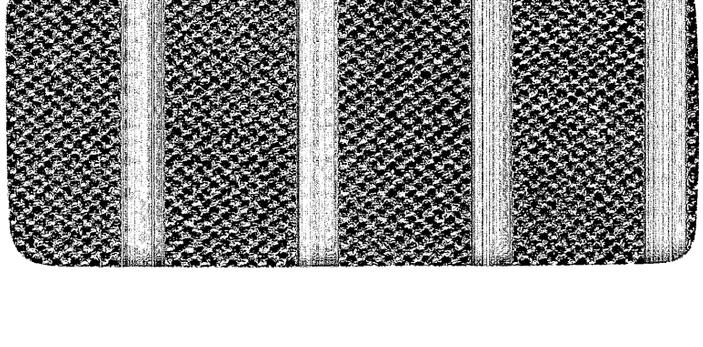
Esso



WCR

BREAM-4A

W752

ESSO EXPLORATION AND PRODUCTION
AUSTRALIA INC.

W 752

WELL COMPLETION REPORT

BREAM - 4A

GIPPSLAND BASIN

VICTORIA

ESSO AUSTRALIA LIMITED

COMPILED BY : G. LINDSAY

APRIL, 1982

BREAM-4A

WELL COMPLETION REPORT

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2. Geological Cross Section
3. Well Completion Log
4. Time Depth Curve & Sonic Calibration Curve

ATTACHMENTS

1. Mudlogging Report - Core Laboratories Australia
2. Well Location Report - Offshore navigation Inc. (missing)

ESSO AUSTRALIA LTD.

COMPLETION REPORT

1. WELL DATA RECORD

LOCATION

WELL NAME	STATE	PERMIT or LICENCE	GEOLOGICAL BASIN	FIELD
BREAM-4A	VIC	VIC/P1	GIPPSLAND	BREAM

CO-ORDINATES	MAP PROJECTION	GEOGRAPHICAL LOCATION
LATITUDE 38° 30' 27.09" S LONGITUDE 147° 44' 50.86" E X 565171 E Y 5737592N		BASS STRAIT

ELEVATIONS & DEPTHS

ELEVATIONS	WATER DEPTH	TOTAL DEPTH / MEASURED DEPTH	Average Angle
KB 21m RT	59m	2421m 2421m	VERTICAL
	PLUG BACK TYPE	REASONS FOR PLUGGING BACK	
		P & A	

DATES

MOVE IN	RIG UP	SPUDDED
17th August 1981	17th August 1981	18th August 1981
RIG DOWN COMPLETE	RIG RELEASED	PRODUCTION UNIT - RIG UP
25th September 1981	25th September 1981	-
PRODUCTION UNIT - RIG DOWN		INITIAL PRODUCTION ESTABLISHED
-		-

MISCELLANEOUS

OPERATOR	PERMITTEE or LICENCE	ESSO INTEREST / OTHER INTEREST
ESSO EXPLORATION & PRODUCTION AUSTRALIA	HEMATITE PETROLEUM PTY LTD	ESSO INTEREST 50% OTHER INTEREST 50%

CONTRACTOR	RIG NAME	EQUIPMENT TYPE
SOUTH SEAS DRILLING COMPANY	SOUTHERN CROSS	SEMI-SUBMERSIBLE

TOTAL RIG DAYS	DRILLING AFE NO.	COMPLETION NO.	TYPE COMPLETION
40	-	-	P & A

WELL CLASSIFICATION		
Before Drilling	-	Outpost/Extension Test
After Drilling	-	Outpost/Extension Well

WELL : BREAM-4A

2. CASING - LINER - TUBING RECORD						
Type	Size	Weight	Grade	Thread	No. Joints	Depth (KB)
PILE JOINT	20"	670 lb/ft	X-52	CC	1	90.1m
CROSSOVER JOINT	20"	129 lb/ft	X52	CC x JV	1	101.2m
	20"	94 lb/ft	X52	JV	7 + FLOAT SHOE	203m
	13-3/8"	54.5 lb/ft	K55	BUTT	58 JOINTS +	789m
					FLOAT SHOE + FLOAT COLLAR	

3. CEMENT RECORD						
String	20"		20"		13-3/8"	
Type of Cement	Class "N" 26% ~~Equiv.Gel~~	Class "N" Cmt. ~~2% Ca Cl_2~~	Class "N" 12% dry ~~BLEND GEL~~ 2% Ca Cl_2	2% Ca Cl_2 Class "N"	Class "N" Freshwater	Class "N"
Slurry Volume	627 sx	350 sx	627 sx	350 sx	692 sx	250 sx
Slurry Density	1.50 SG	1.87 SG	1.48 SG	1.87 SG	1.87 SG	1.87 SG
Cement Top	Seafloor		Seafloor		331m	
Casing Thread	CC x JV		JV		BUTT	
No. of Centralizers			5		12	
No. of Scratchers						
Stage Collars						
Remarks			Cement returns to Seafloor		Plug did not bump Floats held.	

4. CEMENT PLUGS				
Plug	P & A Plug 1	P & A Plug 2	P & A Plug 4	Bridge Plug
Cement Type	Class "N"	Class "N"	Class "N"	
Slurry Volume	305 sx	281 sx	389 sx	
Cement Base	1980	820	249	350
Cement Top	1836	720	102	
Remarks	1% HR 6L Fresh water	Seawater	Seawater	

WELL : BREAM-4A

5. SAMPLES, CONVENTIONAL CORES, SIDEWALL CORES.			
INTERVAL	TYPE	INTERVAL	TYPE
210 - 300m	5m samples cuttings washed and dried.	300 - 800m	10m samples cuttings unwashed & bagged.
300 - 800m	10m samples cuttings washed and dried.	800 - 1920m	5m samples cuttings unwashed & bagged.
800 - 1920m	5m samples cuttings washed and dried.	1960 - 2421m	5m samples cuttings unwashed & bagged.
1960.2 - 2421m	5m samples cuttings washed and dried.	1920 - 1960.2m	Conventional core.
210 - 1275m	Canned samples every 20m.	789 - 2421m	101 sidewall cores.
1275 - 2421m	Canned samples every 15m		
210 - 300m	5m samples cuttings unwashed & bagged.		

6. WIRELINE LOGS AND SURVEYS				
	Type ¢ Scale	From To	Type & Scale	From To
1.	ISF/Sonic/GR 1 : 500) 1 : 200)	80 - 803m	7. RFT/GR	789 - 2421m ?
2.	ISF/Sonic/MSFL/GR 1 : 200) 1 : 500)	730 - 2426m	8. DLT/MSFL/GR Merge Log 1:500 1:200	1850 - 2421m
3.	DLT/GR 1 : 500) 1 : 200)	1850 - 2421m	9. Cyberlook	730 - 2426m
4.	LDT/CNL/GR 1 : 500) 1 : 200)	789 - 2421m		
5.	HDT	1850 - 2421m		
6.	CST (102 shots)	808 - 2407.5m		

7. GEOLOGICAL AND GEOPHYSICAL ANALYSIS

AGE	UNIT/HORIZON	DEPTH (m) PREDICTED KB	DEPTH (m) ACTUAL KB	DEPTH (m) ACTUAL SUBSEA	THICKNESS(m)
Pliocene/Miocene	Gippsland Limestone	80	80	59	931
Miocene/Oligocene	Lakes Entrance Formation	1011	1011	990	845
Eocene/Paleocene	Latrobe Group (Gurnard Fm.)	1855	1856	1835	57 (Gurnard Fm)
	("Coarse Clastics")	1922	1913	1892	
	P.asperopolus Seismic Marker	2032	2025	2004	
	Total Depth	2421	2421	2400	

INTRODUCTION

The object of Bream-4A was to determine the western extent of the Bream Field and to test the reservoir quality of the strata.

PREVIOUS DRILLING HISTORY

In addition to Bream-4A the Bream oil and gas field has been penetrated by two other wells, Bream-2 and Bream-3. The first well, Bream-1, only reached a TD of 231 metres and Bream-4 was abandoned at a TD of 220 metres. The abandonment of Bream-4 was necessitated when the BOP was dropped while running the riser, damaging both the BOP and the well head. Bream-2 was drilled in April 1969 to a TD of 3,248 metres and Bream-3 in January 1970 to a TD of 3,357 metres.

GEOLOGICAL ANALYSIS

Structure

The structure at the top of the "Coarse Clastics", which is the top of the reservoir, is shown in Enclosure 1. As can be seen, the field consists of an east-west trending anticlinal structure which has a lobe extending north-eastwards from near the western end of the field. Faulting is only minor at this level.

Igneous intrusions into the upper Latrobe Group have modified the top Latrobe structure, increasing the height of closure at this level. (Enclosure II)

Stratigraphy

The stratigraphy encountered in the Bream-4A well, was generally as predicted and did not differ greatly from that found in the two crestal wells, Bream-2 and Bream-3. (Enclosure II)

The field is sealed by the Lakes Entrance Formation. The Gurnard Formation at the top of the Latrobe Group is composed of glauconitic mudstones and siltstones and in Bream-4A is non-net.

The underlying N.asperus and P.asperopolus sands of the Latrobe Group "Coarse Clastics" deltaic/marginal marine sequence provide the main reservoir for the Bream field. Average porosities of 20-22% and net to gross of 60-65% was calculated for the resevoir section of Bream-4A.

Beneath these sands the M.diversus zone consists of a sequence of thick coal seams, shales and thin sands.

The underlying upper L.balmei is composed of thick channel sands and only relatively minor coals and shales.

HYDROCARBONS

The oil/water and gas/oil contacts were determined to be approximately one metre and two metres respectively, deeper in Bream-4A than was predicted.

Since the oil/water contact was intersected within a good quality sand zone, it can be precisely positioned from the log analysis at -1929 metres. The gas/oil contact, however, is not quite so clear. Log analysis indicates that it was intersected within a one metre thick shale unit between -1916 metres and -1917 metres. Pressure data suggests that the contact is at -1915 metres $^{+}_{-}$ 1 metre. Therefore, -1916 was selected as the most likely position of the gas/oil contact to be compatible with both the log analysis and the pressure data.

No hydrocarbons were encountered within the Latrobe Group below the top of "Coarse Clastics" reservoir.

GEOPHYSICAL ANALYSIS

Remapping of the field in the vicinity of Bream-4A has resulted in extension of the reservoir beneath a low plateau zone, to the west of the well (see Enclosure 1).

Although the increase in area of the reservoir due to this extension is significant, no major increase in reservoir volume resulted. This is due to the reservoir zone in the extended area only being very thin.

The extension of the field to the west is mainly attributed to the alteration of the velocity field over the area, and the greater precision to which the top of "Coarse Clastics" event can be picked on reprocessed seismic data.

At the well location the main target zone, the top of "Coarse Clastics" came in 9 metres high to prediction, a descrepancy of 0.5%. On repicking the event on reprocessed seismic data and calculating a lag value for the event at the Bream-4A well, this error was reduced to 0.2%. The remainder of the error is attributed to the velocity analysis procedure used.

8. SUMMARY OF FORMATION TEST PROGRAMME

BREAM-4A

TEST	SEAT	DEPTH (METRES) K.B.	CHAMBER Gal	RECOVERY OIL CC	RECOVERY COND.	RECOVERY GAS	RECOVERY FORMATION WATER	RECOVERY FILTRATE CC	HEWLETT-PACKARD FORMATION PRESSURE MPag	HEWLETT-PACKARD FORMATION PRESSURE Psig	HEWLETT-PACKARD HYDROSTATIC PRESSURE MPag	HEWLETT-PACKARD HYDROSTATIC PRESSURE Psig	HORIZONTAL PERMEABILITY millidarcys	REMARKS
1	1	1917	PRETEST						18.86	2735.3	21.85	3168.4		
1	2	1924	PRETEST						18.89	2738.3	21.93	3180.1		
1	3	1927.5	PRETEST						18.89	2738.6	21.96	3184.3		
1	4	1932.5	PRETEST						18.89	2740	22.01	3193		
1	5	1942.5	PRETEST						14.80	2147.3	22.13	3210.1		
1	6	1947.5	PRETEST						18.97	2751				
1	7	1954	PRETEST						19.03	2759.9	22.30	3229		
1	8(a)	1979.	PRETEST							SEAL FAILURE				
1	8(b)	1979.5	PRETEST						19.27	2795.5	22.75	3270.3		
1	9	1990	PRETEST						19.38	2810.5	22.66	3286.3		
1	10	2013.5	PRETEST						19.61	2843.3	22.91	3323.3		
1	11	2048	PRETEST						19.95	2893.9	23.30	3378.9		
1	12	2138	PRETEST						20.82	3020.8	24.30	3523		
1	13	2254	PRETEST											
1	14	2279	PRETEST											
2	1	1944.5	2 3/4 2 3/4	5250		19.25ft^3		2750	18.79 19.01	2726 2757	22.38 22.37	3244 3244		

8. SUMMARY OF FORMATION TEST PROGRAMME

TEST	SEAT	DEPTH (METRES) K.B.	CHAMBER Gal	RECOVERY OIL CC	RECOVERY COND. CC	RECOVERY GAS	RECOVERY FORMATION WATER	RECOVERY FILTRATE CC	HEWLETT-PACKARD FORMATION PRESSURE MPag	HEWLETT-PACKARD FORMATION PRESSURE Psig	HEWLETT-PACKARD HYDROSTATIC PRESSURE MPag	HEWLETT-PACKARD HYDROSTATIC PRESSURE Psig	HORIZONTAL PERMEABILITY millidarcys	REMARKS
3	1	1934.5	2 3/4		500	49 ft^3		1200	19.01	2757	22.57	3228		
			1						19.03	2760	22.27	3228		
4	1	1935.5	1			0.38ft^3		2500	18.99	2755	22.26	3226		
	2		2 3/4	2750		22.24ft^3		4750	19.01	2757	22.31	3236		
5	1	1935.6	6			25.4ft^3		1700	19.03	2760	22.29	3233		
	2	1949.5	1	250	2	1.45ft^3		1750	19.06	2765	22.38	3246		
6	1	1951	1			0.15ft^3	1.52Lt		19.08	2768	22.42	3252		
			6			1.17ft^3	17.05Lt		19.06	2764	22.42	3252		

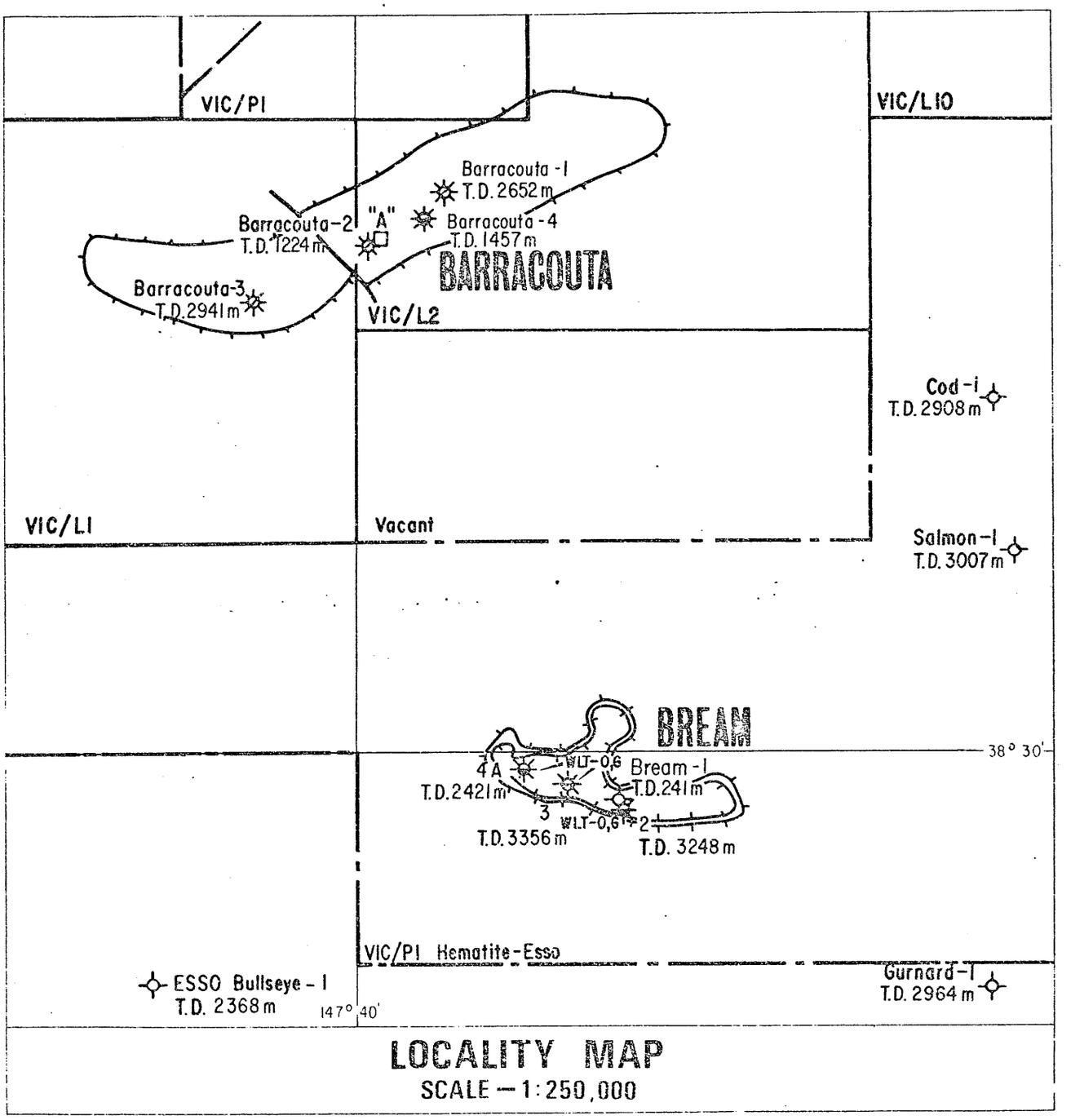
9. BREAM-4A TEMPERATURE RECORD

LOGGING RUN	THERMOMETER DEPTH (m)	MAX. RECORDED TEMPERATURE (C^o)	CIRCULATION TIME (t_K) (hours)	TIME AFTER CIRCULATION STOPPED (Δt) Hours	HORNER* TEMPERATURE (C^o)	GEOTHERMAL GRADIENT (C^o/km)
RUN 1 ISF/Sonic/GR	803	40	10	8	-	
RUN 2 ISF/Sonic LDT/GR DLT/GR ~~HDT~~	 2426 2421 2421 ~~2421~~	 77.5 81.1 83.8 ~~91.6~~	 10 	 6.5 12.0 17.0 ~~20.5~~	 89 	 0.0363

NOTE: 1) Depths in metres below Kelly Bushing
2) Water depth 60 metres below KB
3) Kelly Bushing 21.0 metres ASL
4) Sea Bottom temperature assumed as 4^oC

FIGURES

FIGURE 1.



LOCALITY MAP

SCALE — 1:250,000

Dwg. 1479/OP/15

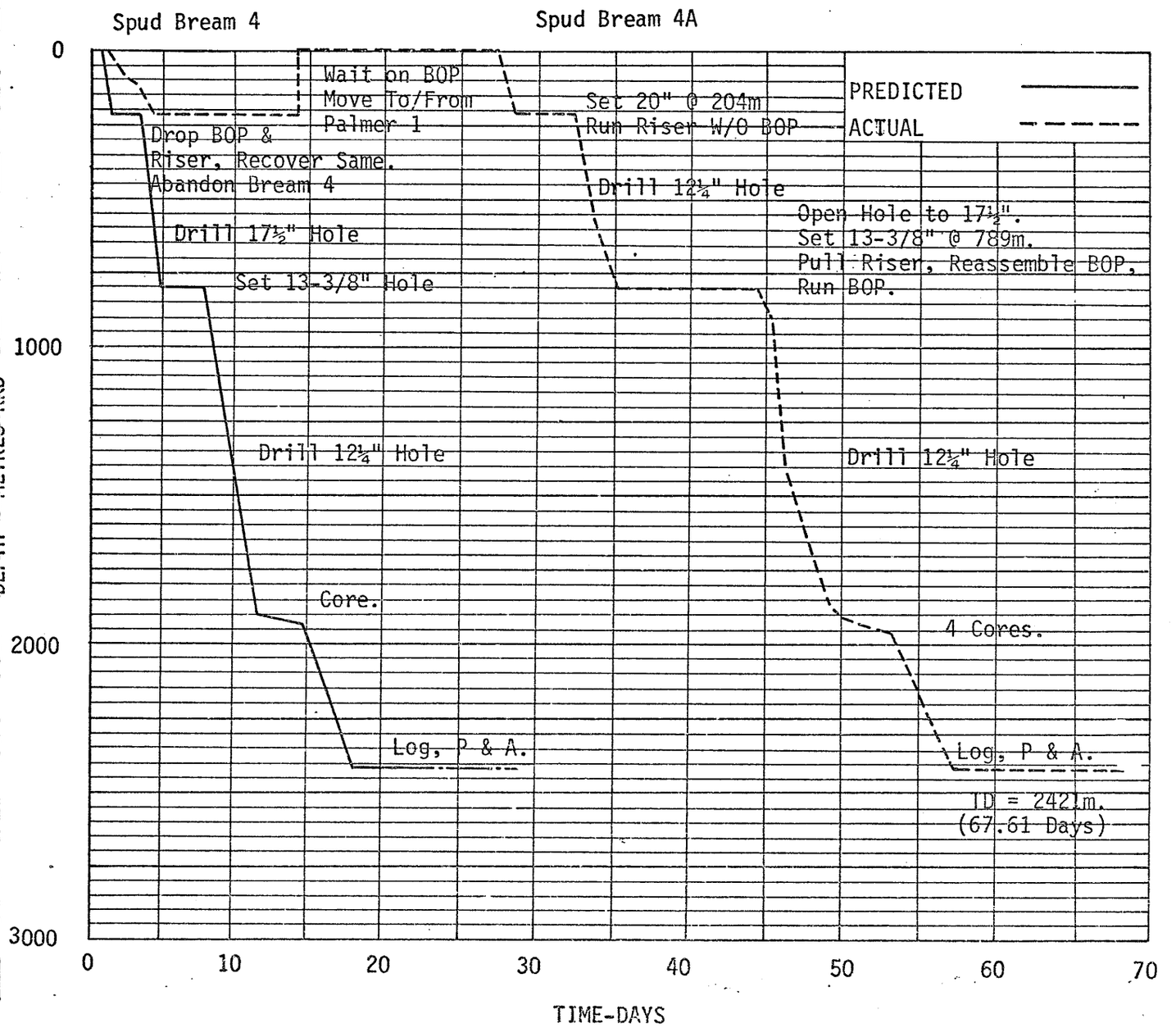
Figure 2

WELL PROGRESS CURVE
ESSO AUSTRALIA WELL BREAM 4/4A
SOUTHERN CROSS SEMI SUBMERSIBLE

Arrive Location Bream 4	: 1800 Hr, 19 Jul
Spud Bream 4	: 1900 Hr, 21 Jul
Depart Bream 4	: 0000 Hr, 11 Aug
Begin Productive Operations Palmer 1	: 2015 Hr, 11 Aug
End Productive Operations Palmer 1	: 1530 Hr, 13 Aug
Arrive Bream 4A	: 0315 Hr, 17 Aug
Spud Bream 4A	: 0015 Hr, 18 Aug
Depart Bream 4A	: 0400 Hr, 27 Sep

Water Depth : 58.6m

RKB - MSL : 21.0m



NOTE: Productive Palmer-1 time not included in above.

RGA 28/9/8

BREAM 4A
ABANDONMENT SCHEMATIC

FIGURE 3.

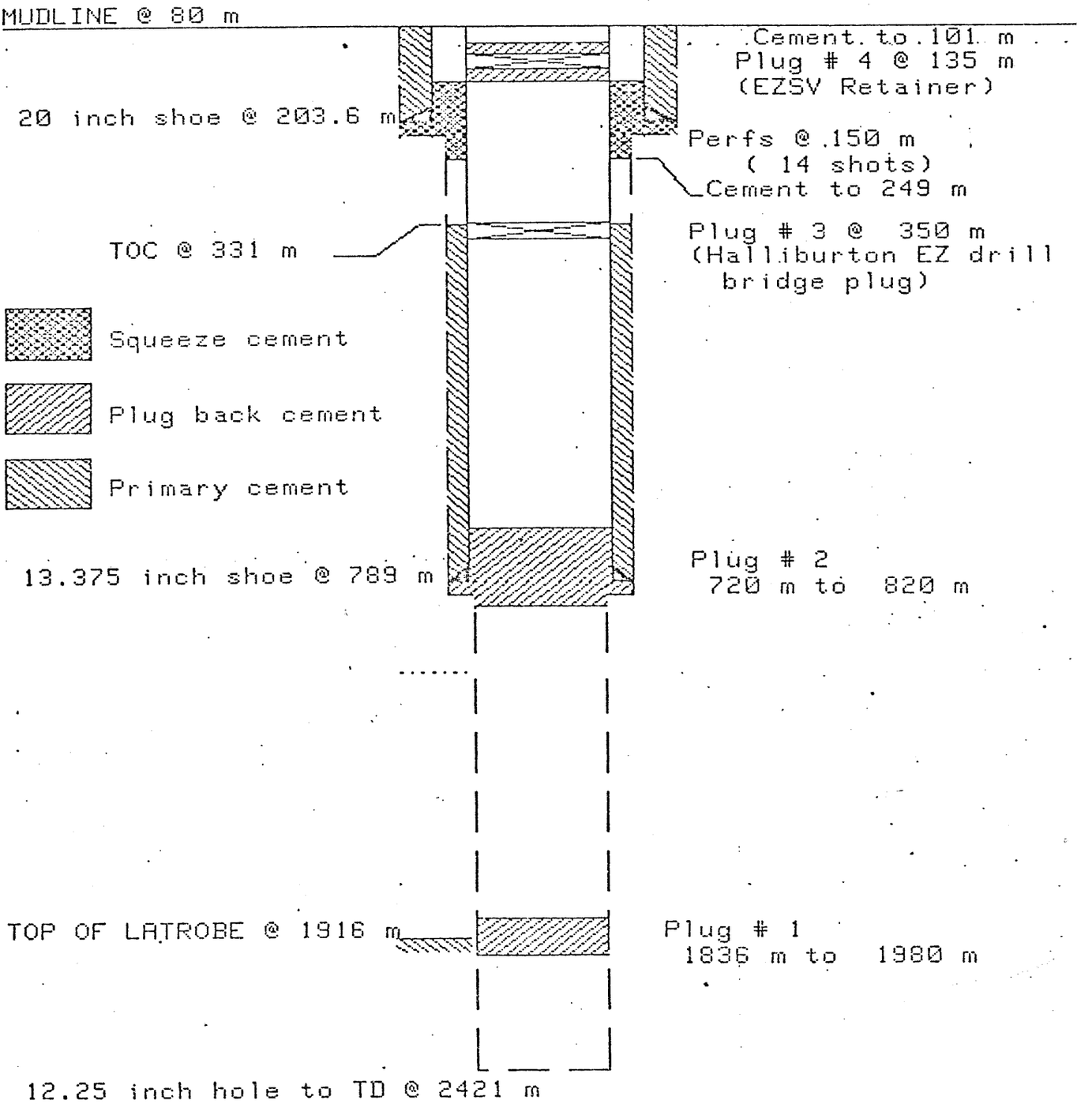
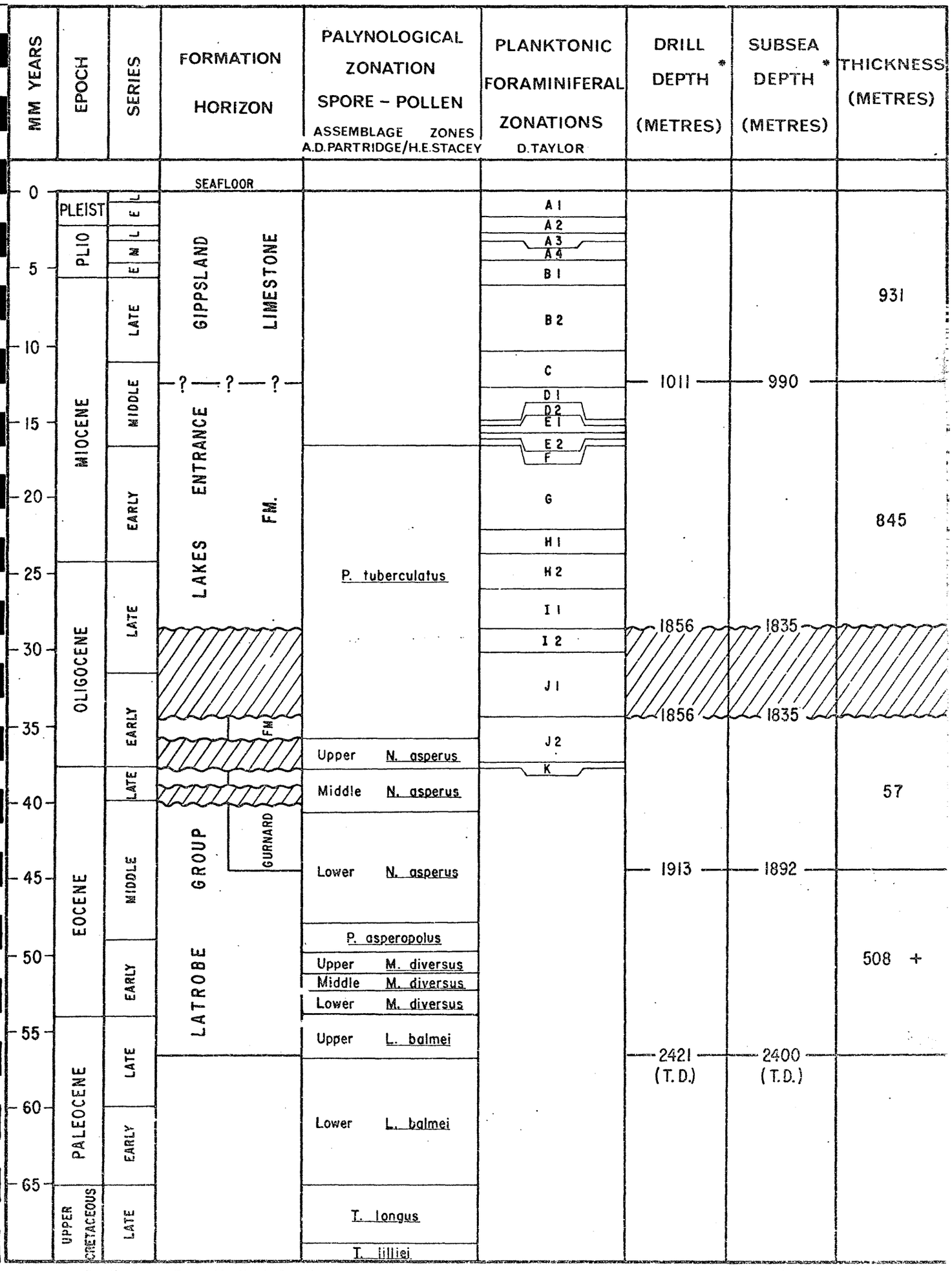


FIGURE 4.

BREAM – 4A
STRATIGRAPHIC TABLE

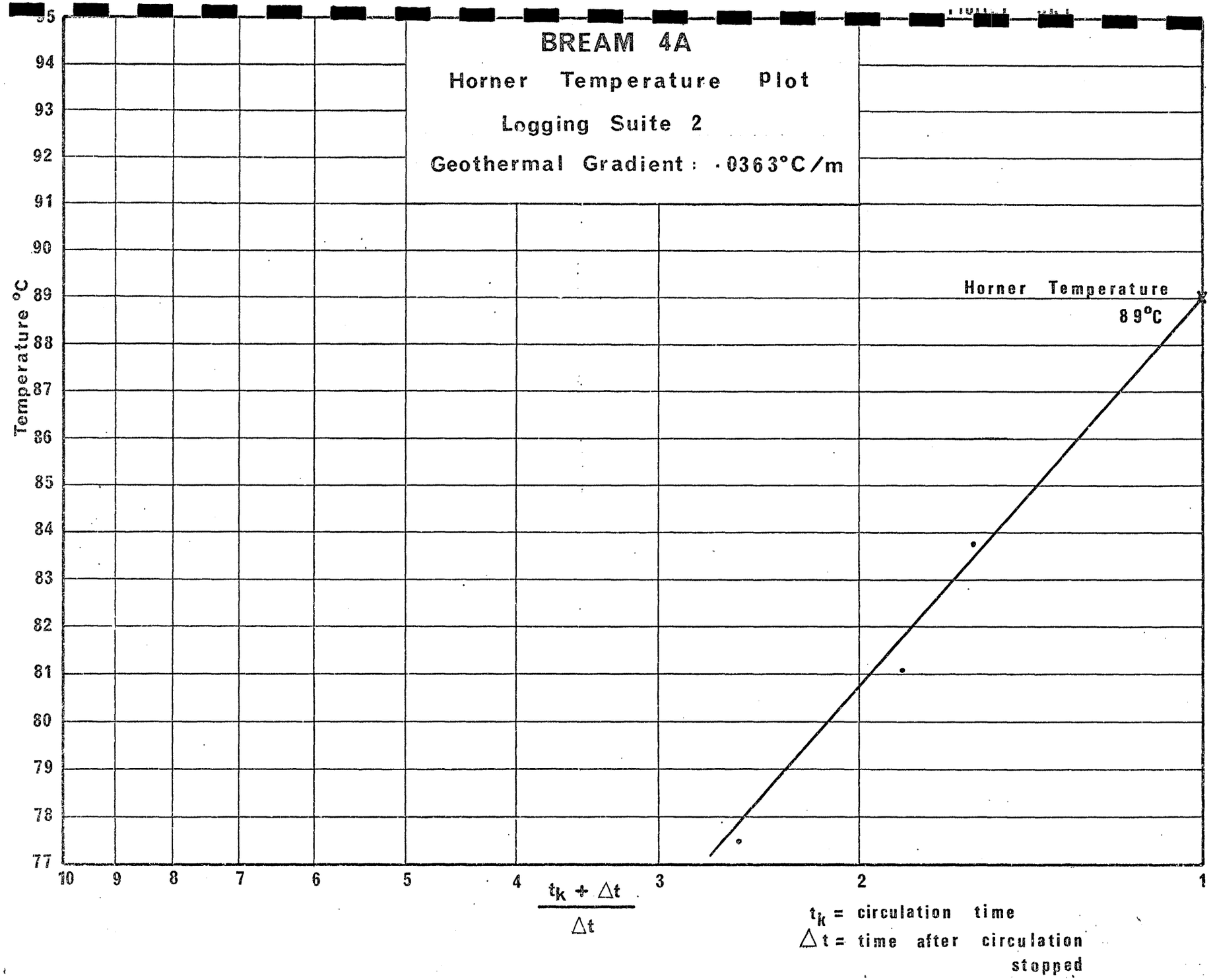


* Depths are True Vertical Depths

Base Dwg. 1107/OP/149

2062/OP/1

FIGURE 5.


BREAM 4A
Horner Temperature Plot
Logging Suite 2
Geothermal Gradient : ·0363°C/m
Horner Temperature
89°C
Temperature °C
95
94
93
92
91
90
89
88
87
86
85
84
83
82
81
80
79
78
77
10
9
8
7
6
5
4
3
2
1
$\frac{t_k + \Delta t}{\Delta t}$
t_k = circulation time
Δt = time after circulation stopped

APPENDIX 1

APPENDIX 1.

LITHOLOGICAL DESCRIPTIONS.

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
210 - 225	100	LIMESTONE - white, light brown, dark brown, grey coquina, consisting of broken shells, forams, very coarse fragments, crypto crystalline in part.
	Tr	SANDSTONE - very coarse grain, clear, vitreous, sub-angular, sub-rounded, moderate sorting.
260 - 270	80	SANDSTONE - various coloured, white, light - dark brown, clear medium grain, sub-rounded quartz grains, minor feldspar? and biotite, fair sorting, fossiliferous, very silty matrix.
	20	LIMESTONE - shell fragments a:a
270 - 275	60	SANDSTONE - a:a
	40	LIMESTONE - a:a
275 - 280	90	SANDSTONE - white, fine grain, sub-rounded, very unconsolidated quartz grains, otherwise a:a
	10	LIMESTONE - white, tan, black cryptocrystalline, occasional forams and broken shell fragments.
280 - 285	70	SANDSTONE - a:a
	30	LIMESTONE - a:a
285 - 290	80	SANDSTONE - white, fine grain, sub-rounded, unconsolidated-friable, occasional biotite, with carbonate cements, very silty matrix.
	20	LIMESTONE - white, tan, coarse grain, occasionally striated, occasionally spotted and crypotocrystalline occasionally fenestral texture, occasionally sandy and cherty.
290 - 295	90	SANDSTONE - a:a
	10	LIMESTONE - a:a
295 - 300	80	SANDSTONE - a:a
	20	LIMESTONE - a:a
300 - 310	60	SANDSTONE - white, grey, very fine grain, sub-rounded, friable quartz grains, minor carbonate cement, commonly biotite, trace glauconitic green sand, fair sorting.
	40	LIMESTONE - various coloured, white, tan, grey, very coarse grained coquina, consisting of striated oolitic, fenestral and spotted shell fragments, occasionally mega crystalline.
310 - 320	70	SANDSTONE - a:a, becoming more indurated.
	30	LIMESTONE - a:a
320 - 330	80	SANDSTONE - a:a
	20	LIMESTONE - a:a

DEPTH (MKB)	%	DESCRIPTION
330 - 340	75	SANDSTONE - predominantly white, light grey, fine grain, sub-rounded - rub-angular, mainly calcareous cement, with biotite becoming silty, occasionally fossiliferous clasts. Occasionally white, very fine grain, sub-rounded with kaolinitic cement, good sorting.
	25	LIMESTONE - various coloured coquina, shell fragments of fenestral fragments, possibly brachiopods? with occasional ooliclastic porosity.
340 - 350	75	SANDSTONE - a:a
	25	LIMESTONE - a:a
350 - 360	90	SANDSTONE - white, very fine grain, sub-rounded relatively unconsolidated, possibly fine grain lignite grains, occasionally fossiliferous, fair sorting.
	10	LIMESTONE - white, tan, coarse, grain, cryptocrystalline, often oolitic, spotty and intracrystalline texture.
360 - 370	50	SANDSTONE - very fine grain, grading to calcarenite, very silty matrix, friable occasionally firm, fossiliferous, poor sorting.
	50	LIMESTONE - a:a
370 - 380	100	LIMESTONE - predominantly white, light grey, occasional tan, coarse grained coquina, often oolitic fenestral and pelletal texture, with occasional forams, gastropods nad coraline. Possible lignite clasts.
380 - 390	20	SANDSTONE - white, light, grey, occasional tan, fine grain, sub-rounded - sub-angular, very silty, calcareous matrix, occasional fossiliferous, firm, poor porosity.
	80	LIMESTONE - white,light grey, coarse grains, abundant forams, coralline stems, possible gastropods? often striated cavenous texture. Intracrystalline porosity.
390 - 400	20	SANDSTONE - a:a becoming increasingly calcareous.
	80	LIMESTONE - a:a
400 - 410	10	SANDSTONE - a:a
	10	LIMESTONE - a:a abundant forams.
410 - 420	10	SANDSTONE - a:a
	90	LIMESTONE - a:a
420-430	100	LIMESTONE - predominantly white, light grey, very coarse grains, consisting of oolitic, coralline and pisolitic grains, commonly striated and fenestral, occasional forams, trace ooliclastic porosity.
430 - 440	80	LIMESTONE - a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
430 - 440	20	SANDSTONE - white, light grey, fine grain, sub-rounded, very silty matrix, calcareous cement, fossiliferous, friable to firm, fair sorting, poor porosity.
440 - 450	90	LIMESTONE - a:a
	10	SANDSTONE - a:a
450 - 460	100	LIMESTONE - a:a
460 - 470	70	SANDSTONE - white, very fine - fine grain, sub-rounded, grading to siltstone, very silty matrix, unconsolidated - friable, fair sorting.
	30	LIMESTONE - a:a
480 - 490	80	SANDSTONE - a:a
	20	LIMESTONE - a:a
490 - 500	20	SANDSTONE - white, fine to medium grain, sub-rounded, quartz grains, silty matrix, predominantly calcareous cement, biotite, occasionally fossiliferous, fair sorting, poor porosity, relatively firm, occasionally friable.
	80	LIMESTONE - white, light grey, tan, coarse grain, limestone clasts in a predominantly silty very sandy matrix, occasionally glauconitic, relatively firm, grading to calcareous sandstone.
500 - 510	20	SANDSTONE - a:a, grading to calcarenite.
	80	LIMESTONE - a:a
510 - 520	20	SANDSTONE - a:a
	80	LIMESTONE - a:a
520 - 530	10	SANDSTONE - white fine to medium grain, sub-rounded - sub-angular, fossiliferous in part, firm, grading to calcarenite, poor porosity.
530 - 540	100	CALCARENITE - a:a
540 - 550	100	CALCARENITE - a:a
550 - 560	100	CALCARENITE - white, grey, medium to coarse grain, predominantly calcareous cement, firm hard, microcrystalline earthy lustre, poor intergranular porosity, occasionally forams.
560 - 570	100	CALCARENITE - white, grey, medium to coarse grain, composed of a calcareous clay mainly of calcite - grading to marl relatively clean and firm.

