M. Dain

WCR
BASKER-1
(W812)

SHELL-AUSTRALIA E. & P. OIL AND GAS

I.D. 0414B/0049B
0410B/0049B

SDA 525

BASKER-1 WELL
WELL COMPLETION REPORT
GIPPSLAND BASIN
OFFSHORE VICTORIA
(VIC/P19)

OFFSHORE VENTURES TEAM/
PETROLEUM ENGINEERING

August 1983

Keywords: exploration well, Latrobe, intra-Latrobe, Strzelecki, coastal, barrier, coastal plain, alluvial, braided streams, carbonaceous mudstone, coal, glauconite, Eocene, Paleocene, Upper Cretaceous, coastlines, Maastrichtian, Campanian, stratigraphic, fluvial, crevasse, point bar

SHELL DEVELOPMENT (AUSTRALIA) PTY LTD

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1. SUMMARY

Basker-1, the third well to be drilled in Permit VIC/P19, was spudded on 21st April 1983 by the semi-submersible rig Nymphea, and plugged and abandoned on 8th September 1983 after reaching a total depth of 3991m.

Basker-1 encountered 18.8m NOS, 1.8m NGS and 1.5m NHS in thin fluvial Upper Campanian sandstones, which produced up to 4967 BOPD on test (limited by facilities). Pressure data suggests the sandstones have limited lateral extent and reserve estimates imply a non-commercial accumulation.

Although Basker-1 was proposed as a fault trap, geological information allied with the production test data indicate that the hydrocarbons are likely to be at least partly stratigraphically trapped.

2. INTRODUCTION

Basker-1 was the third well to be drilled by Shell in offshore exploration permit VIC/P19, in partnership with News (20%), TNT (20%), Crusader (15%) and Mincorp (5%). It was the first test in the central part of the permit (Fig. 1).

The Basker trap was identified as a large (areal closure 28 km^2 at the intra-Campanian level) fault trap at lower Paleocene and deeper levels during mapping of the 1981/82 seismic grid in central VIC/P19. The structural trap is created by a major syndepositional fault crossing the south-west extension of the Sole/Dart nose. The primary objective was the section underlying the intra-Campanian marker. This was predicted to comprise coastal plain sandstones interbedded with lacustrine/paludal siltstones and shales similar to the sequence found in Volador-1.

3. WELL HISTORY

3.1 Summary of Well Data

Well Classification	:	Expendable exploration well
Location Co-ordinates (final)	:	Lat. 38°18' 26.5" S Long. 148°41' 53.2 E
Contractor/Rig	:	Foramer/Nymphea
Derrick Floor Elevation	:	25m above MSL
Water Depth	:	162m below MSL
BOP Stack	:	10,000 psi, 18-3/4" Cameron
Start of Operations	:	06.25 hours, 19/4/83
Spudded	:	02.00 hours, 21/4/83
Abandoned	:	13.30 hours, 8/9/83
End of Operations	:	23.00 hours, 10/9/83
Objective	:	Upper Cretaceous sandstones in the Latrobe Group
Total Depth	:	3991m
Formation at TD	:	Latrobe Formation
Results	:	Oil discovery in intra-Latrobe sands
Casing Record	:	30" at 234m 20" at 498m 13-3/8" at 1104m 9 -5/8" at 2853m 7" at 3287m

Logs	:	DIL/LSS/SP/GR		1015- 498m
		LSS/GR (2 runs)		3986-1104m
		LDL/CAL/GR (2 runs)		2859- 498m
		CNL		2853-2020m
		LDL/CNL/CAL/GR		3991-2856m
		DLL/MSFL/GR/CAL (2 runs)		3988-1104m
		CST	Interval	1110- 498m
			"	2862-1104m
			"	3991-2853m

RFT	1 segregated sample	
	2 non-segregated samples	
	14 pressures	
HDT		3991-2856m
CBL/CCL/VDL		3250-2672m
WST	28 levels	

<u>Production Test</u>

Test 1	Interval	3090-3094m
		3095-3098m
Test 2	Interval	3128.5-3132m

3.2 Site Survey

The site survey was carried out over the Basker location (Fig. 2) between January 15th and January 27th 1983. In this period some 160km of boomer, sidescan sonar and echosounder data was acquired and a single drop core sample was recovered.

The contractor for the survey was BTW Survey Services Pty Ltd who provided the management and navigational expertise, while the geophysical and drop coring operations were subcontracted by BTW to Huntings Surveys Limited. BTW chartered the 22m twin screw survey vessel TSMV FEBRINA from Febrina Coral Pacific Charters for the survey. Horizontal positioning control was provided by a Syledis B chain of four onshore beacons operating in range-range mode.

A detailed description of the survey is contained in reference 1.

The quality of boomer and fathometer data acquired in the survey was excellent with boomer penetration in excess of 100m recorded in much of the survey area. The sidescan sonar data was acceptable. Its quality was impaired by two operational constraints. Firstly the cable length of 640m prohibited acquisition of the appropriate towfish elevation of 10 to 20m above sea floor in water depths exceeding 250m because of strong currents. Secondly the lack of a proper sonar winch prevented rapid control of the sonar cable offset. This had to be varied to maintain optimal elevation of the sidescan fish. On dip lines for example the water depth changed by over 100m requiring continuous control of sonar offset.

Recovery of core samples was extremely poor. Apart from a few surface shell fragments, only one 33cm sample was recovered in ten drops. This compares with eleven recoveries from fourteen drops in the previous EG&G Survey. In the attempt to obtain core samples, changes were made to the weights attached to the corer and to the method of core dropping. After four unsuccessful drops an improvised valve was attached to the top of the core barrel to prevent flushing of the sample on retrieval. The contrasting success between the two surveys, if not due to the nature of the surface sediments at the sites, can only be due to the use in the previous survey of a trigger mechanism which could not be used in this survey because of constraints imposed by the vessel's mechanical fittings.

3.3 Rig Navigation and Positioning

3.3.1 General

Positioning was provided by BTW Survey Services using a Syledis B radio positioning system interfaced to a Hewlett Packard 9825 computer. Software was provided by the contractor using their "Geonav" package and computations were checked throughout the operation using a Hewlett-Packard 85 computer and software supplied by SIPM The Hague.

Equipment was initially mobilised 6 weeks before the date of the move, but due to a significant extension in the testing programme, the operation was suspended for some weeks. The positioning was supervised by G.M. Mason, survey consultant to Shell Development (Australia), and details of the operations are found in reference 2.

3.3.2 Operations

Calibration of the Syledis System was carried out at Seaspray range, and using the experience from previous surveys shore stations were placed at:

Mt. Taylor
Stringers Knob
Cape Conran
Point Hicks

Except for the Point Hicks beacon all stations functioned well. Attempts to fix the beacon became impossible after the access road was flooded and only intermittant, weak signals were received from this station during good reception times till the end of the operation.

For this operation and future rig moves a new 110m antenna cable was purchased by SD(A) for the Nymphea. This cable enables the omni-directional syledis antenna to be located directly over the derrick centre with no offset calculations required.

The rig was positioned directly from the syledis ranges obtained from the derrick antenna without the use of buoys to pre-mark the position. The rig made a run-in along a line to the position of anchor number 6, which was then dropped from the stern. The anchor chain was then played out till the rig reached the well location, where it was held in position as the remaining anchors were run out to their positions.

As the rig was not equipped with radar or direction pointers, it remained essential to rely on the radar ranges and bearings provided by the anchor handling vessels. Final distances of the anchors from the vessel were adjusted to the chain lengths read from the control room indicators.

The final anchor pattern differed from that planned because of shorter chain lengths on anchors number 1 and 6. The chain length on anchor 1 was reduced due to slipping during the test tensioning. When number 6 anchor was dropped there was presumably an unaccounted for delay before the anchor reached the seabed.

3.3.3 Reference Marker Directions

For the purpose of gyro surveys made on the Nymphea, the direction of a line from the drill floor to a reference marker needed to be accurately determined. As this had not been measured for the Volador-1 location, during the operations of this rig move the direction of the line was determined for both locations.

From the positions of both wells, a number of Esso permanent platforms may be seen. These have been accurately surveyed by means of a laser traverse, and their co-ordinates are known to within a metre. Ideally, these should be used as reference pointers as their directions from the Nymphea position are stable and accurate to within one minute of arc. They are not, however, visible from everywhere within the permit area.

Using these accurate indicators, the direction of the required line was determined at both locations using a sextant to measure the angle between the line and the bearing to the platform positions. The final directions are:

Volador-1 - reference marker = 217° 43'
Basker -1 - reference marker = 270° 56'

Although these directions have been given to minutes, they refer to the direction at the time of measurement. As the Nymphea is a floating platform, subject to influence of wind, current, anchor tensions and buoyancy, changes of this bearing by up to 1 degree are possible.

3.3.4 Anchor Handling

The thrusters on board the rig make anchor handling a simple and safe operation. The anchor handling proceeded smoothly and in good time once the weather was suitable. The method of using anchor chasers, rather than buoys was extremely successful. Although extra time was involved in chasing the wires back to the rig, this was easily compensated for by not having to deal with buoys on deck. No slipping of anchors or problems with the anchor configuration were encountered.

3.3.5 Rig Orientation

Taking into account prevailing wind directions for the months of April to June, a rig heading 270° was decided upon. This also provided reasonable positions for the anchors on the seabed (Fig. 3). The pattern used was that of a regular octagon, with 45° between consecutive anchors.

3.3.6 Contractor Performance

Apart from the transmission from one shore beacon, the contractors performance was satisfactory. Since this operation, the contract for the remainder of the rig moves in this commitment was awarded to the same company, after a successful tender bid.

In this contract there are now heavy penalty clauses for non-performance of equipment. Provision has also been made for beacon attendants at all beacon sites open to the public to avoid vandalism.

3.4 Drilling History

Following the end of operations at Volador-1 at 0625 hours on 19/4/83, Nymphea was towed 17.5 km to the Basker-1 location. The first anchor was dropped at 1330 hours on 19/4/83.

After completing the running of the anchors, and pretensioning to 175-235 MT, a penetration test was carried out and showed the seabed to be firm. The temporary guide base was run and set at 187m bdf. The 36" BHA was made up and after making TV camera repairs, Basker-1 was spudded at 0200 hours on 21/4/83. The 36" hole was drilled to 240m in 3-1/4 hours, and circulated to viscous mud. Four joints of 30" casing together with the permanent guide base were run and the casing cemented with returns to the seabed.

The 26" BHA was made up and the shoe track and pocket cleaned. A 12-1/4" pilot hole was drilled to 504m in 16 hours, and then opened up to 26" using seawater and viscous pills. 26 joints of 20" casing together with a cement stinger were run, and the casing landed with the shoe at 498m bdf. The casing was cemented with returns to the seabed observed by the divers. After releasing the running tool, and retrieving it and the stinger, preparations were made to run the BOP stack and the marine riser.

The BOP stack was run to 60m above the well head housing. After waiting on weather for 6 hours the operation was continued. The marine riser slip joint, and one stand of new heavy weight drill pipe (for landing purposes) were connected. Whilst lowering the BOP stack further, the landing joint broke. The BOP and riser fell 3m before the slack was taken up by the tensioners, and then bounced a further 3m. Guide post no.3 was broken off, and no.4 damaged. The BOP stack was retrieved and secured in the moonpool. The H4 connector and wellhead appeared to be undamaged, as were guide posts nos.1 and 2. Guide post no.3 and associated debris (beams) were removed, and no.4 guide post cut and removed by the divers. Nos.1 and 2 guide wires were installed, and the BOP system fully function tested. The BOP stack and riser were run and landed. The test tool was run and the H4 connector, rams/valves tested to 5000 psi.

After making up a 17-1/2" slick assembly and tagging cement at 495m, the shoe track and pocket were drilled out with seawater. The hole was displaced to seawater-lignosulphonate-bentonite mud, and a leak-off test performed at 510m, giving an equivalent maximum mud gradient of 1.55sg. Drilling continued to 620m when a stabiliser was added to the BHA. 17-1/2" hole was drilled to 1110m and viscous mud circulated to clean the hole.

Two logging runs were made (DIL/LSS/GR/SP, LDL/GR/CAL), one run of side wall samples (30 samples with 100% recovery) were taken, and then a check trip carried out. No resistance was noted on running back to bottom.

At this stage, the weather deteriorated and 44 hours were spent waiting on weather. A second checktrip was carried out, the hole was circulated clean, and the wearbushing retrieved.
80 joints of 13-3/8" N80 casing were run in 11 hours, with the shoe at 1104m. A Halliburton subsea release system was used for the cementation. On bumping the top plug, the casing was tested successfully to 2000 psi. The seal assembly was energised and tested to 5000 psi, and the casing running tool retrieved. The BOP was tested at the same time and the blue pod found to be faulty.

The 17-1/2" bottom hole assembly was laid down, and the 12-1/4" BHA made up and run in the hole to 170m. Meanwhile the blue pod was pulled and repaired and after waiting on weather for 5 hours rerun and re-established on the BOP stack. The BOP stack was now function tested satisfactorily. The 12-1/4" BHA was then run in the hole to the top of the cement at 1082m. The cement plugs and shoe track were drilled, and the pocket cleaned. New formation was drilled to 1118m and a Formation Intake Test carried out. This resulted in a maximum equivalent mud gradient of 2.11sg (mud weight 1.10sg, maximum surface pressure 1600 psi). Drilling recommenced and at 1212m, the bit was changed and two stabilisers added to the drill string.

The rest of the 12-1/4" hole section to 2862m was drilled virtually troublefree in 10 days with 6 bit runs. Occasional overpulls were noted during checktrips and on pulling out of the hole for bit change. However on each occasion no problem was experienced on running back to bottom.

