range above Zone J-2. The absence of *Globigerinatheka index* and *Subbotina linaperta* implies that this fauna can be equated with the upper part of the *G. brevis* Zone in New Zealand and was of early Oligocene age (Jenkins, l.c.).
The recrystallized limestone of the side wall core at 6545 bore a very poor fauna due probably to diagenetic obliteration. There were some recognisable specimens of *Subbotina angiporoides* which places the sample as being no younger than the top of Zone J.

LATE OLIGOCENE - ? to 6450:- Although the depth is disputed from evidence of E logs and side wall cores, rotary cuttings between 6490 and 6510 contain mixed faunas which include *Globigerina euapertura* and *Globorotalia opima opima*. The presence of these two species suggests that Zone I was within the section.
The side wall core at 6450 contains *Globoquadrina dehiscens* (s.l.), abundant *Globigerina woodi woodi* and rare *G. euapertura*. Such an association is now regarded as marking the very base of Zone H-2. This necessitates the revision of the Salmon # 1 section in that the base of Zone H-2 is now placed at the side wall core at 6236 so that the top of Zone I has been depressed.

EARLY MIOCENE - 6350 to 5750:- The fauna at 6350 has the lowest occurrence of *Globigerina woodi connecta* which places it at the base of Zone H-1. Jenkins (l.c.) assumes that the evolutionary appearance of *G. woodi connecta* marked the base of the early Miocene in the extra-tropical Austral region. This assumption is partially confirmed by the association of *G. woodi connecta* with *Globorotalia kugleri* in some off-shore Gippsland wells other than Swordfish # 1.
Zone G and Zone F faunas are present respectively at 5950 and 5850.

Zone E-2 and the top of the early Miocene is marked by the appearance of *Praeorbulina glomerosa curva* in the side wall core at 5750.

MID MIOCENE - 5650 to 2100:- Although the fauna is unrepresentative, the lowest Zone D-2 sample is probably at 5650. A more definite D-2 assemblage, with *Orbulina universa* and *Globorotalia peripheroronda* was present in side wall core at 5550. The top of Zone D-2 was placed at 4140 (= rotary cuttings) which suggests that there was a thicker development of the Zone in Swordfish # 1 than in Salmon # 1. Identical means of identifying the zonal top were used in both wells. Zone D-1 was consequently thinner in Swordfish than in Salmon. The top of Zone C and the top of the mid Miocene were placed at 2100 on the highest appearance of *Globorotalia mayeri* in rotary cuttings. This is approximately the same depth as in Salmon # 1.

LATE MIOCENE - 2000 to ? :- The association of *Globorotalia acostaensis* and *G. lenguaensis* in the absence of *G. mayeri* suggests that the rotary cutting sample at 2000 was at the base of Zone B-2 at the base of the late Miocene. Because of poor faunas it is impossible to fix the top of Zone B-2 and thus the top of the late Miocene, but this boundary was definitely below 1180.

PLIOCENE - ? to 1180 to ? :- *Globorotalia conomiozea* and *G. sphericomiozea* were present at 1180 (rotary cutting) indicating a position at the top of Zone B-1 within the early Pliocene.
At 1090 there was an unique association which was not represented in rotary cutting samples either above or below. This species association included *Globorotalia crassaformis* and *G. puncticulata* and may be an expression of the diversity peak seen in Flounder # 5 and Hapuku # 1 at the base of Zone A-4. Planktonic faunas above 1090 are much less diverse and contain neither of the above species.

ENVIRONMENT

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

It is very difficult to make an interpretation on the environment of the late Eocene as planktonic foraminifera were very rare and only one benthonic

specimen was recorded. This could mean the environmental extremes of either very deep conditions at or near the C.C.D. or that the planktonic forms were washed into a low salinity lagoonal or embayment environment.

The early Oligocene "greensands" bore a high percentage of planktonic foraminifera, although the faunas were relatively numerically sparse (planktonics = 80%, whilst total fauna approximated 100 specimens). The rare benthonic forms included *Cibicides brevoralis, C. perforatus* and *Vulvulina granulosa* which give the impression of a continental shelf situation. A transgressive invasion of oceanic waters may have been responsible for the high planktonic percentages. The diagenetic destruction of fauna in the limestone (6545) makes it impossible to speculate on the significance of the lithological change in the early Oligocene from "greensand" to limestone.

The late Oligocene and early Miocene sediments have a deep water aspect, not only in the dominance by planktonic forms, but by the presence of such benthonics as *Melonis pompiloides, Karreriella bradyi, Siphouvigerina proboscidae* and various morphologically simple arenaceous forms.

The mid Miocene Zone D-2 fauna (from 5650 to 4140) indicates deposition at the base of the continental slope with some evidence of sediment accumulation by down-slope slumping. One of the characteristic species of this interval is the large, costate *Euuvigerina maynii*.

The mid Miocene benthonic faunas between 4060 and 2820 have a low diversity and are probably the result of size and/or shape sorting. *Cassidulina carinata* dominates the benthonic fauna in some samples, with the flat *Cibicides thiara* almost ubiquitous. This sorting effect strongly suggests that the micritic limestone of this interval was a canyon fill.

Benthonic diversity increased at 2720 and faunas between there and 1700 (= Zone B) show a mixture of outer and inner continental shelf species including the seaweed adherent, *Cibicides cygnorum*. The faunal mixture and displacement of shallow water forms indicate that the sediment may have been deposited in a canyon head situation.

Above 1700 the fauna was dominated by *Cibicides* spp. and even higher (above 1000) by *Elphidium crassatum* and *Notorotalia clathrata*. This distribution pattern is evidence of gradual progradation from mid to

inner continental shelf during the latest Miocene and Pliocene. The benthonic faunal association between 1120 and 760 includes *Notorotalia clathrata, Parrellina imperatrix, Discoanomalina mitchelli* and *Valvulineria kalimnensis* and is a similar association to those described by Carter (1964) from the Tambo River and Jemmy Point Formations of the onshore Lakes Entrance region. However, the two onshore formations cannot be recognised in Swordfish # 1 either lithologically or on precise distribution of species; for instant, *V. kalimnensis* was confined to the Jemmy Point Formation whilst *Discoanomalina mitchelli* was restricted to the underlying Tambo River Formation, but both species were present in the same sample in Swordfish # 1. The richly bryozoal Pliocene calcarenites bearing this association in Swordfish were deposited in slightly deeper water than the marginal deposits around Lakes Entrance.

REFERENCES

CARTER, A.N., 1964 - Tertiary foraminifera from Gippsland, Victoria and their stratigraphic significance. *Geol. Surv. Vict., Mem.* 23.

JENKINS, D.G., 1974 - Paleogene planktonic foraminifera of New Zealand and the Austral region. *J. Foram. Res.*, 4(4); 155-170.

MICROPALEONTOLOGICAL MATERIAL

WELL NAME AND NO: SWORDFISH # 1 *DATE:* 20.1.77

PREPARED BY: DAVID TAYLOR *SHEET NO:* 1 of 2

DRAW:

DEPTH	*SAMPLE TYPE*	*SLIDES*	*ADDITIONAL INFORMATION*
3200	SWC 60		
3400	SWC 59		
3550	SWC 58		
3770	SWC 57		N.F.F.
4024	SWC 56		
4060	SWC 55		N.F.F.
4104	SWC 54		
4250	SWC 53		
4450	SWC 52		
4650	SWC 51		
4848	SWC 50		
5050	SWC 49		
5150	SWC 48		
5300	SWC 47		
5450	SWC 46		
5550	SWC 45		
5650	SWC 44		
5750	SWC 43		
5850	SWC 42		
5950	SWC 41		
6160	SWC 39		
6250	SWC 38		
6350	SWC 37		
6450	SWC 36		
6545	SWC 35		
6560	SWC 34		
6564	SWC 33		
6571	SWC 32		
6587	SWC 31		
6604	SWC 30		
6619	SWC 29		N.F.F.
6631	SWC 28		N.F.F.
6643	SWC 27		N.F.F.
6658	SWC 26		N.F.F.
6671	SWC 25		N.F.F.
6685	SWC 24		N.F.F.
6695	SWC 23		N.F.F.
6698	SWC 22		N.F.F.