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
570 - 580	100	CALCARENITE - a:a
580 - 590	100	CALCARENITE - a:a
590 - 600	100	CALCARENITE - Marl. White, buff, fine to medium occasionally coarse grain, sub-rounded - sub-angular, quartz crystals in a dominant sandy - silty matrix with a calcareous cement firm with an earthy lustre, with little or no porosity. Minor biotite? glauconite, occasionally kaolinite matrix.
600 - 610	100	CALCARENITE - a:a, grading to marl.
600 - 620	100	CALCARENITE - a:a becoming carbonaceous.
620 - 630	100	CALCARENITE - a:a
630 - 640	100	CALCARENITE - a:a
640 - 650	100	CALCARENITE - a:a
650 - 660	100	CALCARENITE - a:a
660 - 670	100	CALCARENITE - buff, fine to medium grain, sandy in part, mainly firm hard, occasionally friable, grading to marl.
670 - 680	100	CALCARENITE - a:a
680 - 690	100	CALCARENITE - a:a
690 - 700	100	CALCARENITE - a:a becoming more friable.
700 - 710	100	CALCARENITE - a:a trace forams.
710 - 720	100	CALCARENITE - a:a becoming finer grained.
720 - 730	100	CALCARENITE - a:a
730 - 740	100	CALCARENITE - buff, white, predominantly fine grain, very sandy calcareous, moderate firm.
740 - 750	100	CALCARENITE - a:a
750 - 760	100	CALCARENITE - a:a
760 - 770	100	CALCARENITE - a:a
770 - 780	100	CALCARENITE - buff, fine grain hard, silty - sandy calcareous, greater number of forams.
780 - 790	100	CALCARENITE - a:a
790 - 800	100	CALCARENITE - a:a
800 - 804	100	CALCARENITE - a:a
B.U. @ 804	100	CALCARENITE - a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
804		Drilled through casing shoe. Significant contamination with cement, suggested lithology calcareous foram tests common.
804 - 810	100	CALCARENITE - Light grey to medium light grey, granular to blocky, calcareous, fine grain to coarse grain some calcite fragment occasionally, occasionally quartz, round to sub-rounded quartz, occasionally foram test fragments, no fluorescence, forams common firm to occasionally friable as at 790-800m.
810 - 815	100	CALCARENITE - light to medium light grey, to fawn granular to blocky, fine grain to coarse grain, occasionally clear quartz grains sub-rounded to roun, occasionally clear calcite grains, occasionally foram tests and fragments, no fluorescence.
815 - 820	100	CALCARENITE - light - dark grey, predominantly firm, occasionally friable, sub-angular to sub-rounded grains, occasionally foram test some calcite grains, some with pyrite, very fine grains.
820 - 825	100	CALCARENITE - light - dark grey, firm to friable grains, sub-angular to sub-rounded, some calcite grains, some forams, no fluorescence.
825 - 830	100	CALCARENITE - a:a - forams common.
830 - 835	100	CALCARENITE - light to grey to medium light grey occasionally white, granular to blocky, sub- angular to sub-rounded calcareous grains, fine grain to very fine grain, occasionally blocky opaque to clear fragments of calcite, occasionally crystal shape evident in calcite, occasionally foram test fragments, abundant mineral fluorescence, no hydrocarbon fluorescence.
835 - 840	100	CALCARENITE - light to dark grey, occasionally clear to translucent grain, sub-angular to sub-rounded calcareous grains, some very coarse calcite grains, forams common mineral fluorescence, no hydrocarbon fluorescence.
840 - 845	100	CALCARENITE - a:a
845 - 850	100	CALCARENITE - light to dark grey, grains hard to friable, sub-angular tc sub-rounded, occasionally Incineramus prisms, mineral fluorescence, no hydrocarbon fluorescence.
850 - 855	100	CALCARENITE - a:a
855 - 860	100	CALCARENITE - a:a, forams, common, occasionally Incineramus prisms possibly bryozoan fragment, occasionally sponge spicules.
860 - 865	100	CALCARENITE - a:a
865 - 870	100	CALCARENITE - a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
870 - 875	100	CALCARENITE - a:a, forams common.
875 - 880	100	CALCARENITE - a:a, good variety of forams, forams abundant.
880 - 885	100	CALCARENITE - a:a
885 - 890	100	CALCARENITE - a:a finer grained, average grain size being medium sand.
890 - 895	100	CALCARENITE - a:a forams very common, larger (1-2mm) dull brown calcite grains.
895 - 900	100	CALCARENITE - a:a occasional grain with pyrite occasionally clear quartz grain.
900 - 905	100	CALCARENITE - a:a, dull brown calcite grains common.
905 - 910	100	CALCARENITE - a:a, pyrite grains occur occasionally bryozoan fragments also.
910 - 915	100	CALCARENITE - a:a
915 - 920	100	CALCARENITE - very light - moderate dark grey, grains sub-angular to sub-rounded, medium coarse, sized calcareous grains, grains hard to friable, moderate sorting, coarse calcite grains present, dull brown in colour forams + other shell material present, occasional clear quartz grain.
920 - 925	100	CALCARENITE - a:a
925 - 930	100	CALCARENITE - a:a
930 - 935	100	CALCARENITE - a:a, increased clay fraction decreased foram presence.
935 - 940	100	CALCARENITE - light grey to dark grey, occasionally white, very fine grain to fine grain, calcareous grains sub-rounded to sub-angular, blocky to friable aggregates of discrete grains, occasionally rounded quartz grains some with very fine grain pyrite encrusting, abundant forams, some mineral fluorescence, no hydrocarbon fluorescence.
940 - 945	100	CALCARENITE - a:a
945 - 950	100	CALCARENITE - a:a
950 - 955	100	CALCARENITE - a:a, generally finer grained.
955 - 960	100	CALCARENITE - a:a
960 - 965	100	CALCARENITE - light grey to dark grey, fissile to block carbonaceous flecking in places, increased fissility of sample noticeable, very fine grain to fine grain friable aggregates a:a. Some mineral fluorescence.
965 - 970	100	CALCARENITE - a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
970 - 975	100	CALCARENITE - a:a only slight mineral fluorescence.
975 - 980	100	CALCARENITE - a:a
980 - 985	100	CALCARENITE - a:a
985 - 990	100	CALCARENITE - a:a
990 - 995	100	CALCARENITE - a:a
995 - 1000	100	CALCARENITE - a:a
1000 - 1005	100	CALCARENITE - medium light grey to dark grey, friable blocky protions, fine grain to very fine grain aggregates, occasionally foram tests slight mineral fluorescence.
1005 - 1010	100	CALCARENITE - a:a grades with depth to a softer siltier sediment.
1010 - 1015	100	CALCARENITE - a:a
1015 - 1020	100	CALCARENITE - a:a
1020 - 1025	100	CALCAREOUS SILTSTONE - light to medium grey, sub-angular to angular grains consiting of fine calcareous material. Fine to coarse quartz grains occuring, occasionally foram test.
1025 - 1030	100	CALCAREOUS SILTSTONE - medium grey, friable aggregates, blocky, fine grained quartzose and calcareous material, slight mineral fluorescence, no hydrocarbon fluorescence, occasionally foram test.
1030 - 1035	100	CALCAREOUS SILTSTONE - a:a, occasionally coarse quartz grain.
1035 - 1040	100	CALCAREOUS SILTSTONE - a:a, blocky to angular aggregates of calcareous and quartzose material.
1040 - 1045	100	CALCAREOUS SILTSTONE - a:a, forams more common.
1045 - 1050	100	CALCAREOUS SILTSTONE - a:a, forams and other fossil fragments common. Aggregates smaller and more rounded.
1055 - 1060	100	CALCAREOUS SILTSTONE - a:a occasionally pyritic quartz grain.
1060 - 1065	100	CALCAREOUS SILTSTONE - a:a occasionally discrete calcite grain.
1065 - 1070	100	CALCAREOUS SILTSTONE - a:a occasionally pyrite encrusted grain, forams + shell material common.
1070 - 1075	100	CALCAREOUS SILTSTONE - a:a
1075 - 1080	100	CALCAREOUS SILTSTONE - a:a

DEPTH (MKB)	%	DESCRIPTION
1080 - 1085	100	CALCAREOUS SILTSTONE - medium grey, sub-angular to sub-rounded aggregates of calcareous siltstone pyritic encrusted grains more common. Most aggregates friable Forams + other shell material common, slight mineral fluorescence, no hydrocarbon fluorescence.
1085 - 1090	100	CALCAREOUS SILTSTONE - light grey to medium light grey silt size grains with occasionally very fine grain sections, blocky to lamina fracture, generally soft and sticky, often shale like splinters always soft, abundant foram tests, slight mineral fluorescence, no hydrocarbon fluorescence.
1090 - 1095	100	CALCAREOUS SILTSTONE - medium light grey to medium grey firm to soft shale like splinters, carbonaceous material flecking, laminated in places, occasionally calcite crystals, very fine grain pyrite encrusting some firmer cuttings, abundant small forams mineral fluorescence slight, no hydrocarbon fluorescence.
1095 - 1100	100	CALCAREOUS SILTSTONE - a:a NOTE: abundant foram, ostracod, crinoid remains.
1100 - 1105	100	CALCAREOUS SILTSTONE - a:a
1105 - 1110	100	CALCAREOUS SILTSTONE - a:a occasionally large quartz grains.
1110 - 1115	100	CALCAREOUS SILTSTONE - a:a pyritic grains, forams common.
1115 - 1120	100	CALCAREOUS SILTSTONE - medium grey, predominantly soft silty aggregates, calcareous cemented silt to fine sand sized grains. Variety of forams present plus other shell fragments. Quartz grains and pyritic grains preser also. Mineral fluorescence, no hydrocarbon fluorescence.
1120 - 1125	100	CALCAREOUS SILTSTONE - a:a
1125 - 1130	100	CALCAREOUS SILTSTONE - a:a occasionally large calcite grain (3mm).
1130 - 1135	100	CALCAREOUS SILTSTONE - a:a calcite grains present, shell fragments also forams.
1135 - 1140	100	CALCAREOUS SILTSTONE - a:a forams abundant, other shell fragments also calcite grains.
1140 - 1145	100	CALCAREOUS SILTSTONE - a:a forams common and varied, calcite, quartz grains.
1145 - 1150	100	CALCAREOUS SILTSTONE - a:a crinoid stem plus other shell fragments.

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
1150 - 1155	100	CALCAREOUS SILTSTONE - a:a pyrite very common encrusting grains or forming discrete blocks.
1155 - 1160	100	CALCAREOUS SILTSTONE - a:a ostracod fragments present.
1160 - 1165	100	CALCAREOUS SILTSTONE - mediume grey, sub-angular to sub-rounded aggregates, calcareous cement, soft-fine sand. Forams plus other shell material common. Aggregates moderate to firm to soft.
1165 - 1170	100	CALCAREOUS SILTSTONE - a:a
1170 - 1175	100	CALCAREOUS SILTSTONE - a:a
1175 - 1180	100	CALCAREOUS SILTSTONE - a:a forams plus other shell material common.
1180 - 1185	100	CALCAREOUS SILTSTONE - a:a pyrite as discrete blocks or covering other grains.
1185 - 1190	100	CALCAREOUS SILTSTONE - a:a forams common and varied, other shell fragments also - crinoid.
1190 - 1195	100	CALCAREOUS SILTSTONE - a:a occasional large (greater than 2mm) quartz grains.
1195 - 1200	100	CALCAREOUS SILTSTONE - medium grey, sub-angular to sub-rounded aggregates of silt to fine sand held together with a calcareous cement. Discrete blocks of calcite present also. Forams common. Other shell fragments also.
1200 - 1205	100	CALCAREOUS SILTSTONE - a:a
1205 - 1210	100	CALCAREOUS SILTSTONE - a:a forams common. Other shell fragments also. Pyrite and calcite grains present. Crinoid fragments.
1210 - 1215	100	CALCAREOUS SILTSTONE - a:a
1215 - 1220	100	CALCAREOUS SILTSTONE - a:a
1220 - 1225	100	CALCAREOUS SILTSTONE - a:a
1225 - 1230	100	CALCAREOUS SILTSTONE - a:a forams varied and common, pyritic grains.
1230 - 1235	50/50	CALCAREOUS SILTSTONE-Graintstone - white to medium grey, sub-angular to sub-rounded aggregates of silty material plus coarse grains of quartz. Quartz grains angular - rounded, clear-cloudy, pyrite common, Forams common.
1235 - 1240	100	CALCAREOUS SILTSTONE - Grainstone - white medium, grey and calcite grains - sub-rounded to angular to sub-rounded. Aggregates of siltstone common also, forams, pyrite common.
1240 - 1245	100	CALCAREOUS SILTSTONE-Grainstone - a:a increase in amount silty aggregates 50% pyrite, forams and coarse grains common. Other shell material common.

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
1245 - 1250	100	CALCAREOUS SILTSTONE-Grainstone - a:a
1250 - 1255	100	CALCAREOUS SILTSTONE - medium grey, aggregates of silt-fine sand sized material, forams varies and common. Pyrite present in discrete blocks, shell material present also.
1255 - 1260	100	CALCAREOUS SILTSTONE - a:a
1260 - 1265	100	CALCAREOUS SILTSTONE - a:a
1265 - 1270	100	CALCAREOUS SILTSTONE - a:a some aggregates becoming smaller.
1270 - 1275	100	CALCAREOUS SILTSTONE - a:a pyrite nodules encrusting some grains. Forams varied and common calcite as discrete grains.
1275 - 1280	100	CALCAREOUS SILTSTONE - a light grey to medium light grey shale, some fissility, firm to soft, typically appears as flat shards, occasionally blocky frequently pyrite encrusts blocky cuttings, pyrite very fine grained, clear to milky white and buff calcite grains and crystal fragments common; large aggregates of fine grained calcite common, abundant forams and shells, occasionally carbonaceous flecking, mineral fluorescence common, no hydrocarbon fuorescence, calcareous cement.
1280 - 1285	100	CALCAREOUS SILTSTONE - a:a friable calcite crystals, friable, very fine grain pyrite encrusting firm silt-stone cuttings, grades from siltstone to shale in places.
1285 - 1290	100	CALCAREOUS SILTSTONE - a:a increase in blocky style cuttings, occasionally laminated cuttings carbonaceous flecking in some cuttings.
1290 - 1295	100	CALCAREOUS SILTSTONE - a:a predominance of flat shard shale cuttings.
1295 - 1300	100	CALCAREOUS SILTSTONE - a:a increase in carbonaceous flecking presence of very fine grain quartz in blocky siltstone cuttings.
1300 - 1305	100	CALCAREOUS SILTSTONE - a:a predominance of flat bedded cuttings.
1305 - 1310	100	CALCAREOUS SILTSTONE - a:a predominance of flat shaly cuttings occasionally blocky cuttings.
1310 - 1315	100	CALCAREOUS SILTSTONE - a:a
1315 - 1310	100	CALCAREOUS SILTSTONE - a:a
1320 - 1325	100	CALCAREOUS SILTSTONE - a:a occasionally very fine grain rounded quartz.
1325 - 1330	100	CALCAREOUS SILTSTONE - a:a grades to calcareous shale in places, flat firm, shale cuttings.
1330 - 1335	100	CALCAREOUS SILTSTONE - a:a occasionally anhydrite crystal fragment.

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
1335 - 1340	100	CALCAREOUS SILTSTONE - a:a increased blocky character in cuttings colour of siltstone darkening with depth.
1340 - 1345	100	CALCAREOUS SILTSTONE - a:a increased blocky character in cuttings.
1345 - 1350	100	CALCAREOUS SILTSTONE - a:a variety of grain sizes in siltstone. Siltstones changing in character to coarser from finer within sample. Possible volcanic grain. Angular, dull grain 2cm.
1350 - 1355	100	CALCAREOUS SILTSTONE - a:a cuttings blocky to angular, occasionally green mineral a:a
1355 - 1360	100	CALCAREOUS SILTSTONE - a:a
1360 - 1365	100	CALCAREOUS SILTSTONE - a:a some cutting flat "shale" like, cuttings becoming firmer.
1365 - 1370	100	CALCAREOUS SILTSTONE - a:a firmer cuttings, trace white siltstone with included ver fine grain quartz and white calcareous cement.
1370 - 1375	100	CALCAREOUS SILTSTONE - a:a increased fissility, cuttings sharp and shale-like.
1375 - 1380	100	CALCAREOUS SILTSTONE- a:a increased fissility, cuttings sharp and shale-like.
1380 - 1385	100	CALCAREOUS SILTSTONE - a:a maintains increased shaliness some trend siltstone white with very fine grain quartz and calcareous cement.
1385 - 1390	100	CALCAREOUS SILTSTONE - a:a sharp shale character of cuttings dominant.
1390 - 1395	100	CALCAREOUS SILTSTONE - a:a trace anhydrite.
1395 - 1400	100	CALCAREOUS SILTSTONE - a:a only trace mineral fluorescence.
1400 - 1405	100	CALCAREOUS SILTSTONE - a:a few friable aggregates - most firm, few forams present. Bryozoan stem.
1405 - 1410	100	CALCAREOUS SILTSTONE - a:a forams present (as cavings?)
1410 - 1415	100	CALCAREOUS SILTSTONE - a:a shell fragments and occasionally calcite grain.
1415 - 1420	100	CALCAREOUS SILTSTONE - a:a cutting very shaly occasionally containing shell fragments.
1420 - 1425	100	CALCAREOUS SILTSTONE - shell fragments present.
1425 - 1430	100	CALCAREOUS SILTSTONE - medium grey, angular - blocky shale-like fragments, firm-hard occasionally foram present, also shell material plus occasionally calcite grain, occasionally green (volcanic) grain, slight mineral fluorescence, no hydrocarbon fluorescence.

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
1430 - 1435	100	CALCAREOUS SILTSTONE - a:a ostracods present, also forams plus bryozoan fragments.
1435 - 1440	100	CALCAREOUS SILTSTONE - a:a occasionally pyrite grains, bryozoan fragments.
1440 - 1445	100	CALCAREOUS SILTSTONE = a:a shell fragments occasionally black carbonaceous within cuttings, occasionally sandy grain.
1445 - 1450	100	CALCAREOUS SILTSTONE - a:a shell fragments, forams, pyrite occasionally carbonaceous fleck with grains.
1450 - 1455	100	CALCAREOUS SILTSTONE - a:a well cemented sandy cuttings more common.
1455 - 1460	100	CALCAREOUS SILTSTONE - a:a anhydrite grains occuring, clear angular, fractured, - no response to HCl. Pyrite also.
1460 - 1465	100	CALCAREOUS SILTSTONE - a:a green volcanic grains present dull green, soft no HCl response
1465 - 1470	100	CALCAREOUS SILTSTONE - a:a pyrite, volcanic grains (green dull soft).
1470 - 1475	100	CALCAREOUS SILTSTONE - a:a cuttings continue to be hard and angular, occasionally large shell fragements.
1475 - 1489	100	CALCAREOUS SILTSTONE - a:a discrete calcite grains, occasionally clay mass.
1480 - 1485	100	CALCAREOUS SILTSTONE - a:a occasionally mass. Occasionally green volcanic grain, anhydrite grain.
1485 - 1490	100	CALCAREOUS SILTSTONE - a:a occasionally mass of white fluffy clay binding cuttings. Carbonaceous flecks in cuttings, pyrite also, shell fragments, anhydrite, few forams
1490 - 1495	100	CALCAREOUS SILTSTONE - a:a occasionally sandy grain. White fluffy clay material becoming prominent binding cuttings together in loose masses.
1495 - 1500	100	CALCAREOUS SILTSTONE - a:a clay becoming very prominent
1500 - 1505	100	CALCAREOUS SILTSTONE - a:a Calcareous clay affecting much of sample binding cuttings into amorphous masses. Clay sticky - white - light grey black clecks. Possibly claystone fraction has been washed from the cuttings sample, occasionally pyrite encrusting firm cuttings generally sample as above- cuttings firm with distinct shale characters.
1505 - 1510	100	CALCAREOUS SILTSTONE - light grey to dark grey, blocky to fissile, firm, grades to granular appearance, charactersit: shale cuttings with sharp shaly edges, occasionally white cemented calcareous, carbonaceous flecking.

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
	tr	CALCITE appear as aggregates.
	tr	MUDSTONE calcareous - possibly washed out into mud system.
	tr	FORAMS and shaly material no hydrocarbon fluorescence, slight mineral fluorescence.
1510 - 1515	100	CALCAREOUS SILTSTONE - a:a occasionally quartz grain rounded.
1515- 1520	100	CALCAREOUS SILTSTONE - a:a traces mudstone - calcareous.
1520 - 1525	100	CALCAREOUS SILTSTONE - a:a traces mudstone - calcareous, pyrite, anhydrite, discrete grains, occasionally forams and other shell fragments, occasionally sandy grain. SAMPLE TAKEN PRIOR TO 1525.
1525	100	CALCAREOUS SILTSTONE - cutting becoming sub-angular to sub-rounded, appear less shaly, only very occasional traces of clay (white - grey fluffy) increasing in number of sandy cuttings. Pyrite common as grains, some forams present.
1525 - 1530	100	CALCAREOUS SILTSTONE - cuttings bound into lumps by white - grey fluffy calcareous clay. Most cuttings affected, carbonaceous flecks and grains present. Pyrite present as discrete grains.
1530 - 1535	100	CALCAREOUS SILTSTONE - a:a clay still present but in a much smaller amount than above, only a few cuttings affected.
1535 - 1540	70 30	CALCAREOUS SILTSTONE - a:a CLAYSTONE - white - light grey, fluffy, very soft, encloses siltstone cutting, black carbonaceous flecks.
1540 - 1545	90 10	CALCAREOUS SILTSTONE - a:a sandy grains more common. CLAYSTONE - a:a binding siltstone cuttings.
1545 - 1550	95	CALCAREOUS SILTSTONE - a medium light grey to dark grey; firm, occasionally blocky, grades to very fine grain quartz aggregate in places; quartz grains rounded, carbonaceous flecking in parts, cuttings flat sharp shale shaped shards. No hydrocarbon fluorescence, slight mineral fluorescence.
	5	CLAYSTONE - light grey, soft, gummy, washed out from cutting sample this percentage not indicative of quantity in formation. Large quantity of sticky gumbo washed over shakers.
	tr	forams and shelly material.
	tr	pyrite, very fine grain
	tr	calcite discrete crystal fragments.
1550 - 1555	100	CALCAREOUS SILTSTONE - a:a
	tr	MUDSTONE/CLAYSTONE
	tr	pyrite, very fine grain
	tr	calcite a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH (MKB)	%	DESCRIPTION
1555 - 1560	100	CALCAREOUS SILTSTONE - Light - medium grey, angular - sub-angular cuttings, moderately firm, occasionally sandy grain. Few forams, traces mudstone, occasionally ostracod and other shell fragments.
1560 - 1565	100	CALCAREOUS SILTSTONE - a:a cuttings shaly in character angular, flat or shard-like.
1565 - 1570	100	CALCAREOUS SILTSTONE - a:a occasionally hard white-grey sandy grain with carbonaceous flecks, pyrite grains and anhydrite.
1570 - 1575	100	CALCAREOUS SILTSTONE - a:a pyrite present.
1575 - 1580	100	CALCAREOUS SILTSTONE - a:a shell fragments, forams present.
1580 - 1585	100	CALCAREOUS SILTSTONE - a:a anhydrite, forams present.
1585 - 1590	100	CALCAREOUS SILTSTONE - a:a slight increase in claystone globules.
1590 - 1595	100	CALCAREOUS SILTSTONE - a:a claystone globules still present (cavings?)
1595 - 1600	100	CALCAREOUS SILTSTONE - light grey to medium grey, firm fissile to blocky; carbonaceous flecking occasionally grade to more granular in places, grades to shale in places, slight mineral fluorescence, no hydrocarbon fluorescence.
	tr tr tr	MUDSTONE/CLAYSTONE - light grey gummy, loose, incoherent, pyrite, very fine grains, encrusting. calcite crystal fragments.
1600 - 1605	95 5	CALCAREOUS SILTSTONE - a:a MUDSTONE/CLAYSTONE - a:a
1605 - 1610	80 20	CALCAREOUS SILTSTONE - a:a MUDSTONE/CLAYSTONE - a:a
1610 - 1615	100 100	CALCAREOUS SILTSTONE - a:a MUDSTONE/CLAYSTONE NOTE: difficulty of assessing percentage of Mudstone/ claystone - much of the claystone has been washed from the cuttings sample. Estimated gross % approximately 50% of lithology.
1615 - 1620	50 50	CALCAREOUS SILTSTONE - a:a MUDSTONE CLAYSTONE - a:a
1620 - 1625	90 10	CALCAREOUS SILTSTONE - a:a MUDSTONE/CLAYSTONE - unwashed cutting binding together in gummy aggregates.
1625 - 1630	90 10	CALCAREOUS SILTSTONE - a:a occasionally sand grain - unwashed 50/50. MUDSTONE/CLAYSTONE - a:a white/grey - fluffy.
1630 - 1635	90 10	CALCAREOUS SILTSTONE - a:a and pyrite grains - angular. MUDSTONE/CLAYSTONE - unwashed cuttings appear 50% MUDSTONE/50% CLAYSTONE

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
1635 - 1640	50	CALCAREOUS SILTSTONE & MUDSTONE/CLAYSTONE: washed cuttings 'clean'; unwashed cuttings indicate presence of clay bound cuttings, occasionally sandy grain, shell material, ostracod fragments.
1640 - 1645	50	CALCAREOUS SILTSTONE/CLAYSTONE: a:a - pyrite, forams present, sandy grains.
1645 - 1650	50	CALCAREOUS SILTSTONE/CLAYSTONE: a:a shell fragments and forams present.
1650 - 1655	50	CALCAREOUS SILTSTONE/CLAYSTONE: a:a sandy cuttings occur, white granular.
1655 - 1660	50	CALCAREOUS SILTSTONE/CLAYSTONE: a:a forams more common.
1660 - 1665	70	CALCAREOUS SILTSTONE: light grey to dark grey, firm, fissile to blocky, grades to shale in places, grades to white sandy siltstone in places, calcareous cement, slight mineral fluorescence.
	30	MUDSTONE/CLAYSTONE: light grey, gummy, incoherent - largely washed out from sample.
1665 - 1670	90	CALCAREOUS SILTSTONE: a:a NOTE: Predominant shaly character.
	10	MUDSTONE/CLAYSTONE: a:a in unwashed sample forms at least 50% of lithology, slight mineral fluorescence in siltstone.
1670 - 1675	90	CALCAREOUS SILTSTONE: a:a
	10	MUDSTONE/CLAYSTONE: a:a in unwashed cuttings 50/50.
1675 - 1680	90	CALCAREOUS SILTSTONE: a:a NOTE: very shaly.
	10	MUDSTONE/CLAYSTONE: a:a NOTE: lithology across shakers mainly Mudstone and Claystone.
1680 - 1685	100	CALCAREOUS SILTSTONE: a:a - also shaly, some forams also Mudstone/Claystone, a:a unwahsed samples appear to contain sub-equal amounts of the above, some unwashed cuttings very rounded and pebble like.
1685 - 1690	100	CALCAREOUS SILTSTONE MUDSTONE/CLAYSTONE: a:a and anhydrite.
1690 - 1695	100	CALCAREOUS SILTSTONE MUDSTONE/CLAYSTONE: a:a - cuttings very shaly.
1695 - 1700	95	CALCAREOUS SILTSTONE: medium light grey to medium grey, firm, fissile, sometimes blocky, mainly with characteristi shale shaped cutting, grades occasionally to coarser very fine grain sediment with white calcareous cement, occasionally loose quartz, occasionally carbonaceous fleck
	tr	loose calcitegrains, well rounded - only slight mineral fluorescence, no hydrocarbon fluorescence.

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
	5	MUDSTONE/CLAYSTONE: light grey to white, gumm-, soft, incoherent. Noticeable greater percentage in unwashed samples, possibly 50 -70% of gross lithology.
1700 - 1705	50	CALCAREOUS SILTSTONE: a:a
	50	MUDSTONE/CLAYSTONE: a:a
1705 - 1710	50	CALCAREOUS SILTSTONE: a:a
	50	MUDSTONE/CLAYSTONE: a:a
	tr	Pyrite very fine grains, encrusting larger grains.
1710 - 1715	50	CALCAREOUS SILTSTONE: a:a grades to very fine grain granular sediment in places. Remains very calcareous.
	tr	very fine grain pyrite
	50	MUDSTONE/CLAYSTONE: a:a
1715 - 1720	50	CALCAREOUS SILTSTONE: a:a
	50	MUDSTONE/CLAYSTONE: a:a
	tr	Calcite forams very fine grain aggregates
	tr	forams.
1720 - 1725	50	CALCAREOUS SILTSTONE: a:a occasionally cream to tan blocky cuttings, carbonaceous flecking, calcareous cemented.
	50	MUDSTONE/CLAYSTONE: a:a
1725 - 1730	50	CALCAREOUS SILTSTONE: a:a
	50	MUDSTONE/CLAYSTONE: a:a possibly there is a greater percentage of Mudstone/Claystone in the sample but washing sample has washed clay into drill mud during cutting sample preparation.
1730 - 1735	50	CALCAREOUS SILTSTONE: a:a
	50	MUDSTONE/CLAYSTONE: a:a
	tr	Dolomite.
1735 - 1740	50	CLAYSTONE: light grey, soft, gummy.
	50	CALCAREOUS SILTSTONE: a:a
1740 - 1745	50	CLAYSTONE/MUDSTONE: a:a
	50	CALCAREOUS SILTSTONE: a:a occasionally sandy grain - usually light grey - brown in colour - carbonaceous flecking occurs, trace dolomite? granular, slow reaction to HCl.

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
1745 - 1750	75	CLAYSTONE/MUDSTONE: a:a
	25	CALCAREOUS SILTSTONE: a:a and forams, shell material, carbonaceous flecking.
1750 - 1755	50	MUDSTONE/CLAYSTONE: a:a
	50	CALCAREOUS SILTSTONE: a:a - dolomite?
1755 - 1760	50	MUDSTONE/CLAYSTONE: a:a
	50	CALCAREOUS SILTSTONE: a:a increase in sandy cuttings - light grey, brown, carbonaceous flecks.
1760 - 1765	50	MUDSTONE/CLAYSTONE: a:a
	50	CALCAREOUS SILTSTONE: a:a increase in sandy cuttings - forams and shell material present, slight mineral fluorescence - pyrite grains, trace glauconite - dull green.
1765 - 1770	75	MUDSTONE/CLAYSTONE: a:a (clogging catchers)
	25	CALCAREOUS SILTSTONE: a:a - cuttings tending to be sandier, forams present, ostracods, pyrite, trace glauconite, forams common, some large.
1770 - 1775	75	MUDSTONE/CLAYSTONE: a:a
	25	CALCAREOUS SILTSTONE: a:a
1775 - 1780	85	CALCAREOUS SITLSTONE: a:a
	15	MUDSTONE/CLAYSTONE: a:a forams present, pyrite, cuttings often sandy, unwashed sample indicates approximately equal amounts of Calcareous Siltstone and Mudstone/ Claystone.
1780 - 1785	10	MUDSTONE/CLAYSTONE: a:a
	90	CALCAREOUS SILTSTONE: a:a forams common - sandy grains also.
1785 - 1790	10	MUDSTONE/CLAYSTONE: a:a
	90	CALCAREOUS SILTSTONE: a:a pyrite.
1890 - 1795	95	CALCAREOUS SILTSTONE: light grey to medium grey, often fissile, grades to blocky, sharp shale like cuttings, grades to very fine grain aggregates, very calcareous carbonaceous flecking in some cuttings, some cuttings white to very light grey aggregates calcareous grains, slight mineral fluorescence, no hydrocarbon fluorescence.
	5	CLAYSTONE: light grey to very light grey, gummy, loose, sticky.
		NOTE: percentage of Claystone decreasing; less evident over shakers. However gross percentage of Claystone in lithology considerably more than 5%, more like 20 - 30%.

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
	tr	Forams
	tr	Pyrite very fine grain encrusting
	tr	Quartz grains, occasionally sub-angular to sub-rounded loose, grains often yellow, fine grain to coarse grain.
1795 - 1800	95	CALCAREOUS SILTSTONE: a:a increase in grain size more common.
	5	CLAYSTONE: a:a
1800 - 1805	100	CALCAREOUS SILTSTONE: a:a
	tr	CLAYSTONE: a:a
	tr	Loose quartz sub-rounded to round, very fine grain.
1805 - 1810	95	CALCAREOUS SILTSTONE: a:a increase in coarser fraction.
	5	CLAYSTONE: a:a
	tr	Quartz loose grains.
	tr	Very fine grain pyrite.
1810 - 1815	90	CALCAREOUS SILTSTONE: a:a
	10	CLAYSTONE: a:a
1815 - 1820	90	CALCAREOUS SILTSTONE: a:a
	10	CLAYSTONE: a:a
	tr	Loose quartz sub-angular to sub-round grains.
1820 - 1825	60	CALCAREOUS SILTSTONE: a:a
	40	CLAYSTONE: a:a plus discrete calcite grains, sandy grains more common - granular - carbonaceous flecks, light-grey-brown, pyrite.
1825 - 1830	70	CALCAREOUS SILTSTONE: a:a
	30	CLAYSTONE: a:a plus anhydrite, pyrite ('desander' sampled - very little sand present).
	tr	Quartz loose - round to sub-round very fine grain to fine grain.
1830 - 1835	85	CALCAREOUS SILTSTONE: a:a
	15	CLAYSTONE: a:a plus pyrite, forams, shell material plus traces glauconite - dull green - soft, plus traces hard dark green (volcanic?) green.
1835 - 1840	85	CALCAREOUS SILTSTONE: a:a
	5	CLAYSTONE: a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
	10	SAND: quartzose - sub-rounded to sub-angular, moderate to well sorted, fine - medium sand sized, calcareous plus glauconite - angular, more common.
1840 - 1845	85	CALCAREOUS SILTSTONE: a:a
	10	CALCAREOUS SAND: a:a
	5	MUDSTONE/CLAYSTONE: a:a plus glauconite, pyrite, forams. (- 1852 - large grains of glauconite common).
1850 - 1855	90	CALCAREOUS SILTSTONE: flat, shale-like, angular to sub-angular cuttings, light - medium grey, some cuttings sandy occasionally patch of pyrite. Carbonaceous flecking.
	5	CALCAREOUS SAND: fine to medium quartz sand, sub-angular to sub-rounded grains.
	5	MUDSTONE/CLAYSTONE: a:a Plus glauconite content increase in each set of cuttings. Various forms. a) light green sub-angular blocks enclosing angular dark green chips of glauconite b) very dark green - sub-spherical, solid. c) medium green, soft shale-like grains. Dolomite cement.
1855 - 1860	90	CALCAREOUS SILTSTONE: a:a
	5	CALCAREOUS SANDSTONE: a:a
	5	CLAYSTONE: increase in amount of glauconite. Sand sized grain of glauconite more common - very dark green, sub-rounded to sub-angular.
1860 - 1865	90	CALCAREOUS SILTSTONE: a:a
	5	CALCAREOUS SANDSTONE: a:a
	5	GLAUCONITE: all varieties described above plus Claystone percentage - mainly dark green, sub-rounded spheroids plus calcite grains.
1865 - 1870	90	CALCAREOUS SILTSTONE: a:a
	5	CALCAREOUS SANDSTONE: a:a
	5	GLAUCONITE: dark green sand sized spheroids predominant plus Claystone.
1870 - 1875	90	CALCAREOUS SILTSTONE: a:a - light medium grey, angular - sub-angular cuttings.
	5	GLAUCONITE: a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
1870 - 1875	5	CALCAREOUS SANDSTONE: a:a plus Claystone, pyrite, dolomite, occasional foram (mud percentage still) high (50%) in unwashed sample.
		Light grey - brown cuttings becoming common, glauconitic Siltstone (approximately ¼ of cuttings this colour rust brown - reddish brown.)
1875 - 1880	80	CALCAREOUS SILTSTONE: light grey - white, sub-angular to sub-rounded, soft - moderate firm.
	10	GLAUCONITE: predominant, fine grains.
	10	SANDSTONE: calcareous, quartzose plus Claystone (Claystone still very prominant in unwashed cuttings). Occasionally foram - slight mineral fuorescence.
1880 - 1885	80	CALCAREOUS SILTSTONE: light grey and brown a:a
	10	GLAUCONITE: a:a
	10	SANDSTONE: a:a plus Claystone, pyrite slight mineral fluorescence.
1885 - 1890	80	CALCAREOUS SILTSTONE: increase in sandier cuttings.
	10	GLAUCONITE: a:a
	10	SANDSTONE: Calcareous a:a plus foram, pyrite.
1890 - 1895	80	CALCAREOUS SILTSTONE: a:a
	10	GLAUCONITE: a:a
	10	SANDSTONE: a:a plus forams, pyrite.
1895 - 1900	80	CALCAREOUS SILTSTONE: a:a
	10	GLAUCONITE: a:a
	10	SANDSTONE: a:a pyrite common.
1900 - 1905	80	CALCAREOUS SILTSTONE: a:a
	10	GLAUCONITE: a:a
	10	SANDSTONE: a:a
1905 - 1910	80	CALCAREOUS SILTSTONE: a:a
	10	GLAUCONITE: a:a
	10	SANDSTONE: a:a plus pyrite, forams, shell material.
1910 - 1915	80	CALCAREOUS SANDY SILTSTONE: cuttings tending towards being sandy - less shale-like, sub-rounded.
	10	GLAUCONITE: a:a
	10	SANDSTONE: a:a plus some very coarse, well rounded, milky 2mm quartz grains plus pyrite.