The following logging runs were then made, DLL/MSFL/GR/SP/CAL, LDL/CNL/GR/CAL, LSS/GR, WST (16 levels). A 51 shot side wall sample run and a 30 shot side wall sample run were then made, with a total recovery of 75 (4 empty and 2 lost). After rigging down Schlumberger, a checktrip to bottom was made and the hole circulated clean. The wearbushing was then retrieved.

227 joints of 9-5/8" 47 lb/ft casing were run and landed in 11-1/4 hours with the shoe at 2853m. The casing was cemented using a Halliburton subsea release system, and pressure tested to 3250 psi. The seal assembly was energised with 20000 ft/lb of torque, and the seal tested to 5000 psi. After a BOP stack test, the casing running tool was retrieved, and the 9-5/8" wearbushing set. An Eastman gyro multishot survey was then run on Schlumberger cable.

The BHA for the 8-1/2" hole was made up and run in hole to the top of cement at 2830m. The collar, shoe track and pocket to 2862m were drilled out, and new formation drilled to 2872m. At 2872m a Formation Intake Test was carried out, giving a maximum equivalent mud gradient of 1.61 sg. Drilling continued to 2886m where a bit change was made, and a 3 point roller reamer, 2 stabilisers and a circulating sub were added to the BHA.

8-1/2" hole was drilled to 2910m with slow progress (ROP 1m/hr). At this point, the 3 point roller reamer was laid down, and a new bit (previous bit had broken teeth), 6 point roller reamer, shock sub and jar added to the BHA. 8-1/2" hole was drilled to 3108m in two days with one further bit change whereupon it was decided to cut a core.

A 3" core was cut from 3108 to 3126m in 9.4 hours with 100% recovery using a 60' x 6-1/4" Christensen core barrel with a C22 core head. No hydrocarbon indications were apparent in the core.

The rest of the 8-1/2" hole section to 3991m TD was drilled in 16 days with 5 bit runs. This hole section was relatively trouble free with occasional excessive torque necessitating some reaming, and some overpulls occurring on trips. A deviation survey run at 3277m showed that deviation had increased to 3-3/4 degree and the BHA was stiffened. This was successful in controlling the deviation to less than 3 degrees for the rest of the hole.

Schlumberger was rigged up and the DLL/MSFL/GR/CAL, LDL/CNL/GR/CAL, LSS/GR, HDT and WST were run. After the WST, a check trip was made to TD, and the mud conditioned. Two RFT runs were then made (1 segregated sample at 3091.5m, 2 non-segregated samples 3951m, 3131m). This was followed by two 51 shot sidewall sample runs (91 recovered, 10 empty, 1 lost).

After rigging down Schlumberger, a 2-7/8" cement stinger was run in the hole to 3991m. Cement plug no.1 was set from 3991-3820m and cement plug no.2 from 3450 to 3290m. The tubing stinger was laid down, a bit was then run in the hole and cement plug no.2 dressed to 3290m and tested with 7mt. After circulating bottoms up, and pulling out of the hole, a 9-5/8" casing scraper was run over the interval 2650 to 2750m. The 9-5/8" casing was then pressure tested to 2500 psi using a Halliburton 9-5/8" RTTS packer. After retrieving the RTTS packer, a check trip was carried out to 3290m.

49 joints of 7" N80 liner, together with a Brown Oil Tool liner hanger were run on 5" drill pipe. The hanger was set and the liner cemented with the shoe at 3257m and the top of liner at 2695m.

After running in the hole with a 7"/9-5/8" tandem scraper and 6" bit, the cement was drilled and scraped to 3250m, and the hole cleaned, and circulated to seawater. A flow check showed no flow, and the hole was subsequently displaced to 1.10 sg NaCl brine. The scraper assembly was laid down, and 9-5/8" RTTS packer run into the hole. After setting the RTTS packer, the drill pipe was displaced to diesel and an inflow test with 680 psi drawdown was carried out. This test indicated the liner cementation to be satisfactory.

The RTTS packer was laid down and Schlumberger rigged up. A CBL-VDL-CCL log was run from 3250-2672m. Thereafter a gauge ring/junk basket was run to 3150m, and then an F1 packer set at 3058m. The production string was run and landed. Subsequently the R plug was run on wireline but failed to pass through the EZ tree ball valve. The production riser was pulled, but attempts to repair the EZ tree failed. A new EZ tree was flown to the rig, and the production riser run and the string landed. The annulus was pressure tested to 500 psi, and the R plug run and the riser, surface lines and flowhead tested to 5000 psi.

The tubing was displaced to diesel and the intervals 3090-3094m, 3095-3098m perforated using a through tubing 2-1/8" Enerjet perforating gun (4 shot/foot).

Production test no.1 consisting of a clean up period, a 25-1/2 hour main flow period, 26 hour build up, and a multiflow test was carried out. The maximum production achieved during test no.1 was 4967 bbl/d oil and 4.8 MMSCFD gas across a 3/4" fixed choke. The main bottleneck to higher production rates was the limited heater capacity and the requirement to maintain heater outlet temperature higher than 45^{o}C to avoid clogging the separator with wax. For further details of production test no.1 procedure and results see section 3.9.

The well was killed with brine and production tubing and assemblies pulled out of the hole. A packer mill was made up and run in to the top of the packer. A second run with a new milling shoe was required before the packer was fully milled and pushed to 3250m. After a Hi Vis pill was pumped and the hole circulated clean with brine a run was now made with a bit and scraper.

After carrying out a BOP test, Schlumberger were rigged up and a gauge ring/junk basket run. F1 packers were set at 3104m and 3086m, after which Schlumberger was rigged down. An attempt was made to run the production tubing, but bad weather caused a delay. The string was run ready for spacing out and tested to 5000 psi after circulating 88 bbls, before it was necessary to wait on weather again. When the upper packer was tagged with the seal assembly the annulus was tested to 500 psi. The riser and flowhead were run and an attempt to pressure test the riser with the R-plug on wireline was made. This failed as the plug did not seat properly and consequently the RN test plug was run and the full string and surface lines tested to 5000 psi. A tubing drift was run prior to displacing the tubing to diesel.

The Schlumberger lubricator was rigged up and tested and the interval 3128.5-3132m perforated using a through tubing 2-1/8" Enerjet perforating gun (4 shots/ft). Production test no.2 was then carried out with a 6 hour clean up, 20 hour main flow period, 24 hour build-up, and a multi-rate test on two chokes (3/8", 3/4") followed by a 13 hour buildup. Maximum production during the second test was across the 3/4" fixed choke at 3763 BOPD and 11.84 MMSCFD gas. A larger choke was not used in order to limit the pressure drawdown in the reservoir. No problems were encountered with the heater or separator during this flow period. For further details of production test no.2 procedure and results see section 3.9.

The well was killed using 1.10 sg brine and the tubing contents reversed out. This was followed by a complete circulation to eliminate gas cutting. The tubing and assemblies were pulled out and laid down. A 2-3/8" tubing stinger was made up on a 3-1/2" and 5" drillpipe string and run in the hole. After circulating bottoms up cement plug no.3 was set at 3230-3030m and cement plug no.4 was set at 2725-2525m. The stinger was pulled back to 2201m and hung-off. Basker-1 was then suspended at 1230 hours on 16/7/83 as a result of an industrial dispute with contract drilling workers.

At 1400 hrs on 3/9/83 operations recommenced to complete the abandonment of Basker-1. After recovering the hang-off tool and circulating bottoms up, the 3-1/2" drillpipe was pulled out of the hole and laid down. A 6" bit was run in on 4-3/4" drill collars and the fourth cement plug was tagged at 2525m. A pressure test to 3000 psi was conducted on the 9-5/8" casing prior to pulling out and making up a casing cutter. Two attempts to cut and retrieve the casing at 803m BDF with a maximum overpull of 230 MT were made without success. A further two attempts made at 706m BDF with a maximum overpull of 180 MT were also unsuccessful. Finally, an attempt at 288m, and two at 205m did not succeed so the casing spear and cutter were laid down. An EZSV packer and 9 joints of 2-7/8" tubing were run in the hole. Cement plug No. 5 was set from 656-576m and cement plug No. 6 at 310-230m. The wellhead and BOP's were flushed with seawater prior to pulling out and laying down pipe and tubing.

The H4 connector was disconnected from the wellhead, and the riser and BOP stack retrieved. A 20 kg ICI explosive charge was made up and run 193.5m. After firing, a 100 MT overpull was applied and the 18-3/4" wellhead came free of the 30" casing head housing. A dummy run to 193.5m indicated no obstruction so a second 20 kg ICI charge was run and fired at 193.5m. The TGB, PGB, casing and wellhead were subsequently recovered. Basker-1 was abandoned at 1330 hours on 8/9/83. A seabed survey including recovery of debris was undertaken. The rig was ballasted and the anchors pulled . Basker-1 operations ended at 2300 hours on 10/9/83 and the rig was towed to the Bignose-1 location. Supply boats used for the anchor retrieving operations were the M/V Herdentor and the M/V Lady Penelope, with the M/V E.B. Cane put on temporary charter as standby boat.

3.5 List of Contractors, Service Companies and Main Equipment

The Nymphea was brought into Australian waters under a one year contract between Shell Development (Australia) Pty Ltd and Foramer S.A.

The following contractors and service companies have contracts with Shell Development (Australia) for the duration of the one year drilling programme:

Drilling Contract	:	Foramer S.A.
Supply Vessels	:	Australian Offshore Services Vessels used - Herdentor - Lady Penelope
Helicopter Services	:	Commercial Aviation
	:	2 x Bell 212 Helicopters
Electric Logging	:	Schlumberger
Mud Logging	:	Exlog Gemdas Unit
Subsea Support Services	:	Solus Ocean Systems OMBV System
Surface Production Testing	:	Flopetrol Schlumberger
Cementing Services	:	Halliburton Australia
Mud Service and Materials	:	Baroid Australia Pty Ltd

Main Equipment

Drilling Vessel Design	:	Enhanced Pacesetter Semisubmersible
Drilling Vessel Built	:	1982 Hitachi Zosen
Derrick	:	160 ft, 1,000,000 lbs
Drawworks	:	National 1625DE 16,000-25,000 ft rating
Mud Pumps	:	National 12P 150 7*12
BOP's	:	Cameron 18-3/4" 10,000 psi
Well Head Equipment	:	Vetco SG-5
Anchors	:	8 x 20 Stevin type anchors 8 x 3" chain 3 - breaking load 474 MT

Main Equipment (cont'd.)

Cementing Unit	:	Halliburton
Solids Control Equipment	:	- Harrisburg triple tandem shale shaker - Pioneer Sandmaster Desander T8-6 capacity 800 GPM - Pioneer Siltmaster Desilter T16-4 800 GPM - Thule VMS 200 Mud Cleaner 16 cones - 1 Swaco degasser

3.6 Drilling Data

3.6.1 Bit Record

See Table 1: Bit Record

3.6.2 Casing Summary

See Table 2: Casing Summary

3.6.3 Cement Summary

See Table 3: Cement Summary

3.6.4 Mud Summary

See Table 4: Mud Record

36" and 26" Hole Section

The 36" and 26" holes were drilled with seawater and viscous pills with minimum control of properties. Before running the 20" casing, the 26" hole was displaced to viscous mud (prehydrated bentonite).

17-1/2" Hole Section

The 17-1/2" hole was drilled with a seawater-bentonite-polymer system. A mud weight of 1.09-1.11 sg was used and the MBC was kept less than 19 lb/bbl. Celpol was used to keep the yield point in the range 10-13 lb/100 sq.ft. Large additions of seawater were required to maintain the mud weight less than 1.11 sg (5-10 m^3/hr seawater).

No hole problems were experienced during this hole section, and the mud properties were easy to maintain.

12-1/4" Hole Section

The 12-1/4" hole was drilled with similar mud to the 17-1/2" hole. Mud weight was run at 1.10-1.12 sg, MBC 12-15 lb/bbl, yield point 10-15 lb/100 sq.ft and API water loss less than

8cc. Water loss was controlled with Dextrid and CMC, and small additions of Celpol were required to control rheology. Approximately $3m^3$/hr of seawater was required to dilute the mud to control mud weight at less than 1.12 sg. All solids removal equipment was kept operating at maximum capacity.

In general this hole section was trouble-free, with only slight balling up of stabilisers occurring, and occasional light reaming needed. In this respect Basker-1 was far less problematic than Volador-1. This improvement can at least partly be attributed to running a polymer type mud as distinct from Volador-1 in which a bentonite/CMC mud was used. A polymer mud is far more suitable for drilling the sticky marls and hydratable clays which are characteristic of the Gippsland Limestone. Furthermore no hole stability problems were encountered in the Lakes Entrance Formation.

8-1/2" Hole Section

The 8-1/2" hole was drilled with similar mud to the 12-1/4" hole section. Mud weight was run at 1.12-1.14 sg, MBC 12-13 lb/bbl, yield point 12-17 lb/100 sq.ft, and API water loss less than 5cc/30min. Water loss and rheology were controlled by additions of Dextrid and CMC. Small additions of barite were required to keep the mud weight in the range 1.12-1.14 sg. In order to maintain HTHP water loss below 20cc/30min it was necessary to partly replace Dextrid with Durenex as bottom hole temperatures increased.

In general this section was trouble-free except for a tendency of the mud to foam. This was controlled effectively by small additions of Halliburton NF-1. The high and fluctuating torque problem encountered whilst drilling Volador-1 was also evident, but was controlled by using a roller reamer in the BHA.