N.F.F. = No foraminiferal faun

MICROPALEONTOLOGICAL MATERIAL

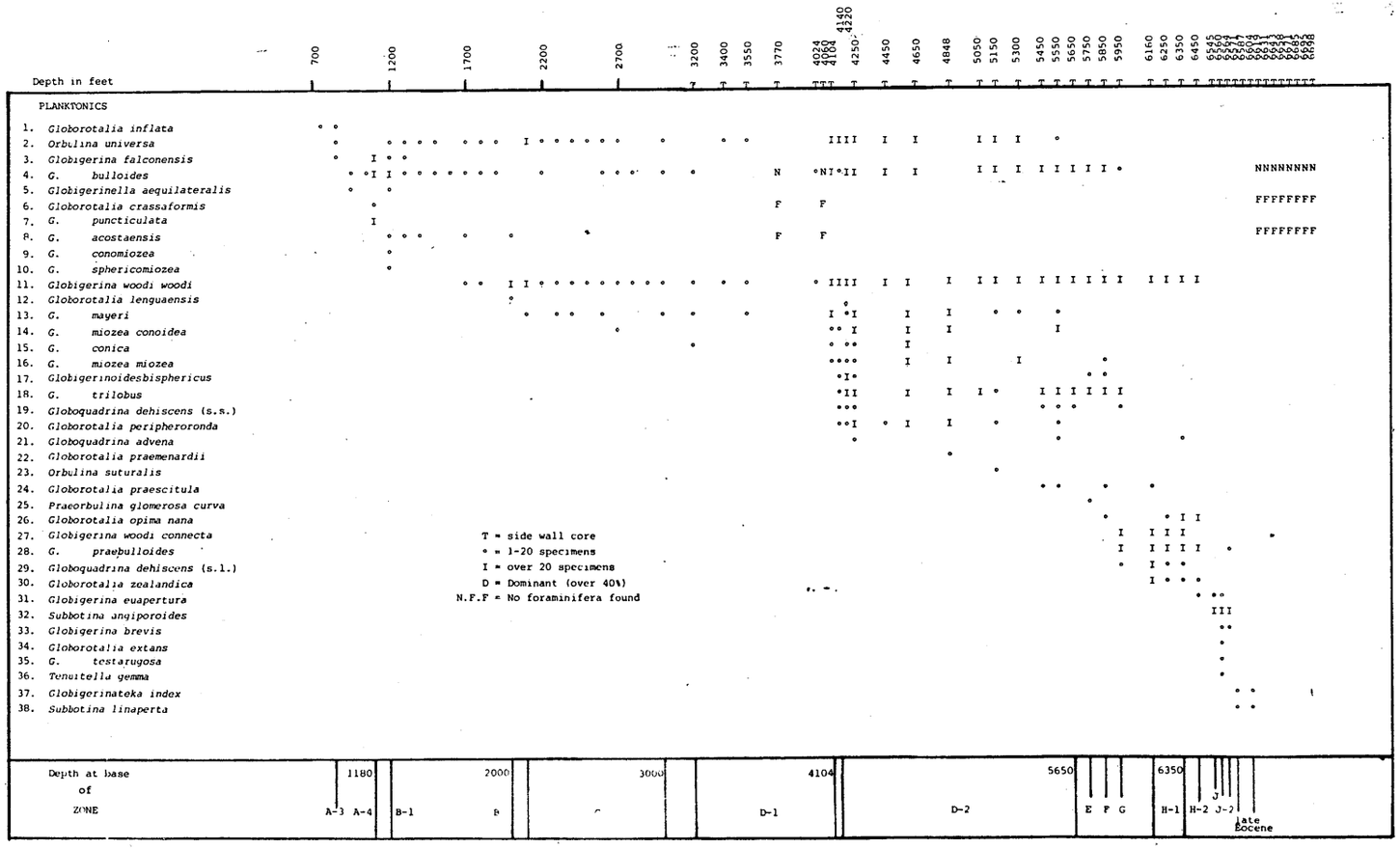
WELL NAME AND NO: SWORDFISH # 1 *DATE:* 20.12.74

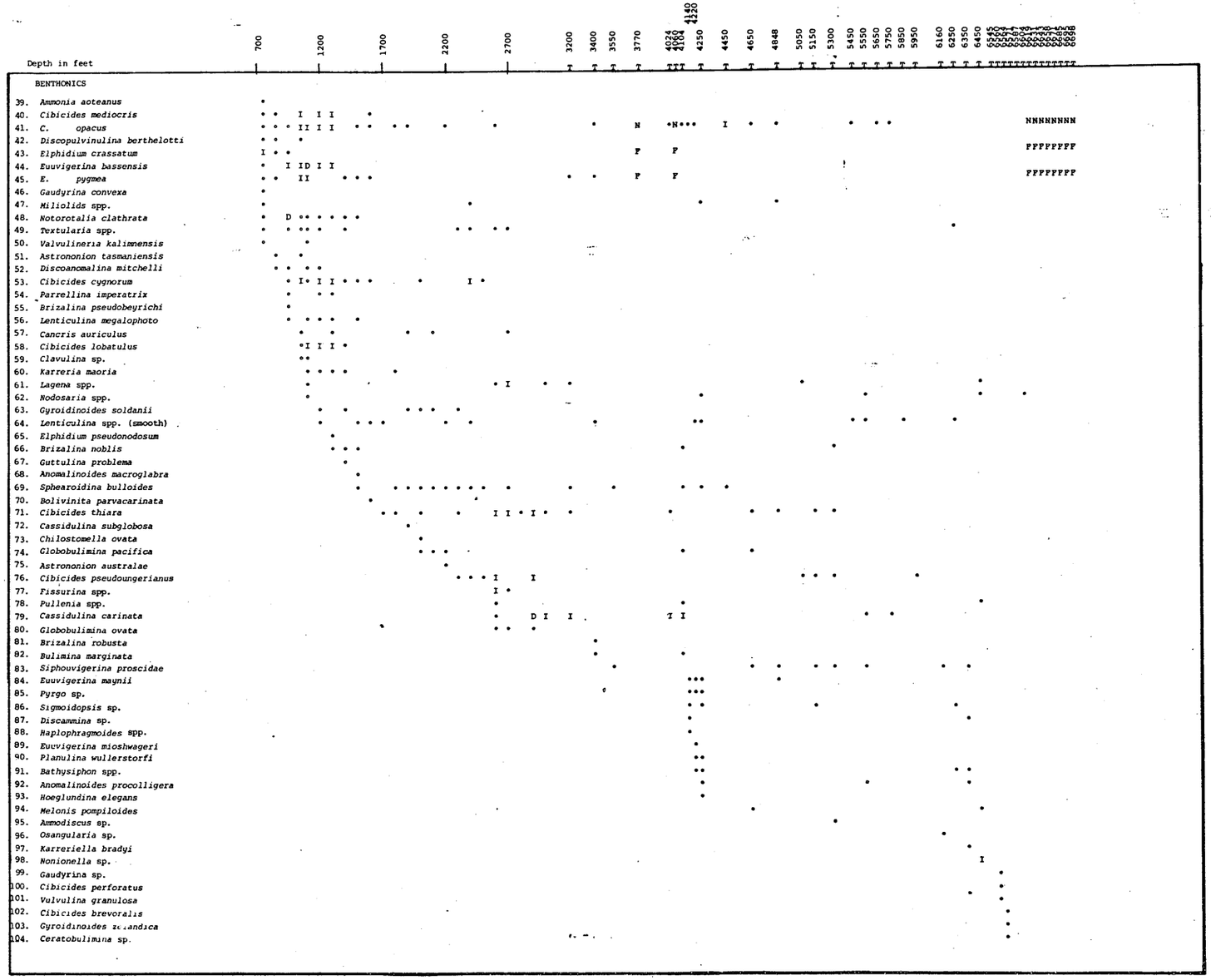
PREPARED BY: DAVID TAYLOR *SHEET NO:* 2 of 2

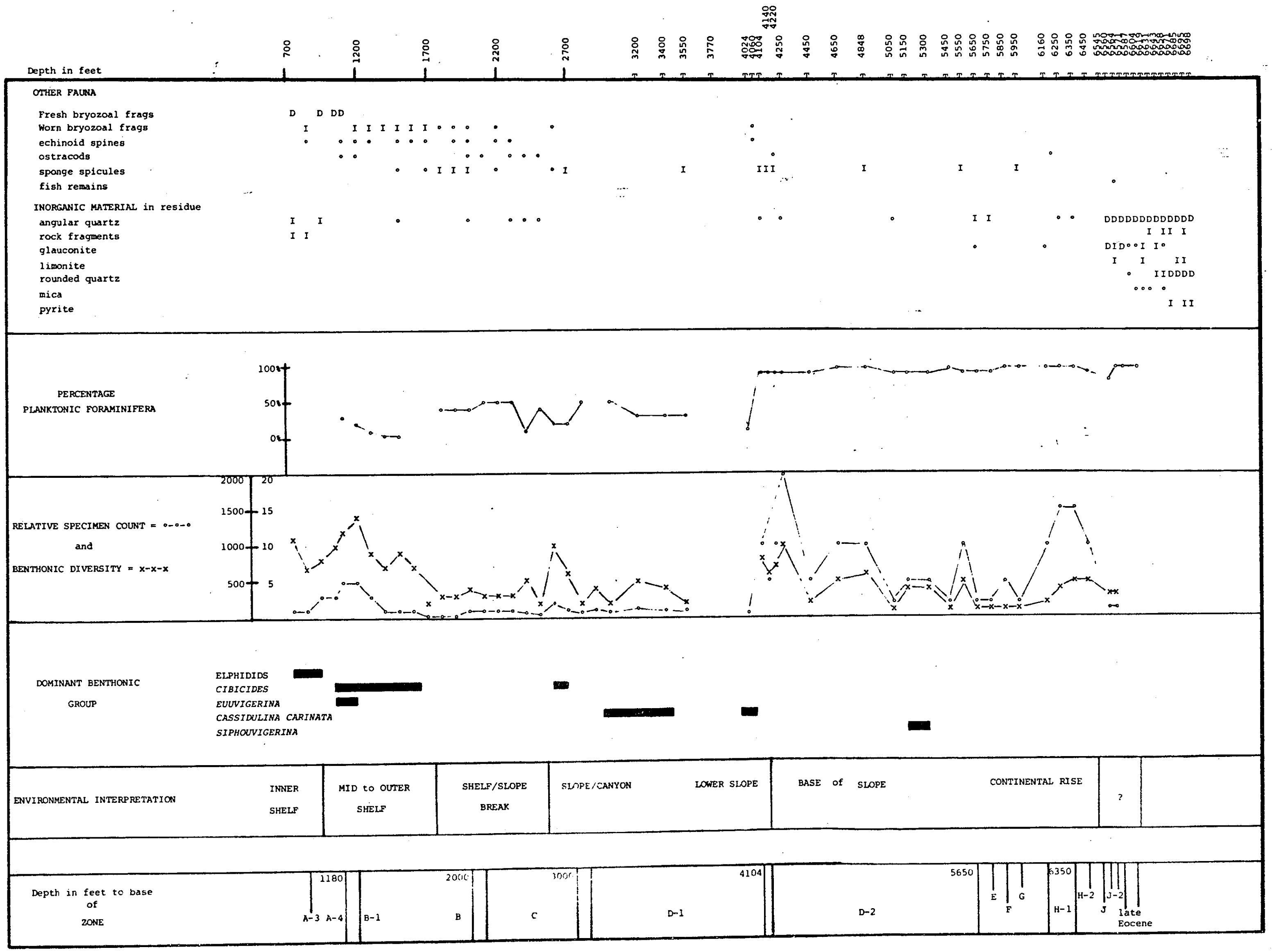
DRAW:

DEPTH	*SAMPLE TYPE*	*SLIDES*	*ADDITIONAL INFORMATION*
760 to 790	RC		
850 880	RC		
970 1000	RC		
1030 1060	RC		
1090 1120	RC		
1180 1210	RC		
1300 1330	RC		
1390 1420	RC		
1480 1510	RC		
1600 1620	RC		
1700 1720	RC		
1800 1820	RC		
1900 1920	RC		
2000 2020	RC		
2100 2120	RC		
2200 2220	RC		
2300 2320	RC		
2400 2420	RC		
2500 2520	RC		
2600 2620	RC		
2720 2740	RC		
2820 2840	RC		
2920 2940	RC		
3020 3040	RC		
4100 4110	RC		
4130 4140	RC		
4140 4150	RC		
4180 4190	RC		
4220 4230	RC		
6490 6500	RC		
6510 6520	RC		
6530 6540	RC		
6610 6620	RC		

SWORDFISH # 1


Depth in feet
700
1200
1700
2200
2700
3200
3400
3550
3770
4024
4060
4104
4140
4220
4250
4450
4650
4848
5050
5150
5300
5450
5550
5650
5750
5850
5950
6160
6250
6350
6450
6545
6560
6574
6587
6619
6631
6636
6685
6698
PLANKTONICS
1. Globorotalia inflata
2. Orbulina universa
3. Globigerina falconensis
4. G. bulloides
5. Globigerinella aequilateralis
6. Globorotalia crassaformis
7. G. puncticulata
8. G. acostaensis
9. G. conomiozea
10. G. sphericomiozea
11. Globigerina woodi woodi
12. Globorotalia lenguaensis
13. G. mayeri
14. G. miozea conoidea
15. G. conica
16. G. miozea miozea
17. Globigerinoidesbispherícus
18. G. trilobus
19. Globoquadrina dehiscens (s.s.)
20. Globorotalia peripheroronda
21. Globoquadrina advena
22. Globorotalia praemenardii
23. Orbulina suturalis
24. Globorotalia praescitula
25. Praeorbulina glomerosa curva
26. Globorotalia opima nana
27. Globigerina woodi connecta
28. G. praebulloides
29. Globoquadrina dehiscens (s.l.)
30. Globorotalia zealandica
31. Globigerina euapertura
32. Subbotina angiporoides
33. Globigerina brevis
34. Globorotalia extans
35. G. testarugosa
36. Tenuitella gemma
37. Globigerinateka index
38. Subbotina linaperta
NNNNNNNN
FFFFFFFF
FFFFFFFF
T = side wall core
• = 1-20 specimens
I = over 20 specimens
D = Dominant (over 40%)
N.F.F = No foraminifera found
Depth at base of ZONE
1180
2000
3000
4104
5650
6350
A-3
A-4
B-1
B
C
D-1
D-2
E
F
G
H-1
H-2
J
J-2
Late Eocene


Depth in feet
700
1200
1700
2200
2700
3200
3400
3550
3770
4024
4104
4140
4220
4250
4450
4650
4848
5050
5150
5300
5450
5550
5650
5750
5850
5950
6160
6250
6350
6450
6526
6554
6567
6613
6643
6673
6695
6698
BENTHONICS
39. Ammonia aoteanus
40. Cibicides mediocris
41. C. opacus
42. Discopulvinulina berthelotti
43. Elphidium crassatum
44. Euuvigerina bassensis
45. E. pygmea
46. Gaudyrina convexa
47. Miliolids spp.
48. Notorotalia clathrata
49. Textularia spp.
50. Valvulineria kaiimensis
51. Astrononion tasmaniensis
52. Discoanomalina mitchelli
53. Cibicides cygnorum
54. Parrellina imperatrix
55. Brizalina pseudobeyrichi
56. Lenticulina megalophoto
57. Cancris auriculus
58. Cibicides lobatulus
59. Clavulina sp.
60. Karreria maoria
61. Lagena spp.
62. Nodosaria spp.
63. Gyroidinoides soldanii
64. Lenticulina spp. (smooth)
65. Elphidium pseudonodosum
66. Brizalina noblis
67. Guttulina problema
68. Anomalinoides macroglabra
69. Sphearoidina bulloides
70. Bolivinita parvacarinata
71. Cibicides thiara
72. Cassidulina subglobosa
73. Chilostomella ovata
74. Globobulimina pacifica
75. Astrononion australae
76. Cibicides pseudoungerianus
77. Fissurina spp.
78. Pullenia spp.
79. Cassidulina carinata
80. Globobulimina ovata
81. Brizalina robusta
82. Bulimina marginata
83. Siphouvigerina proscidae
84. Euuvigerina maynii
85. Pyrgo sp.
86. Sigmoidopsis sp.
87. Discammina sp.
88. Haplophragmoides spp.
89. Euuvigerina mioshwageri
90. Planulina wullerstorfi
91. Bathysiphon spp.
92. Anomalinoides procolligera
93. Hoeglundina elegans
94. Melonis pompiloides
95. Ammodiscus sp.
96. Osangularia sp.
97. Karreriella bradyi
98. Nonionella sp.
99. Gaudyrina sp.
100. Cibicides perforatus
101. Vulvulina granulosa
102. Cibicides brevoralis
103. Gyroidinoides zealandica
104. Ceratobulimina sp.
NNNNNNNN
FFFFFFFF
FFFFFFFF


Depth in feet
700
1200
1700
2200
2700
3200
3400
3550
3770
4024
4060
4104
4140
4220
4250
4450
4650
4848
5050
5150
5300
5450
5550
5650
5750
5850
5950
6160
6250
6350
6450
OTHER FAUNA
Fresh bryozoal frags
Worn bryozoal frags
echinoid spines
ostracods
sponge spicules
fish remains
INORGANIC MATERIAL in residue
angular quartz
rock fragments
glauconite
limonite
rounded quartz
mica
pyrite
PERCENTAGE
PLANKTONIC FORAMINIFERA
100%
50%
0%
RELATIVE SPECIMEN COUNT = o-o-o
and
BENTHONIC DIVERSITY = x-x-x
2000
1500
1000
500
20
15
10
5
DOMINANT BENTHONIC
GROUP
ELPHIDIDS
CIBICIDES
EUUVIGERINA
CASSIDULINA CARINATA
SIPHOUVIGERINA
ENVIRONMENTAL INTERPRETATION
INNER SHELF
MID to OUTER SHELF
SHELF/SLOPE BREAK
SLOPE/CANYON
LOWER SLOPE
BASE of SLOPE
CONTINENTAL RISE
?
Depth in feet to base of ZONE
1180
2000
3000
4104
5650
6350
A-3
A-4
B-1
B
C
D-1
D-2
E
F
G
H-1
H-2
J
J-2
late Eocene

Form R 193 3/71

BASIN GIPPSLAND BY David Taylor

WELL NAME SWORDFISH # 1 DATE 1-2-77 ELEV. _____

Foram Zonules

		Highest Data	Quality	2 Way Time	Lowest Data	Quality	2 Way Time
	A	Alternate			1120[1]	3	
MIOCENE	B	1180[2]	3		2000	3	
		Alternate					
	C	2100	3		3020	3	
		Alternate					
	D_1	3200	1		4104	1	
		Alternate					
	D_2	4140	3		5650	2	
		Alternate 4250	0		5550	0	
	E	5750[3]	0		5750[3]	0	
		Alternate					
	F	5850	1		5850	1	
		Alternate					
	G	5950	1		5950	1	
		Alternate					
	H_1	6160	1		6350	0	
		Alternate					
	H_2	6450[4]	0		6450[4]	0	
		Alternate					
OLIGOCENE	I_1	6490	3		6510	3	
		Alternate					
	I_2						
		Alternate					
	J_1	6545	2		6545	2	
		Alternate					
	J_2	6560	0		6564	0	
		Alternate					
EOC.	K	6571	1		6604	1	
		Alternate					
	Pre K						

1. Good A-4 assemblage between 1090 and 1120

2. Good B-1 assemblage between 1180 and 1210

3. Fauna represents E-2

4. Right at base of H-2, immediately above I-1.

COMMENTS: The fauna designated K was definitely upper Eocene, but could be pre K, as it contained *G. index* not previously recorded in Gippsland.