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
1915 - 1918	50	SANDSTONE: loose quartz grains, coarse grain to medium grain; clear to milky opaque quartz, sub-angular to sub-rounded, occasionally well rounded occasionally angular grains, poorly sorted, some grains encrusted with very fine grain pyriten no mineral fluorescence, no hydrocarbon fluorescence.
	50	SILTSTONE: glauconitic in places, white to very dark grey to dark green, grades to very fine grain, sandstone in places, fine glauconite grain in places. Fissile to blocky.
		Free rounded glauconite grains free pyrite aggregates.
1923 - 1962		This interval conventionally cored.
1955 - 1960	45	SANDSTONE: loose quartz grains, angular to rounded, fine grain to coarse grain.
	50	SILTSTONE: pale grey, firm, calcareous, fine carbonaceous flecking.
	5	COAL:
1960 - 1965	40	COAL: a:a
	30	SILTSTONE: a:a
	30	SANDSTONE: a:a milky white to clear.
1965 - 1970	75	COAL: a:a
	10	SILTSTONE: a:a
	15	SANDSTONE: a:a
1970 - 1975	10	COAL: a:a
	30	SILTSTONE: a:a
	60	SANDSTONE: a:a
1975 - 1980	5	COAL: black, shiny, hard.
	20	SILTSTONE: light to medium grey, friable-hard.
	75	SANDSTONE: predominantly milky, medium to coarse ($\rightarrow$ 3mm) plus pyrite ($\rightarrow$ 2mm).
1980 - 1985	3	COAL: a:a
	17	SILTSTONE: a:a
	80	SANDSTONE: a:a plus trace pyrite, glauconite (cavings?)

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
1985 - 1990	3	COAL: a:a
	22	SILTSTONE: a:a
	75	SANDSTONE: a:a plus trace pyrite, glauconite (cavings?)
1990 - 1995	3	COAL: a:a
	12	SILTSTONE: a:a come cuttings very carbonaceous.
	85	SANDSTONE: a:a plus pyrite.
1995 - 2000	58	SANDSTONE: medium to coarse (> 3mm), sub-angular to sub-rounded, mainly milky, occasionally clear or white, loose grains.
	40	SILTSTONE: predominantly grey to brown, occasionally grey, firm to friable carbonaceous, grey to brown cuttings non-calcareous, grey cuttings - calcareous cavings?
	2	COAL: shiny, black.
2000 - 2005	50	SANDSTONE: a:a
	40	COAL: a:a
	10	SILTSTONE: a:a plus pyrite.
2005 - 1020	10	SANDSTONE: a:a
	85	COAL: a:a
	5	SILTSTONE: a:a
2010 - 2015	85	SANDSTONE: a:a
	10	SILTSTONE: a:a
	5	COAL: a:a plus fine calcareous material - cavings?
2015 - 2020	80	COAL: a:a
	20	SANDSTONE: a:a
	tr	SILTSTONE:
2020 - 2025	40	COAL:
	60	SANDSTONE: milky white - clear, loose quartz grains, medium to very coarse grains with abundant fine grains to very fine grains at desander, angular to sub-rounded, no shows.
2025 - 2030	85	SANDSTONE: loose quartz grains, angular to sub-rounded, medium to very coarse grain to fines in desander.
	45	SILTSTONE: light grey, blocky soft, calcareous possibly contamination.

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2030 - 2035	55	SANDSTONE: a:a
	45	SILTSTONE: a:a
	tr	COAL:
	tr	very fine grain siltstone fragments brown, quartzose, brown, gold fluorescence, very slow stream blue white cuttings, possibly contamination.
2035 - 2040	60	SANDSTONE: a:a fines in desander.
	40	SILTSTONE: predominantly grey as opposed to grey-brown in earlier samples, some grains calcareous - possibly contamination.
	tr	COAL:
	tr	SANDSTONE:
	tr	PYRITE:
2040 - 2045	70	SANDSTONE: a:a occasionally grains of medium sandstone with good yellow-gold fluorescence, strong cut considered to be cavings.
	30	SILTSTONE: a:a, about 50% of siltstone cuttings calcareous.
	tr	COAL
2045 - 2050	75	COAL: a:a
	25	SANDSTONE: a:a
	tr	SILTSTONE
2050 - 2055	90	SANDSTONE: angular to sub-rounded, milky, fine to coarse
	10	SILTSTONE: light to dark grey, occasionally calcareous.
	tr	COAL:
2055 - 2060	75	COAL:
	25	SANDSTONE: quartzose - fine to coarse.
	tr	SILTSTONE:
2060 - 2065	80	COAL: black, shiny, hard.
	20	SANDSTONE: quartzose a:a
	tr	SILTSTONE: predominant., non-calcareous
	tr	SANDSTONE: fine, non-calcareous,friable, no fluorescence.
2065 - 2070	35	COAL: a:a
	65	SANDSTONE: a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2065 - 2070	tr	SILTSTONE: brown-grey, non-calcareous, soft.
	tr	GLAUCONITE: (cavings?)
2070 - 2075	10	COAL: a:a
	75	SANDSTONE:
	15	SILTSTONE:
	tr	PYRITE: coarse grains to 2-3mm, sometimes encrusting quartz grains. Slight mineral fluorescence.
2075 - 2080	40	COAL:
	40	SANDSTONE:
	20	SILTSTONE: brown - grey brown, sometimes carbonaceous, firm to hard.
	tr	PYRITE: encrusting quartz plus occasional coal, blocky - nodular.
2080 - 2085	tr	COAL:
	80	SANDSTONE:
	20	SILTSTONE:
	tr	PYRITE:
2085 - 2909	30	COAL: a:a
	10	SILTSTONE: a:a
	60	SANDSTONE: a:a
2090 - 2095	70	COAL: a:a
	25	SANDSTONE: a:a
	5	SILTSTONE:
2095 - 2100	30	COAL:
	55	SANDSTONE: loose grains fine grain to coarse grain, a:a plus occasional aggregates fine grain sandstone.
	15	SILTSTONE: a:a brown, occasionally blocky, blocky-subfissile, soft to firm, minor carbonaceous flecks.
2100 - 2105	95	COAL: a:a
	5	SANDSTONE: a:a
2105 - 2110	90	COAL: a:a
	10	SANDSTONE: a:a
	tr	SILTSTONE: a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2110 - 2115	95	COAL: a:a
	5	SANDSTONE: a:a
	tr	SILTSTONE: a:a
2115 - 2120	95	COAL: a:a
	5	SANDSTONE: a:a
2120 - 2125	95	COAL: a:a
	5	SANDSTONE: loose quartz grains, coarse - fine grain, occasionally aggregate fine sand grains.
	tr	SILTSTONE: brown, light grey, firm-soft, blocky-subfissile.
2125 - 2130	60	COAL: a:a
	25	SANDSTONE: loose quartz, coarse grain-medium-fine (fine grain from desander) sub-angular to sub-rounded.
	15	SILTSTONE: pale brown, firm occasionally soft, blocky-subfissile, trace micromica.
2130 - 2135	70	COAL: a:a
	20	SANDSTONE: a:a
	10	SILTSTONE: a:a
2135 - 2140	5	SANDSTONE: medium-fine grained, light grey-light brown, medium hard, sub-angular to sub-rounded, some have pale yellow fluorescence, no cut or crush cut.
	50	SANDSTONE: loose quartz grains a:a
	10	SILTSTONE: a:a
	35	COAL: a:a
2140 - 2145	tr- 5	SILTSTONE: a:a
	5 - 10	SANDSTONE: a:a
	90	COAL: a:a
2145- 2150	100	COAL: a:a
	tr	SILTSTONE:
	tr	SANDSTONE:
2150 - 2155	100	COAL:
	tr	SANDSTONE: a:a
	tr	SILTSTONE: a:a
	tr	SANDSTONE: light brown, granular, carbonaceous flecks, hard, fine grain.

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2155- 2160	60	COAL: a:a
	40	SANDSTONE: Coarse quartz grains, angular - sub-rounded, predominantly medium - coarse. Few fine to very fine in desander sample.
	tr	SANDSTONE: fine, brown, granular, a:a
	tr	SILTSTONE: grey, non calcareous, soft.
2160 2165	20	COAL: a:a
	50	SANDSTONE: quartz
	30	SILTSTONE: predominantly grey to brown to dark brown, non calcareous, firm.
	tr	PYRITE: coarse grains of blocky pyrite.
2165 - 2170	30	COAL: a:a
	35	SANDSTONE: quartz a:a
	35	SILTSTONE: a:a
	tr	PYRITE: a:a, mineral fluorescence in occasional sandstone grain.
2170 - 2175	10	COAL: occasionally grains pyrite encrusted.
	60	SANDSTONE: quartz to fine to coarse.
	30	SILTSTONE: grey to brown, hard.
	tr	SANDSTONE: very fine, granular, friable.
2175 - 2180	10	COAL: a:a
	45	SANDSTONE: quartz
	45	SILTSTONE: a:a occasionally carbonaceous.
	tr	PYRITE: encrusting, quartz plus coal grains.
	tr	SAND: granular, fine, dark brown.
	tr	SAND: white, soft, quarts, granular.
2180 - 2185	10	COAL: a:a
	75	SANDSTONE: coarse grain to medium grain, loose, clear to opaque, sub-angular to sub-rounded grains.
	15	SILTSTONE: medium light grey to pale brown, firm, blocky, carbonaceous flecks.

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2185 - 2190	5	COAL: a:a
	30	SILTSTONE: a:a
	65	SANDSTONE: a:a plus sandstone cuttings (fine grain to very fine grain)
2190 - 2195	15	COAL: a:a
	20	SILTSTONE: a:a
	65	SANDSTONE: a:a
2195 - 2200	10	COAL: a:a
	30	SILTSTONE: a:a
	60	SANDSTONE: loose grains a:a plus fine grained - medium grained cuttings, moderately hard, rarely with dull fluorescence, no cut or crust cut, probable mineral fluoresecence, non calcareous.
2200 - 2205	15	COAL: from gas peak @ 2202m (31 units 100% coal)
	45	SILTSTONE: reddish brown to light grey, soft to firm, blocky to subfissile, occasionally micromicaceous, some carbonaceous flecking.
	35	SANDSTONE: a:a
2205 - 2210	35	COAL: a:a
	20	SANDSTONE: quartz a:a
	45	SILTSTONE: varies from light grey to dark red to brown, firm, non calcareous, occasionally micromicaceous, occasionally carbonaceous.
	tr	SANDSTONE: fine quartz grains, carbonaceous flecking, pyrite.
2210 - 2215	5	COAL: a:a
	35	SANDSTONE: quartz
	60	SILTSTONE: varies from white to grey, red to brown, soft to firm, occasionally carbonaceous, fine laminations visible in some cuttings.
	tr	PYRITE: fine grain, sandstone brown, granular. Occasionally mineral fluorescence, rare hydrocarbon fluorescence - cavings.
2215 - 2220	tr	COAL: a:a
	40	SANDSTONE: quartz
	60	SILTSTONE: a:a
	tr	SANDSTONE: a:a, fine, pyrite.

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2220 - 2225	70	COAL: a:a
	15	SANDSTONE: quartz
	15	SILTSTONE:
2225 - 2230	5	COAL: a:a
	20	SILTSTONE: a:a reddish brown to light grey, soft to firm (some soft light grey siltstone calcareous - may be Lakes Entrance contamination).
	75	SANDSTONE: loose grains, medium grain, sub-angular to sub-rounded.
2235 - 2240	70	SILTSTONE: a:a predominantly light grey, blocky - subfissile.
	25	SANDSTONE: loose quartz grains a:a, occasionally fine grain sandstone with mineral fluorescence (calcareous or dolomite cement? slight to moderate effervescence in HCl).
	5	COAL: a:a
2240 - 2245	75	SILTSTONE: even amounts reddish brown siltstone, blocky firm, carbonaceous flecking and light grey soft to firm blocky, rarely subfissile occasionally calcareous siltstone
	25	SANDSTONE: a:a
	tr	COAL:
	tr	MICA FLAKES:
2245 - 2250	40	SILTSTONE: a:a
	60	SANDSTONE: a:a
	tr	COAL
	tr	PYRITE:
	tr	SANDSTONE: granular, white, carbonaceous, soft.
2250 - 2255	95	SANDSTONE: quartz predominantly medium grain with occasional coarse grains, sub-rounded to sub-angular.
	5	SILTSTONE: predominantly brown, carbonaceous, soft.
	tr	COAL:
	tr	SANDSTONE: fine to granular quartz.
	tr	PYRITE:

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2255 - 2260	90	SANDSTONE: a:a loose grains occasionally aggregates with pyrite subhedral.
	10	SILTSTONE: a:a
	tr	COAL:
	tr	SANDSTONE:
	tr	PYRITE:
2260 - 2265	40	COAL: a:a
	40	SANDSTONE: predominantly coarse to medium loose grains, plus friable fine grain sandstone cuttings.
	20	SILTSTONE: a:a
2265 - 2270	10	COAL: a:a
	30	SILTSTONE: a:a
	60	SAND & SANDSTONE: a:a
2270 - 2275	70	SANDSTONE & SAND: quartzose - occurs predominantly as loose medium grain to very coarse grain, rarely fine grain, sub-angular to sub-rounded, occasional cuttings of fine grained friable sandstone.
	25	SILTSTONE: grey to brown-grey siltstone, firm, blocky, some carbonaceous flecking. NOTE: appears to be some gradation between grey siltstone and very fine grain sandstone.
	5	COAL: a:a
2275 - 2280	80	SANDSTONE: a:a
	20	SILTSTONE: a:a
	tr	COAL: a:a
2280 - 2285	80	SANDSTONE/SAND: a:a
	15-20	SILTSTONE: a:a
	6-5	COAL: a:a
2285 - 2290	95	SAND: a:a
	5	SILTSTONE:
	tr	COAL: a:a
	tr-rare	MICA FLAKES:

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2290 - 2295	95	SANDSTONE: a:a
	5	SILTSTONE: a:a
2295 - 2300	100	SAND: loose quartz grains, very coarse grain - medium grain (→ upper fine grain in desander) moderate to well sorted (~ lower coarse to upper medium) no shows, sub-angular to sub-rounded.
	tr	SILTSTONE: a:a
2300 - 2305	90	SAND: a:a medium to coarse quartz grains.
	10	SANDSTONE: fine grain, granular - white to grey, soft.
	tr	SILTSTONE: a:a
	tr	COAL: a:a
	tr	PYRITE: - slight effervescent reaction to HCl.
	tr	MICA: white.
2305 - 2310	70	SAND: a:a medium to coarse quartz.
	20	SANDSTONE: a:a
	10	SILTSTONE: a:a
	tr	COAL, PYRITE:
2310 - 2315	90	SANDSTONE: a:a quartz
	5	SANDSTONE: fine grained, soft.
	5	SILTSTONE: a:a
	tr	COAL, PYRITE:
2315 - 2320	95	SAND/SANDSTONE: quartz predominant, loose grains, medium grain to coarse grain, occasionally cuttings medium to fine grain sandstone, very friable.
	tr- 5	SILTSTONE: light grey, moderately firm, blocky - sub-fissile.
	tr	COAL:
2320 - 2325	95	SANDSTONE: a:a
	5	COAL:
	tr	SILTSTONE: a:a
2325 - 2330	50	SANDSTONE: a:a
	50	COAL: a:a
	tr	SILTSTONE: a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2330 - 2335	50	SANDSTONE: clear, vitreous, medium grain to coarse grain, sub-rounded to sub-angular unconsolidated quartz, hard. No shows, trace pyrite
	20	SILTSTONE: brown, carbonaceous, subfissile, relatively firm, blocky.
	30	COAL: black vitreous, blocky, hard.
2335 - 2340	50	SANDSTONE: milky, vitreous, medium grain to very coarse grain, sub-rounded to sub-angular, loose unconsolidated quartzose, hard, occasionally sub-rounded with glauconite, silty matrix, friable, no shows, minor dolomite/carbonate cement, minor mineral fluorescence.
	30	SILTSTONE: grey, brown, occasionally dark brown, grading to shale, otherwise a:a.
	20	COAL: a:a
2340 - 2345	15	SANDSTONE: a:a
	60	SILTSTONE: predominantly dark brown, occasionally grey brown, carbonaceous, blocky, subfissile, firm, occasionally green glauconite, sandy in part, soft.
	25	COAL: a:a
2345 - 2350	60	SILTSTONE: a:a grading to shale in part.
	40	COAL:
2350 - 2355	60	SILTSTONE: a:a
	30	COAL: a:a
	10	SHALE: dark brown, fissile, hard, slightly carbonaceous matrix.
	tr	SANDSTONE:
2355 - 2360	50	SANDSTONE: predominantly white, clear, vitreous, medium grain to coarse grain, quartzose, unconsolidated, hard, no shows, occasionally very fine to fine grain, sub-rounded, minor coal flecks. Carbonaceous - silty matrix, tight, no shows, trace pyrite.
	30	SILTSTONE: grey to brown, carbonaceous in part, blocky, occasionally subfissile, firm, occasionally glauconite and friable.
	20	COAL: a:a
2360 - 2365	65	SANDSTONE: a:a
	25	SILTSTONE: grading to shale in part.
	10	COAL: a:a

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2365 - 2370	80	SANDSTONE: coarse grain a:a, occasionally fine to medium grain, sub-rounded, silty matrix, no shows.
	20	SILTSTONE: a:a
	tr	COAL:
2370 - 2375	80	SANDSTONE: dark, milky, medium grain, sub-angular to sub-rounded quartzose, unconsolidated, hard, fine grain sub-rounded quartzose in a predominantly silty matrix. Fair sorting. No shows.
	tr	GLAUNCONITE: occasionally friable, trace pyrite, predominantly carbonaceous.
	tr	CALCAREOUS: cement, quartzose.
2375 - 2380	80	SANDSTONE: a:a with minor coal flecks.
	20	SILTSTONE: a:a
	tr	COAL: a:a
2380 - 2385	80	SANDSTONE: a:a predominantly coarse grain, unconsolidated otherwise a:a.
	10	SILTSTONE: a:a
	10	COAL: a:a
2385 - 2390	90	SANDSTONE: a:a
	10	SILTSTONE: a:a
2390 2395	90	SANDSTONE: predominantly medium grain, clear, milky, sub-rounded quartzose, unconsolidated, hard, occasionally fine grain, sub-rounded to sub-angular quartz in a predominantly silty and kaolinitic matrix, no shows. Good sorting.
	10	SILTSTONE: a:a becoming occasionally glauconitic.
	tr	COAL: a:a
2395 - 2400	100	SANDSTONE: a:a, occasional coal flecks.
	tr	SILTSTONE/COAL:
2400 - 2405	100	SANDSTONE: a:a
	tr	SILT & COAL:
2405 - 2410	100	SANDSTONE: clear, white, vitreous, sub-rounded, medium grain to coarse grain, unconsolidated quartzose, hard, excellent sorting, no shows, occasionally fine grain, sub-rounded to sub-angular, in a kaolonitic matrix, occasionally glauconite, fair sorting, no shows.
	tr	SILTSTONE/COAL:

LITHOLOGICAL DESCRIPTIONS

DEPTH	%	DESCRIPTION
2410 - 2415	100	SANDSTONE: a:a
	tr	SILTSTONE, COAL:
2415 - 2420	90	SANDSTONE: a:a
	10	COAL:
2421	90	SANDSTONE: a:a
	10	COAL: a:a
	tr	SILTSTONE: a:a

APPENDIX 2

APPENDIX 2.

CORE DESCRIPTIONS.

ESSO AUSTRALIA LTD.

CORE DESCRIPTION

Core No. 1

Well BREAM 4A

Interval Cored 1920-1929.5 m, Cut 9.5 m, Recovered 9.5 m, (100 %) Fm. La Trobe

Bit Type Christensen C22 Bit Size 8 15/32 in., Desc by TMF Date 10-8-81

Depth & Coring Rate (m/hr)	Graphic	Shows	Interval (m)	Descriptive Lithology
10 0			1920 m	
				Ss qtzose, m-f.g., massive, cl.-white gns, SA-SR, mod well sorted, v. friable, good vis. porosity, no fluor.
				↓ grades to fg-v.fg ss (qtzose), becomes firmer, vis. por. reduces, then grades to:
				Laminated Sltst/v.f.g. ss, qtzose, silt laminations w/ organic material, firm-hard, poor vis. porosity, sl. calc., ripple marks and scour & fill structures at base.
			1923.3m	
				Ss mod-poor sorting fg-v.c.g to granule sized grains. friable-weak calcareous cement, massive. mod vis. porosity
				↓ grades to ...
				Ss, clean, qtzose v.c.g.-fine grained, bimodal? mod sorted SA-SR, good vis. porosity, massive, grains clear-occ. opaque.
			1929.5m	

ESSO AUSTRALIA LTD.

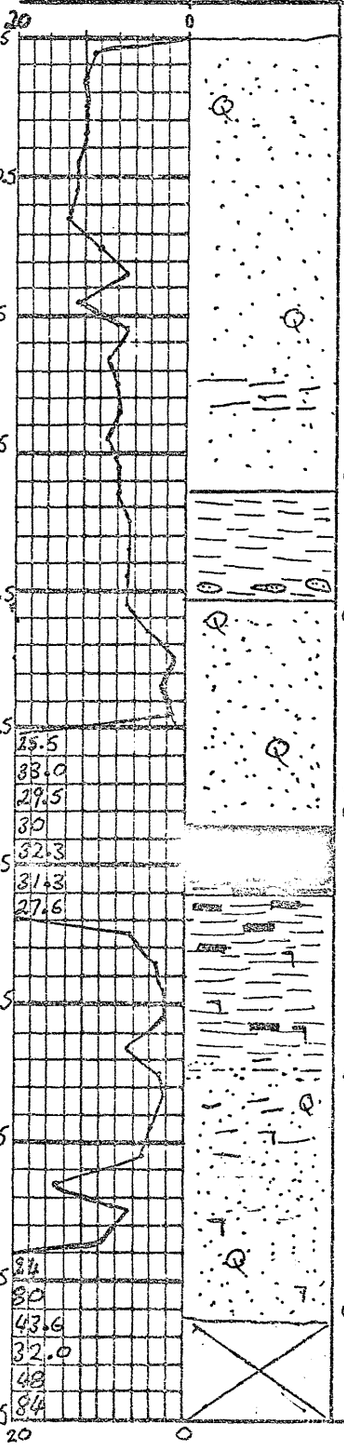
CORE DESCRIPTION

Core No. CORE #2.

Well BREAM 4A.

Interval Cored 1929.5-1939.4m, Cut 9.9 m, Recovered 9.2 m, (93 %) Fm. Latrobe

Bit Type C22 Bit Size 8 15/32 in., Desc by TMF/LJF Date 10-9-81



Interval (m)	Descriptive Lithology
1929.5 -1931.5	Ss, qtzose, m.g., sa-sr, mod well sorted massive, carbonaceous flecks, no shows
1931.5 -1932.9	Ss, as above, but with even, pale yellow white fluor, instant pale yellow white cut. Strong petroleum odour, no stain. Fluor gracies in for 10-15 cm above 1931.5. Towards 1932, occ sh. laminae occur & fluor becomes spotty.
1932.9 -1933.6	Shale. - Sh, finely laminated, dk, v. hard, lamelli discont. organic tracks and bioturbation. At base sand stone clasts enclosed in shale.
1933.6 -1935.2	Ss, qtzose brownish grey, patchy (bioturbated?) mod - well sorted. Brown colouration residual HC? Fluor varies from dull gold to whitish yellow, and is patchy ~ say 30% Instant milky blue white cut.
1935.2 -1935.7	Coal, dirty, with minor intermixed sands, transitional with depth to dk brown hard carbonaceous shale
1935.7 -1936.9	Carbonaceous Shale, grading with depth to hard med dk gry, slightly fissile micaceous siltst.
1936.9 -1938.7	Ss, dk brown cg - v.f. grained qtz (often SR) abund. f.g. mica, v. poorly sorted, mod to good visible porosity, strong petroleum odour Uneven spots yellow white fluor, Instant pale blue white cut. V hard but becomes more friable at bottom of core, possibly as a result of slightly better sorted sediment Uneven weak "shows" may be due to flushing of the porous sediment with drilling fluid

1107/09/28

ESSO AUSTRALIA LTD.

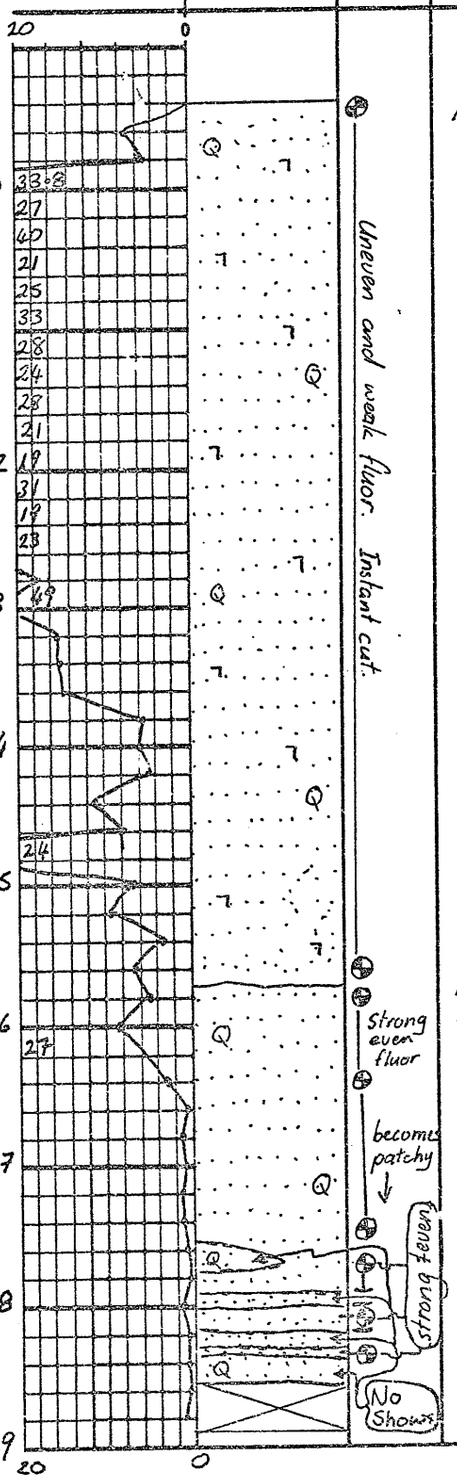
CORE DESCRIPTION

Core No. B 3

Well BREAM 4A.

Interval Cored 1939.4 - 1948.9 m, Cut 9.5 m, Recovered 9.1 m, (96 %) Fm Latrobe.

Bit Type C 22 Bit Size 8 15/32 in., Desc by TMF/LJF Date 11-8-81



Depth & Coring Rate (m/hr)	Graphic	Shows	Interval (m)	Descriptive Lithology
			1939.4 - 1945.76	Ss - continuation of basal core #2 lithology. - med dk gy vfg - cg, occassonally granular, poorly sorted qtzose, SA - SR, occ R, abundant v. fine mica (biotite). Rock is hard in compressional sense (bounces and sparks hammer) but friable tensionally (can pick out grains with probe easily). Good visible porosity, Strong HC odour, uneven weak speckled pale yellow white fluoresecance, fast blue white cut. Suspect formation has been well flushed with drilling fluid.
			1945.76 - 1947.6	Ss (sharp contact.) mod - well sorted f.g. qtzose ss lt olive gy, mod hd - friable. Strong HC. odour Even, bright 100% v. pale yellow/white fluor., streaming blue white cut, mod vis porosity. Occ. sections rich in rounded qtz granules; these become more frequent w/ depth and by 1946.5 m the rock becomes bimodal (fg & v.cg - granular) with respect to grainsize, and fluor becomes patchy.
			1947.6 - 1948.55	2 seperate sandstone lithologies present (interfingering?); one as above immed. above, with strong even, v. pale yellow white fluor, and: second - ss, fine grained lt olive gy - buff, well sorted sand, poor vis por, no shows

ESSO AUSTRALIA LTD.

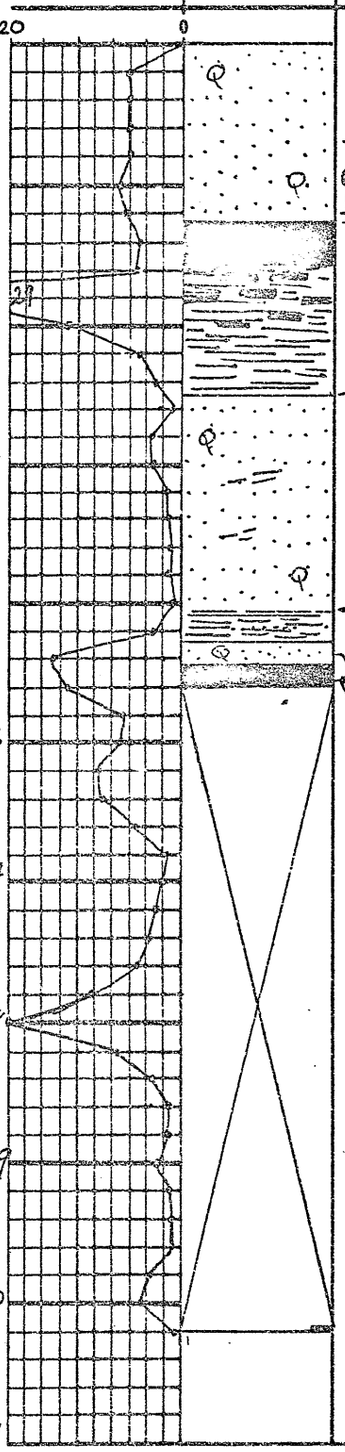
CORE DESCRIPTION

Core No. 4

Well BREAM 4A

Interval Cored 1951.0-1960.1 m, Cut 9.1 m, Recovered 4.6 m, (50.5%) Fm. Latrobe.

Bit Type C 22 Bit Size 8 15/32" in., Desc by TMF/LJF Date 12-9-81.



Depth & Coring Rate (m/hr)	Graphic	Shows	Interval (m)	Descriptive Lithology
			1951 - 1952.27	Ss Grey, med - v.c.gn. mod hd - friable, SA - SR mod - poorly sorted, occ carbonaceous flecks no shows (see note) good vis. porosity, occ sections: m-fg ss, well sorted, mod - poor porosity NOTE: Patches visible "oil" on outside of core between 1951.7 - 1952.2 - dull gold fluor, instant thick milky white cut, brown cut residue. However this oil on exterior of core only - none on freshly opened face of core (no fluor) ∴ suspect contamination.
			1952.27 - 1953.49	Coal Black & shiny, becomes dirty with depth, grading to carbonaceous siltstone/shale between 1952.55 and 1953.49.
			1953.49 - 1955.03	Ss mod firm in places although much of the recovered core disintegrated, brown gray, med - c g, with occ large qutz gns → 5mm, poorly sorted, shaly matrix, occasional clasts of shale, low vis porosity, No shows, strong H_2S odour from core, esp. freshly broken surface.
			1955.03 - 1955.28	Shale Hard micaceous & carbonaceous shale w/ laminations of fine white qutz sand.
			1955.28 - 1955.43	Ss mg., qtzose, SA - SR, v. friable, carb. flecking good vis porosity, no shows.
			1955.43 - 1955.60	Coal black - retrieved sample crushed.

NOTE:- All missing core assumed to be from bottom until checked against logs.
- Strong H_2S odour when core retrieved. 30 ppm H_2S measured on drill floor in vicinity of core trays.

APPENDIX 3

APPENDIX 3

APPENDIX 3.

SIDEWALL CORE DESCRIPTIONS.

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ATT ..... REC .....

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SWC RUN NO .....

IES RUN NO .....

ESSO AUSTRALIA LTD.

SIDEWALL CORE DESCRIPTIONS

WELL BREAM #4A

GEOLOGIST J.ROCHE/R. KEY

SERVICE CO SCHLUMBERGER

NO.	DEPTH	REC	ROCK TYPE	MODIFIERS	CAL	COLOR	INDUR DEG	GRAIN SIZE	SRTG	RND	DISS CLAY	STAIN	FLOURESCENCE				CUT FLUOR.		CUT RESIDUE		SHOW	PROB PROD	REMARKS - GAS
													%	DISTR	INTEN	COLOR	INTEN	COLOR	QUAN	COLOR			
1a	1	2	3	4	5	6	7	8	9	10	11	12	RK	14	15	16	17	18	19	20	21	22	23
1	2407.5	1"	v.f.	Qtz, mica	-	wht.gy	Sft	v.f.	wsrtd	sr													
			Sst.																				
2	2400.5	½"		Qtz. mica	-	wht.gy	Sft	v.f.	wsrtd	sr													
3	2397	½"	v.f.g.	Qtz.mica.	-	m.lt	Fri	v.f.	wsrtd	sr													
			Sst.	pyr.		gy.																	
4	2387	½"	Sst.	Qtz. pyr.	-	Lt gy	Fri	f.g.	wsrtd	sr													
5	2387	3/4	Sst.	Qtz. mica.	-	gr.gy	Fri	v.f.g	wsrtd	sr													
6	2368.5	½"	Sh.	slty. gry.	-	Pl.brn	Soft																
7	2357	3/4	Sh.	arg.slty.	-	m. gy	Soft																
8	2352.5	1"	Coal		-	Bl	hd																
9	2449.3	3/4	Sh.	arg.	-	brn	Soft																
10	2339.3	1 ¼	Sh.	Carb.	-	brn/	Soft																
						blk																	
11	2331.7	1"	coal/	Carb.	-	brn	Soft																
			sh																				
12	2315.5	½"	Sst	Qtz.	-	Mlt.	Fri	f.g.	wsrtd	sa													
						gy.																	

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ATT ..... REC .....

DATE .....

SWC RUN NO .....

IES RUN NO .....

ESSO AUSTRALIA LTD.

SIDEWALL CORE DESCRIPTIONS

WELL BREAM #4A

GEOLOGIST J.ROCHE/R.KEY

SERVICE CO SCHLUMBERGER

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
13	2300.5	3/4	Sst	Qtz.	-	M. lt gy.	Fri	m.g. c.g.	wsrtd	sr													
14	2291.7	3/4	Sst	Qtz. arg.	-	M. lt gy.	Fri	f.g. grnl	psrtd	sa													
15	2275.5	1¼	Sh	carb. arg.	-	brn	Soft																
16	2273.3	1"	Coal		-	blk	Fri																
17	2266.5	½"	Sst	Qtz. arg.	Sl	lt.gy	Slty.	v.f.g	wsrtd	sa													
18	2242	1¼	Sh	arg.	-	m.gy.	Soft																
19	2234	3/4	Sh	arg. slty.	Sl	m.gy.	Soft																
20	2218.2	3/4	Sh	arg. slty. carb	-	m.gy.	Soft																
21	2208	1"	Sh	arg.	-	m.lt. gy.	Firm																
22	2204.9	1"	Coal		-	blk.	Fri																
23	2191.2	½"	Sh	arg. slty.	-	m.gy.	Firm																
24	2180.5	½"	Sh	arg. slty.	Sl	Pl.brn	Soft																

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ATT .... REC ....
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ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

SWC RUN NO ....
IES RUN NO ....

WELL BREAM #4A
GEOLOGIST J.ROCHE/R.KEY
SERVICE CO. SCHLUMBERGER

NO. 1 a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
25	2162	1¼"	Coal		-	blk	Fri																
26	2157.5	1¼	Coal		-	blk	Fri																
27	2150	1¼	Coal		-	blk	Fri																
28	2130.2	¼	Slt.	Qtz	v	v.lt.	Slt.		wsrtd														
			St.			gy.																	
29	2117.7	1	Coal			Black	hd																
30	2110.5	1¼	Coal			Bl	Btle-																
							hd																
31	2106.8	1¼	Shale	Carb		Gy.	Soft																
32	2097.7	¼"	Coal			Bl	Hd																
33	2094.5	½"	Coal			Bl	Hd																
34	2076.5	½"	Shale	Carb. py.		dk.gy	Soft																
35	2057.5	¼"	Slty.	Slty.		lt.gy	Fri	v.f.	Good	r													
			v.f.g			wh.		silt.															
36	2041.6	¼"	v.f.s	Slty.		lt.gy.	Fri	v.f.	Good	r													
						wh		silt.															

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ESSO AUSTRALIA LTD.

SIDEWALL CORE DESCRIPTIONS

WELL BREAM #4A

GEOLOGIST J.ROCHE/R.KEY

SERVICE CO. SCHLUMBERGER

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
37	2032.1	¼	Silt.	Sandy-py	-	lt.gy.	Fri		Good	r													
						wh																	
38	2016.2	¼	Shale	Coal.carb.		dk.gy	Soft																
39	2009.8	3/4	Coal	Carb.		bl.	Hd																
40	1997	½	Shale	Carb. sandy		dk.gy.	Soft																
41	1985.5	½	Shale	Sandy.py.		dk.gy.	Soft																
				Carb.																			
42	1972	¼	Shale	silty.py.		dk.gy.	Soft																
				Carb.																			
43	1963.2	3/4	Shale	Silty. py.		dk.gy.	Soft																
				Carb.																			
44	1951.8		Sst	Carb.coaly.	Sl	lt.gy.	Fri	f.gr.	good	sa													
				py.		wh.																	
45	1950.5	½	Sst			dk.lt.	Fri	f.m.	excel	r													
						gy.																	
46	1948.5	¼	Sst	arg.coal		lt.gy.	Fri	m.c.	Fair	sa		lt.brn		NO SHOWS									
						lt.brn		gr.		sr													

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ESSO AUSTRALIA LTD.