PE903974

This is an enclosure indicator page.
The enclosure PE903974 is enclosed within the container PE902560 at this location in this document.

The enclosure PE903974 has the following characteristics:

ITEM_BARCODE =	PE903974
CONTAINER_BARCODE =	PE902560
NAME =	Basker 1 Table 1: Bit Record Summary
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Basker 1 Table 1: Bit Record Summary
REMARKS =	
DATE_CREATED =	
DATE_RECEIVED =	28/03/84
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell Australia Exploration and Production. Oil and Gas.
CLIENT_OP_CO =	Shell Australia Exploration and Production. Oil and Gas.

(Inserted by DNRE - Vic Govt Mines Dept)

PE903975

This is an enclosure indicator page.
The enclosure PE903975 is enclosed within the container PE902560 at this location in this document.

The enclosure PE903975 has the following characteristics:

ITEM_BARCODE = PE903975
CONTAINER_BARCODE = PE902560
NAME = Basker 1 Table 3: Cement Summary
BASIN = GIPPSLAND
PERMIT = VIC/P19
TYPE = WELL
SUBTYPE = DIAGRAM
DESCRIPTION = Basker 1 Table 3 Cement Summary
REMARKS =
DATE_CREATED =
DATE_RECEIVED = 28/03/84
W_NO = W812
WELL_NAME = Basker-1
CONTRACTOR = Shell Australia Exploration and Production. Oil and Gas.
CLIENT_OP_CO = Shell Australia Exploration and Production. Oil and Gas.

(Inserted by DNRE - Vic Govt Mines Dept)

Table 2 : Casing Summary - Basker-1

Date Run	Size (ins)	Grade	Weight (lb/ft)	Coupling	Shoe Depth (mbdf)	Remarks
21/4/83	30	B	310	Vetco ATD Squnch	234	4 joints
25/4/83	20	X52	133	Vetco LS	498	26 joints. 18-3/4" 10,000 psi SG-5 wellhead system
2/5/83	13-3/8"	N80	72	BTC	1104	80 joints
20/5/83	9-5/8"	N80	47	BTC	2853	226 joints
20/6/83	7	N80	29	BTC	3287	49 joints Top of liner at 2695m

PE903976

This is an enclosure indicator page.
The enclosure PE903976 is enclosed within the container PE902560 at this location in this document.

The enclosure PE903976 has the following characteristics:

ITEM_BARCODE =	PE903976
CONTAINER_BARCODE =	PE902560
NAME =	Basker 1 Table 4: Mud Record
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Basker 1 Table 4 Mud Record
REMARKS =	
DATE_CREATED =	
DATE_RECEIVED =	28/03/84
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell Australia Exploration and Production. Oil and Gas.
CLIENT_OP_CO =	Shell Australia Exploration and Production. Oil and Gas.

(Inserted by DNRE - Vic Govt Mines Dept)

3.6.5 Formation Intake Test

Formation intake tests were carried out on drilling out the 20", 13-3/8", 9-5/8" casing shoes. The following results were obtained:

Depth (m)	Surface Pressure (psi)	Mud (sg)	EMG (sg)	Formation
498	360	1.04	1.55	Marl
1104	1600	1.10	2.11	Marl
2853	2045	1.11	1.61	SST

3.6.6 Lost Circulation

None

3.6.7 Perforations

The following intervals were perforated:

Production Test 1 3090-3094m, 3095-3098m

Production Test 2 3128.5-3132m

All perforations were carried out using a through tubing 2-1/8" Enerjet perforating gun (4 shot/foot).

3.6.8 Fishing

None

3.6.9 Side Tracking

None

3.6.10 Deviation

See Table 5 - Deviation Record

See Fig. 4 - Well Path (Plan View)

3.6.11 Abandonment

See Fig. 5 - Well Status

TABLE 5: Deviation Record - Basker-1

See Eastman survey Fig.4 of well path to the 9-5/8" casing shoe.

Depth AH (m)	Inclination	Remarks
217	0	Totco
240	0	Totco
290	0.5	Totco
370	0.5	Totco
504	0.25	Totco
620	0	Totco
853	0	Totco
1110	0.25	Totco
1210	0.75	Totco
1420	0	Totco
1630	1	Totco
1859	0.75	Totco
2184	1.75	Totco
2364	1.25	Totco
2384	1	Totco
2504	0.25	Totco
2850	1	Totco
3108	2	Totco
3277	3.75	Totco
3420	2.75	Totco
3615	1.5	Totco
3801	2	Totco
3991	2.75	Totco

3.7 Formation Evaluation

3.7.1 Mudlogging Services

The mudlogging services on the Nymphea were provided by Exploration Logging Australia.

The unit was crewed by two mudloggers and one 24 hour Gemdas computer operator.

Services included collection, washing, drying and packing of cuttings samples, routine examination of cuttings and checking for hydrocarbon indications; continuous monitoring of drilling parameters (ROP, WOB, torque, pump rate), mud tank levels, and mud weight; continuous monitoring and chromatographic analysis of gas. These values were recorded at one metre for 8-1/2" and 5 metre intervals (in top hole) by an on-line computer which also produced real-time prints and plots (against driller's depth) of this data. Logged depths were calculated automatically by the computer.

A package of interactive programs to assist in drilling control, drilling optimisation, pressure evaluation and formation evaluation were available from the Gemdas unit. Examples of these programs include hydraulics analysis, D exponent analysis, kick analysis, fracture gradient analysis. A summary of this data can be found in reference 3.

3.7.2 Cuttings

Ditch cuttings were collected every 10m below 20" casing (551m) down to 9-5/8" casing depth and thereafter every 3m to total depth. The samples were bagged and distributed as follows:

(a) Four sets of washed and dried samples (in 100gm packets) were prepared; one set each was sent to the Bureau of Mineral Resources and the Victorian Department of Minerals and Energy, and two sets were sent to Corelab, Perth to be stored on behalf of Shell Development (Australia).

(b) An additional set of washed and dried samples was packed into plastic samplex trays and sent to Shell Development (Australia) in Perth for office use.

(c) Two sets of unwashed cuttings packed in half-kilogram bags were sent to Corelab, Perth (for Shell).

3.7.3 Sidewall Samples

A total of 213 shots were fired with a total recovery of 196 samples. For descriptions of samples see reference 4.

3.7.4 Velocity Survey

The velocity survey, carried out by Schlumberger was comprised 28 levels (Ref. 5).

3.8 Petrophysics

3.8.1 Wireline Logs

The following wireline logs were run:

Date	Hole Size	Interval	Type
3/5/83	17-1/2"	1015-498m	DIL/LSS/GR/SP
		1011-498m	LDL/GR/CAL
			CST 30 shot, 30 recovered
19/5/83	12-1/4"	2856-1104m	DLL/MSFL/GR/SP/CAL
		2859-1104m	LDL/GR/CAL
		2853-2020m	CNL
		2857-1104m	LSS/GR
			WST (16 levels)
			CST 81 shots, 75 recovered 4 empty, 2 lost
13/6/83	8-1/2"	3988-2856m	DLL/MSFL/GR/CAL
		3991-2856m	LDL/CNL/GR/CAL
		3986-2856m	LSS/GR
		3991-2856m	HDT
			WST (12 levels)
		3951.1-2901m	RFT 1 14 pressures 1 sample
		3951 & 3131m	RFT 2 2 samples
			CST 102 shot, 91 recovered 10 empty, 1 lost
23/6/83	7" liner	3250-2672m	CBL/CCL/VDL

3.8.2 Evaluation

3.8.2.1 Method of Evaluation

The following steps were used in the petrophysical evaluation of Basker-1:

- Calculation of shale content (Vsh) log by means of Gamma Ray log.

- Identification of coal layers and volcanics based on the response of the density and neutron logs together with ditch cuttings/sidewall samples description.

- Differentiation of sands and shales based on a 50% cut off of shale content (after elimination of coal and volcanics).

- Correction for borehole effect of the Dual Laterolog deep and shallow readings a well as the Microspherically Focused log.

- True resistivity (R_t) determination.

- Porosity calculation from density log over the water/oil bearing zones in sand layers.

- Porosity calculation from density log/neutron log over the gas/unspecified hydrocarbon zones in sand layers (corrected for gas and shale effects).

- Calculation of hydrocarbon saturations by means of Simandoux equation over the sand intervals.

3.8.2.2 Petrophysical Parameters Used in Evaluation

Refer to Table 6.

PE903977

This is an enclosure indicator page.
The enclosure PE903977 is enclosed within the container PE902560 at this location in this document.

The enclosure PE903977 has the following characteristics:

ITEM_BARCODE =	PE903977
CONTAINER_BARCODE =	PE902560
NAME =	Basker 1 Table 6: Petrophysical parameters
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Basker 1 Table 6: Petrophysical Parameters used in Evaluation
REMARKS =	
DATE_CREATED =	
DATE_RECEIVED =	28/03/84
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell Australia Exploration and Production. Oil and Gas.
CLIENT_OP_CO =	Shell Australia Exploration and Production. Oil and Gas.

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PE905406

This is an enclosure indicator page.
The enclosure PE905406 is enclosed within the container PE902560 at this location in this document.

The enclosure PE905406 has the following characteristics:

ITEM_BARCODE =	PE905406
CONTAINER_BARCODE =	PE902560
NAME =	Basker 1 Well Location Map (fig 1)
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	MAP
DESCRIPTION =	Basker 1 Well Location Map showing fields, pipelines and VIC/P19 Prospects/Leads
REMARKS =	
DATE_CREATED =	28/02/84
DATE_RECEIVED =	28/03/84
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell Australia Exploration and Production. Oil and Gas.
CLIENT_OP_CO =	Shell Australia Exploration and Production. Oil and Gas.

(Inserted by DNRE - Vic Govt Mines Dept)

PE905407

This is an enclosure indicator page.
The enclosure PE905407 is enclosed within the container PE902560 at this location in this document.

The enclosure PE905407 has the following characteristics:

ITEM_BARCODE =	PE905407
CONTAINER_BARCODE =	PE902560
NAME =	Basker 1 Site Survey Location Plan VIC/P19
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	MAP
DESCRIPTION =	Basker 1 Site Survey Location plan VIC/P19. Figure 2
REMARKS =	
DATE_CREATED =	28/02/84
DATE_RECEIVED =	28/03/84
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell Australia Exploration and Production. Oil and Gas.
CLIENT_OP_CO =	Shell Australia Exploration and Production. Oil and Gas.

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Table 11: Chemical Consumption Cost - Basker-1

Interval: Surface - 498m
Casing Size: 30" and 20"

Product	Quantity
Gel	27.5 mt
Sack gel	16 sx
Caustic	14 dm
Soda ash	9 sx
Lime	5 sx
$CaCl_2$	25 sx

Total Cost: $7179
Cost/Metre: $21.37

Interval: 498-1104m
Casing Size: 13-3/8"

Product	Quantity
Gel	36.5 mt
Sack gel	78 sx
Barite	4 mt
Caustic	31 dm
Soda ash	11 sx
Lime	5 sx
$CaCl_2$	40 sx
CMCHV	36 sx
Q Broxin	35 sx
Dextrid	8 sx
Celpol	68 sx
Surflo W300	1/2 drum

Total Cost: $24817
Cost/Metre: $40.95

Table 11 (continued)

Interval: 1104-2853m

Casing Size: 9-5/8"

Product	Quantity	
Gel	21.5	mt
Sack gel	43	sx
Barite	18.5	mt
Sack barite	90	sx
Caustic	82	dm
Soda ash	20	sx
Lime	7	sx
Soda Bicarbonate	15	sx
CMCHV	84	sx
CMCLV	31	sx
Q Broxin	19	sx
Dextrid	148	sx
Celpol	65	sx
Condet	3	drums
Surflo W300	1/2	drums

Total Cost: $36642

Cost/Metre: $20.95

Table 11 (continued)

Interval: 2853-3991m

8-1/2" hole to TD

Product	Quantity	
Barite	30	mt
Sack barite	160	sx
Caustic	59	dm
Soda ash	10	sx
CMCHV	22	sx
CMCLV	80	sx
Q Broxin	12	sx
Durenex	208	sx
Dextrid	289	sx
Celpol	30	sx
Surflo W300	2	dm

Total Cost: $47803

Cost/Metre: $42.00

Final Logging/Abandonment Phase

Product	Quantity	
Barite	18	mt
Caustic	20	dm
Lime	3	sx
$CaCl_2$	6	sx
CMCHV	9	sx
Durenex	30	sx
Dextrid	50	sx
Celpol	8	sx

Total Cost: $11254

Total Mud Chemical Cost: $127695

Cost/Metre: $32.00

Table 11 (continued)

Production Test Chemicals

Product	Quantity	
Salt	1358	sx
Methanol	1	dm
Ethylene Glycol	1	dm
Propane	24	cylinders

Total Cost: $9453

Cement Chemicals

Product	Quantity	
Cement	317	mt
HR-12	25	sx
HR-7	18	sx
CFR-2	11	sx
Halad-22A	12	sx
NF-1	7 dm	