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 _____

Form R 193 3/71

BASIN GIPPSLAND BY David Taylor

WELL NAME SALMON # 1 DATE 20-4-71 ELEV. _____

Foram Zonules

		Highest Data	Quality	2 Way Time	Lowest Data	Quality	2 Way Time
	A				1150	3	
	Alternate						
	B	1300	3		2100	3	
	Alternate						
MIOCENE	C	2150			3100	2	
	Alternate						
	D_1	3200	3		5000	3	
	Alternate						
	D_2	5120	1		5500	3	
	Alternate						
	E	5602	0		5602	0	
	Alternate						
	F	5880	1		5880	1	
	Alternate						
	G						
	Alternate						
	H_1	6030	1		6150	3	
	Alternate						
	H_2	6200	3		6236	0	
	Alternate	6236	0				
	I_1						
	Alternate						
OLIGOCENE	I_2	6416	1		6416	1	
	Alternate						
	J_1	6496	1		6496	1	
	Alternate						
	J_2	6555	0		6555	2	
	Alternate						
EOC.	K						
	Alternate						
	Pre K						

COMMENTS:

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

If a sample cannot be interpreted to be one 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 1-2-77

By David Taylor

APPENDIX 6

WELL COMPLETION REPORT

SWORDFISH-1

APPENDIX 6

PALYNOLOGICAL ANALYSIS OF SWORDFISH-1, GIPPSLAND BASIN

by

A.D. Partridge

PALYNOLOGICAL ANALYSIS

SWORDFISH-1, GIPPSLAND BASIN

by

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INTRODUCTION

Swordfish-1 is the first well drilled in the central part of the Gippsland Basin for 7 years. The adjacent wells, Cod-1 the third offshore well in the basin and Salmon-1 the twenty-first offshore well, were drilled in 1965 and 1969 respectively, both being drilled in the first drilling cycle.

The intervening years have seen an increasing sophistication of the palynological zonation and a more careful selection of the sidewall core programme to achieve the best results from this zonation. Consequent on the better sampling, a more detailed zonation is possible in Swordfish-1 compared to Cod-1 and Salmon-1. Moreover, the results from Swordfish-1 have indicated the need for revision of the concepts of some of the zones as well as the need for revision of the zonation in adjacent wells.

The thirty-one sidewall cores and seven cuttings samples examined from the Latrobe Group intersected in Swordfish-1 are given on Table 1. The zonation of the sequence is summarised below and on the accompanying Data Sheet. A revised Data Sheet for Salmon-1 is also attached.

SUMMARY

Unit	Spore-Pollen Zones	Dinoflagellate Zones
	Unconformity	
Gurnard Formation Unit A	Upper *N. asperus* 6560'-6564'	*P. coreoides* 6564'
	Middle *N. asperus* 6571'-6587'	*D. extensa* Zone equivalent 6571'-6587'
	Lower *N. asperus* 6619'-6658'	*D. heterophylcta* 6619'-6631' *W. echinosuturata* 6658'
Gurnard Formation Unit B	Lower *N. asperus* 6671'-6709'	*A. diktyoplokus* 6671'-6698'
	Unconformity	
Latrobe Coarse Clastics	*P. asperopolus* 6730'-7227'	
	Upper *M. diversus* 7279'-7468'	
	Lower *M. diversus* 7591'-7978'	*W. hyperacantha* 7961'-7978'
	Unconformity	
	Upper *L. balmei* 8054'	

T.D. 8100 feet.

GEOLOGICAL COMMENTS

1. The Gurnard Formation in Swordfish-1 is the most continuous sequence through the Middle and Late Eocene for the study of dinoflagellates from the Bass Strait region. This section is probably present in other wells in the Gippsland Basin but has never been sampled closely enough or the samples have not yielded diverse dinoflagellate suites. The well Nannygai-1 falls into this latter category; the Gurnard Formation was well sampled but did not yield good dinoflagellate assemblages.

2. The sampling in the Gurnard Formation in Swordfish-1 has established in a single sequence the first appearances and extinctions of a number of important dinoflagellate species and has forced the revision of the concept of the Deflandrea heterophylcta zone.

3. A twofold subdivision of the Gurnard Formation was recognised from the lithologies of the sidewall cores. Unit A (6560'-6658') in the sidewall cores is characterised by fine angular quartz grains and glauconite in a siltstone matrix. The unit B (6671'-6709') in contrast, lacks glauconite and contains coarse well rounded quartz grains and abundant pyrite.

What is between ?

4. This lithological change is reflected in the dinoflagellate assemblages. The sample from 6658 feet at the base of unit A, although of very low yield, contains a single specimen of Wetzeliella echinosuturata Wilson. This is the first record of this extremely important species from the Gippsland Basin.

   The absence of W. echinosuturata had been interpreted by Partridge (1976) as evidence of section missing at time of cutting of the Marlin Channel. It was also taken as being equal in age to the lowest part of the Lower N. asperus Zone (Partridge, 1976 figure-2). The presence of W. echinosuturata at the base of the unit A necessitates a revision of the age of the base of the Lower N. asperus Zone and the timing of the formation of the Marlin Channel.

   The unit B of the Gurnard Formation is still clearly Lower N. asperus Zone in age, based on -

   (a) the abundance of Nothofagidites spp. relative to Haloragacidites harrisii; and
   (b) the first appearance of index species for the Lower N. asperus Zone such as Proteacidites recavus and Proteacidites rugulatus at the base of unit B.

The boundary between the P. asperopolus Zone and Lower N. asperus Zone is still one of the most distinctive changes in the spore-pollen succession in the Gippsland Basin and the author still correlates the obvious time break between these zones with time of cutting of the Marlin Channel. However, this does create a problem since the availability of fine grained sediments to the Tasman Sea as revealed by the D.S.D.P. Site 283 apparently corresponds to the first appearance of W. echinosuturata.

Although it is likely because of the very sporatic occurrence of W. echinosuturata that its true range does extend down to the base of unit B, the possibility that it doesn't is just as likely. If the latter is true, this suggests that unit B hints at the presence of an unrecognised (of a recognised) sequence within the basin.

Unit B, although containing a distinctive dinoflagellate suite in Swordfish-1, cannot as yet be recognised in other wells. To find its areal distribution would necessitate careful re-examination of samples from the Gurnard Formation in other wells and this is beyond the scope of this report.

5. The Wetzeliella hyperacantha Dinoflagellate ingression or zone discussed in Partridge (1976, p.76) is represented in two sidewall cores at 7961 and 7978 feet. Both samples contain diverse dinoflagellate assemblages including the nominated species as well as the mangrove pollen Spinizonocolpites prominatus.

DISCUSSION OF ZONES

Species identified from the samples examined are given on the attached distribution sheets. The basis for choosing the zone intervals is discussed in the following :

Upper N. asperus Zone 6560(2) to 6564(0) feet -

The sample at 6564 feet contains a characteristic Upper N. asperus assemblage including the presence of Proteacidites rectomarginis and the common occurrence of the key species Proteacidites stipplatus. The sample also lacks forms such as Proteacidites adenanthoides, P. leightonii, P. crassus and numerous other species which become extinct within or at the top of the Middle N. asperus Zone. The general spotty distribution of many of the Lower and Middle N. asperus Zone indicator species on the distribution charts is a reflection of the general low yield of fossils from individual samples in the Gurnard Formation. Considering the composite assemblage from all samples in these underlying zones the diversity is quite high. The Upper N. asperus age is supported by the presence of the dinoflagellate Phthanoperidinium coreoides but lack of dinoflagellates such as Corrudinium incompositum and Eisenackia ornata characteristic of the underlying zone.

The sample at 6560 feet can only be tentatively referred to the Upper N. asperus Zone. It contains species such as Proteacidites grandis Intratriporopollenites notabilis, Proteacidites pachypolus and Lygistepollenites balmei which are not known elsewhere to range into Upper N. asperus Zone. Consequently, these species are interpreted as reworked. Similar assemblages with reworking are known from the top of Gurnard Formation in Gurnard-1 at 7200 feet and Bream-2 at 6080 feet.

Middle N. asperus Zone 6571(1) to 6587(0) feet -

The base of this zone is picked at 6587 feet on the presence of the important pollen species Triorites magnificus. The dinoflagellates from the samples support this age and are very similar to the assemblages from the Browns Creek Clays in the Otway Basin (Cookson and Eisenack, 1965). The samples however, only contain rare rather dubious specimens of the dinoflagellate Deflandrea extensa. Nevertheless, they are age equivalent to the dinoflagellate zone bearing this name (Partridge, 1976). The characteristic dinoflagellate species in this zone in Swordfish-1 occur together with D. extensa in the Middle N. asperus Zone in Groper-1. From the geographic distribution of D. extensa in the Gippsland Basin it appears that D. extensa could be restricted to very shallow water, near shore environments, and to lakes and lagoons developed behind the shoreline.