SIDEWALL CORE DESCRIPTIONS

WELL BREAM #4A

GEOLOGIST J.ROCHE/R.KEY

SERVICE CO SCHLUMBERGER

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
47	1941.9	¼	Sst	arg.carb.		brn.	Fri	m.c.	Fair	sa		poss.		NO SHOW									
								gr.		sr		lt.brn.											
48	1940.6	¼	Sst	arg.mica.		dk.brn	Fri	f.gr.						NO SHOW									
				carb.																			
49	1938.6	½	Sst	sl.arg.				m.gr	Fair	sr		lt.brn		NO SHOW									
50	1937.2	¼	Shale	Sandy		dk.brn	Fri							NO SHOW									
51	1935.5	½	Sst	sl.arg.		dk.lt.	Fri	m.g.	Good	r				NO SHOW									
						gy.																	
52	1929.8	½	Sst	Clean		wh.lt	Fri	m.g.	Good	r				NO SHOW									
53	1911.8	¼	Sst	Clean		wh.	Fri	f.-m.	Good	r													
								g.															
54	1909.5	1	Sst	v.arg.coaly.		dk.brn	Fri	v.f.-	Poor	r													
				carb.coal				f.grn.															
55	1905.7	1	Sst-	v.arg.coaly		dk.brn	Fri	v.f.-	poor														
			Silt	carb.mica.				f.gr.															
56	1903	1	Sst	arg.mica.		dk.brn	Fri	v.f.-															
			Silt	coaly				f.gr.															
57	1899	-																					

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ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

WELL BREAM #4A

GEOLOGIST J.ROCHE/R.KEY

SERVICE CO SCHLUMBERGER

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
58	1896.9	1¼	Silst	arg.mica.	Sl	dk.brn	Fri		Poor														
				coaly		gy.																	
59	1891.8	1	Silst	arg.mica.py	Sl	dk.gy.	Fri		Poor														
						brn.																	
60	1889.5	1¼	Silst	arg.mica.	Mod	dk.gy	Fri		Poor														
			Shale	coal		brn																	
61	1885	1¼	Shale	arg.carb.	Mod	dk.gy.	Soft																
				mica		brn.																	
62	1882.5	1¼	Shale	arg.mica.	Mod	dk.gy	Fri																
			Silst	coal.py.		brn.																	
63	1879	1¼	Shale	arg.py.	Mod	dk.gy	Soft																
				coal		brn.																	
64	1875.5	1	Shale	arg.mica.	Mod	dk.gy	Soft																
				coal.		brn.																	
65	1872.2	1¼	Shale	arg.mica.	Mod	dk.gy	Soft																
				coal		brn.																	
66	1869	1¼	Shale	arg.mica.	Mod	dk.gy	Soft																
						brn.																	
67	1865.5	1¼	Shale	arg.mica	Mod	dk.brn	Soft																

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SWC RUN NO .....

IES RUN NO .....

ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

WELL BREAM #4A

GEOLOGIST J.ROCHE/R.KEY

SERVICE CO SCHLUMBERGER

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
68	1861.9	1¼	Shale	arg.biot	Mod	dk.brn	Soft																
69	1860	1	Sh -	arg.py.biot	v	dk.bn	Soft																
			Silt																				
70	1859	1	Shale	arg.	v	lt.gy	Soft																
		3/4																					
71	1857.5	1¼	Silt	arg.biote	v	lt.gy	Soft																
72	1854.5	1	Silt	sl.arg.	v	lt.gy	Soft																
						wh.																	
73	1852.7	1	Sh	arg.	v	m.gy	Soft																
74	1850.5	1	Silt	arg.	v	lt.gy	Soft																
75	1847.3	1¼	Silt	arg.	v	lt.gy	Soft																
						wh.																	
76	1845.3	1¼	Silt	arg.	v	gy.wh	Soft																
77	1843	1¼	Silt	arg.sl.coaly	V	lt.gy.	Soft																
						wh.																	
78	1841.5	1¼	Silt	arg.	v	lt.gy	Soft																
						wh																	

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ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

SWC RUN NO ...
IES RUN NO ...

WELL BREAM #4A
GEOLOGIST J.ROCHE/R.KEY
SERVICE CO. SCHLUMBERGER

NO. 1 a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
79	1839	1¼	Silt	arg.	v	gy.	Soft																
80	1836.5	1¼	Silt	arg.	v	gy.wh	Soft																
81	1835	¼	Silt	arg.	v	gy.wh	Soft																
82	1832.5	3/4	Silt	arg.coal	v	gy.wh	Soft																
83	1830.8	3/4	Silt	arg.	v	gy.wh	Soft																
84	1828	3/4	Silt	arg.py.	v	gy.wh	Soft																
85	1826	1	Silst	arg.sl.py	v	lt.gy.	Soft																
86	1824.4	½	Silt	arg.sl.py.	v	lt.gy.	Soft																
87	1822.7	¼	Silt	arg.	v	lt.gy. wh.	Soft																
88	1750	1	Silt	arg.	v.	lt.gy wh.	Soft																
89	1674.5	1	Silt	arg.	v	lt.gy wh.	Soft																
90	1599.8	1	Shale	arg.	v	lt.gy	Soft																
91	1525	1	Silt		v	gy.wh	Soft																

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ATT .... REC ....

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ESSO AUSTRALIA LTD.
SIDEWALL CORE DESCRIPTIONS

IES RUN NO .... SWC RUN NO ....

WELL BREAM #4A

GEOLOGIST J.ROCHE/R.KEY

SERVICE CO SCHLUMBERGER

NO. 1a	DEPTH 1	REC 2	ROCK TYPE 3	MODIFIERS 4	CAL 5	COLOR 6	INDUR DEG 7	GRAIN SIZE 8	SRTG 9	RND 10	DISS CLAY 11	STAIN 12	FLOURESCENCE % RK	FLOURESCENCE DISTR 14	FLOURESCENCE INTEN 15	FLOURESCENCE COLOR 16	CUT FLUOR. INTEN 17	CUT FLUOR. COLOR 18	CUT RESIDUE QUAN 19	CUT RESIDUE COLOR 20	SHOW 21	PROB PROD 22	REMARKS - GAS 23
92	1449	1¼	Silt	arg.	v	gy.wh	Soft																
93	1375	1	Silt	arg.	v	gy.wh	Soft																
94	1298.5	1	Silt	arg.	v	gy.wh.	Soft																
95	1225.5	1	Shale	arg.	v.	gy.wh	soft																
96	1150	1	Silt	arg.	v.	gy.wh	soft																
97	1097	1	Silt	arg.	v.	gy.wh	soft																
98	1025	1	Silt	arg.	v	gy.wh	soft																
99	949.2	1	Silt	arg.py.sndy	v	gy.wh	soft																
100	871.1	1	Silt	gy.py.sndy	v	gy.wh.	soft																
101	808.5	¼	Silt	gy.sndy	v	gy.wh	soft																
102	1942.5	½	Sst	arg.		dk brn	Fri	m.gr	Poor	sa		dk.bn											

FORM R 257 3/72

APPENDIX 4

APPENDIX 4.

PLANKTONIC AND FORAMINIFERAL SEQUENCE.

APPENDIX-4

BREAM-4A FORAMINIFERAL BIOSTRATIGRAPHY

by

DAVID TAYLOR (Consultant)

Esso Australia Ltd

Palaeontology Report: 1982/15 April, 1982

PAPT 1

INTERPRETATIVE DATA

Introduction

Explanation

Summary Table

Data Sheet

INTRODUCTION

by

A.D. Partridge

The analysis of the foraminiferal sequence in Bream-4A given in this report was made by David Taylor and presented as a "data package" on October 20, 1981.

The aim of the study, and the reason for the format of this report, was to make a rapid reconnaissance examination of forty sidewall core samples to give a breakdown of the marine sequence into foraminiferal zones and ages. No attempt has been made to fully document the foraminiferal assemblages or to prepare a detailed environmental and geological interpretation of the sequence. The rationale for this approach was to limit costs and to reduce the time spent by the principal investigator, David Taylor, on what is essentially routine age determinations and report preparation. It is also argued that since the Gippsland Basin is now a mature petroleum province detailed discussion of the individual foraminiferal zones in the well is not essential as it has been adequately treated in earlier reports.

EXPLANATION OF MATERIALS

by

David Taylor

Processed sidewall core samples from Bream-4A were submitted for examination and delineation of planktonic foraminiferal biostratigraphy; particularly in the Greensand and carbonate sequence above the Latrobe Group clastic sequence. In this well, the highest sample documented was at 1298.5 metres which contained a Zone D-2 fauna.

Other fauna in the samples are noted only when obvious; no detailed searching nor precise identifications of benthonics were conducted. The micro-grain character of the residue (approx. 125 microns) was estimated.

Two interesting features in the Bream-4A sequence were:-

1) The "Greensand" from 1909.5 to 1860 metres which contained both the uppermost mid Eocene faunal Event N and the uppermost late Eocene Event K. The apparent hiatus between these two events is marked by a brown oxidised sand horizon at 1865.5 metres sandwiched between a Zone N "Greensand" at 1869 metres and a Zone K "Greensand" at 1861 metres. This oxidised horizon at 1865.5 metres contains a mixed association of both Zone N and Zone K planktonic species.

2) Fluctuating sedimentary energy conditions are evident in the latest Oligocene to earliest Miocene (H-2 & H-1). These fluctuations are expressed by numerical frequency of planktonic foraminifera, nature of the benthonic component and presence or absence of silt and fine quartz sand. A detailed palaeoecological study of this sequence is recommended.

SUMMARY TABLE - BREAM-4A

SAMPLE	DEPTH IN METRES	ZONE	AGE
SWC 94	1298.5	D-2	Middle Miocene
SWC 93	1375	E-1	Middle Miocene
SWC 92	1449	F	Early Miocene
SWC 91	1525	F	Early Miocene
SWC 90	1599.8	Top of G	Early Miocene
SWC 89	1674.5	G	Early Miocene
SWC 88	1750	G	Early Miocene
SWC 87	1822.7	Top of H-I	Early Miocene
SWC 86	1824.4	H-I	Early Miocene
SWC 85	1826	H-I	Early Miocene
SWC 84	1828	H-I	Early Miocene
SWC 83	1830.8	H-I	Early Miocene
SWC 82	1832.5	H-I	Early Miocene
SWC 81	1835	H-I	Early Miocene
SWC 80	1836.5	H-I	Early Miocene
SWC 79	1839	H-2	Late Oligocene
SWC 78	1841.5	H-2	Late Oligocene
SWC 77	1843	H-2	Late Oligocene
SWC 76	1845.3	I-1	Late Oligocene
SWC 75	1847.3	I-1	Late Oligocene
SWC 74	1850.5	I-1	Late Oligocene
SWC 73	1852.7	I-1	Late Oligocene
SWC 72	1854.5	I-1	Late Oligocene
SWC 71	1857	?J-2	Early Oligocene
SWC 70	1859	K/J2	Late Eocene to Early Oligocene
SWC 69	1860	K	Late Eocene
SWC 68	1861.9	K	Late Eocene
SWC 67	1865.5	K	Late Eocene
SWC 66	1869	N	Middle Eocene
SWC 65	1872.2	N	Middle Eocene
SWC 64	1875.5	Indet.	Eocene
SWC 63	1879	Indeterminate	(Benthonic foraminifera only)
SWC 62	1882.5	Indeterminate	Eocene
SWC 61	1885	Indeterminate	(Benthonic foraminifera only)
SWC 60	1889.5	Indeterminate	(Benthonic foraminifera only)
SWC 59	1891.8	Indeterminate	(Arenaceous foraminifera only)
SWC 58	1896.9	Indeterminate	(Arenaceous fragments only)
SWC 56	1903	Indeterminate	(no foraminiferal fauna)
SWC 55	1905.7	Indeterminate	(no foraminiferal fauna)
SWC 54	1909.5	Indeterminate	(no foraminiferal fauna).

MICROPALEONTOLOGICAL DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: 21 GL: -80

WELL NAME: BREAM # 4A TOTAL DEPTH:

AGE		FORAM. ZONULES	HIGHEST DATA					LOWEST DATA				
			Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
PLEISTOCENE		A_1										
		A_2										
PLIOCENE		A_3										
		A_4										
MIOCENE	LATE	B_1										
		B_2										
		C										
	MIDDLE	D_1										
		D_2						1298.5	0			
		E_1	1375	0				1375	0			
		E_2										
	EARLY	F	1449	0				1525	0			
		G	1599.8	0				1750	0			
		H_1	1822.7	0				1836.5	1	1835	0	
OLIGOCENE	LATE	H_2	1839	1				1843				
		I_1	1845.3					1854.5	0			
		I_2										
	EARLY	J_1										
		J_2	1857.2	2				1859	2			
EOCENE		K	1859	2	1861.9	0		1865.5	1	1861.9	0	
		Pre-K	1869	1				1882.5	2	1872.2	1	

COMMENTS: Pre-K fauna represent Bio-Event N Hiatus in "GREENSAND" unit between Event N and Event K marked by brown oxidised horizon at 1865.5 with mixed N/K faunas.

CONFIDENCE RATING:

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).

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

DATA RECORDED BY: *PALTECH PTY. LTD.* DATE: October 20th, 1981.

DATA REVISED BY: DATE:

PART 2

BASIC DATA

Key to Data Codes and Abbreviations
Analysis of Samples

KEY TO DATA CODES AND ABBREVIATIONS

CC #2	= conventional core #2
SWC	= sidewall core
NFF	= no foraminifera found
J-2	= planktonic foram Zone J-2
K/J-2	= exact zonal entity uncertain combined zonal interval.
f	= fine grain size (.25)
m	= medium grain size (.25-5)
c	= coarse grain size (.5-1mm)
ang	= angular grains
subang	= subangular grains
subrd	= subround grains
rd	= round grains
qtz	= quartz
pyr	= pyrite
lim	= limonite
glauc	= glauconite
lst	= limestone
mic. lst	= micritic limestone
sdst	= sandstone
siltst	= siltstone
mdst	= mudstone
calc. siltst	= calcareous siltstone
calc. aren	= calcarenite
recryx	= recrystalised
plank	= significant grain component of planktonic foraminifera.

ANALYSES OF SAMPLES

SWC 54 at 1909.5 metres:

Lithology: 50% glauc. clay with some glauc. after mica and r. pellet glauc. 40% f. ang. qtz with r. subrd qtz. 10% mica and silt including biotite.

Fauna: No foraminifera found (NFF).

SWC 55 at 1905.7 metres:

Lithology: 75% f. ang. qtz with r. subrd qtz.
10% glauc. after mica (very early stage) r. pellet glauc.
10% mica including biotite
5% silt grade biotite and r. ferro-mags. SUGGEST GRANITIC SOURCE WITH RAPID BURIAL.

Fauna: NFF

SWC 56 at 1903 metres:

Lithology: 60% f. ang. qtz.
20% glauc. as clay fragments; ooid and ovoid pellets and "books" after mica.
20% mica including biotite and silt from biotite. Granitic source.

Fauna: NNF but glauc. ovoid pellets suggestive of faecal pellets thus biogenic activity.

SWC 58 at 1896.9 metres:

Lithology: GREENSAND.
50% glauc. clay with r. pellet glauc.
25% minute rhombs of carbonate some brown, ?siderite, f. ang. qtz; mica and silt grade biotite.

Fauna: Fragments. of robust specimens of arenaceous spp. including "Haplophragmoides" incisa, "Bathysiphon" anglescaensis and Gaudyrina convexa. Nil planktonics.

SWC 59 at 1891.8 metres:

Lithology: 50% f. ang. qtz.
40% glauc. clay with r. pellet glauc. and glauc. after mica including biotite. Silt grade biotite.

Fauna: Arenaceous forams only "Haplophragmoides" spp. including H. rondatata.

SWC 60 at 1889.5 metres:

Lithology: 50% f. ang. qtz.
20% ovoid, pellet glauc. with some glauc. after mica.
25% bn clay/silt mica including biotite.

Fauna: Benthonics only. ech. spines; ?bryo fragments; "Haplophragmoides" spp. N.B. ovoid glauc. pellets = ?faecal pellets.

SWC 61 at 1885 metres:

Lithology: 70% f. ang. qtz.
20% glauc. clay with some ovoid faecal pellets and glauc after mica.
10% mica, including biotite - very r. ferro-mags.

Fauna: Benthonics only. Cibicides brevoralis; Bolivinopsis cubensis; "Haplophragmoides" spp.; Bathysiphon; Cassidulina subglobosa. N.B. ?faecal pellets.

SWC 62 at 1882.5 metres:

Lithology: 40% m-f. pellet glauc. including ovoid faecal pellets
40% f. ang. qtz mica, biotite, pyrite.

Fauna: Planktonics:
Globigerina angiporoides minima
Globigerina linaperta
Globigerina spp. indeterminate.
20 depauperate species of planks mostly too poorly preserved for positive identification.
Benthonics:
Bolivinopsis cubensis
Ammosphaeroidina sphaeroidiniformis
Bathysiphon
Haplophragmoides
Other Fauna: Worm tubes "oogenia"

SWC 63 at 1879 metres:

Lithology: 40% glauc. clay including ovoid pellets - some glauc. after mica.
40% f. ang. qtz silt grade biotite, mica, pyrite, very r. ferro-mags.

Fauna: Benthonics only
Cibicides perforatus
Bulimina truncanella
Ammobaculites

SWC 64 at 1875.5 metres:

Lithology: "GREENSAND"
60% glauc. clay with high percentage ovoid pellets.
30% f. ang. qtz mica, pyrite.

Fauna: Planktonics:
Globigerina angiporoides minima
Globigerina spp. indeterminate
Poor preservation. 10 specimens in all.
Benthonics:
Cibicides brevoralis
Cibicides vortex
Gyroidinoides
Cassidulina subglobosa
Lenticulina
"Haplophragmoides"
Bathysiphon
Nodosaria (striate)
Other Fauna: Echinoid spines, worm tubes, fish fragments.

SWC 65 at 1872.2 metres:
Lithology: "GREENSAND"
50% ovoid pellet glauc.
40% f. ang. qtz pyrite-clay-mica
Fauna: Planktonics:
Globigerina angiporoides minima
Globigerina linaperta
Globorotalia collactea?
?Globorotalia inconspicua
Globorotalia nana
Globigerinatheka index
Benthonics:
Siphouvigerina canariensis
Cibicides perforatus
Cibicides brevoralis
Lenticulina
Cassidulina subglobsa
Sphaeroidina bulloides
Vulvulina granulosa
Guttulina problema
Nonionella
Reticulate Bolivina
Other fauna:
Echinoid spines, worm tubes, pyrite rods.

SWC 66 at 1869 metres:
Lithology: "GREENSAND"
50% ovoid pellet glauc.
40% f. ang. qtz pyrite-clay-mica

Fauna: Planktonics:
Globigerina angiporoides minima
Globigerinatheka index
Globorotalia coilactea
Globorotalia nana
Benthonics:
Similar to assemblage in SWC 65 at 1875.5 metres.

SWC 67 at 1865.5 metres:
Lithology: "BROWN SAND"
50% f. ang. qtz
40% bn clay = oxidized glauc. green glauc. - mica biotite
Fauna: Planktonics:
Mixed elements of both Mid and late Eocene
Middle Eocene included.
Globigerina angiporoides minima
Late Eocene included
Globigerina linaperta
Globigerina angiporoides angiporoides
Globigerina brevis
Globorotalia gemma
Benthonics:
Anomalinoides vitrinoda
Trifarina bradyi
Cassidulina subglobosa
Other fauna: ?gypsum. Echinoid spines.

SWC 68 at 1861.9 metres:
Lithology: "GREENSAND"
50% f. ang. qtz.
50% glauc. as clay, ovoid pellets and moulds of forams.
Fauna: Planktonics:
Globigerinatheka index
Globigerina angiporoides angiporoides
Globigerina brevis
Globigerina linaperta
Globorotalia gemma
Globorotalia munda
Benthonics: Typical Lakes Entrance Greensand Assemblage.
Vaginulina gippslandica
Cibicides perfortus

Cibicides vortex
Ramulina
"Haplophragmoides" spp.
Trifrina bradyi
Cassidulina subglobosa
Anomalinoides vitrinoda
Other fauna: Echinoid spines

SWC 69 at 1860 metres:

Lithology: "GREENSAND"
50% f. ang. qtz.
50% glauc.

Fauna: Planktonics: Not as numerically rich as 1861.9 metres.
Globigerina linaperta
Globigerina brevis
Globigerina angiporoides angiporoides
Globorotalia gemma
Globorotalia nana
Benthonics:
Anomalinoides macroglabra
"Haplophragmoides" spp.
Cibicides brevoralis
Not as diverse assemblage as at 1861.9 metres.

SWC 70 at 1859 metres:

Lithology: Brown grey calcareous siltstone
10% f. ang. qtz and f. ang. qtz sandstone rare pellet glauc. and calcite.

Fauna: Planktonics: Preservation poor, diversity low.
Globigerina angiporoides angiporoides
Benthonics:
Discammina
Rhabdammina
Bathysiphon
Cribrostomella
Cassidulina subglobosa
Anomalinoides vitrinoda

SWC 71 at 1857.5 metres.

Lithology: Recryx. micritic limestone.
10% ang. qtz and pellet glauc.

Fauna: Planktonics: Indeterminate pres. very poor through diagenesis.
?Globigerina angiporoides
Other fauna: Micropelecypods.

SWC 72 at 1854.5 metres.

Lithology: Ooze. 90% plank forams. 10% micritic limestone.

Planktonics:

Globigerina euapertura
Globigerina praebulloides
Globigerina labiacrassata
Globoquadrina dehiscens (s.l.)
Globoquadrina tripartita
Globorotalia obesa
Globorotalia nana
Globorotalia munda
Globorotalia extans

Benthonics:

Sphaeroidina bulloides
Discammina
Gyroidinoides
Osangularia
Bathysiphon rhabdammina
Siphouvigerina proboscidea

Other fauna: Echinoid spines.

Count: 4000.

% Planks: 98%.

SWC 73 at 1852.7 metres.

Lithology: 50% micritic limestone
40% plank. forams. glauc.

Planktonics:

Globigerina labiacrassata
Globigerina euapertura
Globigerina praebulloides
Globoquadrina tripartita
Globoquadrina dehiscens (s.l.)
Globorotalia nana
Globorotalia opima opima
Globorotalia munda
Globorotalia obesa
Globorotalia continuosa

Benthonics:

Bathysiphon,
Rhabdammina
Sphaeroidina bulloides
Stilostomella
Cibicides
Anomalinoides
Bulimina

Osangularia.
Planulina wuell.
Other fauna: Echinoid spines
Count: 200
% Planks: 90%

SWC 74 at 1850.5 metres.
Lithology: 60% micritic limestone
30% plank. forams
Fauna: Planktonics:
Globigerina euapertura
Globigerina praebulloides
Globoquadrina dehiscens (s.l.)
Globorotalia opima opima
Globorotalia munda
Globorotalia obesa
Globorotalia nana
Globorotalia continuosa
Benthonics: Similar to assemblage in SWC 73 at 1852.7 metres.
Count: 1000
% Planks: 90%

SWC 75 at 1847.3 metres.
Lithology: 70% plank. forams
25% micrite quartz
Fauna: Planktonics:
Globigerina euapertura
Globigerina praebulloides
Globigerina labiacrassata
Globigerina angisutulalis
Globoquadrina dehiscens
Globoquadrina tripartita
Globorotalia opima opima
Globorotalia nana
Globorotalia continuosa
?Globigerina woodi woodi
Count: 5000
% Planks: 95%

SWC 76 at 1845.3 metres:
Lithology: Planktonic micrite.
Fauna: Similar to assemblage in SWC 75 at 1847.3 metres

SWC 77 at 1843 metres:
Lithology: 50% plank. forams
50% micrite minor ang. qtz.
Fauna: Planktonics:
Globigerina woodi woodi
Globigerina euapertura
Globigerina ciperoensis
Globigerina praebulloides
Globigerina angisutularis
Globoquadrina dehiscens (s.l.)
Globoquadrina advena
Globoquadrina tripartita
Globorotalia continuosa nana
Count: 3000
% Planks: 90%

SWC 78 at 1841.5 metres
Lithology: Micritic "shale"
Fauna: Planktonics: N.B. Specific diversity and numerical decrease compared with 1843 metres.
Globigerina woodi woodi
Globigerina praebulloides
Globoquadrina dehiscens (s.l.)
Globoquadrina advena
Globorotalia continuosa
Benthonics: Poor and small.
Count: 2000
% Planks: 90%

SWC 79 at 1839 metres.
Lithology: Micritic shale
Fauna: Planktonics: Assemblage as for SWC 78 at 2841.5 metres.

SWC 80 at 1836.5 metres.
Lithology: 70% plank. micrite glauc.
Fauna: Planktonics:
Globigerina woodi woodi
Globigerina woodi connecta
Globigerina ciperoensis
Globigerina praebulloides
Globoquadrina dehiscens (s.l.)
Globorotalia bella
Globorotalia continuosa

Benthonics:
Karreria bradyi and slope spp. as below this level.
Count: 3000
% Planks: 90%

SWC 81 at 1835* metres.
Lithology: Plank. micrite.
Fauna: Planktonics:
Globigerina woodi woodi
Globigerina woodi connecta
Globigerina praebulloides
Globigerina ciproensis
Globoquadrina dehiscens (s.l.)
Globoquadrina advena
Globorotalia bella
Globorotalia nana
Globorotalia continuosa
Globorotalia zealandica
Globorotalia incognito
Benthonics:
Slope species.
Count: 3000
% Planks: 90%
Comments: * Washing repeated because of contamination

SWC 82 at 1832.5* metres.
Lithology: Micrite and planks.
Fauna: Planktonics:
Globigerina woodi connecta
Globigerina woodi woodi
Globigerina praebulloides
Globoquadrina dehiscens
Globoquadrina advena
Globorotalia obesa
Globorotalia bella
Globorotalia zealandica
Globorotalia incognito
Globorotalia continuosa
Globorotalia nana
Benthonics:
Cibicides perforatus
Cibicides vortex
Cibicides subhaidingeri
Cassidulina subglobosa
Angulogerina

Bolivina
Count: 3000
% Planks. 90%

Comments: * Washing repeated because of contamination.

SWC 83 at 1830.8* metres.

Lithology: Silty micrite, 20% planks, pyrite.

Fauna: Planktonics: Numerical decline upwards, yet warming indicated with incoming of:
Catapsydrax dissimalis
Globorotalia kugleri
Globoquadrina dehiscens
Globigerina woodi connecta
Globigerina woodi woodi
Globigerina praebulloides
Globorotalia bella
Globorotalia continuosa
Globorotalia zealandica zealandica
Benthonics:
Epistomina
Cibicides
Including Cibicides lobatulus etc.
Bathysiphon.
Other Fauna: Echinoid, bryozoa, pelecypods.
Count: 1000
% Planks: 95%
Environment: High energy - ?slope fan or canyon.

Comments: * Washing repeated because of contamination.

SWC 84 at 1828* metres.

Lithology: Ooze - 80% plank. species, minor micritic limestone.f-m. ang. qtz; pyrite.

Fauna: Planktonics: Massive (5X) numerical increase from sample at 1830.8 metres.
Catapsydrax dissimilis
Globorotalia kugleri
Globoquadrina dehiscens (s.l.)
Globoquadrina advena
Globigerina woodi connecta
Globigerina woodi woodi
Globigerina praebulloides
Globorotalia bella
Globorotalia nana
Globorotalia obesa

Globorotalia zealandica zealandica
Globorotalia continuosa
Benthonics:
Epistomina
Anomalinoides
Cibicides
Angulogerina
Siphouvigerina
Bolivina
Bathysiphon.
Pseudoclavulina rudis
Other fauna: Echinoid spines.
Count: 5000
% Planks: 90%
Environment: Marked sed. energy decline compared with 1830.8 metres.

Comments: * Washing repeated because of contamination

SWC 85 at 1826 metres.
Lithology: Plank. micrite minor f. ang. qtz. pyrite.
Fauna: Planktonics:
Globorotalia kugleri
Globigerina woodi connecta
Globigerina woodi woodi
Globigerina praebulloides
Globoquadrina dehiscens (s.l.)
Globorotalia bella
Globorotalia continuosa
Globorotalia nana
Globorotalia obesa
Globorotalia zealandica zealandica
Benthonics:
Bathysiphon
Rhabdammina
Karreria bradyi
Textularia carinata
Lagena
Nodosaria
Lenticulina
Globobulimina
Discammina
Pseudoclavulina rudis
Anomalinoides procolligera
Melonis barleeanum
Other fauna: Echinoid spines.
Count: 3000
% Planks: 80%

SWC 86 at 1824.4* metres.

Lithology: Silty micrite.

Fauna: Planktonics: Ten times numerical decline from 1826. Also spp. diversity reduced. Pres. poor due to recryx. Determinations very difficult.

Globigerina woodi connecta
Globigerina woodi woodi
Globigerina praebulloides
Globorotalia continuosa
Globorotalia spp. indeterminate.
Benthonics:
Cibicides
Cassidulina
Otherwise indeterminate.
Count: 3000
% Planks: 90%
Environment: High energy N.B. fluctuating sed. energy from 1832.5 metres.

Comments: * Washing repeated because of contamination.

SWC 87 at 1822.7 metres.

Lithology: Ooze with f. calcite rhombs.

Fauna: Planktonics Pres. fair but sugary recryx. large spec. size. fifteen times numerical increase from 1824 metres.

Catapsydrax dissimilis
Globorotalia kugleri
Globigerina woodi connecta
Globigerina woodi woodi
Globoquadrina altispira
Globorotalia zealandica zealandica
Globorotalia praescitula
Globorotalia kugleri
Globorotalia bella
Globorotalia nana
Globorotalia continuosa
Globorotalia obesa
Benthonics:
Siphouvigerina proboscidae
Sigmoidina prygo
Gaudyrina
Karreria bradyi
Pseudoclavulina rudis
Cibicides

Anomalinoides
Melonis barleeanum
Astrononion ?tax
Hoeglundina
Other fauna: Echinoid spines
Count: 5000

SWC 88 at 1750 metres.
Lithology: Plank. ooze.
Fauna: Planktonics:
Globigerinoides trilobus
Globigerina woodi connecta
Globigerina woodi woodi
Globigerina praebulloides
Globoquadrina dehiscens (s.l.)
Globoquadrina advena
Globoquadrina altispira
Globorotalia continuosa
Globorotalia zealandica
Globorotalia bella
Benthonics:
Bolivina folium
"Rosalina"
Cibicides lobatulus
Cibicides subhaid
Cibicides mediocris
Bulimina and Siphouvigerina
Gyroidinoides.
Sphaeroidina
Count: 3000
% Planks: 90%

SWC 89 at 1674.5 metres.
Lithology: Planks.
Fauna: Planktonics:
Globigerinoides trilobus
Globorotalia zealandica zealandica
Globorotalia praescitula
Globorotalia bella
Globorotalia continuosa
Globorotalia nana
Benthonics:
Cibicides
Anomalinoides
Textularia
Count: 2000
% Planks: 95%

SWC 90 at 1599.8 metres.
Lithology: Planks with pyrite "spotting"
Fauna: Planktonics:
Globigerinoides trilobus (advanced morph.)
Globigerina woodi connecta
Globoquadrina dehiscens (s.l)
Globoquadrina altispira
Globorotalia miozea miozea
Globorotalia praescitula
Globorotalia zealandica zealandica
Benthonics:
Vulvulina
Discammina
Buliminella
Nonionella
Cibicides
Count: 3000
% Planks: 95%

SWC 91 at 1515 metres.
Lithology: Planks.
Fauna: Planktonics: Robust fauna - large species sizes.
Globigerinoides bisphericus (early) plus complete multi-layered F association.
Excellent suite of Tasman Globorotalia.
Benthonics: Shelf/slope assemblage
Count: 3000
% Planks: 90%

SWC 92 at 1449 metres.
Lithology: 70% silty micrite flakes, planks. minor f. ang. qtz. siltstones.
Fauna: Planktonics:
Globigerinoides bishphericus complete suite of Tasman Globorotalia with excellent specimens.
Globorotalia miozea miozea
Globorotalia praescitula
Globorotalia praemenardii
Globorotalia zealandica zealandica
Count: 1000
% Planks: 95%

SWC 93 at 1375 metres.
Lithology: 50/50 micrite and forams

Fauna: Planktonics:
Orbulina suturalis
Praeorbulina glomerosa plus complete multi-layer E-1 association.
Benthonics: Upper slope.
Count: 3000
% Planks: 80%

SWC 94 at 1298.5 metres.
Lithology: Ooze.
Fauna: D-2 assemblage.

APPENDIX 5

APPENDIX 5

A PALYNOLOGICAL ANALYSIS OF BREAM-4A, GIPPSLAND BASIN

by

Howard E. Stacy

Esso Australia Ltd
Palaeontological Report 1982/2

20 January 1982

PART I

INTERPRETATIVE DATA

INTRODUCTION:

Thirty-three (33) sidewall cores and chips from one conventional core (Core 4) were processed and examined for palynomorphs. Most of the samples yielded fair microfloras and all but three could be assigned to a stratigraphic zone.

Palynological zones and lithological facies subdivisions from the base of the Lakes Entrance Formation to the total depth is summarised below. All samples are summarised in Table 1 and each occurrence of the individual species is tabulated in the accompanying check charts.

SUMMARY

Unit/Facies	Zone	Depth (metres)
Lakes Entrance Formation (base)	*P. tuberculatus*	1860
1856	UNCONFORMITY	1861±
Gurnard Formation	Middle *N. asperus*	1861.9 - 1879
1913	Lower *N. asperus*	1889.5 - 1940.6
	P. asperopolus	1953.44- 2076.5
Latrobe Group "coarse clastics"	Upper *M. diversus*	2094.5 - 2106.8
	Lower-Middle *M. diversus*	2180.5 - 2234
	Upper *L. balmei*	2242 - 2407.5
		T.D. — 2421

GEOLOGICAL REMARKS:

1) One major unconformity, or period of non-deposition, can be recognised in the pre-Oligocene sediments. It separated the *P. tuberculatus* Zone (Lakes Entrance Formation) and the Middle *N. asperus* Zone (top of the Gurnard Formation). This gap in sedimentation includes all of the time represented by the Upper *N. asperus* Zone and is a break of at least 3 million years.

2) A second break in sedimentation may occur at the top of the Upper *L. balmei* Zone (Paleocene/Eocene boundary) but this cannot be clearly demonstrated.

3) The Gurnard Formation, as picked from the electric log, extends from 1856. to 1913 metres and is characterised, in the descriptions of the sidewall cores, as a dark grey-brown, moderately calcareous shale with minor amounts of mica, pyrite and coal. This apparent homogenous unit contains three different biostratigraphic elements. The uppermost sample from this zone, SWC 69 (1860 metres) contained a well developed Late Oligocene (*P. tuberculatus*), flora. Index species of both dino-flagellates and spores were present. Samples from 1861.9 to 1879 metres yielded an Upper Eocene, Middle *N. asperus* Zone assemblage. As noted above, this suggests a gap in the sedimentary record of about 3 million years, located between 1860 and 1861.9 metres in this section. The lower part of the "Gurnard" section, from 1819.5 to 1909.5 metres enclosed a Lower *N. asperus* flora of Middle Eocene age. This same Lower *N. asperus* assemblage extends at least through the upper 30 metres of the top of the Latrobe clastic sediments (to 1940.6 metres). No obvious shift in sedimentary pattern or electrical characteristics, electric log or sedimentary pattern marks the change from *P. tuberculatus* Zone to Middle *N. asperus* flora nor to the Lower *N. asperus* Zone. Neither is there any marked change in assemblage composition between the Lower *N. asperus* flora in the shaley "Gurnard" and that recovered from the shale stringers in the Latrobe.

4) Similar stratigraphic distribution of the Gurnard-Latrobe boundary was found in other wells around the margin of the basin, e.g. Seahorse-1, Sweep-1, Palmer-1 and Barracouta-4. In contrast, the boundary between the coarse (Latrobe) and finer grained (Gurnard) clastics is found stratigraphically deeper in wells in the more central part of the basin. For example, at Gurnard-1 it lies at base of Lower *N. asperus* Zone and on the Kingfish structure where sampling is available it lies at base of *P. asperopolus* Zone.

5) No clear cut division between the Lower and Middle *M. diversus* Zones could be found in this well. The several *Proteacidites* species, *P. tuberculiformis, P. xestoformis* and *P. ornatus,* that separate the Middle from the Lower *M. diversus* flora were not present in any of the samples.

6) The base of the *P. asperopolus* Zone was separated from the underlying Upper *M. diversus* Zone on the basis of increase of *Proteacidites pachypolus* (over 5% of total assemblage), rather than the lowest occurrence of the marker species, *P. pachypolus* abundances for correlation is found in the Swordfish-1 well report (Partridge, 1977/13).

DISCUSSION OF ZONES:

The presence and distribution of identified species are tabulated in the accompanying check-charts. The basis for biostratigraphic subdivisions and zone identification is given below.

Upper *Lygistepollenites balmei* Zone: 2242 - 2407.5 metres.

The highest in-place appearance of *L. balmei,* and below the lowest occurrence of such Lower Eocene species as *S. prominatus, M. diversus* and *Apectodinium hypercantha* is the basis for picking the top of the *L. balmei* Zone. The rare but consistent occurrence of *P. annularis, P. lapis* and frequent presence of *H. harrisii* suggest that sediments below the Upper *L. balmei* Zone were not penetrated.

Lower to Middle *Malvacipollis diversus* Zone: 2180.5 to 2234 metres.

Sediments above the highest occurrence of *L. balmei* and the inclusion of such forms as *Prominatus* and *M. diversus* in the assemblages are indicative of *M. diversus* Zone or younger. The bottom sample of this section (2234 metres) has a moderate marine element that includes a number of specimens of *Apectodinium hypercantha*. This is indicative of the *Wetzeliella hypercantha (= Apectodinium hypercantha)* marine zone at the base of the Lower *M. diversus* Zone. Confirmation that this sample is from the Lower *M. diversus* sediments is provided by the several specimens of *Cyathidites gigantis*, a form that does not extend above the Lower *M. diversus* horizon. The rest of the samples, from 2180.5 to 2218.2 metres, contain a Middle to Lower *M. diversus* assemblage without specific markers that are restricted to either the Middle or Lower zones.