Total Cost: $119,217

Table 12: Time Allocation - Basker-1

		Hours	%
I.	**Preparation**	-	-
II.	**Mobilisation, Moving, etc.**		
	Moving	58.75	1.70
	Rigging Up/Down	16.25	0.46
	Total Mobilisation	75.00	2.16
III.	**Making Hole**		
	Drilling	638.25	18.42
	Adding pipe	19.0	0.55
	Surveys	7.25	0.21
	Check trip	21.5	0.62
	Round trip - bit change	142.75	4.12
	- deviation operation	2.0	0.06
	Circulation	27.25	0.78
	Reaming/washing	16.25	0.47
	Rig service	29.5	0.85
	Repairs	3.75	0.11
	Wait time	2.0	0.06
	Miscellaneous	0.5	0.01
	Total Making Hole	910.00	26.26
IV.	**Securing Hole**		
	Drilling cement	6.0	0.17
	Adding pipe	3.0	0.09
	Surveys	4.75	0.14
	Check trip	17.5	0.51
	Round trip - cement drilling	10.5	0.30
	- before casing	8.25	0.24
	Circulation	5.25	0.15
	Repairs	3.75	0.11
	Wait time	58.0	1.67
	Miscellaneous	8.25	0.24
	Casing/Liner Run & Cement	65.0	1.88
	Flanging - up (BOP)	95.5	2.75
	Total Securing Hole	285.75	8.25

Table 12: Time Allocation - Basker-1

		Hours	%
V.	Formation Evaluation		
	Coring	10.0	0.29
	Check trip	12.0	0.35
	Round trip - coring	14.75	0.43
	- logging	11.5	0.33
	Circulation	3.25	0.09
	Formation strength test	3.5	0.10
	Rig service	0.25	0.01
	Miscellaneous	2.25	0.06
	Logging	84.25	2.43
	Total Formation Evaluation	141.75	4.09
VI.	Completion/Suspension		
	Drilling cement	1.25	0.04
	Adding pipe	7.00	0.20
	Check trips	3.75	0.11
	Roundtrip - cement drilling	12.5	0.36
	- before casing	5.5	0.16
	- bit and scraper	48.75	1.41
	Circulation	45.5	1.31
	Reaming/washing	0.5	0.01
	Formation Leak-off test/Inflow test	14.25	0.41
	Rig service	2.5	0.07
	Repairs	38.25	1.10
	Wait time	71.00	2.05
	Miscellaneous	75.25	2.17
	Logging - Completion	16.5	0.48
	Casing/Liner Run & cement	24.5	0.71
	Testing (& perforating)	128.75	3.72
	Running - tubing	63.75	1.84
	- wireline	24.0	0.69
	Pressure Surveys	105.75	3.05
	Total completion/suspension	702.25	20.27
VII.	Plug-back/Abandonment		
	Wait time (industrial dispute)	1177.5	33.98
	Abandonment	172.75	4.99
	Total Plug-back/Abandonment	1350.25	38.97
	Total Well	3465 (144.4 days)	100

3.8.2.3 Formation Water Resistivity (Rw)

Formation water resistivity was determined from analyses carried out on water recovered from production tests nos.1 and 2 (refer Table 7 for details).

3.8.2.4 Evaluation Results

All sands in the upper part of the Latrobe Group (2120-2675m) were found to be water bearing with excellent reservoir quality (average porosity about 27%, as high as 30.5% in the cleaner sands).

Below the Maastrichtian marker (2675m) and down to about 2710m sandy intervals were still entirely water bearing.

Some marginal hydrocarbon saturations (up to 20% in places) were calculated from the logs between 2710 and 3010m, SWS confirm minor traces of fluorescence as shallow as 2870m, while gas readings started increasing at 2810m. Definite hydrocarbon sands start at 3018m and continue almost to total depth with variable thicknesses and saturations. A total of 22.1m of hydrocarbons, 1.8m of gas, 18.8m of oil and 1.5m of unspecified hydrocarbons (oil or gas), were found based on a porosity cut off of 13% and a hydrocarbon cut off of 35% (refer to Table 8 for details and Enclosure 1 for depth plot).

The porosity cut off of 13% corresponds to approximately 5 milli-darcies permeability at in-situ conditions (refer section 3.8.3.1), arbitrarily assumed to be the minimum permeability capable of producing any fluids. The 35% cut-off in hydrocarbon saturation appears to be the water-free producing value for the Gippsland Basin.

3.8.3 Core Analyses

Results of the core measurements performed on Core No.1 (3108-3126m) have been analysed and already incorporated in the

TABLE 7: Recovered Formation Water (Properties)

	Chlorides (ppm)	Equiv. NaCl (ppm)	Resistivity (ohmm Rw)	Equiv. NaCl (ppm)	Hardness (ppm)	pf/mf	pH
Production Test No.1							
a) Field measured	9000	14850	0.53 @ 60°F	13800	320-360	0 /1.8	6.5
b) Measured by ANALAB	-	13421*	0.43 @ 20°C	15000	-	-	5.33
c) Measured by FLOPETROL	-	13037*	0.567 @ 25°C	9500	560	-	5.2
		15057	0.502 @ 25°C	11000			
Production Test No.2							
a) Field Measured	11000	18150	0.365 @ 72°F	17000	260-280	0 /1.3	6.5
b) Measured by ANALAB		20370	0.282 @ 20°C	24000	-	-	7.29
		21290	0.277 @ 20°C	24500	-	-	7.13

* Measurements on some samples

Mud Filtrate Properties

Chlorides (ppm)	Equiv. NaCl (ppm)	Resistivity (ohmm Rw)	Equiv. NaCl (ppm)	Hardness (ppm)	pf/mf	pH
21000	34650	0.207 @ 62°F	38800	100-300	0.3/0.8	9.5

TABLE 8: Petrophysical Evaluation Results

DEPTH INTERVAL (M)	NET (M)	AVERAGE POROSITY %	ESTIMATED AVERAGE PERMEABILITY (MD)	AVERAGE HYDROCARBON SATURATION (%)
2987.3 - 2988.4	1.1 Oil	21.9	715	35
3018.0 - 3019.8	1.8 Gas	18.6	40	63
3056.2 - 3057.0	0.8 Oil	16.7	35	40
3090.2 - 3098.0	6.9 Oil	23.4	1670	74
3128.5 - 3132.1	3.7 Oil	21.8	670	54
3195.8 - 3197.3	1.5 Unsp. Hyd.	18.8	120	61
3222.8 - 3223.8	1.0 Oil	20.7	360	44
3240.5 - 3241.5	1.0 Oil	24.2	2640	46
3274.6 - 3276.9	2.3 Oil	23.3	1580	51
3474.1 - 3474.9	0.8 Oil	19.3	160	63
3757.4 - 3758.6	1.2 Oil	13.0	5	36

Total Net Hydrocarbons: 22.1m
(1.8m Gas
(18.8m Oil
(1.5m Unspecified Hydrocarbons

Oil/water contact at 3108.3m.

Figures above are based on the following cut offs:

Porosity	13%
Hydrocarbon saturation	35%
No thickness constraints	

Petrophysical parameters used:

ma = 2.66 (from core data)
Rw = 0.138 ohm.m over the interval 3128.5-3132.1m as recovered in Production Test No.2, otherwise 0.162 as recovered in Production Test No.1
m = 2.096
n = 2.0
A = 0.584

Estimated permeabilities derived from the relationship:

$$\log k = 24.77\, \phi - 2.57$$

evaluation. The following parameters and/or relationships have been derived:

3.8.3.1 Porosity/Permeability Trends (refer Fig. 6)

At surface conditions

$$\text{Log}_{10} \text{ Permeability} = 21.1 \times \text{Porosity} - 2$$

Under Stress Conditions (5700 psi)

$$\text{Log}_{10} \text{ Permeability} = 24.77 \times \text{Porosity} - 2.57$$

Units: Permeability md (millidarcies)
Porosity as a fraction

3.8.3.2 Formation Factor/Porosity Relationship (refer Fig. 7)

At surface conditions

$$\text{Formation factor} = 1.132 \times \text{Porosity}^{-1.597}$$

Under stress conditions (5700 psi)

$$\text{Formation factor} = 0.584 \times \text{Porosity}^{-2.098}$$

(Porosity as a fraction)

3.8.3.3 Cation Exchange Capacity/Porosity Trend (refer Figs. 8 & 9)

Cation exchange capacity (Qv) measurements were performed by two different laboratories (CORELAB in Singapore and ANALAB in Perth) on adjacent plugs in an attempt to compare the results. The results were quite different and it was not known which, if either, set of data gave the correct Qv/porosity relationship. Consequently the Simandoux method rather than the Waxman-Smits equation was used in the petrophysical evaluation.

Derived Qv/Porosity relationships were as follows:

From Corelab Data .. $$Qv = \frac{0.387 - \text{Porosity}}{8 \times \text{Porosity}}$$

From Analab Data .. $$Qv = \frac{0.25 - \text{Porosity}}{1.45 \times \text{Porosity}}$$

Units: Porosity in fraction

3.8.3.4 Porosity and Permeability Reductions With Increased Pressure

Refer to Figures 10 and 11.

3.8.3.5 Rock Compressibility Factor

A rock compressibility factor of 5×10^{-6} psi^{-1} at 5700 psi was calculated using the volume reduction due to increasing pressure from 2500 psi to 5700 psi.

3.8.3.6 Grain Density

An average matrix density of 2.66 g/cc was derived.

3.8.3.7 Saturation Exponent (n)

Results of n measurement in seven plugs indicates a value of 1.83.

3.8.3.8 Capillary Pressure Curves

Results of capillary pressure curves suggest that the water saturation at about 35m above oil-water contact ranges from 40-50 percent (Fig. 12).

3.8.3.9 Basic Flood Tests

Critical water saturation (water saturation at which clean oil flows) was determined by means of basic flood tests on two samples, results ranged from 40 to 60 percent.

3.8.4 Repeat Formation Test Results

See Table 9 for results of formation pressures measured. A graph of these measurements is shown in Figure 13.

The following samples were taken:

1)	Depth	3091.5m	
	Type	Segregated	
	Recovery	Chamber 1	9 litre waxy crude
		(6 gal)	46 SCF gas
			10 litre filtrate
			R sample 0.225 ohmm 67°F
		Chamber 2	0.6 litre oil
2)	Depth	3951m	
	Type	Non segregated	
	Recovery	6 gal Chamber	2 litre water
		(6 gal)	R sample 0.235 ohmm 62°F
3)	Depth	3131m	
	Type	Non segregated	
	Recovery	1 gal Chamber	0.5 litre oil
			2.23 SCF gas
			3 litre water
			R sample 0.202 ohmm 62°F

The above water samples are all mud filtrate or at least heavily contaminated with mud filtrate. Typical properties of mud filtrate whilst drilling 8-1/2" hole.

Rmf	0.207 @ 62F
NaCl	34650 ppm

Table 9: RFT Formation Pressure Measurements

Depth (m)	Temp. (°F.)	Corrected Pressure (psig)	Permeability Indication
2901	212	4157	Good
2953.5	213	4233	"
2986	214	4280	"
3019	216	4350	"
3033	216	4355	"
3059.4	217	4394	"
3097	218	4466	"
3109	219	4470	"
3116	219	4477	"
3131.5	220	4497	"
3196.5	221	4610	"
3241.1	222	4660	"
3361.5	225	-	Tight
3362.5	225	-	"
3380	226	-	"
3487.2	226	5023	Good
3810	239	-	Tight
3811	239	-	"
3951.1	341	5992	"

3.9 Production Testing

Two production tests were performed in Basker-1 to evaluate the two thickest sandstones with the highest hydrocarbon saturations. Test no.1 was done over the intervals 3090-3094m and 3095-3098m, which were considered to be one reservoir unit with a shale parting. The flow rates achieved were up to 4967 BBL/D of oil and 4.82 MMSCF/D of associated gas on a 3/4" choke, with a considerably higher flow potential. The reservoir characteristics were excellent with 1 Darcy permeability and only slight damage to the formation.

The production test results indicated a permeability barrier approximately 300m from the well. This is significantly less than the distance to the interpreted "boundary" fault (700m), which is assumed to correspond to a second permeability barrier estimated at greater than 1500m from the test point. The reservoir appears to be of a limited size (about 10-15 MMBBL STOIIP) and the crude very waxy. RFT pressure data indicate the oil/water contact for this reservoir is at 3108.3m.

Test no.2 was performed on a sandstone in the interval 3128.5-3132m with similar characteristics to the first test zone except that the hydrocarbon saturation was lower (see Table 8). Test no.2 flowed a maximum of 3270 BBL/D oil and 11.8 MMSCF/D gas on a 3/4" choke. The reservoir properties were good but the size very limited (0.22-0.31 MMBBL STOIIP). The recovery factor is likely to be less than 15% as there is no evidence of waterdrive and therefore the recovery mechanism would be solution gas drive. Details of the production testing and the interpretation are given in reference 5, a summary of the flow rates is given in Table 10.

3.10 Geopressure Engineering

Pore pressure gradient was normal with no evidence of any overpressure down to ±3500m. However the formation pressure measured in a sandstone at 3951m (5992 psig) indicated an average pore pressure gradient of 0.63 psi/ft in the interval 3500-3951m (Fig. 13).

For further details on pore pressure analysis of Basker-1 refer to reference 3.

3.11 Well Cost, Time Allocation

See Figure 14 : Drilling Time Graph
See Table 11 : Chemical Consumption Cost
See Table 12 : Time Allocation
See Table 13 : Well Cost

Table 10: Production Test Data

Test 1: 3090-3094m, 3095-3098m

CHOKE SIZE	Flow Rate*		SOLUTION GOR (SCF/BBL)
	OIL (BOPD)	GAS (MMSCFPD)	
Main Flow			
3/8"	1588	1.852	1166
Multirate Flow			
1/4"	717	0.822	1146
1/2"	2833	3.08	1087
5/8"	4000	4.167	1042
3/4"	4967	4.82	970

Oil : API 39.2°
Pour Point 36°C

Gas Composition:

C1	70.05
C2	8.00
C3	3.61
C4	1.13
C5	0.28
CO2	16.86

Test 2: 3128.5-3132m

CHOKE SIZE	Flow Rate*	
	OIL (BOPD)	GAS (MMSCFPD)
1/2"	1953	7.8
3/8"	1172	5.0
3/4"	3270	11.8

Oil : API 40.8°

Gas Composition:

C1	74.70
C2	9.15
C3	4.20
C4	1.19
C5	0.39
CO2	10.15

* Flow rates corrected for shrinkage.