Lower N. asperus Zone 6619(0) to 6709(1) feet -

The base of this zone can be readily picked on the rise in abundance of Nothofagidites pollen and the synchronous decrease of Haloragacidites harrisii (Casuarina) pollen (see Table 2). The base can also be defined by the first occurrence of Proteacidites recavus and P. rugulatus. The top is chosen on the negative evidence of absence of forms characteristic of the overlying zone.

Within the Lower N. asperus Zone in Swordfish-1, three dinoflagellate assemblages or zones can be recognised. The youngest zone is based on the occurrence of Deflandrea heterophylcta at 6619 and 6631 feet. The Wetzeliella echinosuturata zone is based on the occurrence of this species at 6658 feet. The Areosphaeridium diktyoplokus zone is for those samples between 6671 and 6709 feet containing A. diktyoplokus or Deflandrea oebisfeldensis but lacking W. echinosuturata or D. heterophylcta.

Previously, the D. heterophylcta zone has been used cover all assemblages from the Gurnard Formation in other wells having the species D. heterophylcta, D. oebisfeldensis and A. diktyoploku either in combination or separately. The Swordfish-1 results suggest that the first appearance of D. heterophylcta is significantly later than the first appearances of the other two species. This had not been recognised before because of the relatively

poor sample density versus rate of sedimentation within the Gurnard Formation in any one well. Consequently, these dinoflagellate assemblages have previously been lumped.

Proteacidites asperopolus Zone 6730(3) to 7227(1) feet -

Swordfish-1 shows the classic high abundances of the species Proteacidites pachypolus which was originally taken as a key characteristic defining the P. asperopolus Zone. In clastic sediments in Swordfish-1, the abundance of P. pachypolus varies between 5 and 11 percent. The interbedded coals in contrast only show 1 to 2 percent P. pachypolus. Similar high abundance of this species are known from the Marlin, Snapper, Tuna and Flounder wells and from Salmon-1. However, away from this limited geographic area, the abundance of P. pachypolus or P. asperopolus is not as great and is not considered as very reliable. The base of the P. asperopolus Zone has therefore also been taken at the first appearances of the indicator species such as P. asperopolus, Santalumidites cainozoicus, Conbaculites apiculatus and Clavastephanocolporites melosus. An examination of the range charts for Swordfish-1 show that these latter species do not extend down to the base of the high abundance of P. pachypolus. Swordfish-1 also shows at least 450 feet of section with high abundance of P. pachypolus.

In terms of the regional boundary between the P. asperopolus and Upper M. diversus Zones defined on the first appearance of indicator species the results from Swordfish-1 suggest that the time range of high abundances of P. pachypolus and/or P. asperopolus extends from the upper part of the Upper M. diversus Zone through the whole of the P. asperopolus Zone. In spite of this interpretation, the base of the P. asperopolus Zone in Swordfish-1 is taken at the base of the P. pachypolus abundance to agree with the boundary in adjacent wells. Re-evaluation of all wells in this part of the Gippsland Basin to conform with the regional base of the P. asperopolus Zone is beyond the scope of this report.

Upper M. diversus Zone 7279(2) to 7468(1) feet -

The base of this zone is taken at the first appearance of the species Proteacidites xestoformis, P. tuberculiformis, Triporopollenites ambiguus and T. helosus while the boundary with the overyling P. asperopolus Zone is placed at the base of the section containing abundant P. pachypolus. Table 2 however, clearly shows that the P. pachypolus abundance is characteristic of clastic sediments and not the coals. The highest two samples in the Upper M. diversus Zone which are coals, may therefore not be entirely reliable and can only be given a confidence rating of 2.

Lower M. diversus Zone 7591(1) to 7978(0) feet -

The base of this zone is readily identified from the diverse assemblages obtained from the two samples in the Wetzeliella hyperacantha dinoflagellate ingression. A number of spore-pollen species from these samples are diagnostic of this zone including Intratriporopollenites notabilis, Crassiretitriletes vanraadshoovenii, Spinizonocolpites prominatus and Proteacidites pachypolus. The presence of Lygistepollenites balmei in these same samples is interpreted as reworking. The samples overlying this basal transgression are of somewhat lower diversity but can still be assigned to the Lower M. diversus Zone on presence of Tetracolporites multistrixus and T. textus and lack of indicator species for the overlying zones.

Upper Lygistepollenites balmei Zone 8054(1) feet -

This single samples is assigned to the L. balmei Zone on the common presence of the nominated species and occurrence of Polycolpites langstonii. The presence of Proteacidites grandis indicates the sample is from the Upper subdivision of the L. balmei Zone.

REFERENCES

Cookson, I.C., and Eisenack, A., 1965,
Microplankton from the Browns Creek Clays,
SW Victoria: Proc. Roy. Soc. Victoria, vol.79, no. 1, p. 119-131.

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The geological expression of eustacy in the Early Tertiary of the Gippsland Basin : APEA, Jour. vol. 16, pt. 1, p. 73-79.

TABLE 1: Summary of Palynological Analyses, Swordfish-1, Gippsland Basin, Australia.

	Sample and Depth		Zone	Age	Confidence Rating	Preservation	Diversity	Remarks
1999.48	SWC 34	6560'	Upper N. asperus	Early Oligocene	2	Fair to poor	High	Reworking common
2000.7	SWC 33	6564'	Upper N. asperus	Early Oligocene	0	Good	Moderate	
2002.8	SWC 32	6571'	Middle N. asperus	Late Eocene	1	Fair	Moderate	
2007.7	SWC 31	6587'	Middle N. asperus	Late Eocene	0	Very good	High	With Triorites magnificus
	SWC 30	6604'	Indet.	Middle-Late Eocene	-	Fair	Low	
2017.4	SWC 29	6619'	Lower N. asperus	Middle Eocene	0	Good	High	D. heterophylcta Dinoflagellate zone
(2017.7 – 2020.8)	Cuttings	6620'-30'	Lower N. asperus	Middle Eocene	3	Fair	Moderate	
2021.1	SWC 28	6631'	Lower N. asperus	Middle Eocene	0	Good	Moderate	Top occurrence of A. diktyoplokus
(2020.8 – 2023.8)	Cuttings	6630'-40'	Lower N. asperus	Middle Eocene	3	Fair	Moderate	
2024.78	SWC 27	6643'	Lower N. asperus	Middle Eocene	1	Fair	Moderate	
2029.35	SWC 26	6658'	Lower N. asperus	Middle Eocene	1	Fair	Low	Occurrence of Wetzeliella echinosuturata Wilson
2033.3	SWC 25	6671'	Lower N. asperus	Middle Eocene	1	Poor	Moderate	
2037.5	SWC 24	6685'	Lower N. asperus	Middle Eocene	1	Fair	Moderate	
2040.6	SWC 23	6695'	Lower N. asperus	Middle Eocene	0	Good	High	
2041.55	SWC 22	6698'	Lower N. asperus	Middle Eocene	0	Fair	Moderate	
2044.9	SWC 21	6709'	Lower N. asperus	Middle Eocene	1	Fair	Moderate	
	SWC 20	6732'	Indet.	Early Eocene?	-	Good	Low	Very low microfossil yield
(2051.3 – 2054.3	Cuttings	6730'-40'	P. asperopolus	Early Eocene	3	Fair	Fairly low	Coal fraction of cuttings
2057.4 – 2060.4)	Cuttings	6750'-60'	P. asperopolus	Early Eocene	3	Fair	Low	
	SWC 19	6775'	Indet.	Early Eocene	-	Good	Very low	Virtually barren
2062.0	SWC 18	6785'	P. asperopolus	Early Eocene	1	Fair	Moderate	
2109.5	SWC 17	6921'	P. asperopolus	Early Eocene	1	Fair	Moderate	
2133.6	SWC 16	7000'	P. asperopolus	Early Eocene	1	Fair	Moderate	
2142.7 – 2145.78	Cuttings	7030'-40'	P. asperopolus	Early Eocene	3	Fair	Moderate	Coal fraction of cuttings
2182.3 – 2185.4	Cuttings	7160'-70'	P. asperopolus	Early Eocene	3	Fair	Moderate	Coal fraction of cuttings
2185.1	SWC 14	7169'	P. asperopolus	Early Eocene	1	Good	High	
2202.78	SWC 13	7227'	P. asperopolus	Early Eocene	1	Good	Moderate	
2218.6	SWC 12	7279'	Upper M. diversus	Early Eocene	2	Fair	Low	Coal lithology
2218.2 – 2291.2	Cuttings	7280'-90'	Upper M. diversus	Early Eocene	3	Fair	Moderate	Coal fraction of cuttings
2238.45	SWC 11	7344'	Upper M. diversus	Early Eocene	1	Fair	Moderate	
2267.7	SWC 10	7440'	Upper M. diversus	Early Eocene	1	Good	High	
2276.2	SWC 9	7468'	Upper M. diversus	Early Eocene	1	Good	High	
2313.7	SWC 8	7591'	Lower M. diversus	Early Eocene	1	Fair	High	
2337.2	SWC 7	7668'	Lower M. diversus	Early Eocene	0	Poor	Moderate	Diverse dinoflagellate suite
2403.6	SWC 5	7886'	Lower M. diversus	Early Eocene	1	Fair	Moderate	
2426.5	SWC 4	7961'	Lower M. diversus	Early Eocene	0	Good	High	Proteacidites pachypolus fairly common. Wetzeliella hyperacantha Zone.
2431.6	SWC 3	7978'	Lower M. diversus	Early Eocene	0	Good	Moderate	W. hyperacantha Dinoflagellate Zone.
2454.2	SWC 2	8054'	Upper L. balmei	Late Paleocene	1	Fair	Moderate	