Malvacipollis diversus Zone: 2110.5 - 2162 metres.

The three samples examined from this section contained a gernalised *M.diversus* flora, without any specific marker species for the Lower, Middle or Upper Zones.

Upper *Malvacipollis diversus* Zone: 2094.5 - 2106.8 metres.

The presence of *M. tenuis* in all these samples confirm that they are Upper *M. diversus*, or younger. The lack of *P. asperopolus*, more than 5% abundance of *P. pachypolus* or other indications of a younger section indicates that an Upper *M. diversus* assignment is correct for this group of samples.

Proteacidites asperopolus Zone: 1953.44 - 2076.5 metres.

The upper two samples (1953.44 and 2016.2 metres) contained specimens of the index species for this zone, *P. asperopolus*. The lower sample (2076.5) did not contain *P. asperopolus*, however it was assigned to this zone on the basis of the presence of *P. pachypolus* in excess of 5% of the assemblage (see geological remarks above for further comment).

Lower *Nothofagidites asperus* Zone: 1889.5 - 1940.6 metres.

The lowest sample in this section (1940.6) contained *N. asperus* and *I. thomasii*, markers for the *N. asperus* Zone sediments, but no forms restricted to the lower part. However the dinoflagellate index species for the Lower *N. asperus*, *A. dictyoplokus* was noted in many of the other samples.

Middle *Nothofagidites asperus* Zone: 1879 - 1865.5 metres.

Deflandria extensa, index species for the Middle of the *N. asperus* Zone was present in thelimiting samples.

Nothofagidites asperus Zone: 1861.9 metres.

This sample did not contain the Middle *N. asperus* Marker, *D. extensa*, however, the occurrence of specimens of *Phthanoperidinium coreoides* and *P.eocenicum* demonstrate that this is Eocene (*N. asperus* Zone), rather than Oligocene (*P. tuberculatus* Zone), age.

Proteacidites tuberculatus Zone: 1860 metres.

The presence of *Cyatheacidites annulatus* in the sample shows that it is from the base of the *P. tuberculatus* Zone. Samples above this depth were not examined for palynomorphs.

TABLE-1

SUMMARY OF PALAEONTOLOGICAL ANALYSIS, BREAM-4A, GIPPSLAND BASIN

SAMPLE	DEPTH(m)	DEPTH(ft)	ZONE	AGE	CONFIDENCE RATING	YIELD	SPORE-POLLEN DIVERSITY	DINO. DIVERSITY	COMMENTS
SWC 69	1860	6102	P. tuberculatus	Oligocene	1	Poor	Low	Low	C. annulatus
SWC 68	1861.9	6108.5	N. asperus	Late Eocene	1	Poor	Low	Low	Phthanoperidinium eocenicum
SWC 67	1865.5	6120.5	Middle N. asperus	Late Eocene	0	Fair	Low	Moderate	D. extensa
SWC 66	1869	6132	Middle N. asperus	Late Eocene	1	Fair	Moderate	Moderate	
SWC 63	1879	6165	Middle N. asperus	Late Eocene	0	Fair	Moderate	Moderate	D. extensa
SWC 60	1889.5	6199	Lower N. asperus	Middle Eocene	0	Fair	Moderate	Moderate	A. dictyoplokus
SWC 56	1903	6243.5	Lower N. asperus	Middle Eocene	0	Fair	Moderate	Moderate	A. dictyoplokus
SWC 55	1905.7	6252	N. asperus	Middle Eocene	1	Poor	Low	Low	
SWC 54	1909.5	6265	N. asperus	Middle Eocene	1	Fair	Moderate	Moderate	
SWC 53	1911.8	6272	N. asperus	Middle Eocene	1	Fair	Moderate	Moderate	
SWC 52	1929.8	6331.5	Indeterminate	-	-	Almost Barren	-	-	
SWC 51	1935.5	6350	Indeterminate	-	-	Barren	-	-	
SWC 50	1937.2	6355.5	Lower N. asperus	Middle Eocene	0	Fair	High	Low	A. dictyoplokus
SWC 48	1940.6	6367	Lower N. asperus	Middle Eocene	1	Fair	Moderate	None	
SWC 47	1941.9	6371	Indeterminate	-	-	Barren	-	-	
CORE 4	1953.44	6409	P. asperopolus	Early-Middle Eocene	1	Fair	Moderate	Low	
SWC 38	2016.2	6615	P. asperopolus	Early-Middle Eocene	2	Poor	Moderate	Low	
SWC 34	2076.5	6812.5	P. asperopolus	Early-Middle Eocene	1	Good	High	Moderate	
SWC 33	2094.5	6872	Upper M. diversus	Early Eocene	1	Fair	Moderate	None	Coal
SWC 32	2097.7	6882	Upper M. diversus	Early Eocene	1	Fair	Moderate	None	Coal
SWC 31	2106.8	6912	Upper M. diversus	Early Eocene	1	Fair	Moderate	None	-
SWC 30	2110.5	6924	M. diversus	Early Eocene	2	Good	High	None	Coal
SWC 27	2150	7054	M. diversus	Early Eocene	2	Poor	Low	None	Coal
SWC 25	2162	7093	M. diversus	Early Eocene	2	Poor	Moderate	None	Coal
SWC 24	2180.5	7154	Lower-Middle M. diversus	Early Eocene	1	Good	High	None	-
SWC 23	2191.2	7189	Lower-Middle M. diversus	Early Eocene	2	Poor	Moderate	None	-
SWC 22	2204.9	7234	Indeterminate	-	-	Poor	Low	None	Coal
SWC 21	2208	7244	M. diversus	Early Eocene	2	Fair	Moderate	None	Mud contamination.
SWC 20	2218.2	7277.5	Lower-Middle M. diversus	Early Eocene	1	Good	High	Low	-
SWC 19	2234	7329.5	Lower M. diversus	Early Eocene	2	Fair	Moderate	Moderate	W. hypercantha Zone
SWC 18	2242	7355.5	Lower L. balmei	Late Paleocene	1	Good	High	None	
SWC 16	2273.3	7358	Upper L. balmei	Late Paleocene	1	Fair	High	None	Coal
SWC 15	2275.5	7465.5	Upper L. balmei	Late Paleocene	1	Fair	Moderate	None	
SWC 1	2407.5	7898.5	Upper L. balmei	Late Paleocene.	1	Fair	Moderate	None	

PALYNOLOGY DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: 21 GL: 80

WELL NAME: BREAM-4A TOTAL DEPTH: 2421 metres

AGE	PALYNOLOGICAL ZONES	HIGHEST DATA					LOWEST DATA				
		Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
NEOGENE	*T. pleistocenicus*										
	M. lipsis										
	C. bifurcatus										
	T. bellus										
PALEOGENE	*P. tuberculatus*	1860	0				1860	0			
	Upper *N. asperus*										
	Mid *N. asperus*	1861.9	2	1865.5	0		1879	0			
	Lower *N. asperus*	1889.5	0				1940.6	1	1938.2	0	
	P. asperopolus	1953.44	0				2076.5	1			
	Upper *M. diversus*	2094.5	1				2110.5	1			
	Mid *M. diversus*	2180.5	1								
	Lower *M. diversus*						2234	1			
	Upper *L. balmei*	2242	1				2407.5	1			
	Lower *L. balmei*										
LATE CRETACEOUS	*T. longus*										
	T. lilliei										
	N. senectus										
	U. *T. pachyexinus*										
	L. *T. pachyexinus*										
	C. triplex										
	A. distocarinatus										
EARLY CRET.	*C. paradoxus*										
	C. striatus										
	F. asymmetricus										
	F. wonthaggiensis										
	C. australiensis										
PRE-CRETACEOUS											

COMMENTS: *D. extensa:* 1865.5 to 1879; *A. dictyoplokus:* 1889.5 - 1937.2;
A. hypercantha: 2234 metres.

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

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

DATA RECORDED BY: Howard E. Stacy DATE: January 12, 1982

DATA REVISED BY: Howard E. Stacy DATE: January 19, 1982.

PART II

BASIC DATA

Table 1: Basic Data

Range Charts

TABLE 1 - BASIC DATA

SUMMARY OF PALAEONTOLOGICAL ANALYSIS, BREAM-4A, GIPPSLAND BASIN

SAMPLE	DEPTH (METRES)	DEPTH (FEET)	YIELD	SPORE-POLLEN DIVERSITY	DINO. DIVERSITY
SWC 69	1860	6102	Poor	Low	Low
SWC 68	1861.9	6108.5	Poor	Low	Low
SWC 67	1865.5	6120.5	Fair	Low	Moderate
SWC 66	1869	6132	Fair	Moderate	Moderate
SWC 63	1879	6165	Fair	Moderate	Moderate
SWC 60	1889.5	6199	Fair	Moderate	Moderate
SWC 56	1903	6243.5	Fair	Moderate	Moderate
SWC 55	1905.7	6252	Poor	Low	Low
SWC 54	1909.5	6265	Fair	Moderate	Moderate
SWC 53	1911.8	6272	Fair	Moderate	Moderate
SWC 52	1929.8	6331.5	Almost Barren	-	-
SWC 51	1935.5	6350	Barren	-	-
SWC 50	1937.2	6355.5	Fair	High	Low
SWC 48	1940.6	6367	Fair	Moderate	None
SWC 47	1941.9	6371	Barren	-	-
CORE 4	1953.44	6409	Fair	Moderate	Low
SWC 38	2016.2	6615	Poor	Moderate	Low
SWC 34	2076.5	6812.5	Good	High	Moderate
SWC 33	2094.5	6872	Fair	Moderate	None
SWC 32	2097.7	6882	Fair	Moderate	None
SWC 31	2106.8	6912	Fair	Moderate	None
SWC 30	2110.5	6924	Good	High	None
SWC 27	2150	7054	Poor	Low	None
SWC 25	2162	7093	Poor	Moderate	None
SWC 24	2180.5	7154	Good	High	None
SWC 23	2191.2	7189	Poor	Moderate	None
SWC 22	2204.9	7234	Poor	Low	None
SWC 21	2208	7244	Fair	Moderate	None
SWC 20	2218.2	7277.5	Good	High	Low
SWC 19	2234	7329.5	Fair	Moderate	Moderate
SWC 18	2242	7355.5	Good	High	None
SWC 16	2273.3	7358	Fair	High	None
SWC 15	2275.5	7465.5	Fair	Moderate	None
SWC 1	2407.5	7898.5	Fair	Moderate	None

PE903950

This is an enclosure indicator page.
The enclosure PE903950 is enclosed within the container PE902701 at this location in this document.

The enclosure PE903950 has the following characteristics:

ITEM_BARCODE	= PE903950
CONTAINER_BARCODE	= PE902701
NAME	= Bream 4A Species List (spores-pollen) palynology
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= DIAGRAM
DESCRIPTION	= Bream 4A Gippsland Basin Species List (Spores and Pollen). From appendix-5, WCR)
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	= 17/06/82
W_NO	= W752
WELL_NAME	= Bream-4A
CONTRACTOR	= Esso Australia Ltd
CLIENT_OP_CO	= Esso Australia Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

PE903951

This is an enclosure indicator page.
The enclosure PE903951 is enclosed within the container PE902701 at this location in this document.

The enclosure PE903951 has the following characteristics:

ITEM_BARCODE	= PE903951
CONTAINER_BARCODE	= PE902701
NAME	= Bream 4A Species List (Dinoflagellates) palynology
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= DIAGRAM
DESCRIPTION	= Bream 4A Gippsland Basin Species List (Dinoflagellates). From appendix-5, WCR)
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	= 17/06/82
W_NO	= W752
WELL_NAME	= Bream-4A
CONTRACTOR	= Esso Australia Ltd
CLIENT_OP_CO	= Esso Australia Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

APPENDIX 6

APPENDIX 6.

QUANTITATIVE LOG EVALUATION.

BREAM-4A LOG ANALYSIS

An analysis of wireline log data for the interval 1915 - 2065M of Bream-4A has been carried out using the HP41C "LOOKLOG" analysis program. The analysed interval includes the Bream-4A pay zone (1916 - 1950), that part of the underlying section which would come into the reservoir up dip (1950 - 2025), and approximately 40 metres of further underlying section (2025 - 2065).

LOGS AVAILABLE:

GR, ILD, SFL, MSFL, DLT (LLs & LLd), BHC, LDT & CNL.

NOTE:- The DLT appeared to give anomolous readings through many of the water sand intervals i.e. LLs < LLd < MSFL in a situation where the mud salinity is less than formation water salinities. This anomoly has been tentatively attributed to the effect of very high resistivity shoulder beds (in Bream-4A, the abundant coals) overfocusing the LLd.

LOGS USED:

GR, ILD, MSFL, LDT and CNL.

MSFL readings were multiplied by a factor of 0.8 to allow for mudcake effects, and CNL values corrected for pressure and temperature effects.

ANALYSIS AND SHALE PARAMETERS USED:

a	0.8
m	2
n	2
Matrix density limits	2.65 - 2.665 gm/cc
Fluid density	1.0 gm/cc
Hydrocarbon density - gas	0.25 gm/cc
Hydrocarbon density - oil	0.7 gm/cc
Apparent shale density	2.55 gm/cc
Apparent shale neutron porosity	38%
Apparent shale resistivity	10 ohm m
Gamma ray minimum	15 API units
Gamma ray maximum	140 API units

SALINITIES:

Apparent formation water salinities were calculated from a number of representative water sands using the standard LOOKLOG options i.e. from SP, from ratioing resistivities and by backing out from the Archie relationship and from the Indonesia shaly sand relationship.

Each technique, except for resistivity ratioing, gives similar apparent formation water salinities when applied to any particular sand. Resistivity ratioing appears to give anomolously high salinities, and for the purposes of this analysis, the technique is ignored.

S.P.,Archie,and Indonesia salinity determinations indicate that formation water salinity is in the order 35000 ppm in the vicinity of pay zone, and that salinities increase with depth, being in the order of 50,000 ppm by 2050m.

For the purposes of this log analysis, a salinity of 35000 ppm was input for the interval 1915 - 2030m, 45000 ppm for the interval 2030 - 2047m, and 50,000 ppm for the interval 2047 - 2065m.

CONTACTS

The Oil-Water contact is clearly defined at 1950m RKB.

The Gas-Oil contact appears to fall within a shale bed which occurs between 1937 and 1938m RKB.

T. FRANKHAM
2nd October 1981

BREAM-4A

LOG ANALYSIS SUMMARY SHEET

Depth Interval	Thickness	V. Shale	Matrix Density	Av. Porosity	Sxo	Sw	Comment
1916 - 1918m	2m	10%	2.65 gm/cc	16%	65%	49%	Gas
1922 - 1923m	1m	22%	2.66 gm/cc	16%	74%	38%	
1923 - 1925m	2m	24%	2.65 gm/cc	25%	51%	7%	
1926.5 - 1930m	3.5m	8%	2.65 gm/cc	20%	73%	12%	
1930 - 1933m	3m	14%	2.64 gm/cc	24%	64%	13%	
1933 - 1935m	2m	18%	2.66 gm/cc	24%	68%	16%	
1935 - 1936m	1m	25%	2.67 gm/cc	24%	63%	22%	
1936 - 1937m	1m	30%	2.67 gm/cc	24%	59%	24%	Gas
1938 - 1939.5m	1.5m	12%	2.65 gm/cc	25%	61%	25%	Oil
1942 - 1945m	3m	2%	2.66 gm/cc	22%	65%	21%	
1945 - 1948m	3m	9%	2.67 gm/cc	20%	78%	29%	
1948 - 1950m	2m	10%	2.67 gm/cc	24%	75%	31%	Oil
1950 - 1955.5m	5.5m	12%	2.65 gm/cc	23%	90%	90%	Water
1958.5 - 1960.5m	2m	14%	2.64 gm/cc	22%	100%	100%	
1964.5 - 1965.5m	1m	19%	2.64 gm/cc	14%	100%	100%	
1965.5 - 1966.5m	1m	22%	2.65 gm/cc	21%	95%	95%	
1969.5 - 1971.5m	2m	36%	2.65 gm/cc	15%	71%	71% *	
1976 - 1981m	5m	2%	2.64 gm/cc	24%	100%	100%	
1981 - 1984.5m	3.5m	14%	2.65 gm/cc	26%	100%	100%	
1986.5 - 1993.5m	7m	11%	2.65 gm/cc	24%	100%	100%	
1999 - 2000m	1m	3%	2.67 gm/cc	25%	91%	91% *	
2001 - 2004.5m	3.5m	10%	2.64 gm/cc	22%	100%	100%	Water

2-10-81

BREAM-4A

LOG ANALYSIS SUMMARY SHEET

Depth Interval	Thickness	V. Shale	Matrix Density	Av. Porosity	Sxo	Sw	Comment
2013.5 - 2015.5m	2m	10%	2.64 gm/cc	23%	100%	100%	Water
2017.5 - 2021m	3.5m	11%	2.65 gm/cc	21%	100%	100%	
2026 - 2027.7m	1.7m	11%	2.65 gm/cc	22%	100%	100%	
2027 - 2029m	1.3m	6%	2.65 gm/cc	18%	100%	100%	
2036 - 2038m	2m	6%	2.64 gm/cc	27%	100%	100%	
2038 - 2039m	1m	16%	2.67 gm/cc	17%	100%	100%	
2044 - 2047m	3m	9%	2.65 gm/cc	23%	100%	100%	
2047 - 2049.5m	2.5m	13%	2.67 gm/cc	25%	100%	100%	
2050.5 - 2052.3	2.3m	7%	2.66 gm/cc	24%	100%	100%	
2059.2 - 2065m	5.8m	15%	2.66 gm/cc	25%	95%	95%	Water

* Apparent low saturations in these water sands probably due to shoulder bed effect of interbedded shale laminations in the sands, on the deep resistivity readings.

T M Franklin 2-10-81

BREAM-4A

NET - GROSS INTERVAL SUMMARY

SECTION	DEPTH INTERVAL	GROSS THICKNESS	NET THICKNESS	NET:GROSS - %age
Gas Zone	1916 - 1937m	21m	15.5m	74%
Oil Zone	1937 - 1950m	13m	9.5m	73%
OWC - P Asperopolus Marker	1950 - 2025m	75m	37m	49%
Total Analysed Interval	1916 - 2065m	149m	81.6m	54%

2-10-87

LOG ANALYSIS WORKSHEET (HP 41 CV)

KEY F TO INPUT WELL DATA AND CALCULATE GG

WELL BREAM-4A

LOG RUN # 2

DATE SEPTEMBER 1981

SERVICE CO. SCHLUMBERGER

INTERPRETER T. FRANKHAM

WELL DATA

TEMPERATURES °F or °C ?	MUD SYSTEM 0 (oil based) or W(water based)?	BHT	SBT	WD+KB	TD	Rmf @ T(Rmf)	GG
		77 °C	10 °C	80m	2426m	.388 @14.4° C	0.029 °C/m

ANALYSIS PARAMETERS

ρf	a	m	n	ΦN shale	GR min.	GR max.	ρb shale	R shale	ρma - L	ρma - U	ρma	Z
1	0.8	2	2	0.38	15	140	2.55	10	2.650	2.665		
									use if ΦN log available		use if no ΦN lg.	use if no Rxo lg.

Rw & FORMATION SALINITY DETERMINATION

Depth	SP(±)	GR	Rt	Rxo	ρb	ΦN	KEY G FROM SP Rw	KEY G FROM SP Equivalent Salinity	KEY H FROM RATIO Rt/Rxo Rw	KEY H FROM RATIO Rt/Rxo Equivalent Salinity	KEY I FROM ARCHIE EQUATION Rw	KEY I FROM ARCHIE EQUATION Equivalent Salinity	FROM INDONESIAN EQUATION Rw	FROM INDONESIAN EQUATION Equivalent Salinity
1953	-20	38	1.6	3.2	2.25	.24	.096	36000	.082	43000	.118	29,000	.118	29,000
1978	-20	25	0.95	2.8	2.25	.20	.095	36000	.055	67500	.070	51,400	.065	56,000
1983	-20	33	1.0	2.9	2.21	.27	.095	36000	.056	66,000	.089	39,000	.092	37,500
1990	-25	42	1.5	1.5	2.25	.24	.086	40000	.061	60,000	.110	30,500	.108	31,000

POROSITY & SATURATION : KEY A TO PERFORM ANALYSIS KEY B IF ANALYSIS PARAMETERS PREVIOUSLY ENTERED KEY C TO REDISPLAY RESULTS

Zone #	Depth Interval	Thickness	GR	ρb	Rt	ΦN	Fm. Salinity	pH	Rxo	V shale	ρma c	Φe	Sxo	Sw	Remarks
1	1916 – 1918m	2m	43	2.34	12	.11	35000	.25	11	.1	2.65	.16	.65	.49	
2	1922 – 1923m	1m	43	2.35	17.5	.18	35000	.25	7	.22	2.66	.16	.74	.38	
3	1923 – 25m	2m	38	2.14	200	.21	35000	.25	6.4	.24	2.65	.25	.51	.07	
4	1926.5 – 1930m	3.5m	55	2.265	125	.14	35000	.25	5.6	.08	2.65	.20	.73	.12	
5	1930 – 1933m	3m	55	2.165	70	.17	35000	.25	4.8	.14	2.64	.24	.64	.13	
6	1933 – 1935m	2m	60	2.18	45	.21	35000	.25	4	.18	2.66	.24	.68	.16	
7a	1935 – 1936	1m	43	2.18	23	.24	35000	.25	4.4	.25	2.67	.24	.63	.22	
7b	1936 – 1937	1m	45	2.17	19	.26	35000	.25	4.7	.30	2.67	.24	.59	.24	
8	1938 – 1939.5	1.5m	52	2.195	18	.24	35000	.7	5	.12	2.65	.25	.61	.25	
9	1942 – 1945m	3m	18	2.27	38	.18	35000	.7	6.4	.02	2.66	.22	.65	.21	
10	1945 – 1948m	3m	23	2.31	22	.20	35000	.7	4.8	.09	2.67	.20	.78	.29	

LOG ANALYSIS WORKSHEET (HP 41 CV)

KEY F TO INPUT WELL DATA AND CALCULATE GG

WELL _____

LOG RUN # _____

DATE _____

SERVICE CO. _____

INTERPRETER _____

WELL DATA	TEMPERATURES °F or °C ?	MUD SYSTEM O (oil based) or W(water based)?	BHT °	SBT °	WD+KB	TD	R_{mf} @ T(R_{mf}) @ °	GG ° /

ANALYSIS PARAMETERS	ρf	a	m	n	ΦN shale	GR min.	GR max.	ρb shale	R shale	ρma - L (use if ΦN log available)	ρma - U	ρma (use if no ΦN lg.)	Z (use if no Rxo lg.)

Rw & FORMATION SALINITY DETERMINATION

Depth	SP(±)	GR	Rt	Rxo	ρb	ΦN	KEY G: FROM SP Rw	KEY G: FROM SP Equivalent Salinity	KEY H: FROM RATIO Rt/Rxo Rw	KEY H: FROM RATIO Rt/Rxo Equivalent Salinity	KEY I: FROM ARCHIE EQUATION Rw	KEY I: FROM ARCHIE EQUATION Equivalent Salinity	FROM INDONESIAN EQUATION Rw	FROM INDONESIAN EQUATION Equivalent Salinity
2048	-50	25	0.8	2.4	2.24	.27	.058	62,000	.053	69,000	.062	58,000	.070	50,000
2051	-40	24	.9	2.7	2.25	.23	.066	53,000	.053	69,000	.066	53,000	.068	51,500
2063	-35	34	.9	2.8	2.23	.27	.071	48,500	.051	72,000	.073	47,500	.077	45,000

POROSITY & SATURATION : KEY A TO PERFORM ANALYSIS KEY B IF ANALYSIS PARAMETERS PREVIOUSLY ENTERED KEY C TO REDISPLAY RESULTS

Zone #	Depth Interval	Thickness	GR	ρb	Rt	ΦN	Fm. Salinity	pH	Rxo	V shale	ρmac	Φe	Sxo	Sw	Remarks
11	1948 - 1950m	2m	24	2.24	13.5	.24	35000	.7	3.7	.10	2.67	.24	.75	.31	
12	1950 - 1955.5m	5.5m	38	2.25	1.6	.24	35000	1	3.2	.12	2.65	.23	.90	.90	
13	1958.5 - 1960.5	2m	40	2.27	1.1	.23	35000	1	3.2	.14	2.64	.22	1.0	1.15	
14a	1964.5 - 1965.5	1m	50	2.4	3	.17	35000	1	7	.19	2.64	.14	1.0	1.04	
14b	1965.5 - 1966.5	1m	50	2.28	1.6	.26	35000	1	6.4	.22	2.65	.21	.95	.95	
15	1965.5 - 1971.5	2m	75	2.37	4.5	.27	35000	1	8	.36	2.65	.15	.71	.71	
16	1976 - 1981	5m	25	2.25	.95	.20	35000	1	2.8	.02	2.64	.24	1.0	1.19	
17	1981 - 1984.5	3.5m	33	2.21	1	.27	35000	1	2.9	.14	2.65	.26	1.0	1.03	
18	1986.5 - 1993.5	7m	40	2.24	1	.24	35000	1	3	.11	2.65	.24	1.0	1.11	
19	1999 - 2000	1m	42	2.25	1.5	.24	35000	1	4	.03	2.67	.25	.91	.91	

LOG ANALYSIS WORKSHEET (HP 41 CV)

KEY F TO INPUT WELL DATA AND CALCULATE GG

WELL _____

LOG RUN # _____

DATE _____

SERVICE CO. _____

INTERPRETER _____

WELL DATA

TEMPERATURES °F or °C ?	MUD SYSTEM O (oil based) or W (water based) ?	BHT	SBT	WD+KB	TD	Rmf @ T(Rmf)	GG
		°	°			@ °	° /

ANALYSIS PARAMETERS

ρf	a	m	n	ΦN shale	GR min.	GR max.	ρb shale	R shale	ρma - L (use if ΦN log available)	ρma - U	ρma (use if no ΦN lg.)	Z (use if no Rxo lg.)

Rw & FORMATION SALINITY DETERMINATION

Depth	SP(±)	GR	Rt	Rxo	ρb	ΦN	KEY G: FROM SP Rw	KEY G: FROM SP Equivalent Salinity	KEY H: FROM RATIO Rt/Rxo Rw	KEY H: FROM RATIO Rt/Rxo Equivalent Salinity	KEY I: FROM ARCHIE EQUATION Rw	KEY I: FROM ARCHIE EQUATION Equivalent Salinity	FROM INDONESIAN EQUATION Rw	FROM INDONESIAN EQUATION Equivalent Salinity

POROSITY & SATURATION : KEY A TO PERFORM ANALYSIS KEY B IF ANALYSIS PARAMETERS PREVIOUSLY ENTERED KEY C TO REDISPLAY RESULTS

Zone #	Depth Interval	Thickness	GR	ρb	Rt	ΦN	Fm. Salinity	pH	Rxo	V shale	ρma c	Φe	Sxo	Sw	Remarks
20	2001 – 2004.5	3.5m	35	2.28	1.5	.21	35000	1	4	.10	2.64	.22	1.0	1.01	
21	2013.5 – 2015.5m	2m	43	2.25	1	.23	35000	1	3.3	.10	2.64	.23	1.0	1.14	
22	2017.5 – 2021	3.5m	33	2.3	1.4	.21	35000	1	4	.11	2.65	.21	1.0	1.08	
23a	2026 – 2027.7	1.7m	36	2.28	1.3	.22	35000	1	3	.11	2.65	.22	1.0	1.06	
b	2027.7 – 2029	1.3m	38	2.35	2	.16	35000	1	5.2	.06	2.65	.18	1.0	1.07	
24a	2036 – 2038	2m	26	2.19	.7	.245	35000	1	2.2	.06	2.64	.27	1.0	2.03??	
b	2038 – 2039	1m	35	2.35	1.2	.21	45000	1	3.2	.16	2.67	.17	.1	1.23	
25a	2044 – 47	3m	30	2.26	1.1	.22	45000	1	3.2	.09	2.65	.23	.1	.1	
b	2047 – 49.5	2.5m	25	2.24	.8	.27	50000	1	2.4	.13	2.67	.25	1	1.02	
26	2050.5 – 2052.3	2.3m	24	2.25	.9	.23	50000	1	2.7	.07	2.66	.24	1.0	1.01	
27	2059.2 – 2065	5.8m	34	2.23	.9	.27	50000	1	2.8	.15	2.66	.25	.95	.95	

APPENDIX 7

APPENDIX 7.

WIRELINE TEST REPORT.

SUMMARY REPORT

BREAM 4A RFT RUNS 1-6

During September 20 and 21, 1981 six RFT runs were made in Bream 4A. A total of 23 seats were attempted over the interval 1917.0 to 2279.0m MDKB, 2 of these having seal failure. Pressure build-up was rapid in all tests indicating high permeability sands. Quantitative analysis was not possible because of plugging or near-wellbore reduced permeability.

Attachment 1 summarizes pressure and sampling results.

Attachment 2 shows formation pressure from pretest data plotted against depths. The estimated water gradient is 1.43 psi/m, oil gradient is 0.89 psi/m and gas gradient is 0.30 psi/m. These indicate an OWC at 1950m MDKB and a GOC at 1936m MDKB $\pm$ 1m.

The RFT pressures confirm the estimate of a 13.0m gross oil column between 1950.0 and 1937.0m MDKB derived from the well logs. High proved oil was recovered at 1938.5m and low proved oil at 1949.5m MDKB further supporting the extent of the oil column. Low proved gas was sampled at 1935.6m MDKB. There is 21.0m of gross gas column.

(1595f)

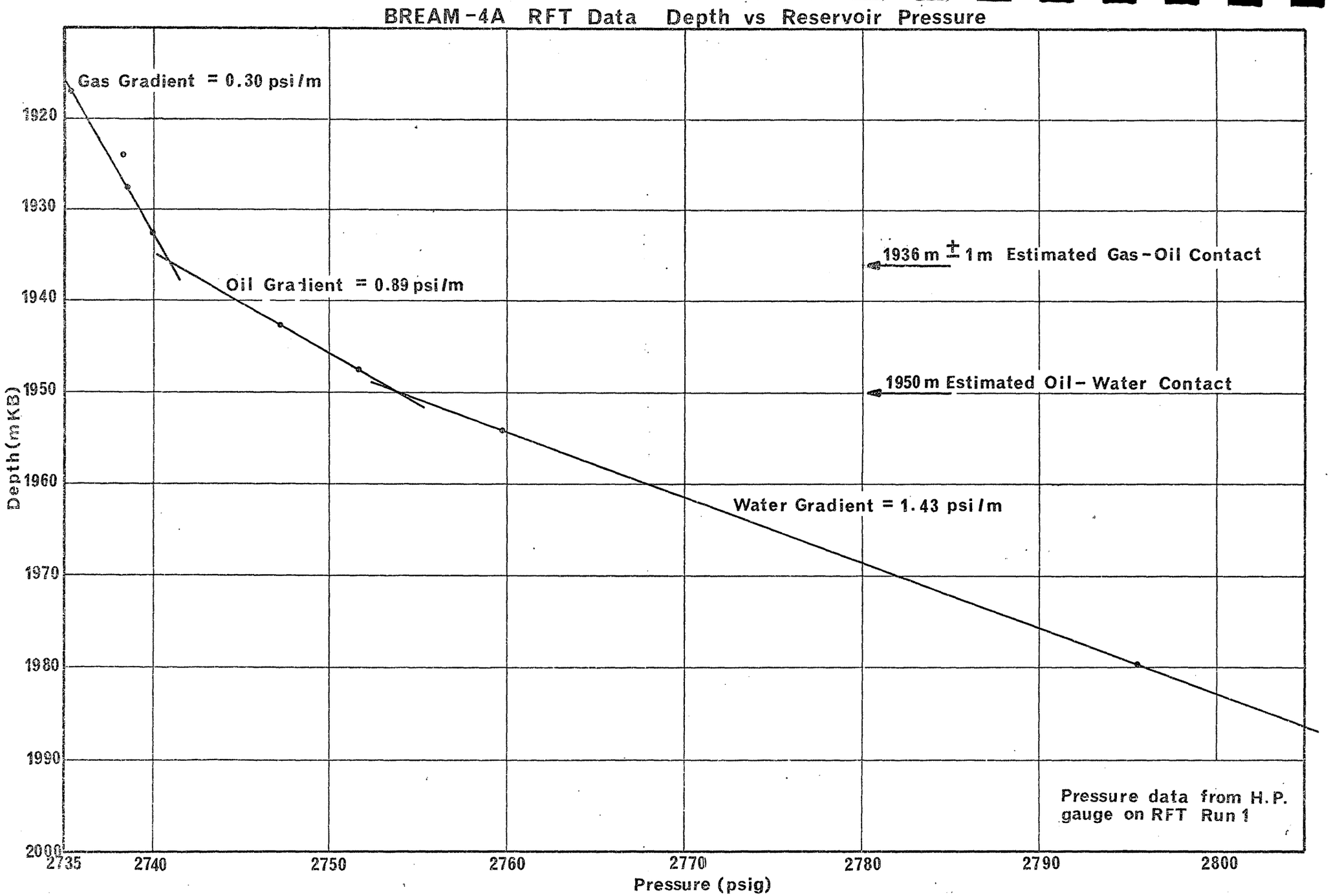
BREAM 4-A
RFT INTERPRETATION
RUNS 1-6

RUN/SEAT NO.	DEPTH (m MDKB)	FORMATION PRESSURE (psig)	COMMENTS
1/1	1917	2735.3	No MTR in build-up.
1/2	1924	2738.3	Fast build-up.
1/3	1927.5	2738.6	"
1/4	1932.5	2740	"
1/5	1942.5	2747.3	No MTR in build-up.
1/6	1947.5	2751.7	Fast build-up.
1/7	1954.0	2759.9	"
1/8	1979.0		Seal failure.
1/8a	1979.0		"
1/8b	1979.5	2795.5	Fast build-up.
1/9	1980.0	2810.5	"
1/10	2013.5	2843.3	"
1/11	2048.0	2893.3	"
1/12	2138.0	3020.8	"
1/13	2254.0	3020.8	"
1/14	2279.0	3222.8	"
2/15	1944.5	2744.0	Sample. 19.25 ft^3 gas, 5225 cc oil 2750 cc filtrate
3/16	1934.5	2745.0	Sample. 49.0 ft^3 gas, 500 cc condensate 1200 cc filtrate
4/17	1938.5	2743.0	Sample. 22.24 ft^3 gas, 2750 cc light oil 4750 cc filtrate
4/18	1935.5	2741.0	Sample. 0.38 ft^3 gas, 2500 cc filtrate
5/19	1935.6	2745.0	Sample. 25.4 ft^3 gas, 17,000 cc filtrate
5/20	1949.5	2750.0	Sample. 1.45 ft^3 gas, 250 cc oil 1700 cc filtrate
6/21	1951.0	2754.0	Sample. 1.17 ft^3 gas 15.4 L water + filtrate.

Notes: (1) Pressure measurements for Run No. 1 from HP gauge.

(2) Pressure measurements for Runs 2-6 from RFT gauge and corrected for temperature effects.

SRK: 18/12/81
(1595f)


BREAM-4A RFT Data Depth vs Reservoir Pressure
Gas Gradient = 0.30 psi/m
Oil Gradient = 0.89 psi/m
Water Gradient = 1.43 psi/m
1936 m ± 1 m Estimated Gas-Oil Contact
1950 m Estimated Oil-Water Contact
Pressure data from H.P. gauge on RFT Run 1
Depth (m KB)
1920
1930
1940
1950
1960
1970
1980
1990
2000
2735
2740
2750
2760
2770
2780
2790
2800
Pressure (psig)

PE903948

This is an enclosure indicator page.
The enclosure PE903948 is enclosed within the container PE902701 at this location in this document.

The enclosure PE903948 has the following characteristics:

ITEM_BARCODE	= PE903948
CONTAINER_BARCODE	= PE902701
NAME	= Bream 4A RFT data depth vs reservoir pressure
BASIN	= GIPPSLAND
ON_OFF	= OFFSHORE
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= CHART
DESCRIPTION	= Bream 4A RFT data. Depth Vs Reservoir Pressure Chart. Figure from appendix7, WCR.
REMARKS	=
DATE_CREATED	= 30/4/82
DATE_RECEIVED	= 17/6/82
W_NO	= W752
WELL_NAME	= Bream 4A
CONTRACTOR	= Esso Australia Ltd
CLIENT_OP_CO	= Esso Australia Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

psig = psig 14.7

RFT PRETEST PRESSURES

SERVICE COMPANY: SCHLUMBERGER ..... RFT RUN.NO: 1 .....

WELL: BREAM-4A .....

DATE: 18.9.81 .....

OBSERVERS: P. Tan, Jeff Roche, Robert Key .....

N.B. ALL PRESSURES FROM CORRECTED PLAYBACK

SEAT. NO.	DEPTH	DEPTH (Ss)	REASON 1 FOR TEST	GAUGE 2	TEMP.3 CORR.	UNITS 4	IHP ppg	ISIP ppg	FSIP psig	FHP psig	TEST RESULT
1	1917			HP	184.2	A-14.7	=	=	=2735.3	=3168.4	Good K Gas
2	1924			HP	181.7	A-14.7			2738.3	3180.1	Good K Gas
3	1927.5			HP	181.7	A-14.7			2738.6	3184.3	Good K Gas
4	1932.5			HP	181.7	A-14.7			2740	3193	Good K Gas
5	1942.5			HP	181.6	A-14.7			2747.3	3210.1	Fair K - oil tighter than 1-4
6	1947.5			HP	182.0	A-14.7			2751	3218.7	Good K oil
7	1954			HP	182.4	A-14.7			2759.9	3229	Good K water

1. Pressure Test = PT
   Sample & Pressure Test = SPT

2. Gauges = SCH = Schlumberger Strain Guage
   = HP = Hewlett Packard

3. Yes = Y
   No = N

4. PSIA = A
   PSIG = G

NOTE:

1. ALL PRESSURES TAKEN WITH HEWLETT PACKARD GAUGE AND CONVERTED TO PSIG.
2. SCHLUMBERGER TAPE RAN OUT AT PRETEST NO. 13

1107/OP/198

RFT PRETEST PRESSURES

SERVICE COMPANY:..SCHLUMBERGER... RFT RUN.NO:...J.....