Table 13: Well Cost - Basker-1

	Cost Type	$ Million
0	Preparation/Mobilisation	0.293
1	Drilling - Installation	15.278
2	Mud	0.152
3	Bits	0.076
4	Casing and Cement	1.146
5	Evaluation	1.121
6	Production Testing	0.756
7	Abandonment	0.031
8	Transportation	4.987
9	Recoveries/Recharges	0.181
	TOTAL:	24.021

Note: Rig contract day rates = $13,571,425
Open hole logging cost = 791,916

4. GEOLOGY

4.1 Regional Setting

The Gippsland Basin and the underlying Strzelecki Basin are the most easterly of the sedimentary basins that border the southern Australian continental margin.

Jurassic/Early Cretaceous Strzelecki Basin formed during the initial ('pre-rift') subsidence phase prior to break-up along Australia's southern and eastern margins. The subsequent Gippsland Basin is a 'failed' rift arm (aulacogen) associated with the opening of the Tasman Sea in the Late Cretaceous and Early Tertiary.

Spreading in the Tasman Sea commenced about 78 m.y. BP, at which time the developing Gippsland Rift was landlocked and volcanic activity was common. After break-up, the depositional surface in the rift remained close to sea level until the much later opening of the Southern Ocean in the Tertiary, and the position of the coastline was controlled by the balance between sea level, subsidence and sediment supply. Rift subsidence continued steadily during the Campanian and Maastrichtian, but at the same rate as sedimentation, and the seaward margin of the basin, which includes VIC/P19, remained in a swampy, lower coastal plain environment.

The sea first transgressed the Basker area from the east in the Late Maastrichtian. The Early Tertiary history is broadly transgressive but in detail consists of several cycles of transgression each followed by gradual regression. By Middle Paleocene, Basker was in a dominantly marine setting where there was very little deposition of Latrobe Group sediments.

At the end of the Paleocene, at about the time when spreading stopped in the Tasman Sea (c. 55 m.y. BP) and commenced in the Southern Ocean, subsidence in the Gippsland Basin slowed or even ceased, particularly along the seaward margin (roughly over the western flank of VIC/P19). In the Early Eocene there were two minor and one major relative sea level falls, each followed by rises. The seaward margin of the Gippsland Basin was subjected to the full effect of these changes and was incised by channels.

After the Early Eocene sedimentation virtually ceased until the deposition of the marine Lakes Entrance mudstone in the Oligocene/Early Miocene. Rapid sedimentation recommmenced in VIC/19 in the Middle Miocene with progradation of the bioclastic Gippsland Limestone, but did not reach the Basker area until the Late Miocene. Relative sea level falls in the Late Miocene created channels in the prograding shelf edge. Further sea level falls in the Pleistocene probably caused the canyon system in the present-day shelf edge and slope.

4.2 Stratigraphic Table

AGE	BIOZONE	FORMATION	DEPTH bdf (m)	DEPTH SS, (m)
		Sea level	25	0
		Sea Floor	187	162
Pliocene	A3-B1	GIPPSLAND LIMESTONE	187-1346	162-1321
Miocene	B1-F		1346-1807	1321-1782
Early-Mid Miocene	B2-F	LAKES ENTRANCE FORMATION	1807-2119.5	1782-2094.5
Early-Mid Eocene	P.asperopolus/ M. diversus	Flounder Fm	2119.5-2187	2094.5-2162
		LATROBE GROUP		
Maastrichtian	T. longus	Latrobe Coarse	2187-3172	2162-3147
Campanian	T. lilliei	Clastics	3172 - TD	3147 - TD
		TD	3991	3966

4.3 Well Stratigraphy

The stratigraphic sequence in Basker-1 is summarised in part 4.2 and on Enclosures 1 & 2. Formation tops and ages are based on lithological palaeontological, and palynological information from cuttings and sidewall samples, together with wireline log characteristics. All depths are below derrick floor.

4.3.1 Gippsland Limestone 187-1807m

187-498m No returns.

498-1120 Light to greenish grey, soft, fossiliferous (forams, echinoderms) marl with traces of pyrite, glauconite and carbonaceous material; interbedded with minor light to dark grey, fine-grained, fossiliferous calcarenite. These are interpreted from palaeontological information to be mid to outer shelf carbonates deposited in 40 to 200m of water.

1120-1200m Calcarenite (60%) greenish-grey, argillaceous, foraminiferal, with traces of pyrite and glauconite, and marl (50%), soft, greyish white, foraminiferal also with traces of pyrite, glauconite and carbonaceous material.

1200-1807m Light grey to greenish grey very fossiliferous (forams, ostracods, rare echinoderms and bryozoa) marl interbedded with minor calcarenite, light brown to grey, fine-grained fossiliferous with traces of pyrite and glauconite.

The carbonates from 1120 to 1750m appear to have been deposited in water depths of 100 to 200m, probably on the shelf edge. Below 1750m the palaeo-water depth, has been interpreted from palaeontological data to have been between 200 and 300m.

4.3.2 Lakes Entrance Formation 1807-2119.5m

1807-1983 Grey, very fossiliferous marl with traces of glauconite, pyrite and carbonaceous detritus, interbedded with calcarenite in the upper two thirds of the interval and pyritic, weakly fossiliferous claystone in the lower third.

1983-2119.5 Grey to brownish grey claystone, fossiliferous (forams, echinoderms) pyritic, with traces of glauconite and weakly calcareous.

Palaeontological information indicates the Lakes Entrance Formation consists of continental slope sediments deposited in 300-400m of water.

4.3.3 Latrobe Group 2119.5-3991m (TD)

2119.5-2187m Flounder Formation

Dominantly grey to brown, glauconitic, very argillaceous siltstone containing one argillaceous, very fine to coarse-grained pyritic, 10m thick, sandstone.

2187-3991m Latrobe Coarse Clastics

The Latrobe Group reservoir section in Basker-1 may be grossly subdivided into eight major units.

1. 2187-2497.5m Barrier face/neritic deposits consisting largely of clean sandstones (porosities 25-30%) developed in several regressive marine cycles. Below 2428m the sandstones are based by a glauconitic shale (the lower Paleocene shale). This unit is in total 70m thick but contains a 15m sand body interpreted to be the slumped toe of a coastal barrier system.

2. 2497.5-2612m Back barrier/coastal plain sandstones and siltstones with thin carbonaceous mudstones. Fluvial sandstones within this unit are generally fine-grained with porosities of 20-22%. Thin coals (maximum thickness 1m) are present in this section.

3. 2612-2678m Coarsening upward coastal barrier sandstone grading downwards into marine silt and slightly glauconitic shale. The base of this sequence corresponds to the Maastrichtian marker seismic horizon.

4. 2678-2893m Back barrier sandstones interfingering with silts, lagoonal shale and thin coal beds.

5. 2893-3212m Coastal plain deposits consisting of fluvial sandstones, carbonaceous siltstones and shales, coals and some less carbonaceous, more dense siltstones and shales. Sandstones are generally fine to medium-grained, quartzose, well sorted and show fining upwards trends. These are interpreted to be mainly point bar and crevasse splay deposits. The coals typically have organic carbon contents of 60-70% and the carbonaceous siltstones and shales 20-40%. The higher density siltstones and shales have maximum organic carbon contents of about 2%.

6. 3212-3286m This section is dominated by higher density less carbonaceous, micaceous siltstones and shales, with minor thin sandstones, most with dolomite cemented layers. The top of this sequence

corresponds to the lower Campanian seismic marker.

7. 3286-3870m Interbedded volcanic and extrusive igneous rocks (largely weathered), sandstones, siltstones and shales with little carbonaceous content and very minor coal.

The igneous rocks occupy about 40% of the section in units 3 to 60m thick, but typically 20 to 30m thick. Characteristic log response is low gamma/high density/high PEF although the most highly weathered parts (usually the upper and lower parts of the units) are often badly washed out and show anomalous log response. The rocks are highly varied in colour, ranging from light to dark, pinkish to greenish greys and browns. The volcanics are amygdaloidal, the amygdales being filled with carbonate and zeolite minerals. Thin section studies show many of the volcanics have relict olivine and pyroxene phenocrysts in a matrix of feldspar paths and fine-grained mafic minerals. In places the volcanics have features of welded tuffs and pyroclastics, however it is thought that they are mainly lava flows of basaltic and andesitic composition. Weathering products are mainly clay minerals, but calcite veining is also common. Calcimetry indicates a 10 to 30% carbonate content in many places.

The sandstones are fine to coarse-grained with common calcareous cement and silty and argillaceous maturix. Siltstones and shales are micaceous and in places carbonaceous, grading to rare thin coals.

8. <u>3870-3991m (TD)</u> Volcanics are absent below 3870m and the sequence consists of interbedded sandstone, siltstone, shale and minor coal, as described above.

4.4 Geophysics

4.4.1 Structure

Pre-drill seismic inerpretation showed the Basker prospect to be a large intra-Latrobe fault trap created by the intersection of a major syndepositional fault with the gentle southwestern extension of the Sole/Dart nose. Fault closure had been mapped at all levels within the Latrobe Group at and below the Lower Paleocene transgressive shale, although the prognosed high sand content of the Maastrichtian section was expected to increase mapping risk at the uppermost levels.

Well results have been tied directly to seismic data using a synthetic seismosgram generated in-house. A good match with seismic data close to the well location was achieved after the filtered impedance log had been phase shifted by 270 degrees, implying that the DESIGN seismic data is close to zero phase. In general major geological units on electric logs could be visually correlated to reflectors at the Basker-1 location with little ambiguity.

Major markers were penetrated about 40m high on prognosed depths. AIMS-predicted velocities used in depth conversion proved approximately 2% faster in the Gippsland Limestone Formation than well shoot data (Fig. 15). This is similar to results established at neighbouring well locations and may be intrinsic to the method.

Since the discrepancy between the AIMS and well shoot data will slightly change absolute depths but not structural shape, the pre-drill structural configuration remains unchanged.

4.4.2 Seismic Markers

Depths below the derrick floor to the main seismic markers are listed below:

	Sec	m.bdf
Base Gippsland Limestone	1.39	1807m
Top Flounder Formation	1.61	2119.5m
Base Flounder Formation	1.64	2187m
Mid Paleocene Shale	1.69	2268m
Lower Paleocene Shale	1.80	2498m
Maastrichtian Marker	1.91	2678m
Intra Campanian Marker	2.03	2893m
Lower Campanian Marker	2.23	3212m
Top Volcanics	2.25	3286m

Individual hydrocarbon-bearing reservoir units in Basker-1 are not resolvable by the seismic due to their thinness and the lack of impedance contrast between the sandstones and the carbonaceous mudstones which dominate the paludal environment. A black loop at 2.16 seconds includes a package containing the production tested sandstones between 3090 and 3098m. It is thought the the loop may be generated partially by coals but is largely from acoustic interfaces (boundaries of major depositional units) above and below the oil-bearing sequence.

4.5 Hydrocarbon Indications

The top of significant gas and oil shows in Basker-1 occurred at depths of 2810m and 2985m bdf respectively.

Gas readings in excess of 100 units (20,000 ppm) are associated with coals below 3000m and in sandstones below 3088m. Analysed C_1 percentage is substantially less than at equivalent stratigraphic levels in Volador, averaging 85%, and traces of C_5 were reported.

Moderate oil indications were observed in scattered thin sands between 3090 and 3245m. Spotted dull blue-yellow sample fluorescence and a straw yellow crush cut occur in sandstones in the intervals 3088-3096m and 3220-3231m, associated with increased background gas. Sandstones recovered in the core did not contain visible hydrocarbon indications. RFT samples were taken from three sandstones showing significant hydrocarbon saturations on the logs (see Section 3.8.2) and production tests were carried out over the intervals 3090-3094m, 3095-3098m and 3128.5-3132m (see Section 3.9).

Gas levels decreased through the volcanic section, only increasing opposite some of the thin, interbedded coals. Sandstones associated with these coals had traces of spotty fluorescence.

Below 3870m (the base of the volcanic section) coal and carbonaceous shale increased with associated peaks on ditch gas measurements. The sandstone between 3850m and 3857m showed a dim pale yellow spotted fluorescence, giving a fast streaming bright white cut fluorescence and leaving a dim white, thin film residue fluorescence. A second sandstone from 3867m to 3871m also had yellow fluorescence, giving a fast streaming blue-white cut fluorescence with a trace of oil in the mud. Gas values in the sands were a maximum of 9.62%. Both of these sands were very fine to fine-grained having a considerable amount of argillaceous matrix and low visible porosity. A sand unit logged between 3949-3958m showed a slight resistivity separation.

This body drilled relatively quickly and was medium grained. RFT's however recovered only small amounts of mud filtrate indicating it to be relatively tight.

4.6 Reservoir Potential

Reservoir quality of the upper Latrobe barrier sandstones is excellent, as the sands are clean, well sorted and quartzose. Porosity values are up to 30.5%, with an average value of about 27%. All these sandstones were water bearing.

Sandstones in the Campanian coastal plain sequence underlying the barrier sands are quartz arenites with subordinate feldspar, partly or wholly replaced by authigenic clay. Average porosities range from 26% at 2675m to 20% at 3285m bdf.