	Sample Depths in feet	Dinoflagellates	Spores	Gymnosperms	Angiosperms (total)	Phyllocladidites mawsonii	Nothofagidites spp.	H. harrisii	Malvacepollis spp.	Proteacidites pachypolus	Prot. grandis (complex)
N. asperus	6564	41	17	44	39	11	18	15	X	-	-
	6587	69	16	20	64	7	27	17	2	-	-
	6695	17	4	29	67	14	30	11	1	X	-
	6698	8	13	40	47	11	16	6	1	4	1
	6709	6	4	28	68	14	22	7	5	X	X
P. asperopolus	6730-40 *	-	-	12	88	-	2	16	2	1	4
	6785	-	2	6	92	-	1	19	17	8	4
	6921	25	10	4	86	-	6	43	2	5	X
	7000	-	7	18	75	1	1	18	7	7	10
	7030-40 *	-	-	-	100	-	3	63	12	1	-
	7160-70 *	-	2	15	83	-	X	33	5	2	X
	7169	3	39	8	53	-	X	4	3	11	11
	7227	-	20	11	69	-	4	12	11	6	-
U.M. diversus	7279 *	-	-	9	91	-	-	2	40	-	-
	7280-90 *	-	1	2	97	-	3	72	6	-	1
	7344	39	19	2	79	1	5	61	2	-	-
	7440	-	27	6	67	-	4	25	5	-	1

* Coal lithologies

Note: Dinoflagellates expressed as percentage of combined spores, pollen and dinoflagellates. Other categories expressed as percentage of total spore-pollen count excluding dinoflagellates and acritachs.

Table-2: Relative abundance of various microfossils from selected samples in Swordfish-1.

BASIN Gippsland DATE May 2, 1977

WELL NAME Swordfish-1 ELEVATION K.B: + 83 feet

AGE	PALYNOLOGIC ZONES	HIGHEST DATA					LOWEST DATA				
		Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time	Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time
OLIG-MIO.	P. tuberculatus										
EOCENE	U. N. asperus	6560	2	6564	0		6564	0			
	M. N. asperus	6571	1				6587	0			
	L. N. asperus	6619	0				6709	1			
	P. asperopolus	6730	3	6785	1		7227	1			
	U. M. diversus	7279	2	7344	1		7468	1			
	M. M. diversus										
	L. M. diversus	7591	1				7978	0			
PALEOCENE	U. L. balmei	8054	1				8054	1			
	L. L. balmei										
	T. longus										
LATE CRETACEOUS	T. lilliei										
	N. senectus										
	C. trip./T.pach.										
	C. distocarin.										
	T. pannosus										
EARLY CRETACEOUS											
PRE-CRETACEOUS											

COMMENTS: Wetzeliella hyperacantha Dinoflagellate Zone 7961 ft (1) to 7978 ft (1)

For discussion of dinoflagellate sequence between 6560 to 6709 feet see palnology report.

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 May 2, 1977

DATA REVISED BY: _____ DATE _____

FORM No R 315 12/72

BASIN GIPPSLAND DATE May 2, 1977

WELL NAME Salmon-1 ELEVATION + 99 feet

AGE	PALYNOLOGIC ZONES	HIGHEST DATA					LOWEST DATA				
		Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time	Preferred Depth	Rtg.	Alternate Depth	Rtg.	2 way time
OLIG-MIO.	P. tuberculatus										
EOCENE	U. N. asperus										
	M. N. asperus										
	L. N. asperus	6630					6688	2			
	P. asperopolus	6888	1				7172	1			
	U. M. diversus	7220	2	7310	1		7310	1			
	M. M. diversus										
	L. M. diversus	7844	1				7844	1			
PALEOCENE	U. L. balmei	8008	1				8152	1			
	L. L. balmei	8820	2				9865	1			
	T. longus										
LATE CRETACEOUS	T. lilliei										
	N. senectus										
	C. trip./T.pach.										
	C. distocarin.										
	T. pannosus										
EARLY CRETACEOUS											
PRE-CRETACEOUS											

COMMENTS: Deflandrea heterophylcta Dinoflagellate Zone 6630'(1) to 6688'(2)

Eisenackia crassitabulata Dinoflagellate Zone 9250' (2)

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: L.E.S./A.D.P.; A.D.P. DATE June 1971; Dec. 1971; Jan. 1975.

DATA REVISED BY: A.D. Partridge DATE May, 1977.

FORM No R 315 12/72

Well Name SWORDFISH-1 Basin GIPPSLAND Sheet No. 1 of 7

SAMPLE TYPE *	S	S	S	S	S	S	T	S	T	S	S	S	S	S	S	S	S	T	T	S	S	S	S	T	T	S	S	S
DEPTHS / PALYNOMORPHS	6560	6564	6571	6587	6604	6619	6620-30	6631	6630-40	6643	6658	6671	6685	6695	6698	6709	6732	6730-40	6750-60	6775	6785	6921	7000	7030-40	7160-70	7169	7227	7279
A. qualumis																												
A. acutullus																												
A. luteoides																												
A. oculatus																												
A. sectus																												
A. triplaxis																												
A. obscurus																												
B. disconformis			/										/		/								/			/	/	
B. arcuatus																/												
B. elongatus					/																							
B. mutabilis																												
B. otwayensis																												
B. elegansiformis																		/						/				/
B. trigonalis				/																								
B. verrucosus														/														
B. bombaxoides																												
B. emaciatus		/																/										
C. bullatus																												
C. heskermensis																												
C. horrendus																												
C. meleosus																												
C. apiculatus																												
C. leptos																												
C. striatus																												
C. vanraadshoovenii																												
C. orthoteichus/major				/	/											/				/	/				/		/	
C. annulatus	C				C		C		C										C									
C. gigantis																												
C. splendens						/		/			/			/	/	/					/		/			A	/	
D. australiensis		/	/	/																								
D. granulatus		/	/	/	/			/			/	/	/	/	/	/					/	/	/			/	/	
D. tuberculatus		/						/		/			/	/	/	/												
D. delicatus																												
D. semilunatus																										/		
E. notensis																												
E. crassiexinus																							/					
F. balteus	/																											
F. crater																												
F. lucunosus									C																			
F. palaequetrus			/																									
G. edwardsii																												
G. rudata																												
G. divaricatus																												
G. gestus																												
G. catathus																										/		
G. cranwellae																												
G. wahooensis																												
G. bassensis														/														
G. nebulosus																												
H. harrisii	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/	/
H. astrus																					/			•	/			
H. elliottii		/	/					/		/													/		/			
I. anguloclavatus																/		/					/		/			
I. antipodus																												
I. notabilis	RW													RW?														
I. gremius		/				/								/														
I. irregularis		/	/						/		/																	
J. peiratus																												
K. waterbolkii			/			/			/																			
L. amplus																												
L. crassus																												
L. ohaiensis																												
L. bainii																												
L. lanceolatus														/														/
L. balmei	RW					RW									RW	RW												
L. florinii	/	/	/	/	/	/	/	/		/	/		/	/	/	/	/	A			/	/	/	/	/	/	/	/	/
M. diversus														/	/	/	/				/	/	/	/		/	/	/
M. duratus																												
M. grandis																												
M. perimagnus																												

*C= core; S= sidewall core; T= cuttings.

Well Name SWORDFISH-1 Basin GIPPSLAND Sheet No. 2 of 7

SAMPLE TYPE *	T	S	S	S	S	S	S	S	S	S
DEPTHS / PALYNOMORPHS	7280-90	7344	7440	7468	7591	7668	7886	7961	7978	8054
A. qualumis										
A. acutullus										
A. luteoides										
A. oculatus										
A. sectus										
A. triplaxis										
A. obscurus										
B. disconformis							/			
B. arcuatus		/		/			/			
B. elongatus										
B. mutabilis										
B. otwayensis										
B. elegansiformis										
B. trigonalis										
B. verrucosus										
B. bombaxoides										
B. emaciatus										
C. bullatus										
C. heskermensis				/						
C. horrendus										
C. meleosus										
C. apiculatus										
C. leptos										
C. striatus										
C. vanraadshoovenii								/	/	
C. orthoteichus/major				/						
C. annulatus										
C. gigantis								/		
C. splendens		/	/			/		/	/	/
D. australiensis					/					
D. granulatus		/	/	/		/ A	/			
D. tuberculatus							/			
D. delicatus										
D. semilunatus			/							
E. notensis										
E. crassiexinus										
F. balteus										
F. crater										
F. lucunosus										
F. palaequetrus										
G. edwardsii										
G. rudata										
G. divaricatus										
G. gestus										
G. catathus										
G. cranwellae										
G. wahooensis										
G. bassensis										
G. nebulosus										
H. harrisii	/	/	/	/			/	/	/	
H. astrus	/									
H. elliottii										
I. anguloclavatus			/	/	/					
I. antipodus										
I. notabilis				/				/		
I. gremius				/						
I. irregularis							/			
J. peiratus										
K. waterbolkii										
L. amplus										
L. crassus		/								
L. ohaiensis										
L. bainii										
L. lanceolatus										
L. balmei								RW	RW	/ A
L. florinii	/		/	/	/	/	/			
M. diversus	/	/	/	/	/		/	/	/	
M. duratus										
M. grandis										
M. perimagnus										

*C= core; S= sidewall core; T= cuttings.