WELL:..BREAM-4A.....
DATE:...18.9.81.....
OBSERVERS:..P..Tan,..J..Roche,..& R. Key

SEAT. NO.	DEPTH	DEPTH (Ss)	REASON 1 FOR TEST	GAUGE 2	TEMP.3 CORR.	UNITS 4	IHP ppg	ISIP psig	FSIP psig	FHP psig	TEST RESULT
8a	1979			HP	183.1	A-14.7	=	=	=	=	Seal Failure Twice
8b	1979.5			HP	183.1	A-14.7			2795.5	3270.3	Good K Water
9	1990			HP	186.4	A-14.7			2810.5	3286.3	Good K Water
10	2013.5			HP	187.4	A-14.7			2843.3	3323.3	Good K Water
11	2048			HP	188.6	A-14.7			2893.9	3378.9	Good K Water
12	2138			HP	193.1	A-14.7			3020.8	3522	Good K Water
13	2254			HP	203	A-14.7			3182.5		Good K Water

1. Pressure Test = PT
   Sample & Pressure Test = SPT

2. Gauges = SCH = Schlumberger Strain Guage
   = HP = Hewlett Packard

3. Yes = Y
   No = N

4. PSIA = A
   PSIG = G

1107/OP/198

RFT PRETEST PRESSURES

SERVICE COMPANY: SCHLUMBERGER RFT RUN.NO: 1

WELL: BREAM-4A
DATE: 18.9.81
OBSERVERS: P. Tan, J. Roche, R. Key

SEAT. NO.	DEPTH	DEPTH (Ss)	REASON 1 FOR TEST	GAUGE 2	TEMP.3 CORR.	UNITS 4	IHP ppg	ISIP ppg	FSIP psig	FHP psig	TEST RESULT
14	2279			HP		A-14.7	=	=	= 3222.8	= 3739.0	Good K Water

1. Pressure Test = PT
   Sample & Pressure Test = SPT

2. Gauges = SCH = Schlumberger Strain Guage
   = HP = Hewlett Packard

3. Yes = Y
   No = N

4. PSIA = A
   PSIG = G

RFT SAMPLE TEST REPORT

WELL :...BREAM-4A.....

OBSERVER :.Phil.Tan.Jeff.Roche DATE : ..20-9-81..... RUN NO.:...RFT 2...

	CHAMBER 1 (2-3/4 g)	CHAMBER 2 (2-3/4 g)
SEAT NO. Sample 1	Upper Chamber segregated	Lower Chamber
DEPTH	1944.5	1944.5
A.RECORDING TIMES		
Tool Set	2022	1958
Pretest Open	2022	2003
Time Open	2023	2005
Chamber Open	2023	2005
Chamber Full	2043	2022
Fill Time	20 min.	17 min.
Start Build up	2029	2012
Finish Build up	2041	2021
Build Up time	12	9
Seal Chamber	2044	2022
Tool Retract	2045	
Total Time	hrs.	hrs.
B.SAMPLE PRESSURES		
IHP	psig	psig
ISIP		
Initial Flowing Press.	(2756) 580	(2758) 60
Final Flowing Press.	1129 (before buildup)	
Sampling Press. Range		
FSIP	2726	2757 (Fm Press.)
FHP	3244	
Form.Press.(Horner)		
C.TEMPERATURE		
Depth Tool Reached	1944 m	1944 m
Max.Rec.Temp.	171.5°F	182°F
Time Circ. Stopped	1100 hrs.	1100 hrs.
Time since Circ.	hrs.	hrs.
Form.Temp.(Horner)	°C	°C
D.SAMPLE RECOVERY		
Surface Pressure	psig	1450 psig
Amt Gas	lit.	19.25 ft^3
Amt oil	lit.	5.25 lit.
Amt Water	lit.	- lit.
Amt Others Filtrate	lit.	2.75 lit.
E.SAMPLE PROPERTIES		
Gas Composition		
C1	ppm	241660 ppm
C2	ppm	1123 ppm
C3	ppm	3448 ppm
IC4/nC4	ppm	355 ppm
C5	ppm	108 ppm
C6+	ppm	58 ppm
CO2/H2S	ppm	0.5%/100 ppm
Oil Properties	°API@ °C	48 °API@ 16 °C
Colour		light brown
Fluorescence		bright white yellow
GOR		583 SCF/STB
Water Properties		
Resistivity	@ °C	1.3@ 16 °C
NaCl Equivalent	ppm	7.2 ppm
~~Cl titrated~~ ph	ppm	6000 ppm
NO3	ppm	418 ppm
Est.Water Type		Filtrate
Mud Properties		
Resistivity	@°C	@°C
NaCl Equivalent	ppm	ppm
Cl- titrated	ppm	ppm
Calibration		
Calibration Press.	psig	psig
Calibration Temp.	°C	°C
Hewlett Packard No.		
Mud Weight		
Calc.Hydrostatic		
RFT Chokesize		
REMARKS		RFT pressures not corrected for temp.

Av. Mu
Filtra
10-10.

RFT SAMPLE TEST REPORT

WELL : BREAM-4A

OBSERVER : Phil Tan Jeff Roche DATE : 21-9-81 RUN NO.: RFT 3

	CHAMBER 1 (1g.)		CHAMBER 2 (2-3/4g)	
SEAT NO. Sample 2	Upper chamber segregated		Lower chamber	
DEPTH	1934.5		1934.5	
A.RECORDING TIMES				
Tool Set			0123	
Pretest Open			0125	
Time Open	0134		0128	
Chamber Open	0134		0128	
Chamber Full	0139		0133	
Fill Time	5 min.		5 min.	
Start Build up	0137		0129	
Finish Build up	0139		0131	
Build Up time	2 min.		2 min.	
Seal Chamber	0139		0133	
Tool Retract	0140			
Total Time		hrs.		hrs.
B.SAMPLE PRESSURES				
IHP		psig	3221	psig
ISIP			2755	
Initial Flowing Press.	2736		1964	
Final Flowing Press.	2737 (before buildup)		2492	
Sampling Press. Range				
FSIP	2760		2757	
FHP	3228			
Form.Press.(Horner)				
C.TEMPERATURE				
Depth Tool Reached	1934.5	m		m
Max.Rec.Temp.	172.7° F.			°C
Time Circ. Stopped	1100	hrs.		hrs.
Time since Circ.	143/4	hrs.		hrs.
Form.Temp.(Horner)		°C		°C
D.SAMPLE RECOVERY			1700 cc	
Surface Pressure		psig	1750	psig
Amt Gas		lit.	49 ft³	lit.
Amt ~~Oil~~ Condensate		lit.	500 cc	lit.
Amt Water		lit.		lit.
Amt Others Filtrate		lit.	1200 cc	lit.
E.SAMPLE PROPERTIES				
Gas Composition				
C1		ppm	132915	ppm
C2		ppm	14515	ppm
C3		ppm	3978	ppm
IC4/nC4		ppm	1421	ppm
C5		ppm	627	ppm
C6+		ppm	157	ppm
CO2/H2S		ppm	1%/0	ppm
Properties Condensate	°API@	°C	60.2 °API@	16 °C
Colour			Dark brown, streaming	
Fluorescence			white fluor.	
GOR				
Water Properties				
Resistivity	@	°C	1.2 @	74°F
NaCl Equivalent ph		ppm	8.2	ppm
Cl-titrated		ppm	4100	ppm
NO3		ppm	147	ppm
Est.Water Type				
Mud Properties				
Resistivity	@°C		@°C	
NaCl Equivalent		ppm		ppm
Cl- titrated		ppm		ppm
Calibration				
Calibration Press.		psig		psig
Calibration Temp.		°C		°C
Hewlett Packard No.				
Mud Weight				
Calc.Hydrostatic				
RFT Chokesize				
REMARKS				

RFT SAMPLE TEST REPORT

WELL :...BREAM-4A.....

OBSERVER :.Phil.Tan,.Jeff.RocheDATE : ..21-9-81..... RUN NO.:.RFT.4...

	CHAMBER 1 (1g)		CHAMBER 2 (2-3/4g)	
SEAT NO. Sample 3	Upper chamber		Lower chamber	
DEPTH	1935.5		1938.5	
A.RECORDING TIMES				
Tool Set	0700		0644	
Pretest Open	0700		0644	
Time Open	0702		0646	
Chamber Open	0702		0646	
Chamber Full	0706		0653	
Fill Time	4		7	
Start Build up	0704		0649	
Finish Build up	0706		0652	
Build Up time	2		3	
Seal Chamber	0706		0653	
Tool Retract	0707		0654	
Total Time		hrs.		hrs.
B.SAMPLE PRESSURES				
IHP	3225	psig	3231	psig
ISIP	2750		2759	
Initial Flowing Press.	2687		1484	
Final Flowing Press.	2669 (before buildup)		1437	
Sampling Press. Range				
FSIP	2755		2757	
FHP	3226		3236	
Form.Press.(Horner)				
C.TEMPERATURE				
Depth Tool Reached	1935.5	m	1938.5	m
Max.Rec.Temp.	178° F.	°C		°C
Time Circ. Stopped	1100	hrs.	1100	hrs.
Time since Circ.	20	hrs.	20	hrs.
Form.Temp.(Horner)		°C		°C
D.SAMPLE RECOVERY	2220		7500 cc	
Surface Pressure	420	psig	1450	psig
Amt Gas	0.38 cu ft	lit.	22.24 ft^3	lit.
Amt oil		lit.	Light crude 2750 cc	lit.
Amt Water		lit.		lit.
Amt Others Filtrate	2500 cc	lit.	Filtrate 4750 cc	lit.
E.SAMPLE PROPERTIES				
Gas Composition				
C1		ppm	129894	ppm
C2		ppm	11289	ppm
C3		ppm	2699	ppm
IC4/nC4		ppm	639	ppm
C5		ppm	118	ppm
C6+		ppm	39.2	ppm
CO2/H2S		ppm	2%/14	ppm
Oil Properties	°API@	°C	49.3 °API@ 16	°C
Colour			Medium brown - yellow	
Fluorescence			Bright white	
GOR			1286 SCF/STB	
Water Properties				
Resistivity	0.24@ 71° F.	°C	1.10 @ 69° F.	°C
NaCl Equivalent	9.4	ppm	7.2	ppm
Cl-titrated	4200	ppm	3100	ppm
NO3	99	ppm	82	ppm
Est.Water Type	Filtrate			
Mud Properties				
Resistivity	@°C		@°C	
NaCl Equivalent		ppm		ppm
Cl- titrated		ppm		ppm
Calibration				
Calibration Press.		psig		psig
Calibration Temp.		°C		°C
Hewlett Packard No.				
Mud Weight				
Calc.Hydrostatic				
RFT Chokesize				
REMARKS				

RFT SAMPLE TEST REPORT

WELL :..BREAM-4A.....

OBSERVER :.Phil.Tan.Jeff.Roche DATE : ....21-9-81..... RUN NO.:..RFT 5....

	CHAMBER 1 (1g)	CHAMBER 2 (6g)
SEAT NO. Sample 4	Upper chamber	Lower chamber
DEPTH	1949.5 (low proof oil)	1935.6 (low proof gas)
A.RECORDING TIMES		
Tool Set	1251	1227
Pretest Open	1251	1227
Time Open		
Chamber Open	1252 1254	1229
Chamber Full	1258	1244
Fill Time	plugged 4	15
Start Build up		1235
Finish Build up		1244
Build Up time		11
Seal Chamber	1253 1258	1244
Tool Retract	1258	1245
Total Time	hrs.	hrs.
B.SAMPLE PRESSURES		
IHP	3246 psig	3227 psig
ISIP	2764	2756
Initial Flowing Press.	2662 (after opening)	2451
Final Flowing Press.	(Before buildup)	Oscillates btn 2311-2450 Pluggi 25
Sampling Press. Range		
FSIP	2765	2760
FHP	3246	3233
Form.Press.(Horner)		
C.TEMPERATURE		
Depth Tool Reached	m	m
Max.Rec.Temp.	182.4°F °C	°C
Time Circ. Stopped	1100 hrs.	1100 hrs.
Time since Circ.	25 hrs.	25 hrs.
Form.Temp.(Horner)	°C	°C
D.SAMPLE RECOVERY		
Surface Pressure	950 psig	1600 psig
Amt Gas	1.45 ft³ lit.	25.4 ft³ lit.
Amt oil	250 cc lit.	lit.
Amt Water	lit.	lit.
Amt Others Mud filtrate	1750 lit.	Filtrate 1700 cc lit.
E.SAMPLE PROPERTIES		
Gas Composition		
C1	102707.2 ppm	144998 ppm
C2	18432 ppm	14745 ppm
C3	8110 ppm	3379 ppm
IC4/nC4	390 ppm	568 ppm
C5	216 ppm	162 ppm
C6+	117 ppm	98 ppm
CO2/H2S	2%/4 ppm	1.5%/0 ppm
Oil Properties	100 Waxy 39 °API@ 60° F	°API@ °C
Colour	Light brown yellow waxy	
Fluorescence	Bright white	
GOR		
Water Properties		
Resistivity	1.2 @ 72°F °C	.78 @ 68.5° F °C
NaCl Equivalent	ppm	ph = 7.0 ppm
Cl-titrated	4500 ppm	5800 ppm
NO3	ppm	Filtrate ppm
Est.Water Type		
Mud Properties		
Resistivity	@°C	@°C
NaCl Equivalent	ppm	ppm
Cl- titrated	ppm	ppm
Calibration		
Calibration Press.	psig	psig
Calibration Temp.	°C	°C
Hewlett Packard No.		
Mud Weight		
Calc.Hydrostatic		
RFT Chokesize		
REMARKS		

RFT SAMPLE TEST REPORT

WELL : BREAM-4A

OBSERVER : Phil Tan, Jeff Roche DATE : 22-9-81 RUN NO.: RFT 6

	CHAMBER 1 (1g)		CHAMBER 2 (6g)	
SEAT NO.	Segregated Upper Chamber		Lower Chamber	
DEPTH	1951		1951	
A.RECORDING TIMES				
Tool Set			1147	
Pretest Open			1148	
Time Open			1 min.	
Chamber Open	1205		1150	
Chamber Full	1207		1203	
Fill Time	2 min.		15 min.	
Start Build up	1207		1203	
Finish Build up	1210		1204	
Build Up time				
Seal Chamber	1210		1205	
Tool Retract	1210			
Total Time	5 min	hrs.	17 min	hrs.
B.SAMPLE PRESSURES				
IHP		psig	3251	psig
ISIP	(before buildup)		2755	
Initial Flowing Press.	2711		2595	(2767 -Fm Pres.)
Final Flowing Press.	2714		2592	
Sampling Press. Range	3 psig			
FSIP	2768		2764	
FHP	3252			
Form.Press.(Horner)				
C.TEMPERATURE				
Depth Tool Reached	1951	m	1951	m
Max.Rec.Temp.	169	°C		°C
Time Circ. Stopped	0500 22-9-81	hrs.	0500 22-9-81	hrs.
Time since Circ.		hrs.		hrs.
Form.Temp.(Horner)		°C		°C
D.SAMPLE RECOVERY				
Surface Pressure	400	psig	500	psig
Amt Gas	0.15	lit.	1.17	ft³
Amt oil		lit.		lit.
Amt Water	1/3 gal.	lit.	3-3/4 gal.	lit.
Amt Others		lit.		lit.
E.SAMPLE PROPERTIES				
Gas Composition				
C1		ppm	60416	ppm
C2		ppm	374	ppm
C3		ppm	84	ppm
IC4/nC4		ppm	27	ppm
C5		ppm	14	ppm
C6+		ppm	TR	ppm
CO2/H2S		ppm	TR/0	ppm
Oil Properties	°API@	°C	°API@	°C
Colour				
Fluorescence				
GOR				
Water Properties				
Resistivity	2.2 @ 72°F	°C	0.7 @ 74°F	°C
NaCl Equivalent	6.9	ppm	9.2	ppm
Cl-titrated	6900	ppm	5400	ppm
NO3	284	ppm	110	ppm
Est.Water Type				
Mud Properties				
Resistivity	@°C		@°C	
NaCl Equivalent		ppm		ppm
Cl- titrated		ppm		ppm
Calibration				
Calibration Press.		psig		psig
Calibration Temp.		°C		°C
Hewlett Packard No.				
Mud Weight				
Calc.Hydrostatic				
RFT Chokesize				
REMARKS				

APPENDIX 8

APPENDIX 8.

GEOCHEMICAL REPORT.

BREAM-4A WELL

GIPPSLAND BASIN, VICTORIA

by

J.K. EMMETT

Esso Australia Ltd

Geochemical Report

March 1982

CONTENTS

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INTRODUCTION:

Canned cuttings, composited over 15-metre intervals were collected from 275 metres down to 2421 metres (T.D). Alternate 15-metre intervals were analysed for C_{1-4} headspace hydrocarbon gases by the Esso Australia Geochemistry Laboratory. Between 840 and 2421 metres (T.D), succeeding alternate 15-metre intervals were analysed for both, total C_{1-4} cuttings gas hydrocarbons and C_{4-7} gasoline range hydrocarbons by Exxon's Research Laboratory in Houston (EPRCO). Selected samples were then handpicked for more detailed analyses, such as Total Organic Carbon (TOC), Rock-Eval pyrolysis, and C_{15+} liquid and gas chromatography. Vitrinite Reflectance ($R_{o\ max}$) was measured by Professor A.C. Cook of Wollongong.

DISCUSSION OF RESULTS:

The detailed C_{1-4} and C_{4-7} data are listed in Appendices 1, 2 and 3, but are more conveniently displayed in Figures 1, 2, and 3. As can be seen by referring to Figures 1 and 2, similar data covering the same depth range has been obtained by both EAL and EPRCO. The results are in good agreement and the same trends are obvious from both plots.

The C_{1-4} gas content is relatively uniform (maximum reading 9665 ppm) down to approximately 1875 metres after which there is a sharp increase corresponding with the top of the more organic rich Latrobe Group sediments, which occurs at 1856 metres (KB). This increased C_{1-4} gas content (usually in the range 10,000 to 100,000 ppm; maximum reading 223,557 ppm) continues to be fairly uniform down to T.D (2421 metres). The relatively uniform C_{1-4} gas content in, or above, the Latrobe Group, is partly due to migratory "smearing" of

these light hydrocarbons through extensive sequences of similar rock types. The % "wet" (C_{2+}) gas components is uniformly low (usually less than 10%) down to the top of the Latrobe Group, below which it increases significantly, usually ranging between 10% and 40%, with a maximum value of 61% between 1860-1875 metres (fig. 1).

The C_{4-7} gasoline range hydrocarbons show a similar trend to the C_{1-4} hydrocarbons, again with a significant increase below the Top of Latrobe boundary, and maximizing around 2110 metres (fig. 2). Therefore, based on cuttings gas and gasoline range hydrocarbons, the Latrobe Group sediments have the best source potential for oil and gas. The concentration of the highest C_{1-4} cuttings gas values in the boundary region of the Latrobe Group and the overlying sediments is no doubt due to the presence of the reservoired hydrocarbons in the latrobe Group sands and to some migration into the overlying sediments.

Twenty-eight selected sidewall cores samples were analysed for TOC and the results are presented in Table 1. The undifferentiated non-marine Latrobe Group sediments have an average TOC value of 1.96% (TOC range: 0.26% - 6.05%, 14 samples), which rates them as very good source rocks for both liquid and gaseous hydrocarbons. The overlying Gurnard Formation has an average TOC of 1.01% (TOC range: 0.20% - 1.57%, 11 samples) and is rated as a fair source rock. The marine Lakes Entrance Formation samples have low TOC values (average TOC 0.40%) which indicates a poor potential hydrocarbon source rock rating.

Vitrinite reflectance data determined on 4 sidewall core samples (all from the Latrobe Group) are listed in Table 2 and plotted against depth in Figure 4. Bearing in mind the small number of data

points, the straight line gradient indicates that there are no major maturation breaks. If the top of maturity is taken to occur at $R_{o\ max}$ = 0.65, then the Latrobe Group sediments at T.D in Bream-4A, are approaching the top of the maturity window for significant generation of oil and gas. The presence of "common to abundant" exinite macerals in the majority of samples (see Table 2) also suggests a very good potential for the Latrobe Group sediments to source both oil and gas.

The same samples which were prepared and analysed for TOC were analysed using Rock-Eval pyrolysis. The results are presented in Table 3. S_1 is a measure of the hydrocarbons freely present in the rock and represents present oil potential. S_2 represents the hydrocarbons released mainly by the cracking of kerogens, and indicates the quantity of hydrocarbons which could be obtained after further maturation. The S_2 value together with the TOC value is used for calculating the Hydrogen Index (HI), (which has a close correlation to the H/C atomic ratio given by elemental analysis of the kerogen). S_3 is a measure of the CO_2 released by kerogen pyrolysis. S_3, again with the TOC value, is used for calculating the Oxygen Index (OI) which can be related to the O/C atomic ratio given by kerogen elemental analysis. T_{max} is the temperature corresponding to the maximum rate of kerogen cracking, and gives information about the degree of maturation of organic matter.

Figure 5 is a plot of HI versus OI for Bream-4A Rock-Eval data. The kerogen Type I, II and III fields delineated on this plot are equivalent to those determined using elemental atomic ratios of kerogens. i.e. Type I is relatively hydrogen-rich, algal and amorphous kerogen, and is a good oil source; Type II is less

hydrogen-rich amorphous and herbaceous kerogen, and may source both oil and gas; Type III is hydrogen-poor woody and inertinite (coaly) organic matter which is usually regarded as being gas prone. As can be seen in Figure 5 the majority of data points for the Latrobe Group sediments plot in Type III field, with 2 or 3 in Type II. Approximately half the values in Type III plot in the upper half of the field showing some hydrogen content and together with those points in Type II indicate potential to generate some oil, in addition to gas. The remaining data concentrated toward the base of field III (i.e. relatively hydrogen-poor) is best interpreted as gas prone. The three samples from the overlying Lakes Entrance Formation have low TOC's and plot in the lower half of field III, which indicates some dry gas potential, but little potential for oil. Hence the Rock-Eval pyrolysis information confirms the Latrobe Group sediments as having the best potential to source oil and gas.

The C_{15+} liquid chromatography results from selected canned cuttings are listed in Table 4. All four samples are from the Tertiary Latrobe Group sediments, and are rich in total extract, which again is confirmation of a good oil and gas source rock potential. The corresponding C_{15+} saturate chromatograms are presented in figs 6,7,8 and 9. On the whole, the chromatograms exhibit typical features of immature, dominantly terrestrial organic matter becoming more mature with increasing depth. This is indicated by the gradual reduction in the amount of odd-over-even predominance in the high molecular weight (C_{22+}) n-alkanes, and the disappearance from the high molecular weight region of sterane/triterpane-type compounds. Based on the relatively high amounts of asphaltenes and non-hydrocarbon (NSO) components, as well as the distributions of C_{15+} saturated hydrocarbon components, the organic matter at T.D in Bream-4A is in the immature - early mature stage.

CONCLUSIONS:

(1) Of the rock sequence penetrated in Bream-4A, the Tertiary Latrobe Group sediments are rated as having the best potential to source both oil and gas.

(2) The Latrobe Group sediments are however, at best presently in the early mature zone of hydrocarbon generation at T.D in Bream-4A.

PE601388

This is an enclosure indicator page.
The enclosure PE601388 is enclosed within the container PE902701 at this location in this document.

The enclosure PE601388 has the following characteristics:

ITEM_BARCODE	= PE601388
CONTAINER_BARCODE	= PE902701
NAME	= C1-4 Cuttings Gas Log
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= WELL_LOG
DESCRIPTION	= C1-4 Cuttings Gas Log EAL data for Bream-4A
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W749
WELL_NAME	= Bream-4A
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

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PE601389

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The enclosure PE601389 is enclosed within the container PE902701 at this location in this document.

The enclosure PE601389 has the following characteristics:

ITEM_BARCODE	= PE601389
CONTAINER_BARCODE	= PE902701
NAME	= C1-4 Cuttings Gas Log Erpco Data
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= WELL_LOG
DESCRIPTION	= C1-4 Cuttings Gas Log Erpco Data for Bream-4A
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W749
WELL_NAME	= Bream-4A
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

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The enclosure PE601390 has the following characteristics:

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CONTAINER_BARCODE	= PE902701
NAME	= Geochemical Log
BASIN	= GIPPSLAND
PERMIT	=
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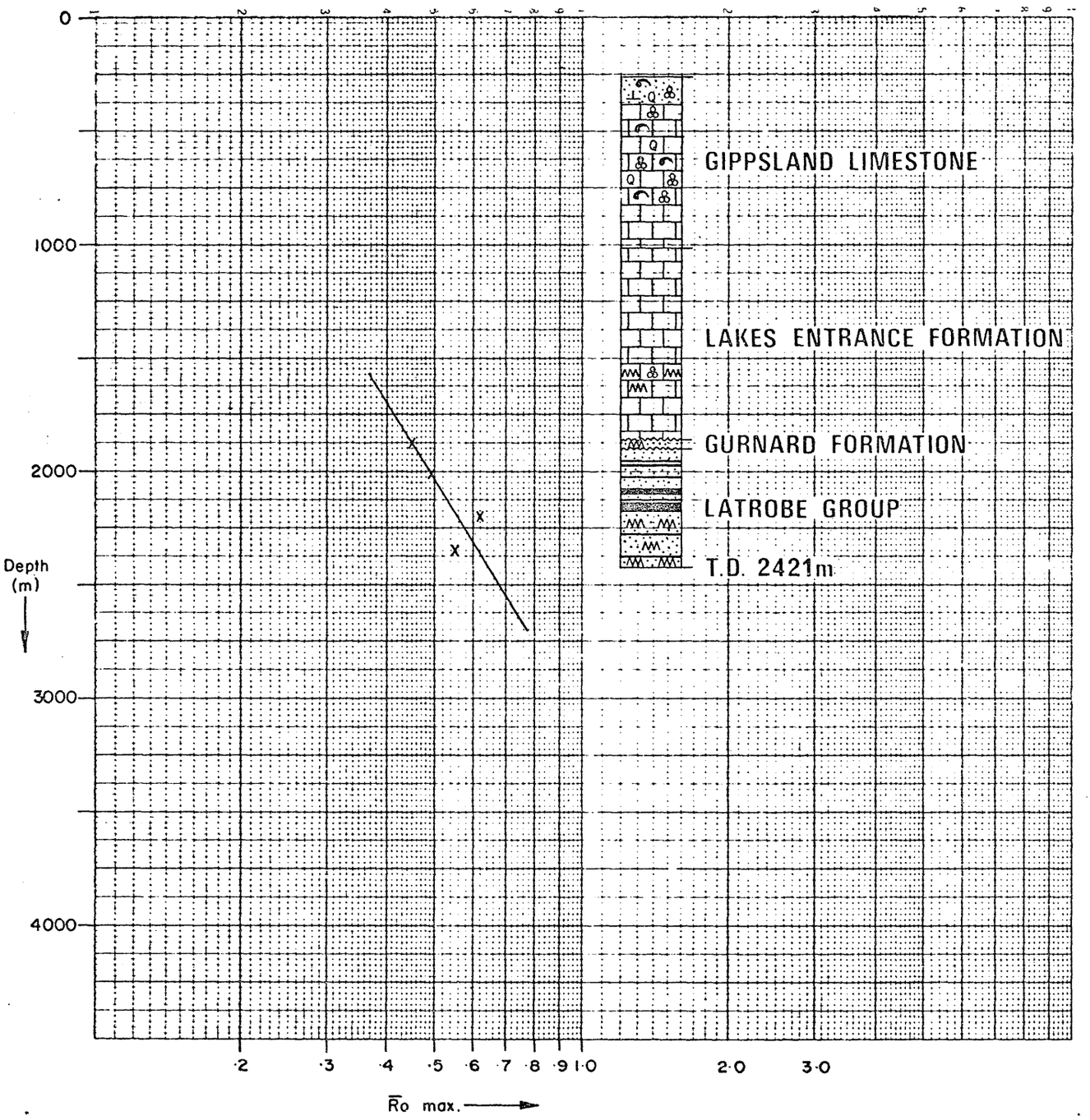
SUBTYPE	= WELL_LOG
DESCRIPTION	= Geochemical Log for Bream-4A
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W749
WELL_NAME	= Bream-4A
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