A cored waterbearing sand at 3113-3117m, between the two tested oil zones, provides a porosity/permeability relationship at these depths. This unit fines upwards from coarse sand to silt grade; plug-measured porosities and permeabilities decreased correspondingly from about 24% and 1 D respectively to 15% and 10 mD. A detailed sedimentological description of the cored interval is given in Appendix 6.3. The tested oil sands have average porosities around 23% and deduced permeabilities approaching 1 Darcy.

The majority of sandstones in this Campanian sequence fine upwards and are interbedded with carbonaceous shales and coals, suggesting they are point bar sandstones. Occasional coarsening upward sandstones are probably crevasse splay deposits, although the possibility exists that they may be a distal part of an alluvial fan complex.

4.6.1 Geodip Interpretation

The upper production tested sand units (3090-3098m) in Basker-1 have a blocky gamma ray log character at 1:1000 scale (Encl. 4) scale, and a dominant easterly dip, which distinguishes them from the typical point bar sandstones in this section. However, the high resolution GEODIP resistivity curves shows the interval to be composed of about seven stacked units (Encl. 4). The lower 5m is made up of at least four fining-up sands which culminate in sealing carbonaceous shale, whereas the upper 3m comprises a small fining up unit overlain by several coarsening-up units. The fining-up units, which mainly show northeasterly dip directions, are interpreted as point bar deposits; these culminate in two instances in flood-plain (lacustrine) shales. The overlying coarsening up units, which have a dominant easterly dip, are interpreted as crevasse splay deposits. The sand tested by Production Test No.2 (3128-3131.5m) in Basker-1 is also composed of many small fining-up sand units, and culminates in a coarsening-up unit.

4.7 Source Rocks

Campanian source rock sequences were penetrated in Basker-1 above and below the volcanics. The sequence below the volcanics consisted of interbedded carbonaceous shales (TOC up to 22%) sandstones and coal (TOC up to 71%) and is mature for oil generation (% VRE 0.75-0.90) in the Basker structure. Vertical migration of oil into the trap from these source rocks would be inhibited by the intervening volcanics and shales, and would have to rely on movement up faults.

The Late Campanian section above the volcanics in Basker-1 also consists of interbedded fluvial sandstones, carbonaceous shales (TOC up to 34%) and coal (TOC up to 76%). Although immature in Basker (% VRE 0.5-0.7), this source rock sequence enters the oil generating window in the deeper kitchen to the south where, on the basis of its seismic expression, it has a thickness of between 500 and 800m. Lateral migration probably occurred through the intraformational sandstones in the sequence.

4.8 Well Correlation

The upper Latrobe marine cycles can be correlated easily between Basker and the surrounding wells. However within the Campanian section individual sandstones are too thin and laterally restricted to be correlated (Encl. 5). Regionally, sand percentage and average sand thickness in the Campanian and older section increase northwards towards the rift margin, while the overall section thins. Sandstone percentage in Basker-1 between the intra and lower Campanian markers was 18% while in Volador-1 it was 9%. Basker-1 lies in an intermediate position between the wholly paludal facies near the axis of the rift (e.g. Volador-1) and the alluvial fan facies near its margins (e.g. Hammerhead-1), where the section is nearly 100% sandstone.

4.9 Conclusions and Contributions to Geological Knowledge

1. The lithological sequence encountered in Basker-1 was close to that predicted from surrounding well control and seismostratigraphic studies, with the exception of the presence of volcanic rocks below 3286m. The volcanics are andesitic to basaltic in composition and are thought to be flows asociated with the rift phase of the Gippsland Basin development. Similar volcanics were found in Stonefish-1 and Tuna-1 to the west.

2. The onset of significant gas and oil shows occur at stratigraphically younger levels in Basker-1 compared to Volador-1. Vitrinite reflectance data suggest the onset of gas to be at a level corresponding to a vitrinite reflectance of about 0.53%, with oil shows starting at a vitrinite reflectance of about 0.57% (compared to Volador 0.68 and 0.72% respectively). Analysis of gas from RFT and production tests indicate a lower CO_2 content (up to 17%) than Volador-1, where the average was 30%. Both these observations suggest that migration within the Campanian section has been more effective in Basker. No evidence of migration into the overlying marine cycles has been found.

3. Sandstones in the prospective section (between the intra and lower Campanian markers) are thin, with an average thickness of 2-3m, and are unresolvable by the seismic, and hence unmappable. As most of the sandstones are point bar deposits they are likely to be of limited lateral extent. Production test data from the interval 3090-3098m also supports this conclusion as it indicates a permeability barrier about 300m from the well, significantly less than the distance to the interpreted boundary fault, and probably representing the edge of a fluvial channel.

4. RFT measurements indicate the upper production-tested interval (3090-3098m) was penetrated approximately 10m from its oil/water contact. Other thinner oil-bearing sands are interpreted from RFT data to have been intersected close to their oil/water contacts. Reserve estimates imply a non-commercial accumulation.

5. REFERENCES

1. R4623 Report of Survey of Basker-A, Block VIC/P19, Gippsland Basin. BTW 1983.

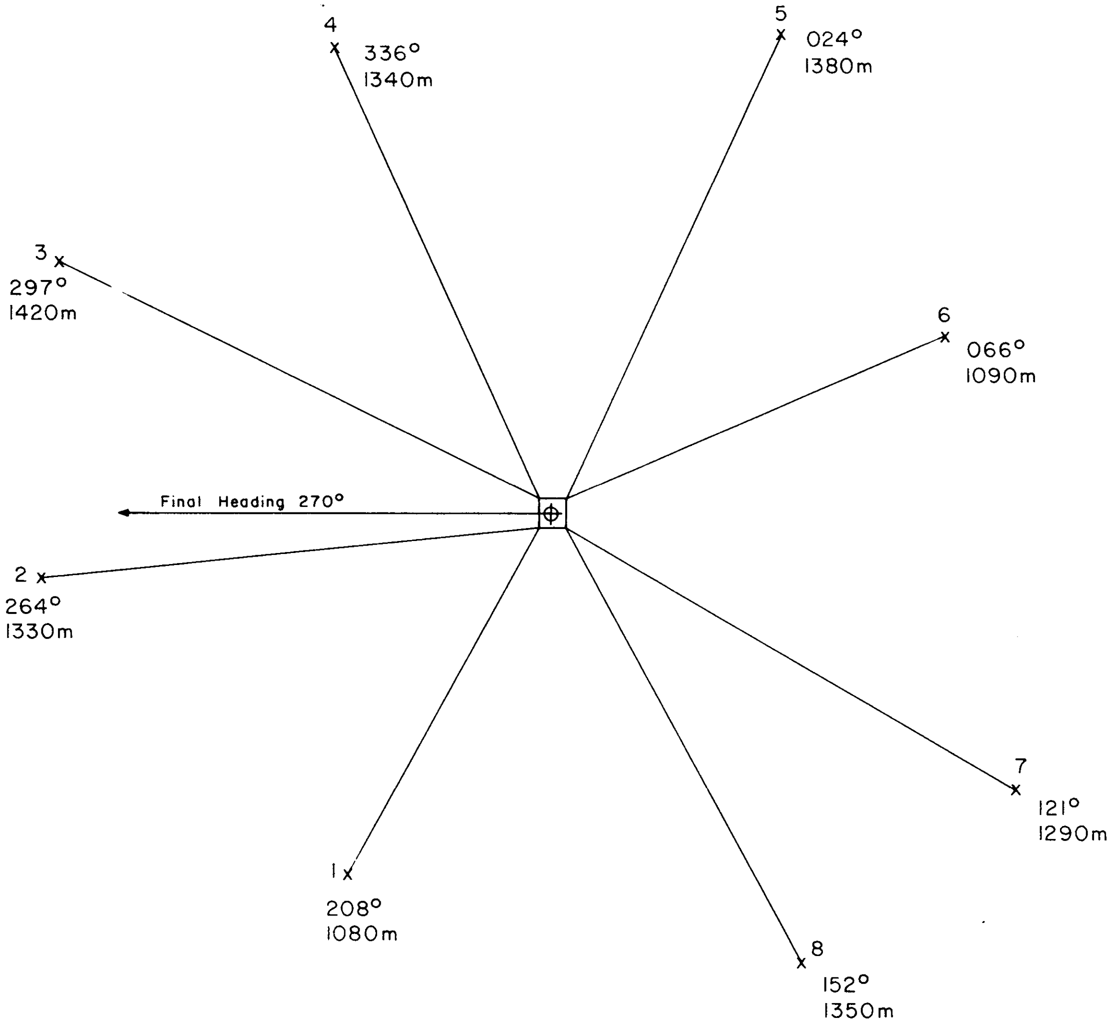
2. SDA 495 Rig Location Report of Nymphea over Basker No.1, Gippsland Basin Permit VIC/P19. G.M. Mason, 1983.

3. R4877 Final Well Report - Basker-1. Exlog, 1983.

4. SDA 556 Basker-1 Basic Data, Permit VIC/P19. Shell Development (Aust.), 1983.

5. SDA 556 Report on Well Velocity Survey. Schlumberger, 1983 (in Basker-1 Basic Data).

6. SDA 543 Basker-1 Production Test Results and Pressure Analysis. T. Carlson and I. Soylemezoglu, 1984.

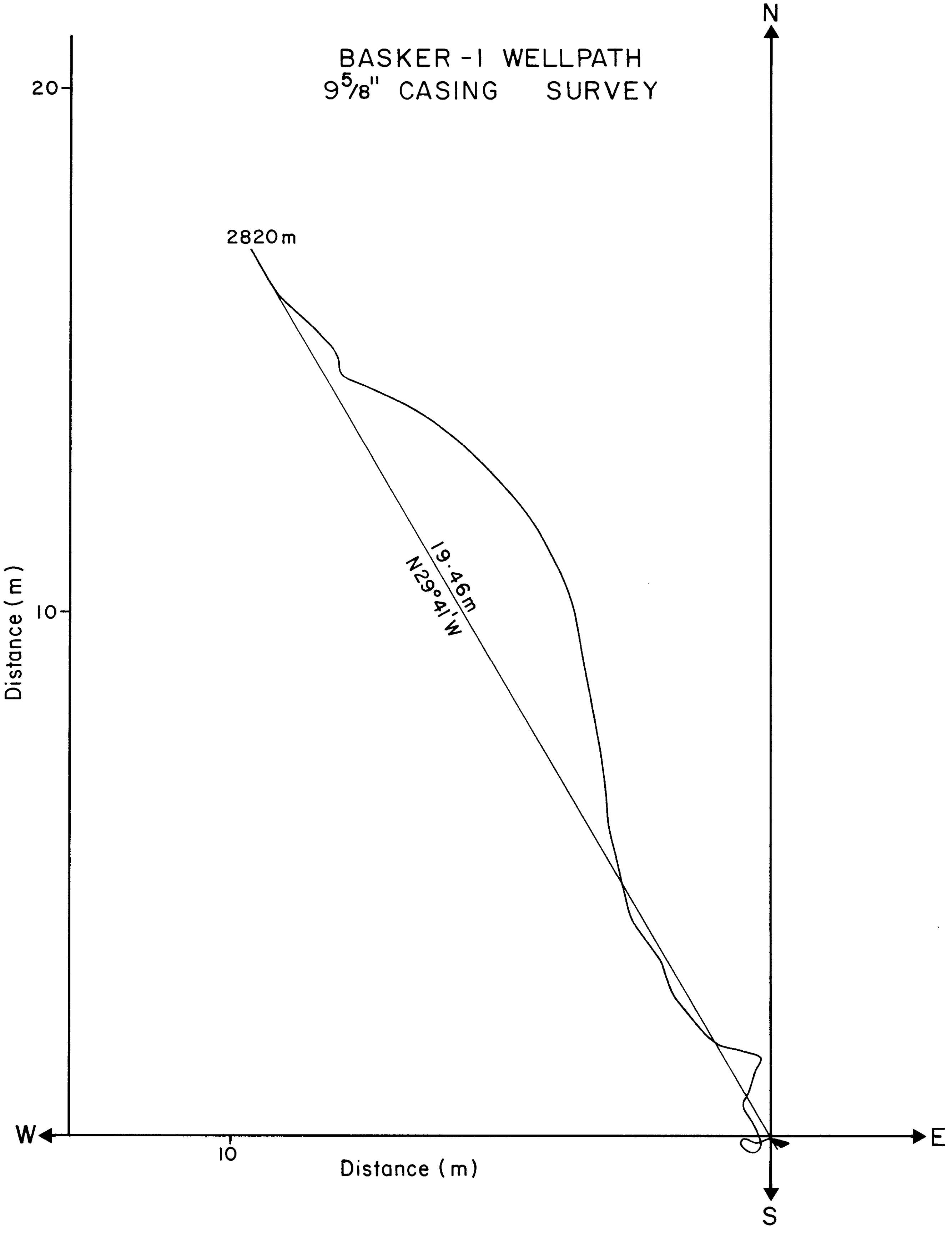


SHELL - AUSTRALIA E.& P. OIL AND GAS.