Well Name SWORDFISH-1 Basin GIPPSLAND Sheet No. 3 of 7

SAMPLE TYPE *	S	S	S	S	S	S	T	S	T	S	S	S	S	S	S	S	S	T	T	S	S	S	S	T	T	S	S	S
DEPTHS / PALYNOMORPHS	6560	6564	6571	6587	6604	6619	6620-30	6631	6630-40	6643	6658	6671	6685	6695	6698	6709	6732	6730-40	6750-60	6775	6785	6921	7000	7030-40	7160-70	7169	7227	7279
M. subtilis																												A
M. ornamentalis																												
M. hypolaenoides																												
M. homeopunctatus																												
M. parvus/mesonesus																												
M. tenuis																												
M. verrucosus																												
M. australis																												
N. asperus																												
N. asperoides																												
N. brachyspinulosus																												
N. deminutus																												
N. emarcidus/heterus																												
N. endurus																												
N. falcatus																												
N. flemingii																												
N. goniatus																												
N. senectus																												
N. vansteenisii																												
O. sentosa																												
P. ochesis																												
P. catastus																												
P. demarcatus																												
P. magnus																												
P. polyoratus																												
P. vesicus																												
P. densus																												
P. velosus																												
P. morganii/jubatus																												
P. mawsonii																												
P. reticulosaccatus																												
P. verrucosus																												
P. crescentis																												
P. esobalteus																												
P. langstonii																												
P. reticulatus																												
P. simplex																												
P. varus																												
P. adenanthoides (Prot.)																												
P. alveolatus																												
P. amolosexinus																												
P. angulatus																												
P. annularis																												
P. asperopolus																												
P. biornatus																												
P. clarus																												
P. cleinei																												
P. confragosus																												
P. crassis																												
P. delicatus																												
P. formosus																												
P. grandis	RW																											
P. grevillaensis																												
P. incurvatus																												
P. intricatus																												
P. kopiensis	RW																											
P. lapis																												
P. latrobensis																												
P. leightonii	RW																											
P. obesolabrus																												
P. obscurus																												
P. ornatus																												
P. otwayensis																												
P. pachypolus	RW																											
P. palisadus																												
P. parvus																												
P. plemmelus																												
P. prodigus																												
P. pseudomoides																												
P. recavus																												

*C= core; S= sidewall core; T = cuttings.

Well Name SWORDFISH-1 Basin GIPPSLAND Sheet No. 4 of 7

SAMPLE TYPE *	T	S	S	S	S	S	S	S	S	S
DEPTHS / PALYNOMORPHS	7280-90	7344	7440	7468	7591	7668	7886	7961	7978	8054
M. subtilis	/		/	/			/			
M. ornamentalis										
M. hypolaenoides										
M. homeopunctatus								/		
M. parvus/mesonesus	/		/			/				
M. tenuis										
M. verrucosus										
M. australis										
N. asperus										
N. asperoides										
N. brachyspinulosus			/				/			
N. deminutus			/							
N. emarcidus/heterus	/	/	/					/		
N. endurus										
N. falcatus										
N. flemingii			/	/				/		
N. goniatus										
N. senectus										
N. vansteenisii		/								
O. sentosa										
P. ochesis										
P. catastus										
P. demarcatus			/	/						
P. magnus										
P. polyoratus										
P. vesicus										
P. densus									/	
P. velosus										
P. morganii/jubatus										
P. mawsonii		/			/	/				
P. reticulosaccatus										
P. verrucosus										
P. crescentis										
P. esobalteus	/		/							
P. langstonii									/	
P. reticulatus										
P. simplex										
P. varus				/				/		
P. adenanthoides (Prot.)	/		/	/						
P. alveolatus										
P. amolosexinus										
P. angulatus										
P. annularis	/		/	/						
P. asperopolus										
P. biornatus				/				/		
P. clarus										
P. cleinei										
P. confragosus										
P. crassis										
P. delicatus										
P. formosus										
P. grandis	/		/	/	/ A	/	/		/	
P. grevillaensis										
P. incurvatus										
P. intricatus										
P. kopiensis										
P. lapis			/							
P. latrobensis			/							
P. leightonii		/						/		
P. obesolabrus										
P. obscurus			/							
P. ornatus										
P. otwayensis										
P. pachypolus	/							/		
P. palisadus										
P. parvus										
P. plemmelus										
P. prodigus							/			
P. pseudomoides										
P. recavus										

*C= core; S= sidewall core; T= cuttings.

Well Name SWORDFISH-1 Basin GIPPSLAND Sheet No. 5 of 7

SAMPLE TYPE *	S	S	S	S	S	S	T	S	T	S	S	S	S	S	S	S	S	T	T	S	S	S	S	T	T	S	S	S
DEPTHS / PALYNOMORPHS	6560	6564	6571	6587	6604	6619	6620-30	6631	6630-40	6643	6658	6671	6685	6695	6698	6709	6732	6730-40	6750-60	6775	6785	6921	7000	7030-40	7160-70	7169	7227	7279
P. rectomarginis		/							C				aff															
P. reflexus																												
P. reticulatus																												
P. reticuloconcavus													/	/		/												
P. reticuloscabratus													/	/														
P. rugulatus														/														
P. scitus																												
P. stipplatus		/																										
P. tenuiexinus	/											/											/					
P. truncatus																												
P. tuberculatus																												
P. tuberculiformis																/							/					
P. tuberculotumulatus																												
P. xestoformis (Prot.)																					/					/		
Q. brossus																												
R. boxatus																/												
R. stellatus																												
R. mallatus				/		/															/							
R. trophus														/														
S. cainozoicus												/	/	/		/	/	/										
S. rotundus		/						/						/													/	
S. digitatoides																												
S. marlinensis																												
S. rarus				/																								
S. meridianus										/	/		/	/	/	/	/	A			/			/	/			
S. prominatus																												
S. uvatus																												
S. punctatus				/		/				/			/			/												
S. regium																												
T. multistrixus (CP4)																												
T. textus																												
T. verrucosus																												
T. securus																												
T. confessus (C3)																												
T. gillii																												
T. incisus																												
T. longus																												
T. phillipsii																/												
T. renmarkensis																												
T. sabulosus																												
T. simatus																												
T. thomasii																												
T. waiparaensis																												
T. adelaidensis (CP3)						/								/	/	/	/	/					/	/				
T. angurium																												
T. delicatus																												
T. geraniodes																												
T. leuros																		/										
T. lilliei																												
T. marginatus																												
T. moultonii																								•				
T. paenestriatus		/				/												/			/		/	/		/	/
T. retequetrus																												
T. scabratus														/														
T. sphaerica																	/											
T. magnificus (P3)				/																								
T. spinosus																						/						
T. ambiguus			/																									
T. chnosus																												
T. helosus						/												A										
T. scabratus												/		/														
T. sectilis																												
V. attinatus																												
V. cristatus			/																									
V. kopukuensis	/	/			/	/		/		/	/					/												

*C= core; S= sidewall core; T= cuttings.

Well Name SWORDFISH-1 Basin GIPPSLAND Sheet No. 6 of 7

SAMPLE TYPE *	T	S	S	S	S	S	S	T	T	S
DEPTHS / PALYNOMORPHS	7280-90	7344	7440	7468	7591	7668	7880	[illegible]	[illegible]	8054
P. rectomarginis										
P. reflexus										
P. reticulatus										
P. reticuloconcavus										
P. reticuloscabratus			/							
P. rugulatus										
P. scitus										
P. stipplatus										
P. tenuiexinus			/	/		/				
P. truncatus										
P. tuberculatus										
P. tuberculiformis		/	/							
P. tuberculotumulatus										
P. xestoformis (Prot.)				/						
Q. brossus										
R. boxatus										
R. stellatus										
R. mallatus			/	/						
R. trophus										
S. cainozoicus										
S. rotundus										
S. digitatoides										
S. marlinensis										
S. rarus										
S. meridianus	/	/	/	/	/					
S. prominatus							/			
S. uvatus										
S. punctatus			/						/	
S. regium										
T. multistrixus (CP4)			/		A	/			/	
T. textus					/				/	
T. verrucosus										
T. securus										
T. confessus (C3)										
T. gillii										
T. incisus										
T. longus										
T. phillipsii										
T. renmarkensis										
T. sabulosus										
T. simatus										
T. thomasii										
T. waiparaensis										
T. adelaidensis (CP3)	/			/						
T. angurium										
T. delicatus										
T. geraniodes										
T. leuros										
T. lilliei										
T. marginatus										
T. moultonii				/						
T. paenestriatus	/		/			/	/			
T. retequetrus										
T. scabratus			/		CF					
T. sphaerica			/							
T. magnificus (P3)										
T. spinosus										
T. ambiguus	/			/						
T. chnosus										
T. helosus			/							
T. scabratus										
T. sectilis										
V. attinatus										
V. cristatus										
V. kopukuensis										
P. bowenii							/			

*C= core; S= sidewall core; T= cuttings.