BREAM – 4A

Figure 4

VITRINITE REFLECTANCE vs DEPTH



Base 1107/OP/207

2062/OP/2-4/82

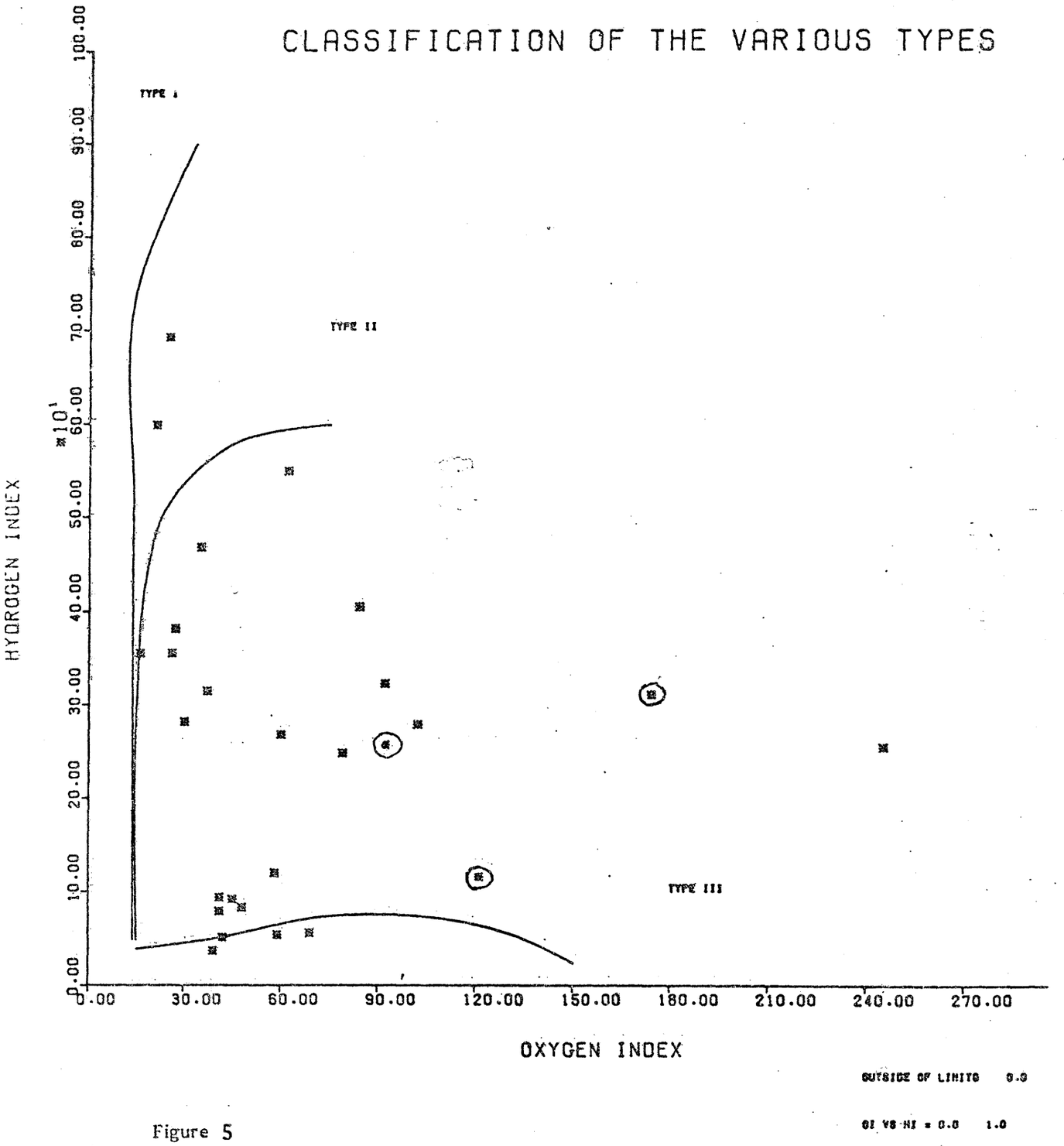


Figure 5

BREAM NO.46

(*) LAKES ENTRANCE FORMATION

* LATROBE GROUP

C_{15+} Paraffin-Naphthene Hydrocarbon

GeoChem Sample No. E492-017

Exxon Identification No. 75208-A

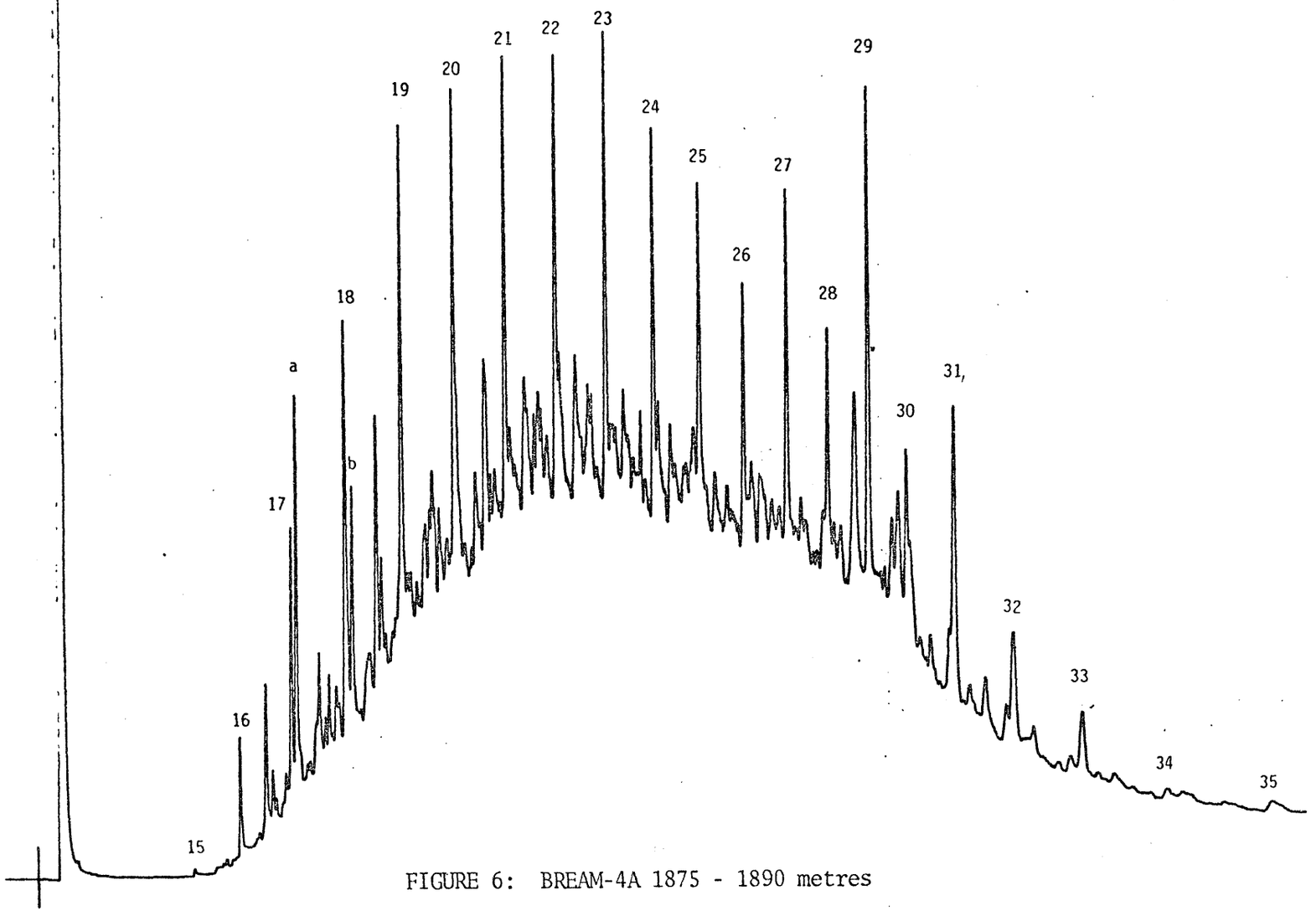


FIGURE 6: BREAM-4A 1875 - 1890 metres

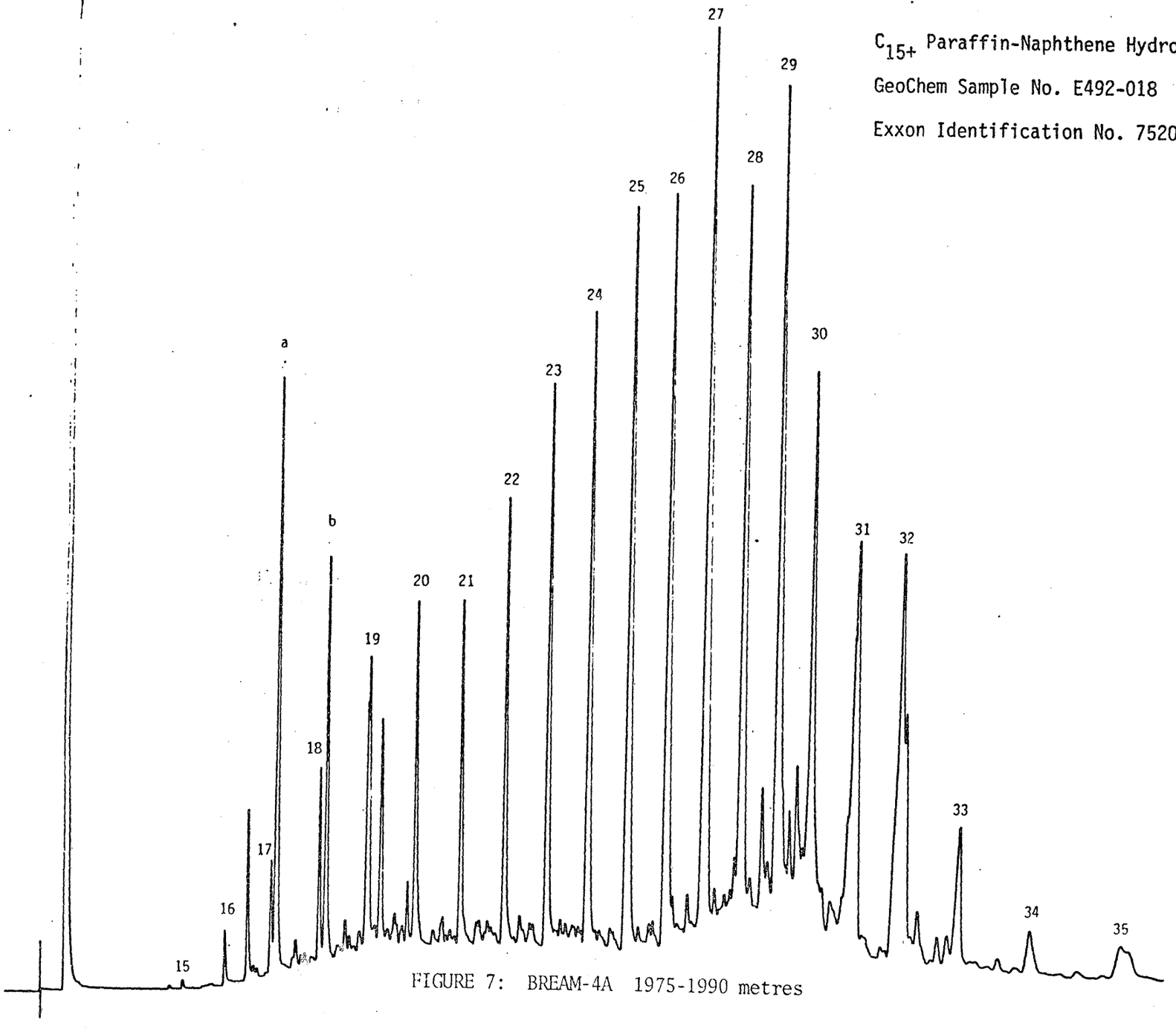


FIGURE 7: BREAM-4A 1975-1990 metres

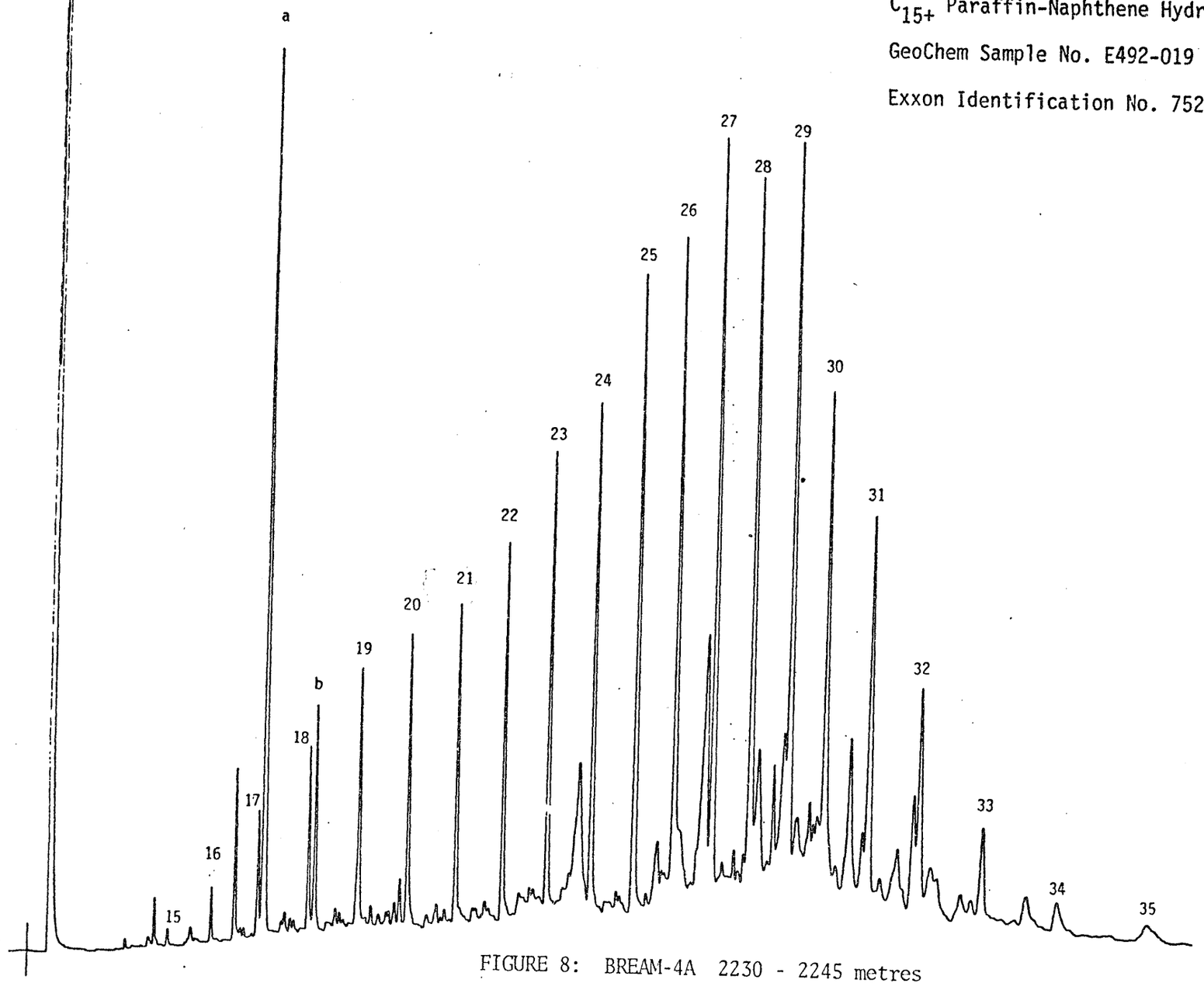


FIGURE 8: BREAM-4A 2230 - 2245 metres

C_{15+} Paraffin-Naphthene Hydrocarbon

GeoChem Sample No. E492-020

Exxon Identification 75208-D

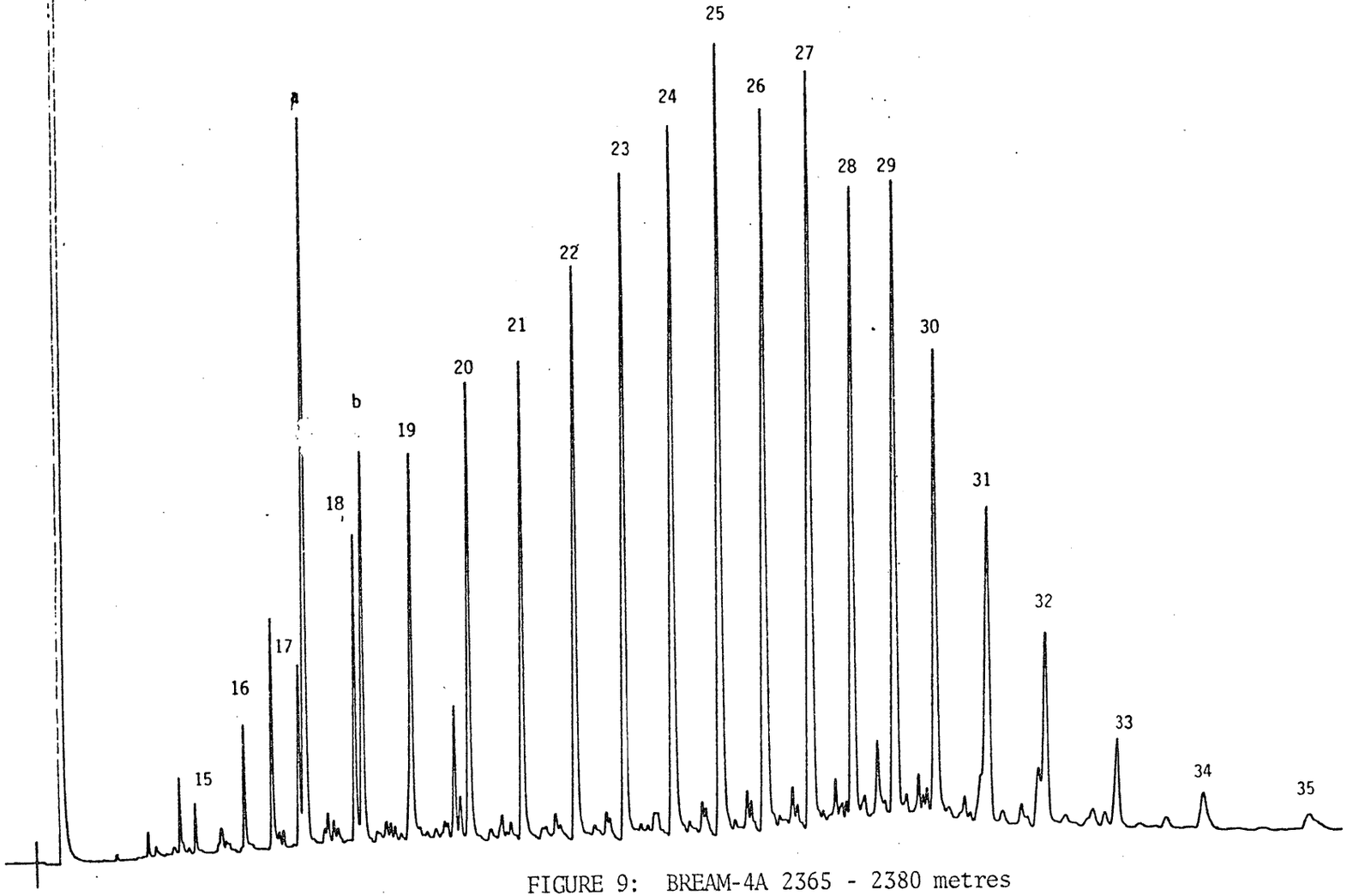


FIGURE 9: BREAM-4A 2365 - 2380 metres

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TABLE 1: TOTAL ORGANIC CARBON REPORT

BASIN - GIPPSLAND
WELL - BREAM 4A

SAMPLE NO.	DEPTH	FORMATION	AN	TOC%
72279 U	1225.50	LAKES ENTRANCE	1	.35
72279 V	1599.80	LAKES ENTRANCE	1	.47
72279 W	1852.70	LAKES ENTRANCE	1	.38
*** DEPTH :	.00 TO 1852.70	*** AVERAGE TOC % =		.40 ***
72278 Z	1859.00	GURNARD	1	.20
72312 H	1860.00	GURNARD	1	.55
72279 X	1861.90	GURNARD	1	.83
72279 T	1865.50	GURNARD	1	1.26
72279 Y	1869.00	GURNARD	1	1.00
72279 Z	1872.20	GURNARD	1	.83
72312 A	1875.50	GURNARD	1	1.30
72312 B	1879.00	GURNARD	1	1.57
72277 U	1882.50	GURNARD	1	1.33
72277 W	1889.50	GURNARD	1	1.26
*** DEPTH :	1856.00 TO 1889.50	*** AVERAGE TOC % =		1.01 ***
72277 X	1937.20	LATROBE GROUP	1	3.30
72277 V	2076.50	LATROBE GROUP	1	2.56
72279 S	2106.60	LATROBE GROUP	1	1.11
72278 W	2180.50	LATROBE GROUP	1	1.92
72312 D	2191.20	LATROBE GROUP	1	.43
72278 V	2208.00	LATROBE GROUP	1	.26
72277 Y	2218.20	LATROBE GROUP	1	1.73
72276 X	2234.00	LATROBE GROUP	1	.72
72312 F	2242.00	LATROBE GROUP	1	1.59
72277 Z	2275.50	LATROBE GROUP	1	6.05
72312 F	2339.30	LATROBE GROUP	1	5.24
72312 G	2349.30	LATROBE GROUP	1	.83
72278 Y	2357.00	LATROBE GROUP	1	.38
72312 I	2368.50	LATROBE GROUP	1	1.36
*** DEPTH :	1901.00 TO 2368.50	*** AVERAGE TOC % =		1.96 ***

02/04/82

ESSO AUSTRALIA LTD.

TABLE 2: VITRINITE REFLECTANCE REPORT

BASIN - GIPPSLAND
WELL - BREAM 4A

SAMPLE NO.	DEPTH	FORMATION	AN	MAX. $\bar{R}O$	FLUOR. COLOUR	NO.CNTS.	MACERAL TYPE
72312 A	1875.50	GURNARD	5	.45	YELLOW TO OR	6	RARE SPORIN & DINO
72312 U	2009.80	LATROBE GROUP	5	.49	GREEN TO ORA	20	EXINITE ABUND
72312 V	2204.90	LATROBE GROUP	5	.62	SPOR YEL-OR	23	EXIN COMMON
72312 W	2353.50	LATROBE GROUP	5	.55	SPOR DULL OR	20	EXIN ABUND

Table 3 - Rock-Eval Analysis of Cuttings and Sidewall Cores from Gippsland Basin

(TOC data from Esso Australia; Rock-Eval by K. R. Hahn)

Depth (meters)	EPR No.	Total Organic Carbon	S_1	S_2	S_3	H Index	O Index	T-Max (°C)
BREAM 4-A (Sidewall Cores)								
1225.5	75133 -A	.42	.28	1.31	.73	312	174	424
1599.8	-B	.51	.36	1.43	.52	280	102	419
1852.7	-C	.42	.15	.49	.51	117	121	427
1859	-D	.22	.22	.56	.54	255	245	427
1860	-E	.58	.12	.33	.40	57	69	426
1861.9	-F	.88	.15	.48	.52	55	59	430
1865.5	-G	1.32	1.67	3.55	.79	269	60	430
1869	-H	1.47	.15	1.24	.71	84	48	429
1872.2	-I	.89	.19	1.08	.52	121	58	428
1875.5	-J	1.35	.16	.51	.52	38	39	430
1879	-K	1.63	.16	.85	.68	52	42	427
1882.5	-L	1.35	.20	1.26	.61	93	45	429
1885	-M	1.37	.19	1.10	.56	80	41	428
1889.5	75133 -N	1.28	.25	1.22	.52	95	41	429
1937.2	-O	3.30	1.28	11.79	.54	357	16	421
2076.5	75144 -A	2.56	.54	9.13	.67	357	26	427
2106.8	-B	1.11	.61	6.10	.69	550	62	434
2180.5	-C	1.92	.45	7.36	.51	383	27	433
2191.2	-D	.43	.40	1.07	.34	249	79	429
2208	-E	.26	.27	.67	.24	258	92	407
2218.2	-F	1.73	.59	4.90	.52	283	30	424
2234	-G	—	.29	2.23	.35	—	—	427
2242	-H	1.59	.63	7.46	.55	469	35	434
2275.5	-I	6.05	1.34	36.31	1.28	600	21	432
2339.3	-J	5.42	1.05	37.60	1.34	694	25	439
2349.3	-K	.83	1.02	3.37	.70	406	84	433
2357	-L	.38	.52	1.23	.35	324	92	427
2368.5	-M	1.36	.55	4.30	.50	316	37	428

TABLE-4

C_{15+} LIQUID CHROMATOGRAPHY DATA

BREAM-4A

DEPTH IN METRES	TOTAL EXTRACT (ppm)	HC's (ppm)	NON HC's (ppm)	SULPHUR (ppm)	E X T R A C T (%)				
					SATS	AROM.	NSO	ASPH.	SULP
1875-1890	435	75	360	4	9.8	7.4	15.9	65.9	1.0
1975-1990	12077	1627	10450	-	1.2	12.3	13.6	73.0	-
2230-2245	7690	1253	6437	-	2.5	13.8	18.8	64.9	-
2365-2380	12564	3168	9378	-	5.7	19.6	17.3	57.3	-

APPENDICES

APPENDIX 1: C1-C4 HYDROCARBON ANALYSES

REPORT A - HEADSPACE GAS

BASIN - GIPPSLAND
WELL - BREAM 4A

SAMPLE NO.	DEPTH	GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS) METHANE C1	ETHANE C2	PROPANE C3	IBUTANE IC4	NBUTANE C4	WET C2-C4	TOTAL C1-C4	WET/TOTAL PERCENT	GAS COMPOSITION (PERCENT) TOTAL GAS M	E	P	IB	NB	WET GAS E	P	IB	NB
72277 A	300.00	3	0	0	0	0	0	3	.00	100.	0.	0.	0.	0.	0.	0.	0.	0.
72277 B	400.00	10	0	0	0	0	0	10	.00	100.	0.	0.	0.	0.	0.	0.	0.	0.
72277 C	500.00	255	4	0	0	0	4	259	1.54	98.	2.	0.	0.	0.	100.	0.	0.	0.
72277 D	600.00	1322	42	10	3	1	56	1378	4.06	96.	3.	1.	0.	0.	75.	18.	5.	2.
72277 E	700.00	1730	63	10	5	2	80	1810	4.42	96.	3.	1.	0.	0.	79.	13.	6.	2.
72277 F	800.00	4008	136	26	6	3	171	4179	4.09	96.	3.	1.	0.	0.	80.	15.	4.	2.
72277 G	825.00	3014	122	28	10	6	166	3180	5.22	95.	4.	1.	0.	0.	73.	17.	6.	4.
72277 H	855.00	3025	116	27	8	4	155	3180	4.87	95.	4.	1.	0.	0.	75.	17.	5.	3.
72277 I	885.00	7826	274	75	29	18	396	8222	4.82	95.	3.	1.	0.	0.	69.	19.	7.	5.
72277 J	915.00	3479	138	26	10	5	179	3658	4.89	95.	4.	1.	0.	0.	77.	15.	6.	3.
72277 K	945.00	2919	113	32	9	5	159	3078	5.17	95.	4.	1.	0.	0.	71.	20.	6.	3.
72277 L	975.00	6004	233	53	20	9	315	6319	4.98	95.	4.	1.	0.	0.	74.	17.	6.	3.
72277 M	1005.00	7026	217	150	46	20	433	7459	5.81	94.	3.	2.	1.	0.	50.	35.	11.	5.
72277 N	1030.00	6976	177	57	21	9	264	7240	3.65	96.	2.	1.	0.	0.	67.	22.	8.	3.
72277 O	1060.00	6252	141	59	21	13	234	6486	3.60	96.	2.	1.	0.	0.	60.	25.	9.	6.
72277 P	1090.00	9218	270	115	42	20	447	9665	4.62	95.	3.	1.	0.	0.	60.	25.	9.	4.
72277 Q	1150.00	5146	166	98	47	22	333	5479	6.08	94.	3.	2.	1.	0.	50.	29.	14.	7.
72277 R	1180.00	2786	70	61	31	15	177	2963	5.97	94.	2.	2.	1.	0.	40.	34.	18.	8.
72277 S	1200.00	4718	124	106	43	20	293	5011	5.85	94.	2.	2.	1.	0.	42.	36.	15.	7.
72277 T	1230.00	7939	212	193	76	37	518	8457	6.13	94.	3.	2.	1.	0.	41.	37.	15.	7.
72278 A	1260.00	5757	132	109	77	28	346	6103	5.67	94.	2.	2.	1.	0.	38.	32.	22.	8.
72278 B	1290.00	5364	111	116	40	26	293	5657	5.18	95.	2.	2.	1.	0.	38.	40.	14.	9.
72278 C	1305.00	4114	170	90	29	15	304	4418	6.88	93.	4.	2.	1.	0.	56.	30.	10.	5.
72278 D	1350.00	1927	46	43	16	10	115	2042	5.63	94.	2.	2.	1.	0.	40.	37.	14.	9.
72278 E	1380.00	1784	39	42	17	12	110	1894	5.81	94.	2.	2.	1.	1.	35.	38.	15.	11.
72278 F	1410.00	736	25	53	23	16	117	853	13.72	86.	3.	6.	3.	2.	21.	45.	20.	14.
72278 G	1440.00	715	26	59	24	17	126	841	14.98	85.	3.	7.	3.	2.	21.	47.	19.	13.
72278 H	1470.00	1229	37	52	20	11	120	1349	8.90	91.	3.	4.	1.	1.	31.	43.	17.	9.
72278 I	1500.00	921	30	49	25	12	116	1037	10.57	89.	3.	4.	2.	1.	26.	42.	22.	10.
72278 J	1530.00	3223	74	81	24	12	191	3414	5.59	94.	2.	2.	1.	0.	39.	42.	13.	6.
72278 K	1560.00	2369	58	43	20	8	129	2498	5.16	95.	2.	2.	1.	0.	45.	33.	16.	6.
72278 L	1590.00	921	30	132	34	14	210	1131	18.57	81.	3.	12.	3.	1.	14.	63.	16.	7.
72278 M	1620.00	2050	54	67	27	19	167	2217	7.53	92.	2.	3.	1.	1.	32.	40.	16.	11.
72278 N	1650.00	310	12	38	14	6	70	380	18.42	82.	3.	10.	4.	2.	17.	54.	20.	9.
72278 O	1680.00	295	14	60	18	8	100	395	25.32	75.	4.	15.	5.	2.	14.	60.	18.	8.
72278 P	1710.00	325	20	25	16	7	68	393	17.30	83.	5.	6.	4.	2.	29.	37.	24.	10.
72278 Q	1740.00	264	14	10	5	2	31	295	10.51	89.	5.	3.	2.	1.	45.	32.	15.	7.
72278 R	1770.00	727	53	35	18	7	111	838	12.36	86.	5.	4.	2.	1.	48.	30.	16.	6.
72278 S	1800.00	470	32	33	16	7	88	558	15.77	84.	5.	6.	3.	1.	36.	38.	18.	8.
72278 T	1830.00	785	122	129	35	25	311	1096	28.38	72.	11.	12.	3.	2.	39.	41.	11.	8.
72279 A	1860.00	1661	299	292	57	71	719	2380	27.87	72.	12.	11.	2.	3.	42.	41.	8.	10.
72279 B	1890.00	1807	383	303	57	81	824	2631	31.32	69.	15.	12.	2.	3.	46.	37.	7.	10.
72279 C	1925.00	6314	902	983	247	429	2561	8875	28.86	71.	10.	11.	3.	5.	35.	38.	10.	17.
72279 D	1990.00	20270	2338	854	44	115	3401	23671	14.37	85.	10.	4.	0.	0.	69.	25.	3.	3.
72279 E	2020.00	97443	9456	2370	226	213	12265	109708	11.18	89.	9.	2.	0.	0.	77.	19.	2.	2.
72279 F	2035.00	199171	19281	4418	351	536	24386	223557	10.91	89.	9.	2.	0.	0.	79.	18.	1.	1.
72279 G	2065.00	157410	13607	2348	194	116	16265	173675	9.37	91.	8.	1.	0.	0.	84.	14.	1.	1.

ESSO AUSTRALIA LTD.

C1-C4 HYDROCARBON ANALYSES

REPORT A - HEADSPACE GAS

BASIN - GIPPSLAND
WELL - BREAM 4A

SAMPLE NO.	DEPTH	GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS) METHANE C1	ETHANE C2	PROPANE C3	IBUTANE IC4	NBUTANE C4	WET C2-C4	TOTAL C1-C4	WET/TOTAL PERCENT	GAS COMPOSITION (PERCENT) TOTAL GAS M	E	P	IB	NB	WET GAS E	P	IB	NB
72279 H	2095.00	76514	5696	1107	109	76	6988	83502	8.37	92.	7.	1.	0.	0.	82.	16.	2.	1.
72279 I	2125.00	113596	5867	656	115	26	6664	120260	5.54	94.	5.	1.	0.	0.	88.	10.	2.	0.
72279 J	2155.00	85899	3374	342	84	13	3813	89712	4.25	96.	4.	0.	0.	0.	88.	9.	2.	0.
72279 K	2185.00	22177	2654	695	105	47	3501	25678	13.63	86.	10.	3.	0.	0.	76.	20.	3.	1.
72279 L	2215.00	12772	1672	544	88	70	2374	15146	15.67	84.	11.	4.	1.	0.	70.	23.	4.	3.
72279 M	2245.00	14661	1331	401	46	44	1822	16483	11.05	89.	8.	2.	0.	0.	73.	22.	3.	2.
72279 N	2275.00	53073	4676	1346	125	127	6274	59347	10.57	89.	8.	2.	0.	0.	75.	21.	2.	2.
72279 O	2305.00	5383	813	266	37	33	1149	6532	17.59	82.	12.	4.	1.	1.	71.	23.	3.	3.
72279 P	2335.00	50906	2549	481	48	44	3122	54028	5.78	94.	5.	1.	0.	0.	82.	15.	2.	1.
72279 Q	2380.00	18374	1335	547	84	88	2054	20428	10.05	90.	7.	3.	0.	0.	65.	27.	4.	4.
72279 R	2410.00	8670	1016	410	64	78	1568	10238	15.32	85.	10.	4.	1.	1.	65.	26.	4.	5.

APPENDIX - 2

BREAM-4A TABLE 1D 03 DEC 81

CUTTINGS GAS SUMMARY

SAMPLE NO.	DEPTH	TOTAL C1-C4	% WET	% C3+	C3+/C1	C2/C1
75168A	840	4107.	6.	1.	0.02	0.05
75168B	960	5045.	6.	2.	0.02	0.04
75168C	1165	8819.	6.	4.	0.03	0.02
75168D	1395	5748.	5.	4.	0.03	0.01
75168E	1425	2382.	8.	6.	0.07	0.02
75168F	1455	2447.	10.	8.	0.08	0.02
75168G	1485	3008.	9.	7.	0.07	0.02
75168H	1515	2962.	7.	5.	0.06	0.02
75168I	1545	3490.	6.	4.	0.05	0.02
75168J	1575	1758.	5.	4.	0.05	0.01
75168K	1605	1774.	8.	7.	0.07	0.01
75168L	1635	3000.	4.	3.	0.03	0.01
75168M	1665	2792.	4.	3.	0.03	0.01
75168N	1695	3506.	5.	4.	0.04	0.01
75168O	1725	4148.	4.	3.	0.03	0.01
75168P	1755	1825.	8.	6.	0.07	0.03
75168Q	1785	4605.	5.	3.	0.03	0.02
75170A	1815	2092.	9.	7.	0.07	0.02
75168R	1845	3055.	28.	21.	0.28	0.09
75168S	1875	7174.	61.	51.	1.29	0.24
75168T	1910	13621.	47.	37.	0.71	0.19
75170B	1975	96888.	28.	12.	0.16	0.22
75170C	2005	36029.	43.	22.	0.39	0.37
75170D	2050	5920.	39.	19.	0.32	0.34
75170E	2080	59148.	24.	8.	0.10	0.22
75170F	2110	137705.	15.	2.	0.03	0.15
75170G	2140	66173.	15.	4.	0.04	0.13
75170H	2170	28415.	31.	10.	0.13	0.30
75169A	2200	56554.	18.	6.	0.07	0.14
75170I	2230	48136.	46.	16.	0.29	0.56
75170J	2260	13512.	31.	14.	0.21	0.25
75169B	2290	21874.	34.	14.	0.22	0.30
75169C	2320	13178.	26.	11.	0.14	0.19
75169D	2350	89244.	28.	15.	0.19	0.18
75170K	2395	21185.	29.	15.	0.19	0.19
75169E	2421	20949.	25.	11.	0.16	0.18

SPL NO	REG	DEPTH	- - BLENDER GAS ONLY - - WET **	TOTAL **	WET/TOTAL PERCENT	- - - CAN GAS ONLY - - - WET **	TOTAL **	WET/TOTAL PERCENT	-- SUM OF BLENDER + CAN -- WET **	TOTAL **	WET/TOT PERCEN
75168A	0	840	85.63	1852.63	4.6221	179.29	2254.70	7.9518	264.92	4107.33	6.44
75168B	0	960	157.36	2389.36	6.5858	150.97	2655.22	5.6858	308.33	5044.58	6.11
75168C	0	1165	108.49	2526.49	4.2941	304.77	6292.56	4.8433	413.26	8819.04	4.68
75168D	0	1395	53.34	2006.34	2.6586	170.64	3741.84	4.5603	223.98	5748.18	3.89
75168E	0	1425	62.58	1587.78	3.9413	130.16	793.90	16.3950	192.74	2381.68	8.09
75168F	0	1455	77.72	1602.92	4.8486	155.24	844.27	18.3875	232.96	2447.19	9.51
75168G	0	1485	50.84	1594.64	3.1882	197.36	1412.87	13.9687	248.20	3007.51	8.25
75168H	0	1515	49.69	1760.89	2.8219	155.69	1201.37	12.9593	205.38	2962.26	6.93
75168I	0	1545	15.03	1391.43	1.0802	220.41	2098.60	10.5027	235.44	3490.03	6.74
75168J	0	1575	41.43	1343.43	3.0839	58.95	414.98	14.2055	100.38	1758.41	5.70
75168K	0	1605	61.00	1270.00	4.8031	71.49	504.00	14.1845	132.49	1774.00	7.46
75168L	0	1635	44.55	1430.25	3.1148	66.59	1570.02	4.2413	111.14	3000.27	3.70
75168M	0	1665	38.85	1526.85	2.5444	75.04	1265.44	5.9299	113.89	2792.29	4.07
75168N	0	1695	40.90	1454.50	2.8119	126.29	2051.74	6.1552	167.19	3506.24	4.76
75168O	0	1725	56.41	1916.41	2.9435	116.11	2231.36	5.2035	172.52	4147.77	4.15
75168P	0	1755	88.56	1316.16	6.7286	69.29	508.78	13.6188	157.85	1824.94	8.64
75168Q	0	1785	63.13	1699.93	3.7137	147.50	2904.84	5.0777	210.63	4604.77	4.57
75170A	0	1815	95.47	1821.55	5.2411	85.24	270.33	31.5318	180.71	2091.88	8.63
75168R	0	1845	339.01	1696.81	19.9792	484.96	1357.92	35.7134	823.97	3054.73	26.97
75168S	0	1875	2708.34	4084.74	66.3038	1629.16	3089.44	52.7332	4337.50	7174.18	60.45
75168T	0	1910	2983.86	4650.42	64.1632	3474.99	8970.33	38.7387	6458.84	13620.74	47.41
75170B	0	1975	17632.64	34298.23	51.4097	9032.07	62589.88	14.4306	26664.71	96888.11	27.52
75170C	0	2005	10998.30	16764.30	65.6055	4565.00	19264.64	23.6963	15563.30	36028.94	43.19
75170D	0	2050	1080.83	2057.33	52.5356	1260.96	3862.83	32.6434	2341.79	5920.16	39.55
75170E	0	2080	9042.60	20667.60	43.7525	5046.48	38480.55	13.1144	14089.08	59148.14	23.82
75170F	0	2110	15328.49	51970.49	29.4946	6005.95	85734.37	7.0053	21334.45	137704.87	15.49
75170G	0	2140	5910.11	19302.11	30.6190	4016.82	46871.20	8.5699	9926.93	66173.30	15.00
75170H	0	2170	6282.48	23543.28	26.6848	2173.21	4871.45	44.6111	8455.69	28414.73	29.75
75169A	0	2200	6632.76	16751.16	39.5958	3297.41	39803.00	8.2843	9930.16	56554.16	17.55
75170I	0	2230	16898.69	37916.69	44.5679	5173.00	10219.76	50.6176	22071.68	48136.45	45.85
75170J	0	2260	2974.87	6453.07	46.1001	1277.22	7059.16	18.0931	4252.09	13512.22	31.46
75169B	0	2290	3916.08	6520.08	60.0618	3527.54	15354.10	22.9745	7443.61	21874.18	34.02
75169C	0	2320	2047.68	5767.68	35.5026	1258.29	7410.32	16.9802	3305.97	13178.00	25.08
75169D	0	2350	15002.10	26906.10	55.7572	9431.38	62338.04	15.1294	24433.48	89244.12	27.37
75170K	0	2395	3073.15	5602.75	54.8507	2754.55	15582.25	17.6775	5827.69	21184.99	27.50
75169E	0	2421	2869.86	6813.06	42.1229	2473.12	14135.82	17.4954	5342.98	20948.87	25.50

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APPENDIX - 3

75168A BREAM-4A, 840 METERS

	TOTAL PPB	NORM PERCENT
METHANE	0.0	
ETHANE	0.0	
PROPANE	0.0	
IBUTANE	24.9	5.36
NBUTANE	37.5	8.06
IPENTANE	98.6	21.21
NPENTANE	41.2	8.86
22-DMB	1.4	0.29
CPENTANE	0.0	0.00
23-DMB	4.7	1.01
2-MP	44.3	9.53
3-MP	20.0	4.30
NHEXANE	34.3	7.37
MCP	24.3	5.23
22-DMP	0.0	0.00
24-DMP	0.0	0.00
223-TMP	0.0	0.00
CHEXANE	12.8	2.75
33-DMP ,	0.0	0.00
11-DMCP	13.0	2.79
2-MHEX ,	0.0	0.00
23-DMP ,	6.1	1.31
3-MHEX ,	10.9	2.35
1C3-DMCP	9.3	1.99
1T3-DMCP	9.0	1.93
1T2-DMCP	10.2	2.19
3-EPENT	0.0	0.00
224-TMP	0.0	0.00
NHEPTANE	28.1	6.03
1C2-DMCP	0.0	0.00
MCH	34.5	7.42

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	465.		C1/C2	1.14
GASOLINE	465.		A /D2	5.70
NAPHTHENES	113.	24.30	C1/D2	5.51
C6-7	192.	41.38	CH/MCP	0.52
			PENT/IPENT,	0.42

	PPB	NORM PERCENT
MCP	24.3	34.0
CH	12.8	17.8
MCH	34.5	48.2
TOTAL	71.6	100.0

PARAFFIN INDEX 1	0.842
PARAFFIN INDEX 2	21.006

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75168B PREAM-4A, 960 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	12.3	2.10
ETHANE	0.0		1T2-DMCP	16.9	2.88
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	16.6	2.84	224-TMP	0.0	0.00
NBUTANE	39.9	6.81	NHEPTANE	33.1	5.65
IPENTANE	129.5	22.12	1C2-DMCP	0.0	0.00
NPENTANE	48.6	8.29	MCH	53.4	9.12
22-DMB	3.3	0.56			
CPENTANE	1.5	0.26			
23-DMB	4.9	0.83			
2-MP	52.1	8.90			
3-MP	21.6	3.69			
NHEXANE	46.7	7.97			
MCP	28.5	4.87			
22-DMP	0.0	0.00			
24-DMP	1.7	0.30			
223-TMB	0.0	0.00			
CHEXANE	17.0	2.91			
33-DMP ,	0.0	0.00			
11-DMCP	17.9	3.05			
2-MHEX ,	0.0	0.00			
23-DMP ,	9.1	1.56			
3-MHEX ,	15.4	2.62			
1C3-DMCP	15.7	2.67			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	586.		C1/C2	1.20
GASOLINE	586.		A /D2	5.19
NAPHTHENES	163.	27.87	C1/D2	5.75
C6-7	268.	45.70	CH/MCP	0.60
			PENT/IPENT,	0.37

	PPB	NORM PERCENT
MCP	28.5	28.8
CH	17.0	17.2
MCH	53.4	54.0
TOTAL	98.9	100.0

PARAFFIN INDEX 1	0.741
PARAFFIN INDEX 2	17.342

07 DEC 81

751680 BREAM-4A, 1165 METERS

	TOTAL PPB	NORM PERCENT
METHANE	0.0	
ETHANE	0.0	
PROPANE	0.0	
IBUTANE	28.1	6.42
NBUTANE	27.4	6.26
IPENTANE	65.0	14.83
NPENTANE	38.8	8.86
22-DMB	0.0	0.00
CPENTANE	0.0	0.00
23-DMB	5.3	1.21
2-MP	46.7	10.67
3-MP	18.0	4.11
NHEXANE	33.1	7.56
MCP	29.9	6.82
22-DMP	0.0	0.00
24-DMP	1.1	0.26
223-TMB	0.0	0.00
CHEXANE	6.2	1.42
33-DMP ,	0.0	0.00
11-DMCP	14.4	3.28
2-MHEX ,	0.0	0.00
23-DMP ,	9.4	2.15
3-MHEX ,	15.0	3.42
1C3-DMCP	12.1	2.76
1T3-DMCP	10.0	2.27
1T2-DMCP	10.9	2.50
3-EPENT	0.0	0.00
224-TMP	0.0	0.00
NHEPTANE	30.5	6.96
1C2-DMCP	0.0	0.00
MCH	36.1	8.24

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	438.		C1/C2	0.90
GASOLINE	438.		A /D2	4.25
NAPHTHENES	120.	27.29	C1/D2	3.79
C6-7	209.	47.63	CH/MCP	0.21
			PENT/IPENT,	0.60

	PPB	NORM PERCENT
MCP	29.9	41.4
CH	6.2	8.6
MCH	36.1	50.0
TOTAL	72.2	100.0

PARAFFIN INDEX 1	0.889
PARAFFIN INDEX 2	21.088

07 DEC 81

751680 BREAM-4A, 1395 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	0.0	0.00
ETHANE	0.0		1T2-DMCP	0.0	0.00
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	0.0	0.00	224-TMP	0.0	0.00
NBUTANE	0.0	0.00	NHEPTANE	0.0	0.00
IPENTANE	0.0	0.00	1C2-DMCP	0.0	0.00
NPENTANE	0.0	0.00	MCH	0.0	0.00
22-DMB	0.0	0.00			
CPENTANE	0.0	0.00			
23-DMB	0.0	0.00			
2-MP	0.0	0.00			
3-MP	0.0	0.00			
NHEXANE	0.0	0.00			
MCP	0.0	0.00			
22-DMP	0.0	0.00			
24-DMP	0.0	0.00			
223-TMB	0.0	0.00			
CHEXANE	0.0	0.00			
33-DMP ,	0.0	0.00			
11-DMCP	0.0	0.00			
2-MHEX ,	0.0	0.00			
23-DMP ,	0.0	0.00			
3-MHEX ,	0.0	0.00			
1C3-DMCP	0.0	0.00			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS
ALL COMP	0.		C1/C2 999.99
GASOLINE	0.		A /B2 999.99
NAPHTHENES	0.	0.00	C1/I2 999.99
C6-7	0.	0.00	CH/MCP 999.99
			PENT/IPENT 999.99

	PPB	NORM PERCENT
MCP	0.0	0.0
CH	0.0	0.0
MCH	0.0	0.0
TOTAL	0.0	0.0

PARAFFIN INDEX 1	0.000
PARAFFIN INDEX 2	0.000

07 DEC 81

75168F BREAM-4A, 1455 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	0.0	0.00
ETHANE	0.0		1T2-DMCP	0.0	0.00
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	0.0	0.00	224-TMP	0.0	0.00
NBUTANE	0.0	0.00	NHEPTANE	0.0	0.00
IPENTANE	0.0	0.00	1C2-DMCP	0.0	0.00
NPENTANE	0.0	0.00	MCH	0.0	0.00
22-DMB	0.0	0.00			
CPENTANE	0.0	0.00			
23-DMB	0.0	0.00			
2-MP	0.0	0.00			
3-MP	0.0	0.00			
NHEXANE	0.0	0.00			
MCP	0.0	0.00			
22-DMP	0.0	0.00			
24-DMP	0.0	0.00			
223-TMB	0.0	0.00			
CHEXANE	0.0	0.00			
33-DMP ,	0.0	0.00			
11-DMCP	0.0	0.00			
2-MHEX ,	0.0	0.00			
23-DMP ,	0.0	0.00			
3-MHEX ,	0.0	0.00			
1C3-DMCP	0.0	0.00			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS
ALL COMP	0.		C1/C2 999.99
GASOLINE	0.		A /D2 999.99
NAPHTHENES	0.	0.00	C1/D2 999.99
C6-7	0.	0.00	CH/MCP 999.99
			PENT/IPENT, 999.99