GIPPSLAND BASIN

ANCHOR PATTERN AND HEADING OF NYMPHEA AT BASKER-1 FINAL COORDINATES 38° 18' 26·5"S 148° 41' 53·2"

Author: EXN/1	Date: August 1983	Fig: 3
Report No.: SDA 525	Drawing No.: 17062	



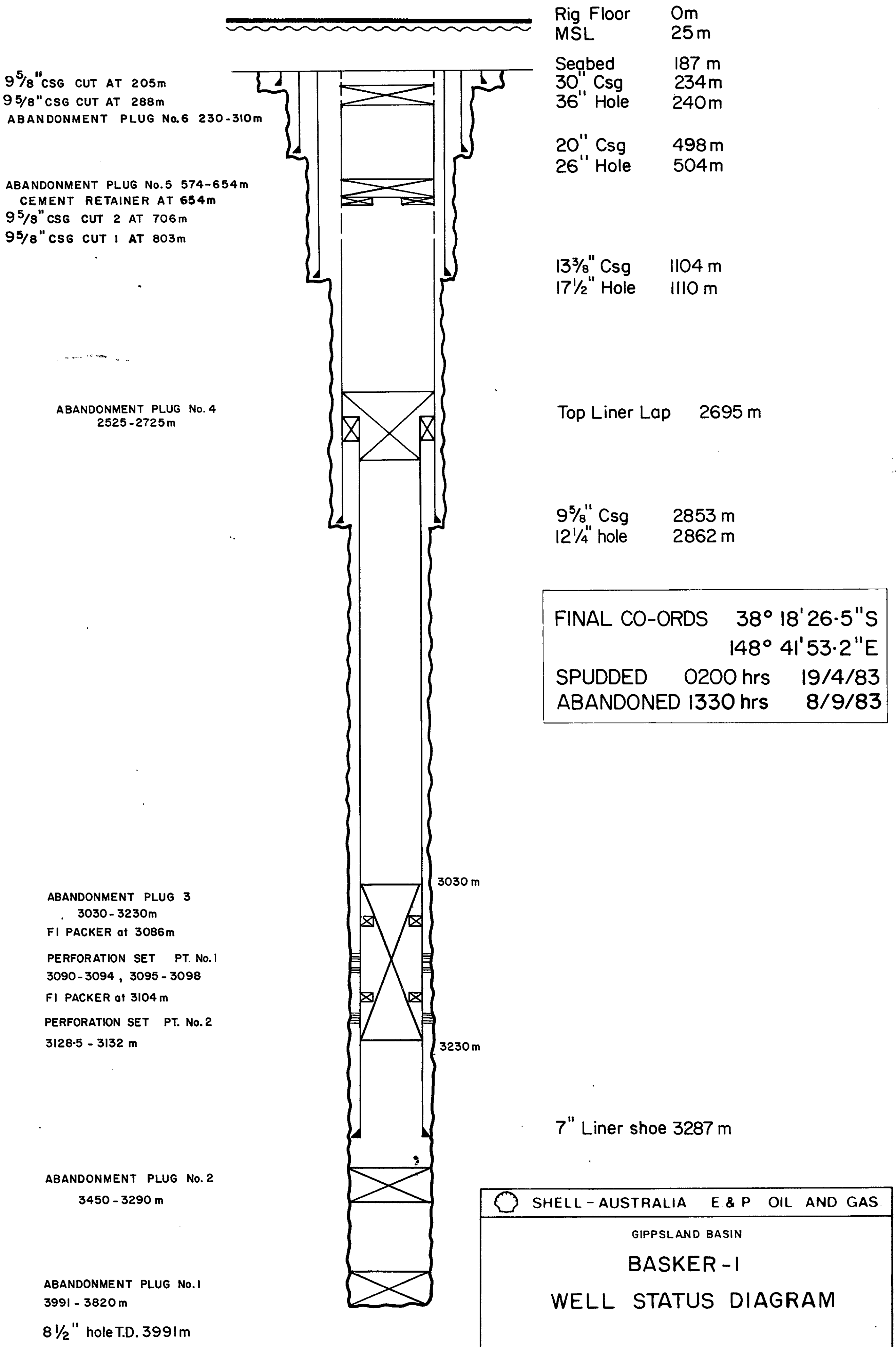
SHELL - AUSTRALIA E.& P. OIL AND GAS.

GIPPSLAND BASIN

BASKER – I

PLAN VIEW OF WELL PATH

Author: EPE / I	Date: October 1983	Fig. 4
Report No.: SDA 525	Drawing No.: 17549	



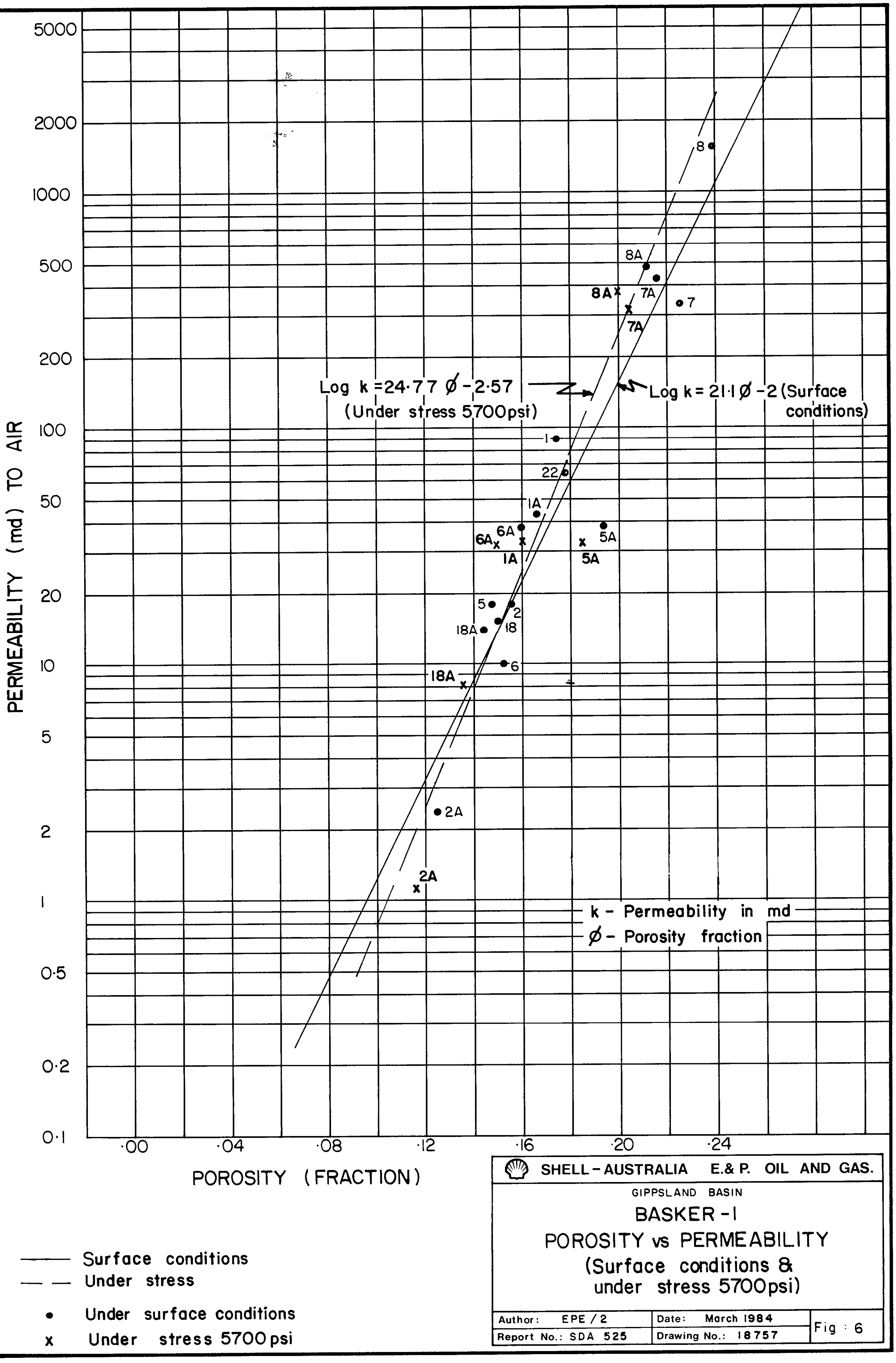
SHELL - AUSTRALIA E & P OIL AND GAS

GIPPSLAND BASIN

BASKER - 1

WELL STATUS DIAGRAM

Author EPE/1	Date August 1983	Fig. 5
Report No. SDA 525	Drawing No 17023	



SHELL - AUSTRALIA E.& P. OIL AND GAS.

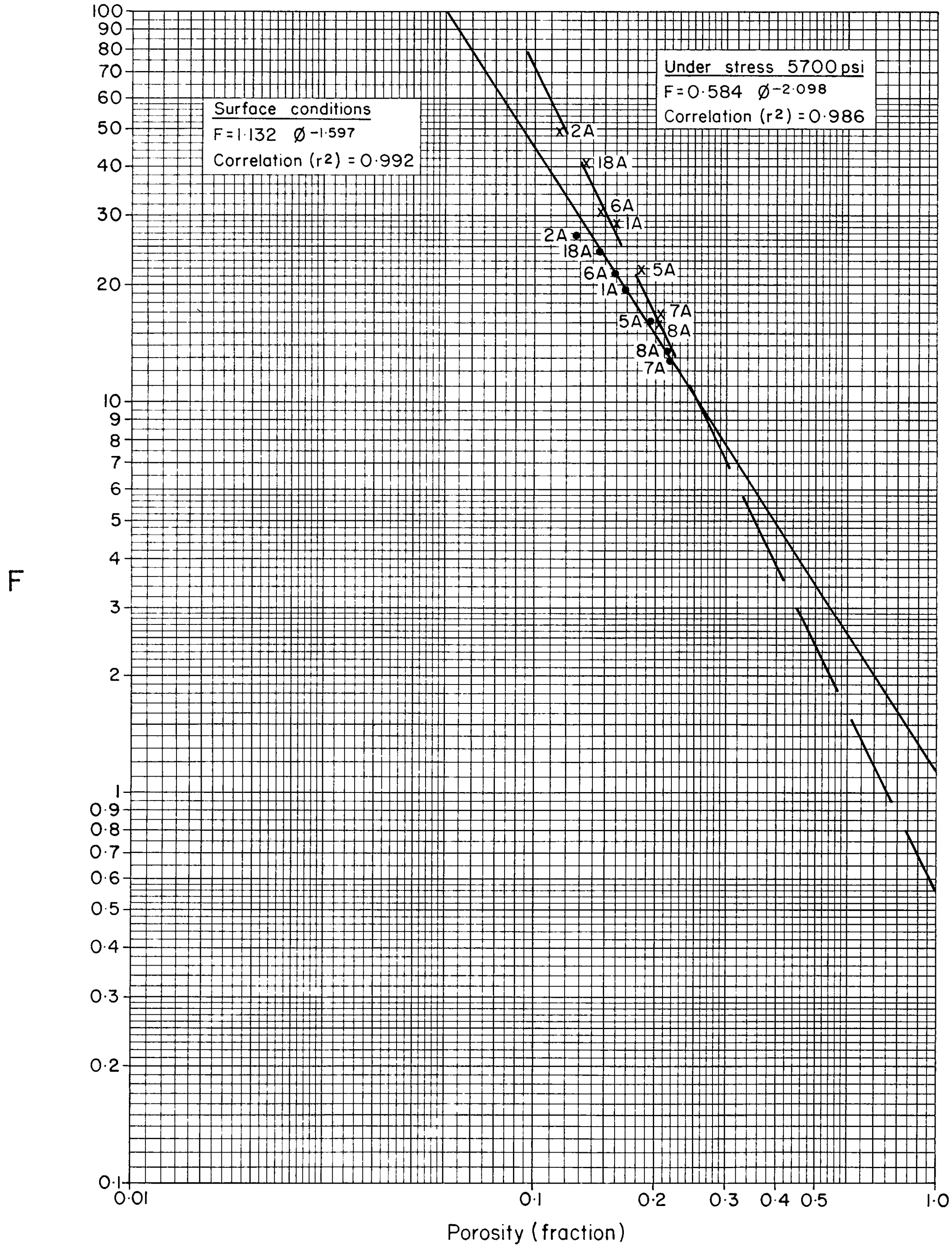
GIPPSLAND BASIN

BASKER - I

POROSITY vs PERMEABILITY

(Surface conditions & under stress 5700psi)