Well Name SWORDFISH-1 Basin GIPPSLAND Sheet No. 7 of 7

SAMPLE TYPE *	S	S	S	S	S	S	S	S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	S	S	S	
DEPTHS / PALYNOMORPHS	6560	6564	6571	6587	6604	6619	6631	6643	6658	6671	6685	6695	6698	6709		6785	6921	7000	7169	7227	7344	7468	7591	7668	7886	7961	7978	
Lept. victorianum	/																											
Ling. solarum	/																											
Syst. placacantha	/	/																										
Cleist. epacrum	/					/																						
Reticulodinium spp.	/					/																						
Delf. phosphoritica	/					/																						
Dino. simplex	/				/					/																		
H/Kolp. rigaudae	/													/														
Oper. centrocarpum	/	A	/	/	/	/	/			/		/		/		/	/		/							/		
Spin. ramosa	/	/	/	/	/	/				/						/											/	
Phth. coreoides		/		/																								
Nema. balcombiana			/																									
Lept. dispertitum			/																									
Corr. incompositum			/	/																								
Ling. machaerophorum			/							/																		
Tect. marlum			/	/		/		/																				
Defl. extensa			cf	cf																								
Eise. ornata				/																								
Dyph. ariensis				/																								
Duos. nudum				/																								
Emme. urnaformis				/																								
Cass. imperfecta				/																								
Bati. compta				/		/																						
Phth. eocenicum				/		/																						
Corr. corrugatum				/	/	/																						
Palm. reticulifera				/		/																						
Balt. nanum				/		/																						
Cord. capricornum				/		/					cf																	
Prae. indentata				/			/																	/				
Wetz. lineidentata					cf																							
Cycl. vieta					/																							
Neot. dentalia						/																						
Hete. paxilla						/	/														<							
Defl. heterophylcta						/	/																					
Spinidinium spp.						/	/		/		/	/		/														
Areo. arcuatum							/																					
Area. diktyoplokus							/	/	/	/		/	/															
Phth. delicatum								/																				
Thal. pelagica								/				/																
Defl. oebisfeldensis								/	/	/	/	/	/	/														
Hemicystodinium spp.								/									/											
Hist. variata									/																			
Wetz. echinosuturata									/																			
Wetz. hyperacantha											/							/	/		A	/		/		/	/	
Kolp. trabeculoides												/																
Defl. obliquipes												/																
Holo. tricornus													/															
Seno. compacta														/														
Kenleyia spp.																/								/		/	/	
Cord. inodes																								/				
Diph. colligerum																								/				
Wetz. homomorpha																								/				
Adna. retiintextum																								/		/		
Kenl. lophophora																										/		
Kenl. pachycerata																										/		
Spin. crassipellis																										/		
Balt. septatum																										/		
Eocl. peniculatum																											/	

*C = core; S = sidewall core; T = cuttings.

ENCLOSURES

ENCLOSURES

PE902277

This is an enclosure indicator page.
The enclosure PE902277 is enclosed within the container PE902276 at this location in this document.

The enclosure PE902277 has the following characteristics:

ITEM_BARCODE	= PE902277
CONTAINER_BARCODE	= PE902276
NAME	= Swordfish Prospect True Velocity to Top of Latrobe Group (Post Swordfish -1)
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= SEISMIC
SUBTYPE	= HRZN_CONTR_MAP
DESCRIPTION	= Swordfish Prospect True Velocity to Top of Latrobe Group (Post Swordfish -1), enclosure from WCR, for Swordfish-1
REMARKS	=
DATE_CREATED	= 30/04/77
DATE_RECEIVED	=
W_NO	= W686
WELL_NAME	= Swordfish-1
CONTRACTOR	= ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE902279

This is an enclosure indicator page.
The enclosure PE902279 is enclosed within the container PE902276 at this location in this document.

The enclosure PE902279 has the following characteristics:

ITEM_BARCODE	= PE902279
CONTAINER_BARCODE	= PE902276
NAME	= Structure Map Top of Latrobe Group
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= SEISMIC
SUBTYPE	= HRZN_CONTR_MAP
DESCRIPTION	= Swordfish prospect Structure Map Top of Latrobe Group, Post Swordfish-1, (enclosure from WCR) for Swordfish-1
REMARKS	=
DATE_CREATED	= 30/04/77
DATE_RECEIVED	=
W_NO	= W686
WELL_NAME	= Swordfish-1
CONTRACTOR	= ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.
CLIENT_OP_CO	= ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.

(Inserted by DNRE - Vic Govt Mines Dept)

PE902280

This is an enclosure indicator page.
The enclosure PE902280 is enclosed within the container PE902276 at this location in this document.

The enclosure PE902280 has the following characteristics:

ITEM_BARCODE	= PE902280
CONTAINER_BARCODE	= PE902276
NAME	= Structure Map Top of Coarse Clastics
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= SEISMIC
SUBTYPE	= HRZN_CONTR_MAP
DESCRIPTION	= Swordfish Prospect Structure Map Top of Coarse Clastics, Post Swordfish-1, (enclosure from WCR) for Swordfish-1
REMARKS	=
DATE_CREATED	= 30/04/77
DATE_RECEIVED	=
W_NO	= W686
WELL_NAME	= Swordfish-1
CONTRACTOR	= ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.
CLIENT_OP_CO	= ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.

(Inserted by DNRE - Vic Govt Mines Dept)

PE906359

This is an enclosure indicator page.
The enclosure PE906359 is enclosed within the container PE902276 at this location in this document.

The enclosure PE906359 has the following characteristics:

ITEM_BARCODE	= PE906359
CONTAINER_BARCODE	= PE902276
NAME	= Geological Cross-Section
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= CROSS-SECTION
DESCRIPTION	= Geological Cross-Section (Post Swordfish-1), Enclosure from WCR for Swordfish-1
REMARKS	=
DATE_CREATED	= 31/05/77
DATE_RECEIVED	=
W_NO	= W686
WELL_NAME	= SWORDFISH-1
CONTRACTOR	=
CLIENT_OP_CO	= ESSO EXPLORATION AND PRODUCTION AUSTRALIA LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE902281

This is an enclosure indicator page.
The enclosure PE902281 is enclosed within the container PE902276 at this location in this document.

The enclosure PE902281 has the following characteristics:

ITEM_BARCODE	= PE902281
CONTAINER_BARCODE	= PE902276
NAME	= Geological Cross Section B-B'
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= CROSS_SECTION
DESCRIPTION	= Geological Cross Section B-B' , Post Swordfish-1, (enclosure from WCR) for Swordfish-1
REMARKS	=
DATE_CREATED	= 31/05/77
DATE_RECEIVED	=
W_NO	= W686
WELL_NAME	= Swordfish-1
CONTRACTOR	= ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.
CLIENT_OP_CO	= ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.

(Inserted by DNRE - Vic Govt Mines Dept)

PE902282

This is an enclosure indicator page.
The enclosure PE902282 is enclosed within the container PE902276 at this location in this document.

The enclosure PE902282 has the following characteristics:

ITEM_BARCODE	= PE902282
CONTAINER_BARCODE	= PE902276
NAME	= Time Depth Curve
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Time Depth Curve
REMARKS	=
DATE_CREATED	= 16/01/77
DATE_RECEIVED	=
W_NO	= W686
WELL_NAME	= Swordfish-1
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE906360

This is an enclosure indicator page.
The enclosure PE906360 is enclosed within the container PE902276 at this location in this document.

The enclosure PE906360 has the following characteristics:

ITEM_BARCODE	= PE906360
CONTAINER_BARCODE	= PE902276
NAME	= Sonic Calibration Curve
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Sonic Calibration Curve (enclosure from WCR) for Swordfish-1
REMARKS	=
DATE_CREATED	= 31/05/77
DATE_RECEIVED	=
W_NO	= W686
WELL_NAME	= SWORDFISH-1
CONTRACTOR	=
CLIENT_OP_CO	= ESSO EXPLORATION AND PRODUCTION AUSTRALIA LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE601426

This is an enclosure indicator page.
The enclosure PE601426 is enclosed within the container PE902276 at this location in this document.

The enclosure PE601426 has the following characteristics:

ITEM_BARCODE	= PE601426
CONTAINER_BARCODE	= PE902276
NAME	= Well Completion Log
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= COMPLETION_LOG
DESCRIPTION	= Well Completion Log
REMARKS	=
DATE_CREATED	= 20/01/77
DATE_RECEIVED	=
W_NO	= W686
WELL_NAME	= Swordfish-1
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)