	PPB	NORM PERCENT
MCP	0.0	0.0
CH	0.0	0.0
MCH	0.0	0.0
TOTAL	0.0	0.0

PARAFFIN INDEX 1	0.000
PARAFFIN INDEX 2	0.000

07 DEC 81

75168H BREAM-4A, 1515 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	11.4	2.80
ETHANE	0.0		1T2-DMCP	10.0	2.45
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	7.6	1.87	224-TMP	0.0	0.00
NBUTANE	20.6	5.06	NHEPTANE	38.2	9.40
IPENTANE	57.2	14.05	1C2-DMCP	0.0	0.00
NPENTANE	33.5	8.24	MCH	43.5	10.71
22-DMB	0.9	0.22			
CPENTANE	0.0	0.00			
23-DMB	3.8	0.93			
2-MP	41.3	10.17			
3-MP	13.1	3.23			
NHEXANE	37.2	9.14			
MCP	26.3	6.47			
22-DMP	0.0	0.00			
24-DMP	1.7	0.41			
223-TMB	0.0	0.00			
CHEXANE	9.0	2.21			
33-DMP ,	0.0	0.00			
11-DMCP	14.2	3.49			
2-MHEX ,	0.0	0.00			
23-DMP ,	11.1	2.73			
3-MHEX ,	14.6	3.59			
1C3-DMCP	11.5	2.82			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	407.		C1/C2	1.13
GASOLINE	407.		A /D2	5.17
NAPHTHENES	126.	30.95	C1/D2	4.57
C6-7	229.	56.21	CH/MCP	0.34
			PENT/IPENT,	0.59

	PPB	NORM PERCENT
MCP	26.3	33.4
CH	9.0	11.4
MCH	43.5	55.3
TOTAL	78.8	100.0

PARAFFIN INDEX 1	0.877
PARAFFIN INDEX 2	23.387

07 DEC 81

75168J BREAM-4A, 1575 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	44.2	3.79
ETHANE	0.0		1T2-DMCP	25.2	2.12
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	24.8	2.09	224-TMP	0.0	0.00
NBUTANE	47.9	4.04	NHEPTANE	76.5	6.45
IPENTANE	266.6	22.48	1C2-DMCP	0.0	0.00
NPENTANE	86.9	7.33	MCH	109.6	9.24
22-DMB	6.0	0.51			
CPENTANE	9.9	0.83			
23-DMB	15.2	1.28			
2-MP	115.4	9.73			
3-MP	41.6	3.51			
NHEXANE	80.5	6.79			
MCP	97.5	8.22			
22-DMP	0.0	0.00			
24-DMP	6.2	0.53			
223-TMB	1.4	0.12			
CHEXANE	23.7	2.00			
33-DMP ,	0.0	0.00			
11-DMCP	30.5	2.57			
2-MHEX ,	0.0	0.00			
23-DMP ,	18.1	1.53			
3-MHEX ,	28.0	2.36			
1C3-DMCP	30.1	2.54			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	1186.		C4/C2	0.83
GASOLINE	1186.		A /D2	5.60
NAPHTHENES	371.	31.25	C1/D2	5.84
C6-7	572.	48.20	CH/MCP	0.24
			PENT/IPENT,	0.33

	PPB	NORM PERCENT
MCP	97.5	42.2
CH	23.7	10.3
MCH	109.6	47.5
TOTAL	230.8	100.0

PARAFFIN INDEX 1 0.588
PARAFFIN INDEX 2 19.831

07 DEC 81

75168L BREAM-4A, 1635 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	0.0	0.00
ETHANE	0.0		1T2-DMCP	0.0	0.00
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	0.0	0.00	224-TMP	0.0	0.00
NBUTANE	0.0	0.00	NHEPTANE	0.0	0.00
IPENTANE	0.0	0.00	1C2-DMCP	0.0	0.00
NPENTANE	0.0	0.00	MCH	0.0	0.00
22-DMB	0.0	0.00			
CPENTANE	0.0	0.00			
23-DMB	0.0	0.00			
2-MP	0.0	0.00			
3-MP	0.0	0.00			
NHEXANE	0.0	0.00			
MCP	0.0	0.00			
22-DMP	0.0	0.00			
24-DMP	0.0	0.00			
223-TMB	0.0	0.00			
CHEXANE	0.0	0.00			
33-DMP ,	0.0	0.00			
11-DMCP	0.0	0.00			
2-MHEX ,	0.0	0.00			
23-DMP ,	0.0	0.00			
3-MHEX ,	0.0	0.00			
1C3-DMCP	0.0	0.00			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	0.		C1/C2	999.99
GASOLINE	0.		A /D2	999.99
NAPHTHENES	0.	0.00	C1/D2	999.99
C6-7	0.	0.00	CH/MCP	999.99
			PENT/IPENT	999.99

	PPB	NORM PERCENT
MCP	0.0	0.0
CH	0.0	0.0
MCH	0.0	0.0
TOTAL	0.0	0.0

PARAFFIN INDEX 1	0.000
PARAFFIN INDEX 2	0.000

07 DEC 81

75168N BREAM-4A, 1695 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	5.5	0.91
ETHANE	0.0		1T2-DMCP	5.2	0.87
PROPANE	0.0		3-EPENT	0.0	0.0
IBUTANE	33.7	5.57	224-TMP	0.0	0.00
NBUTANE	67.8	11.21	NHEPTANE	29.2	4.83
IPENTANE	191.4	31.65	1C2-DMCP	0.0	0.00
NPENTANE	72.1	11.93	MCH	16.4	2.72
22-DMB	1.9	0.31			
CPENTANE	1.2	0.20			
23-DMB	7.1	1.18			
2-MP	54.6	9.03			
3-MP	22.9	3.78			
NHEXANE	38.9	6.44			
MCP	26.4	4.37			
22-DMP	0.0	0.00			
24-DMP	2.2	0.36			
223-TMB	0.0	0.00			
CHEXANE	5.2	0.87			
33-DMP ,	0.0	0.00			
11-DMCP	6.3	1.04			
2-MHEX ,	0.0	0.00			
23-DMP ,	5.8	0.96			
3-MHEX ,	7.1	1.17			
1C3-DMCP	3.6	0.60			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	605.		C1/C2	0.69
GASOLINE	605.		A /D2	9.63
NAPHTHENES	70.	11.58	C1/D2	3.96
C6-7	152.	25.13	CH/MCP	0.20
			PENT/IPENT,	0.38

	PPB	NORM PERCENT
MCP	26.4	55.0
CH	5.2	10.9
MCH	16.4	34.1
TOTAL	48.0	100.0

PARAFFIN INDEX 1 0.931
PARAFFIN INDEX 2 34.619

07 DEC 81

75168P BREAM-4A, 1755 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	4.2	0.79
ETHANE	0.0		1T2-DMCP	2.6	0.49
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	46.7	8.84	224-TMP	0.0	0.00
NBUTANE	54.6	10.32	NHEPTANE	15.8	2.99
IPENTANE	184.1	34.82	1C2-DMCP	0.0	0.00
NPENTANE	65.5	12.39	MCH	7.8	1.47
22-DMB	1.4	0.27			
CPENTANE	2.1	0.40			
23-DMB	6.3	1.19			
2-MP	49.7	9.40			
3-MP	15.9	3.01			
NHEXANE	31.2	5.90			
MCP	22.8	4.31			
22-DMP	0.0	0.00			
24-DMP	1.8	0.35			
223-TMB	0.0	0.00			
CHEXANE	3.8	0.72			
33-DMP ,	0.0	0.00			
11-DMCP	4.9	0.92			
2-MHEX ,	0.0	0.00			
23-DMP ,	3.6	0.69			
3-MHEX ,	3.8	0.72			
1C3-DMCP	0.0	0.00			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	529.		C1/C2	0.56
GASOLINE	529.		A /D2	12.36
NAPHTHENES	48.	9.10	C1/D2	4.32
C6-7	102.	19.34	CH/MCP	0.17
			PENT/IPENT,	0.36

	PPB	NORM PERCENT
MCP	22.8	66.4
CH	3.8	11.1
MCH	7.8	22.6
TOTAL	34.4	100.0

PARAFFIN INDEX 1	1.281
PARAFFIN INDEX 2	34.007

07 DEC 81

75170A BREAM-4A, 1815 METERS

	TOTAL PPB	NORM PERCENT
METHANE	0.0	
ETHANE	0.0	
PROPANE	162.6	
IBUTANE	105.7	6.89
NBUTANE	207.2	13.51
IPENTANE	160.4	10.46
NPENTANE	145.1	9.46
22-DMB	4.1	0.27
CPENTANE	3.7	0.24
23-DMB	26.3	1.71
2-MP	154.9	10.10
3-MP	65.4	4.27
NHEXANE	122.4	7.99
MCP	86.6	5.65
22-DMP	0.0	0.00
24-DMP	13.3	0.87
223-TMB	0.0	0.00
CHEXANE	30.4	1.98
33-DMP ,	0.0	0.00
11-DMCP	53.1	3.46
2-MHEX ,	0.0	0.00
23-DMP ,	33.4	2.18
3-MHEX ,	37.8	2.47
1C3-DMCP	26.1	1.71
1T3-DMCP	18.5	1.20
1T2-DMCP	24.8	1.62
3-EPENT	0.0	0.00
224-TMP	0.0	0.00
NHEPTANE	114.2	7.45
1C2-DMCP	0.0	0.00
MCH	99.7	6.50

	TOTALS PPB	NORM PERCENT
ALL COMP	1696.	
GASOLINE	1533.	
NAPHTHENES	343.	22.37
C6-7	660.	43.08

SIG COMP RATIOS	
C1/C2	1.17
A /D2	6.25
C1/D2	4.84
CH/MCP	0.35
PENT/IPENT,	0.99

	PPB	NORM PERCENT
MCP	86.6	40.0
CH	30.4	14.0
MCH	99.7	46.0
TOTAL	216.7	100.0

PARAFFIN INDEX 1	1.311
PARAFFIN INDEX 2	26.072

07 DEC 81

75168R BREAM-4A, 1845 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	5.6	0.77
ETHANE	0.0		1T2-DMCP	8.4	1.15
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	25.9	3.53	224-TMP	0.0	0.00
NBUTANE	38.9	5.30	NHEPTANE	40.7	5.54
IPENTANE	146.9	20.01	1C2-DMCP	0.0	0.00
NPENTANE	112.6	15.34	MCH	28.0	3.82
22-DMB	1.4	0.20			
CPENTANE	0.0	0.00			
23-DMB	13.6	1.85			
2-MP	90.1	12.26			
3-MP	35.9	4.89			
NHEXANE	80.0	10.89			
MCP	35.6	4.85			
22-DMP	0.0	0.00			
24-DMP	5.9	0.81			
223-TMB	0.0	0.00			
CHEXANE	13.9	1.89			
33-DMP ,	0.0	0.00			
11-DMCP	16.4	2.24			
2-MHEX ,	0.0	0.00			
23-DMP ,	12.9	1.76			
3-MHEX ,	14.8	2.02			
1C3-DMCP	6.6	0.90			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	734.		C1/C2	1.04
GASOLINE	734.		A /D2	8.14
NAPHTHENES	115.	15.62	C1/D2	3.94
C6-7	269.	36.63	CH/MCP	0.39
			PENT/IPENT,	0.77

	PPB	NORM PERCENT
MCP	35.6	45.9
CH	13.9	17.9
MCH	28.0	36.1
TOTAL	77.5	100.0

PARAFFIN INDEX 1	1.511
PARAFFIN INDEX 2	27.587

07 DEC 81

751688 BREAM-4A, 1875 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	15.3	0.48
ETHANE	0.0		1T2-DMCP	35.8	1.13
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	136.3	4.31	224-TMP	0.0	0.00
NBUTANE	171.5	5.43	NHEPTANE	158.8	5.02
IPENTANE	419.0	13.25	1C2-DMCP	0.0	0.00
NPENTANE	532.1	16.83	MCH	256.7	8.12
22-DMB	13.0	0.41			
CPENTANE	16.7	0.53			
23-DMB	48.9	1.55			
2-MP	302.9	9.58			
3-MP	137.0	4.33			
NHEXANE	414.6	13.11			
MCP	172.9	5.47			
22-DMP	0.0	0.00			
24-DMP	13.5	0.43			
223-TMB	0.0	0.00			
CHEXANE	119.6	3.78			
33-DMP ,	0.0	0.00			
11-DMCP	84.3	2.67			
2-MHEX ,	0.0	0.00			
23-DMP ,	34.4	1.09			
3-MHEX ,	56.5	1.79			
1C3-DMCP	22.2	0.70			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	3162.		C[illegible]/D2	1.87
GASOLINE	3162.		A /D2	10.15
NAPHTHENES	723.	22.88	C1/D2	8.16
C6-7	1384.	43.79	CH/MCP	0.69
			PENT/IPENT,	1.27

	PPB	NORM PERCENT
MCP	172.9	31.5
CH	119.6	21.8
MCH	256.7	46.7
TOTAL	549.2	100.0

PARAFFIN INDEX 1	1.921
PARAFFIN INDEX 2	20.265

07 DEC 81

75168T BREAM-4A, 1910 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	14.7	0.48
ETHANE	0.0		1T2-DMCP	27.6	0.90
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	168.3	5.20	224-TMP	0.0	0.00
NBUTANE	468.4	14.47	NHEPTANE	74.6	2.39
IPENTANE	307.0	9.49	1C2-DMCP	0.0	0.00
NPENTANE	661.1	20.43	MCH	123.0	3.80
22-DMB	11.5	0.35			
CPENTANE	94.7	2.93			
23-DMB	32.7	1.01			
2-MP	247.8	7.65			
3-MP	128.4	3.97			
NHEXANE	330.5	10.21			
MCP	246.7	7.62			
22-DMP	0.0	0.00			
24-DMP	8.1	0.25			
223-TMB	0.0	0.00			
CHEXANE	161.0	4.98			
33-DMP ,	0.0	0.00			
11-DMCP	51.8	1.60			
2-MHEX ,	0.0	0.00			
23-DMP ,	22.6	0.70			
3-MHEX ,	35.5	1.10			
1C3-DMCP	20.8	0.64			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	3237.		C1/C2	1.08
GASOLINE	3237.		A /D2	11.41
NAPHTHENES	740.	22.87	C1/D2	9.46
C6-7	1117.	34.51	CH/MCP	0.65
			PENT/IPENT,	2.15

	PPB	NORM PERCENT
MCP	246.7	46.5
CH	161.0	30.3
MCH	123.0	23.2
TOTAL	530.7	100.0

PARAFFIN INDEX 1	1.383
PARAFFIN INDEX 2	14.029

07 DEC 81

75170B BREAM-4A, 1975 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	51.3	1.51
ETHANE	0.0		1T2-DMCP	41.3	1.22
PROPANE	0.0		3-EPENT	0.0	0.00
IBUTANE	217.1	6.41	224-TMP	0.0	0.00
NBUTANE	385.3	11.37	NHEPTANE	148.2	4.37
IPENTANE	407.3	12.02	1C2-DMCP	0.0	0.00
NPENTANE	457.5	13.50	MCH	321.5	9.49
22-DMB	12.3	0.36			
CPENTANE	41.5	1.22			
23-DMB	39.1	1.16			
2-MP	219.6	6.48			
3-MP	114.2	3.37			
NHEXANE	302.9	8.94			
MCP	246.0	7.26			
22-DMP	0.0	0.00			
24-DMP	8.2	0.24			
223-TMB	0.0	0.00			
CHEXANE	194.0	5.73			
33-DMP ,	0.0	0.00			
11-DMCP	64.9	1.92			
2-MHEX ,	0.0	0.00			
23-DMP ,	34.4	1.01			
3-MHEX ,	49.9	1.47			
1C3-DMCP	31.2	0.92			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	3388.		C1/C2	1.57
GASOLINE	3388.		A /D2	9.04
NAPHTHENES	992.	29.27	C1/D2	11.62
C6-7	1494.	44.09	CH/MCP	0.79
			PENT/IPENT,	1.12

	PPB	NORM PERCENT
MCP	246.0	32.3
CH	194.0	25.5
MCH	321.5	42.2
TOTAL	761.5	100.0

PARAFFIN INDEX 1	0.928
PARAFFIN INDEX 2	15.822

07 DEC 81

75170D BREAM-4A, 2050 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	13.6	1.00
ETHANE	0.0		1T2-DMCP	19.5	1.44
PROPANE	120.2		3-EPENT	0.0	0.00
IBUTANE	85.5	6.31	224-TMP	0.0	0.00
NBUTANE	193.7	14.29	NHEPTANE	59.2	4.37
IPENTANE	230.1	16.97	1C2-DMCP	0.0	0.00
NPENTANE	173.0	12.76	MCH	58.5	4.32
22-DMB	4.6	0.34			
CPENTANE	17.8	1.31			
23-DMB	19.6	1.45			
2-MP	104.2	7.68			
3-MP	44.7	3.30			
NHEXANE	97.7	7.20			
MCP	97.5	7.19			
22-DMP	0.0	0.00			
24-DMP	6.8	0.50			
223-TMB	0.0	0.00			
CHEXANE	55.7	4.11			
33-DMP ,	0.0	0.00			
11-DMCP	22.6	1.66			
2-MHEX ,	0.0	0.00			
23-DMP ,	17.1	1.26			
3-MHEX ,	18.5	1.37			
1C3-DMCP	16.1	1.19			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	1476.		C1/C2	0.93
GASOLINE	1356.		A /D2	8.46
NAPHTHENES	301.	22.22	C1/D2	7.38
C6-7	483.	35.61	CH/MCP	0.57
			PENT/IPENT,	0.75

	PPB	NORM PERCENT
MCP	97.5	46.1
CH	55.7	26.3
MCH	58.5	27.6
TOTAL	211.7	100.0

PARAFFIN INDEX 1	0.835
PARAFFIN INDEX 2	21.079

07 DEC 81

75170F BREAM-4A, 2110 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	2659.2	1.46
ETHANE	52358.0		1T2-DMCP	3656.2	2.01
PROPANE	48555.6		3-EPENT	0.0	0.00
IBUTANE	48967.3	26.86	224-TMP	0.0	0.00
NBUTANE	15372.4	8.43	NHEPTANE	6770.2	3.71
IPENTANE	30932.4	16.97	1C2-DMCP	355.8	0.20
NPENTANE	9456.2	5.19	MCH	7146.2	3.92
22-DMB	190.5	0.10			
CPENTANE	1515.0	0.83			
23-DMB	3326.7	1.83			
2-MP	13306.2	7.30			
3-MP	5971.7	3.28			
NHEXANE	6951.0	3.81			
MCP	11524.7	6.32			
22-DMP	0.0	0.00			
24-DMP	665.2	0.36			
223-TMB	53.4	0.03			
CHEXANE	2376.1	1.30			
33-DMP ,	0.0	0.00			
11-DMCP	2105.6	1.16			
2-MHEX ,	0.0	0.00			
23-DMP ,	3452.8	1.89			
3-MHEX ,	2424.2	1.33			
1C3-DMCP	3107.5	1.70			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	283200.		C1/C2	0.55
GASOLINE	182286.		A /D2	5.66
NAPHTHENES	34446.	18.90	C1/D2	4.80
C6-7	53248.	29.21	CH/MCP	0.21
			PENT/IPENT,	0.31

	PPB	NORM PERCENT
MCP	11524.7	54.8
CH	2376.1	11.3
MCH	7146.2	34.0
TOTAL	21047.0	100.0

PARAFFIN INDEX 1	0.481
PARAFFIN INDEX 2	20.091

07 DEC 81

75169A BREAM-4A, 2200 METERS

	TOTAL PPB	NORM PERCENT
METHANE	0.0	
ETHANE	0.0	
PROPANE	2525.9	
IBUTANE	1332.6	12.77
NBUTANE	2358.7	22.60
IPENTANE	1651.9	15.83
NPENTANE	906.5	8.69
22-DMB	7.5	0.07
CPENTANE	383.0	3.67
23-DMB	41.5	0.40
2-MP	539.5	5.17
3-MP	279.2	2.68
NHEXANE	345.6	3.31
MCP	889.7	8.53
22-DMP	0.0	0.00
24-DMP	13.6	0.13
223-TMB	0.0	0.00
CHEXANE	133.5	1.28
33-DMP ,	0.0	0.00
11-DMCP	106.2	1.02
2-MHEX ,	0.0	0.00
23-DMP ,	88.4	0.85
3-MHEX ,	170.0	1.63
1C3-DMCP	147.4	1.41
1T3-DMCP	139.2	1.33
1T2-DMCP	225.3	2.16
3-EPENT	0.0	0.00
224-TMP	0.0	0.00
NHEPTANE	191.0	1.83
1C2-DMCP	18.2	0.17
MCH	466.8	4.47

	TOTALS PPB	NORM PERCENT
ALL COMP	12961.	
GASOLINE	10435.	
NAPHTHENES	2509.	24.05
C6-7	2935.	28.12

SIG COMP RATIOS

C1/C2	0.50
A /D2	3.16
C1/D2	4.16
CH/MCP	0.15
PENT/IPENT,	0.55

	PPB	NORM PERCENT
MCP	889.7	59.7
CH	133.5	9.0
MCH	466.8	31.3
TOTAL	1490.0	100.0

PARAFFIN INDEX 1	0.540
PARAFFIN INDEX 2	11.452

07 DEC 81

75170J BREAM-4A, 2260 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	73.3	1.21
ETHANE	0.0		1T2-DMCP	74.9	1.23
PROPANE	228.5		3-EPENT	0.0	0.00
IBUTANE	364.6	6.01	224-TMP	0.0	0.00
NBUTANE	571.0	9.41	NHEPTANE	259.8	4.28
IPENTANE	927.7	15.28	1C2-DMCP	0.0	0.00
NPENTANE	830.2	13.68	MCH	253.2	4.17
22-DMB	8.2	0.14			
CPENTANE	88.5	1.46			
23-DMB	70.3	1.16			
2-MP	614.2	10.12			
3-MP	252.6	4.16			
NHEXANE	601.5	9.91			
MCP	497.5	8.20			
22-DMP	0.0	0.00			
24-DMP	10.9	0.18			
223-TMB	0.0	0.00			
CHEXANE	220.3	3.63			
33-DMP ,	0.0	0.00			
11-DMCP	142.0	2.34			
2-MHEX ,	0.0	0.00			
23-DMP ,	51.8	0.85			
3-MHEX ,	101.2	1.67			
1C3-DMCP	55.8	0.92			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	6298.		C1/C2	0.88
GASOLINE	6070.		A /B2	8.51
NAPHTHENES	1405.	23.16	C1/C4	6.08
C6-7	2342.	38.59	CH/MCP	0.44
			PENT/IPENT,	0.59

	PPB	NORM PERCENT
MCP	497.5	51.2
CH	220.3	22.7
MCH	253.2	26.1
TOTAL	971.0	100.0

PARAFFIN INDEX 1	1.193
PARAFFIN INDEX 2	21.080

07 DEC 81

75169C BREAM-4A, 2320 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	13.1	1.18
ETHANE	0.0		1T2-DMCP	19.8	1.79
PROPANE	136.5		3-EPENT	0.0	0.00
IBUTANE	94.6	8.52	224-TMP	0.0	0.00
NBUTANE	133.2	11.99	NHEPTANE	47.4	4.27
IPENTANE	168.9	15.20	1C2-DMCP	0.0	0.00
NPENTANE	114.1	10.27	MCH	82.2	7.40
22-DMB	0.0	0.00			
CPENTANE	16.0	1.44			
23-DMB	15.0	1.35			
2-MP	89.6	8.07			
3-MP	38.9	3.50			
NHEXANE	74.7	6.73			
MCP	92.9	8.37			
22-DMP	0.0	0.00			
24-DMP	3.6	0.33			
223-TMB	0.0	0.00			
CHEXANE	43.4	3.91			
33-DMP ,	0.0	0.00			
11-DMCP	18.3	1.65			
2-MHEX ,	0.0	0.00			
23-DMP ,	14.0	1.26			
3-MHEX ,	16.8	1.51			
1C3-DMCP	14.1	1.27			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	1247.		C1/C2	1.03
GASOLINE	1111.		A /D2	7.27
NAPHTHENES	300.	26.99	C1/D2	8.57
C6-7	440.	39.64	CH/MCP	0.47
			PENT/IPENT,	0.68

	PPB	NORM PERCENT
MCP	92.9	42.5
CH	43.4	19.9
MCH	82.2	37.6
TOTAL	218.5	100.0

PARAFFIN INDEX 1	0.748
PARAFFIN INDEX 2	17.624

07 DEC 81

75170K BREAM-4A, 2395 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	55.0	0.76
ETHANE	0.0		1T2-DMCP	55.1	0.77
PROPANE	524.1		3-EPENT	0.0	0.00
IBUTANE	1286.1	17.88	224-TMP	0.0	0.00
NBUTANE	1014.6	14.10	NHEPTANE	209.5	2.91
IPENTANE	1249.2	17.37	1C2-DMCP	0.0	0.00
NPENTANE	819.7	11.40	MCH	128.6	1.79
22-DMB	7.1	0.10			
CPENTANE	55.4	0.77			
23-DMB	83.4	1.16			
2-MP	664.3	9.23			
3-MP	254.4	3.54			
NHEXANE	556.9	7.74			
MCP	353.5	4.91			
22-DMP	0.0	0.00			
24-DMP	12.8	0.18			
223-TMB	0.0	0.00			
CHEXANE	101.1	1.41			
33-DMP ,	0.0	0.00			
11-DMCP	119.8	1.67			
2-MHEX ,	0.0	0.00			
23-DMP ,	45.8	0.64			
3-MHEX ,	83.8	1.16			
1C3-DMCP	37.5	0.52			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	7718.		C1/C2	0.70
GASOLINE	7194.		A /D2	9.15
NAPHTHENES	906.	12.59	C1/D2	4.17
C6-7	1759.	24.46	CH/MCP	0.29
			PENT/IPENT.	0.64

	PPB	NORM PERCENT
MCP	353.5	60.6
CH	101.1	17.3
MCH	128.6	22.1
TOTAL	583.2	100.0

PARAFFIN INDEX 1	1.378
PARAFFIN INDEX 2	25.058

07 DEC 81

75169E BREAM-4A, 2421 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	77.2	1.52
ETHANE	0.0		1T2-DMCP	78.1	1.53
PROPANE	640.5		3-EPENT	0.0	0.00
IBUTANE	621.4	12.21	224-TMP	0.0	0.00
NBUTANE	586.8	11.53	NHEPTANE	193.7	3.81
IPENTANE	365.0	7.17	1C2-DMCP	5.3	0.10
NPENTANE	648.6	12.75	MCH	340.5	6.69
22-DMB	11.1	0.22			
CPENTANE	205.0	4.03			
23-DMB	42.0	0.82			
2-MP	376.6	7.40			
3-MP	191.1	3.75			
NHEXANE	335.8	6.60			
MCP	454.6	8.93			
22-DMP	0.0	0.00			
24-DMP	14.5	0.29			
223-TMB	0.0	0.00			
CHEXANE	244.9	4.81			
33-DMP ,	0.0	0.00			
11-DMCP	95.3	1.87			
2-MHEX ,	0.0	0.00			
23-DMP ,	61.9	1.22			
3-MHEX ,	75.9	1.49			
1C3-DMCP	63.2	1.24			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	5729.		C1/C2	1.00
GASOLINE	5088.		A /D2	6.97
NAPHTHENES	1564.	30.74	C1/D2	8.97
C6-7	2041.	40.11	CH/MCP	0.54
			PENT/IPENT,	1.78

	PPB	NORM PERCENT
MCP	454.6	43.7
CH	244.9	23.6
MCH	340.5	32.7
TOTAL	1040.0	100.0

PARAFFIN INDEX 1	0.784
PARAFFIN INDEX 2	15.740

APPENDIX 9

APPENDIX 9.

ORGANIC PETROLOGY..

APPENDIX 10

APPENDIX 10.

VELOCITY SURVEY REPORT.

VELOCITY SURVEY

Well .....BREAM 4A.....

Basin ....GIPPSLAND.....

INTRODUCTION

Esso personnel .BRETT HARDIMAN.....

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

Supplied (1) Instruments.
(2) Personnel

Seismic Observer ...JOHN LARSEN.....

Marine Shooter .....TED POOLE..... MAL O'DRISCOLL

Navigation .....

(3) Licenced Shooting Boat

Name .....N/A.....

Date Loaded .....

Date Released .....

Agent .....

(4) Seismic Source

Gas Gun

Gas Pressures .....20 SEC FILL.....

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

Propane .....45/47.....psi

Personnel and Instruments

assembled at .....MELBOURNE..... Date .....17.9.81.....

Boarded (rig) .SOUTHERN GROSS..... Date ..18.9.81.....

Date of survey .....18.9.81.....

Casing Depth ..20" at 203.6m KB, 13 3/8" at 789m KB

T.D. when shot .....2421m RKB.....

water depth 58.6m.metres

SURVEY PROCEDURE

Weather: Wind .....10 - 15kn/15 - 25kn.....

Swell .....1 - 2m/3 - 4m.....

Sea .....LIGHT - MODERATE.....

Rig Movement ..MODERATE.....

Rig Noise .....LIGHT - MODERATE.....

Hydrophones: Number ..... 2 .....

Depth below sea level .12.2.....metres

Position ..ONE AT TOP OF GUN AND.....

..ONE IN MOONPOOL (NEAR SEA LEVEL)

Gas Gun: number of shots per level ....2. - 3.....

gun depth .12.2.....metres

Well phone positioning:

No of depths .....14.....

Time: first shot .....1418.....

last shot .....1729.....

Total rig time .....4. hrs.....

RESULTS

Quality of results (good .....22.....

(fair .....8.....

(poor .....1.....

(not used .....1.....

Comparison of Interval Times with Sonic Log

/ Δ / average .....18.34...microsec/metre

/ Δ / max .....63.30...microsec/metre

CONCLUSION

Reliability of T-D curve ....AVERAGE.....

COMMENTS

Survey went off without malfunction, except for 1 Gun misfire due to inadequate gas pressure. Quality of results was impaired at deeper levels due to tool not locking in well bore. After first ten shoots propane levels were increased to 47 psi to give better results.

Shothole Information:- Elevation, Distance & Direction from Well

Company: ESSO EXPLORATION AUSTRALIA INC.

Well: BREAM 4A

Elevation (Derrick Floor): 21mKB

Total Depth: 2421m

LOCATION

Coordinates: Lat 38° 30' 27.09"S, Long 147° 44' 50.86"E

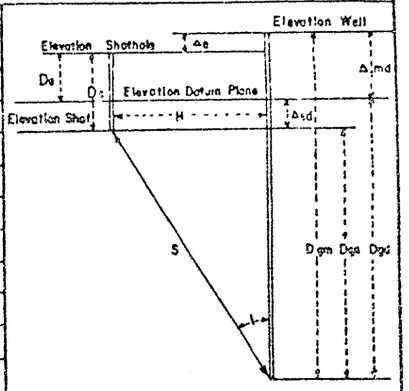
Section, Township, Range:

County: GIPPSLAND

Area or Field:

DATUM : SEA LEVEL

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
31	14	1729	475			.027	.212		F	441	42	.0017	1	.212	13	8	.220	.220	454				2064
30		1728	475				.212		F	441				.212			.220		454	175	.062	2823	
29	13	1717	650				.274		G	616	"	.0012	1	.274	"	"	.282	.282	629				2230
28		1716	650				.274		G	616				.274			.282		629	185	.060	3083	
27	12	1705	825				.334		G	791	"	.0009	1	.334	"	"	.342	.342	814				2380
26		1704	825				.334		G	791				.334			.342		814	180	.072	2490	
A	11	1418	1015				.407		G	981	"	.0008	1	.407	"	"	.415	.4143	994				2395
24		1652	1015				.406		G	981				.406			.414		994				2401
25		1653	1015				.406		G	981				.406			.414		994	160	.064	2512	2414
23	10	1643	1175				.470		G	1141	"	.0007	1	.470	"	"	.478	.478	1154				
22		1642	1175				.470		G	1141				.470			.478		1154	175	.071	2465	2421
21	9	1631	1350				.541		G	1316	"	.0006	1	.541	"	"	.549	.549	1329				
20		1630	1350				.541		G	1316				.541			.549		1329	185	.068	2721	2454
19	8	1616	1525				.609		G	1491	"	.0005	1	.609	"	"	.617		1514				
18		1614	1525	MISFIRE					NR									.617					
17		1613	1525				.609		G	1491				.609			.617		1514				
16	7	1559	1700				.674		G	1666	"	.0005	1	.674	"	"	.682	.6815	1679	165	.065	2558	2462
15		1558	1700				.673		G	1666				.673			.681		1679				2465
14	6	1551	1859				.728		G	1825	"	.0004	1	.728	"	"	.736	.736	1838	159	.055	2917	2497
13		1550	1859				.728		G	1825				.728			.736		1838				
12	5	1541	1915				.746		G	1881	"	.0004	1	.746	"	"	.754	.754	1894	56	.018	3111	2512
11		1540	1915				.746		F	1881				.746			.754		1894				
10	4	1531	2023				.779		F	1989	"	.0004	1	.779	"	"	.787	.7865	2002	108	.033	3323	2544
9		1530	2023				.778		G	1989				.778			.786		2002				2547
8	3	1519	2150				.819		G	2116	"	.0004	1	.819	"	"	.827	.827	2129	127	.041	3136	2574
7		1518	2150				.819		G	2116				.819			.827		2129				
6	2	1508	2275				.862		F	2241	"	.0003	1	.862	"	"	.870		2254	125	.042	2976	2591
5		1507	2275				.862		F	2241				.862			.870	.869	2254				
4		1506	2275				.860		P	2241				.860			.868		2254				2597
3	1	1448	2422				.911		F	2388	"	.0003	1	.911	"	"	.919		2401	147	.050	2940	2613
2		1447	2422				.911		G	2388				.911			.919	.919	2401				
1		1446	2422			.027	.911		F	2388	42	.0003	1	.911	13	8	.919		2401				2613



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 Ts Vert. travel time from shot elev to geophone

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

Dgd = Dgm - Δmd

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

Va = Average = $\frac{D\,gd}{T\,gd}$

Surveyed by: Brett Hardiman

Date: 18.9.81

20" at 203.6m KB, 13 3/8" at 789m KB.

Casing Record

DWG. 1107/OP/3

A = Checkshot

VELOCITY SURVEY ERROR CHECK

BREAM 4 - A

Depth el.S.L. (m)	Av. Vertical Travel Time (check shots)	Ti Check Shots (sec.)	Ti Sonic Log (sec.)	△ (Millisecs.) Ti Check — Ti Sonic	Depth Interval (m.)	Error (Microsec. per m.)
454	0.220	0.062			175	
629	0.282					
629	0.282	0.060			185	
814	0.342					
814	0.342	0.072	0.0684	3.6	180	20.0
994	0.4143					
994	0.4143	0.064	0.0636	0.4	160	2.5
1154	0.478					
1154	0.478	0.071	0.0677	3.3	175	18.9
1329	0.549					
1329	0.549	0.068	0.0683	- 0.3	185	1.6
1514	0.617					
1514	0.617	0.065	0.0625	2.5	165	15.2
1679	0.6815					
1679	0.6815	0.055	0.0526	2.4	159	15.1
1838	0.736					
1838	0.736	0.018	0.0174	0.6	56	10.7
1894	0.754					
1894	0.754	0.033	0.0323	0.7	108	6.5
2002	0.7865					
2002	0.7865	0.041	0.0398	1.2	127	9.5
2129	0.827					
2129	0.827	0.042	0.0372	4.8	125	38.4
2254	0.869					
2254	0.869	0.050	0.0407	9.3	147	63.3
2401	0.919					

ENCLOSURES

PE902702

This is an enclosure indicator page.
The enclosure PE902702 is enclosed within the container PE902701 at this location in this document.

The enclosure PE902702 has the following characteristics:

ITEM_BARCODE	PE902702
CONTAINER_BARCODE	PE902701
NAME	Structure Map Top of ""Coarse Clastics""
BASIN	GIPPSLAND
PERMIT	
TYPE	SEISMIC
SUBTYPE	STRUCTURE_MAP
DESCRIPTION	Structure Map Top of ""Coarse Clastics"" (enclosure 1 of WCR) for Bream-4A
REMARKS	
DATE_CREATED	31/12/1980
DATE_RECEIVED	
W_NO	W749
WELL_NAME	Bream-4A
CONTRACTOR	ESSO
CLIENT_OP_CO	ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE902703

This is an enclosure indicator page.
The enclosure PE902703 is enclosed within the container PE902701 at this location in this document.

The enclosure PE902703 has the following characteristics:

ITEM_BARCODE	= PE902703
CONTAINER_BARCODE	= PE902701
NAME	= Bream Field Cross Section A-A'
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= CROSS_SECTION
DESCRIPTION	= Bream Field Cross Section A-A' (enclosure 2 of WCR) for Bream-4A
REMARKS	=
DATE_CREATED	= 31/12/1980
DATE_RECEIVED	=
W_NO	= W749
WELL_NAME	= Bream-4A
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE601391

This is an enclosure indicator page.
The enclosure PE601391 is enclosed within the container PE902701 at this location in this document.

The enclosure PE601391 has the following characteristics:

ITEM_BARCODE	= PE601391
CONTAINER_BARCODE	= PE902701
NAME	= Well Completion Log Bream 4A
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= COMPOSITE_LOG
DESCRIPTION	= Well Completion Log Bream 4A (enclosure 3 of WCR)
REMARKS	=
DATE_CREATED	= 25/09/1981
DATE_RECEIVED	=
W_NO	= W749
WELL_NAME	= Bream-4A
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)

PE903949

This is an enclosure indicator page.
The enclosure PE903949 is enclosed within the container PE902701 at this location in this document.

The enclosure PE903949 has the following characteristics:

ITEM_BARCODE	= PE903949
CONTAINER_BARCODE	= PE902701
NAME	= Bream 4A Time Depth Curve
BASIN	= GIPPSLAND
PERMIT	= VIC/P1
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Bream 4A Time Depth Curve (enclosure 4 from WCR)
REMARKS	=
DATE_CREATED	= 31/10/81
DATE_RECEIVED	= 17/06/82
W_NO	= W752
WELL_NAME	= Bream-4A
CONTRACTOR	= Esso Australia Ltd
CLIENT_OP_CO	= Esso Australia Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

PE902704

This is an enclosure indicator page.
The enclosure PE902704 is enclosed within the container PE902701 at this location in this document.

The enclosure PE902704 has the following characteristics:

ITEM_BARCODE	= PE902704
CONTAINER_BARCODE	= PE902701
NAME	= Sonic Calibration curve
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Sonic Calibration curve (enclosure 4 of WCR) for Bream-4A
REMARKS	=
DATE_CREATED	= 31/05/1982
DATE_RECEIVED	=
W_NO	= W749
WELL_NAME	= Bream-4A
CONTRACTOR	= ESSO
CLIENT_OP_CO	= ESSO

(Inserted by DNRE - Vic Govt Mines Dept)