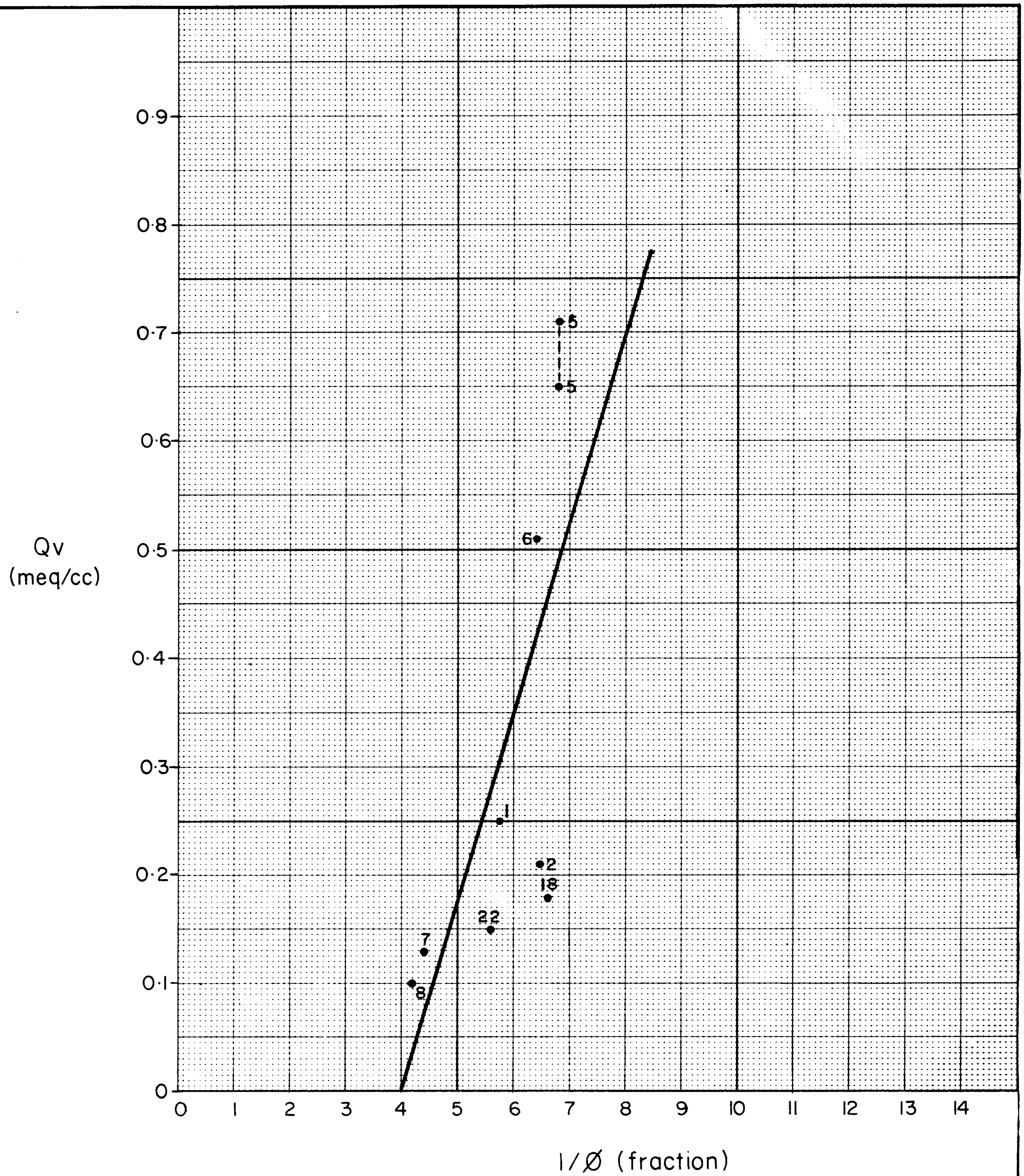
Author: EPE / 2	Date: March 1984	Fig : 6
Report No.: SDA 525	Drawing No.: 18757	



• Surface conditions

x Under stress 5700 psi

SHELL - AUSTRALIA E.& P. OIL AND GAS.		
GIPPSLAND BASIN BASKER - I FORMATION FACTOR VS POROSITY (Surface conditions and under stress 5700psi)		
Author: EPE/2	Date: March 1984	Fig: 7
Report No.: SDA 525	Drawing No.: 18756	



$$Qv = \frac{\cdot 25 - \text{Porosity}}{1{\cdot}45 \times \text{Porosity}}$$

Correlation (r^2) = ·490

SHELL - AUSTRALIA E.& P. OIL AND GAS.

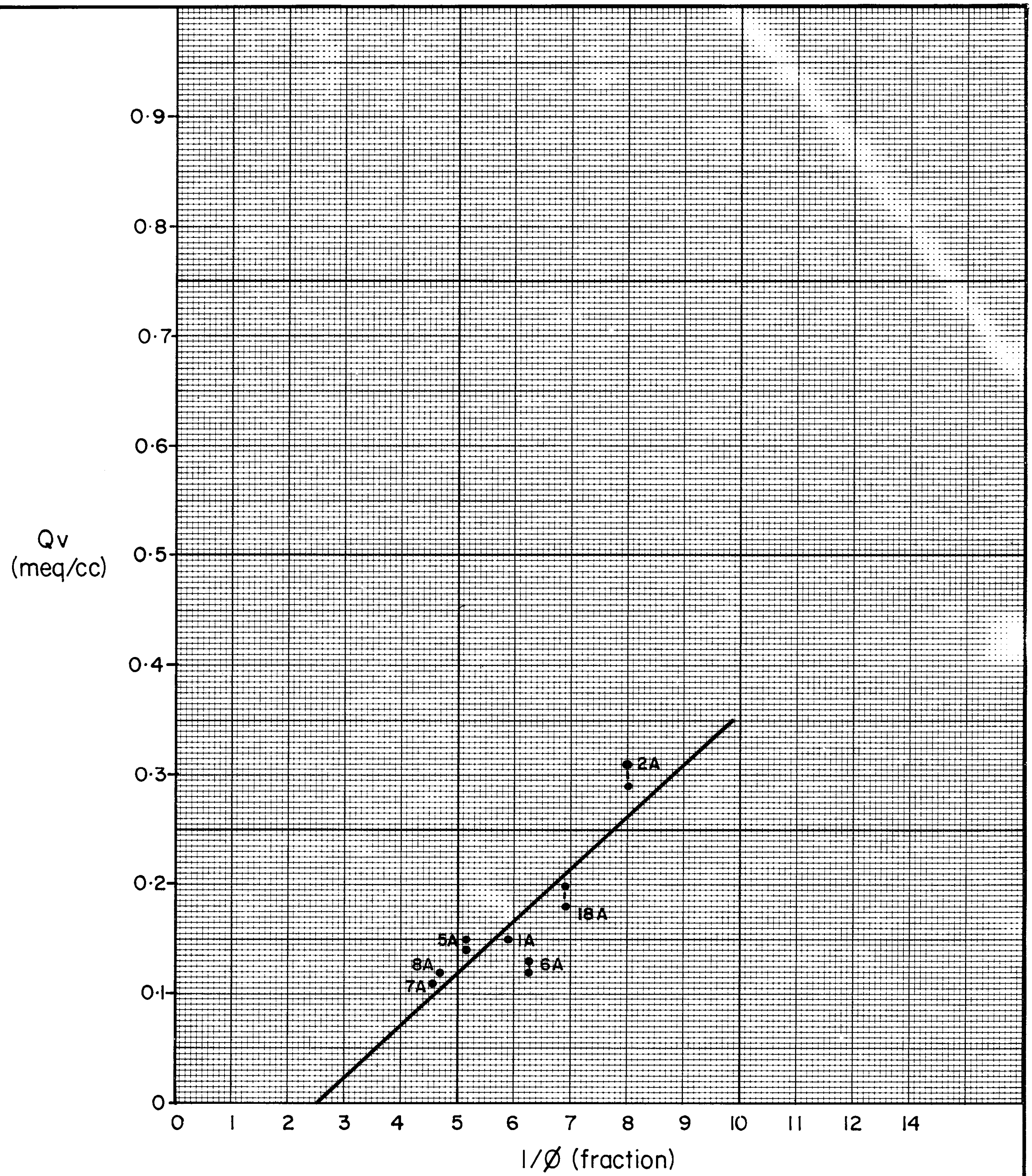
GIPPSLAND BASIN

BASKER - I

Qv vs POROSITY

(Qv measurements by ANALAB)

Author: EPE/2	Date: March 1984	Fig. 8
Report No.: SDA 525	Drawing No.: 18754	



$$Qv = \frac{\cdot 387 - Porosity}{8 \cdot 0 \times Porosity}$$

Correlation (r^2) = ·760

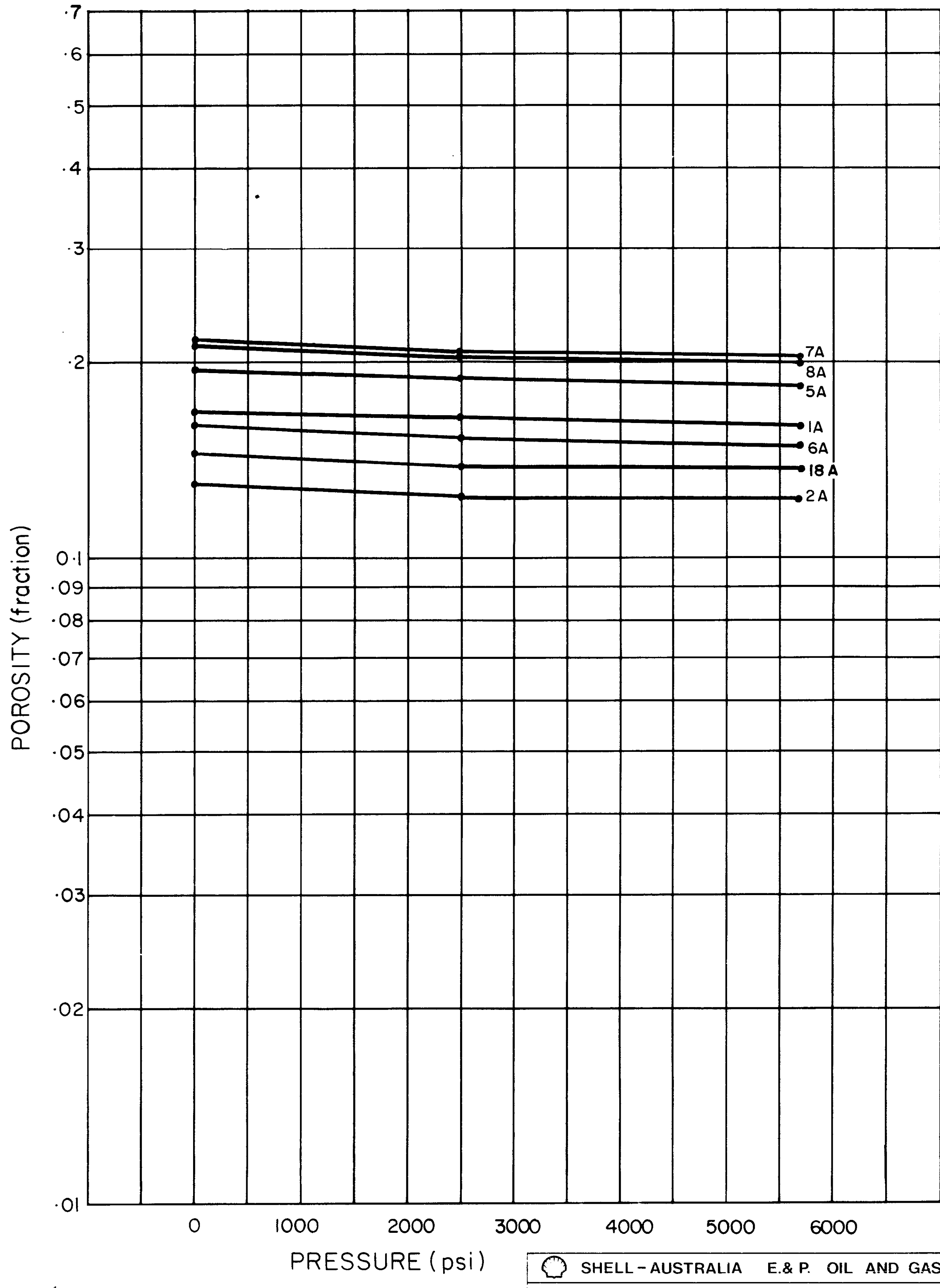
SHELL - AUSTRALIA E.& P. OIL AND GAS.

GIPPSLAND BASIN

BASKER-1

Qv vs POROSITY
(Qv measurements by Corelab)

Author: EPE / 2	Date: March 1984	Fig: 9
Report No.: SDA 525	Drawing No.: 18759	



SHELL - AUSTRALIA E.& P. OIL AND GAS.

GIPPSLAND BASIN

BASKER-1
POROSITY REDUCTION
WITH PRESSURE

Author: EPE/2	Date: March 1984	Fig: 10
Report No.: SDA 525	Drawing No.: 18758	

PE905409

This is an enclosure indicator page.
The enclosure PE905409 is enclosed within the container PE902560 at this location in this document.

The enclosure PE905409 has the following characteristics:

ITEM_BARCODE =	PE905409
CONTAINER_BARCODE =	PE902560
NAME =	Basker 1 Capillary Pressure Curve
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Basker 1 Capillary Pressure Curve (fig 12)
REMARKS =	
DATE_CREATED =	31/10/83
DATE_RECEIVED =	28/03/84
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell Australia Exploration and Production. Oil and Gas.
CLIENT_OP_CO =	Shell Australia Exploration and Production. Oil and Gas.

(Inserted by DNRE - Vic Govt Mines Dept)

PE905408

This is an enclosure indicator page.
The enclosure PE905408 is enclosed within the container PE902560 at this location in this document.

The enclosure PE905408 has the following characteristics:

ITEM_BARCODE =	PE905408
CONTAINER_BARCODE =	PE902560
NAME =	Basker 1 Permeability (horizontal) reduction with P.
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Basker 1 Permeability (horizontal) reduction with Pressure
REMARKS =	
DATE_CREATED =	31/05/84
DATE_RECEIVED =	28/03/84
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell Australia Exploration and Production. Oil and Gas.
CLIENT_OP_CO =	Shell Australia Exploration and Production. Oil and Gas.

(Inserted by DNRE - Vic Govt Mines Dept)

PE905410

This is an enclosure indicator page.
The enclosure PE905410 is enclosed within the container PE902560 at this location in this document.

The enclosure PE905410 has the following characteristics:

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CONTAINER_BARCODE = PE902560
             NAME = Basker 1 Corrected press. & fluid
                    recov. from RFT
            BASIN = GIPPSLAND
           PERMIT = VIC/P19
             TYPE = WELL
          SUBTYPE = DIAGRAM
      DESCRIPTION = Basker 1 Corrected Pressure and fluid
                    Recovery from RFT
          REMARKS =
     DATE_CREATED = 31/07/83
    DATE_RECEIVED = 28/03/84
             W_NO = W812
        WELL_NAME = Basker-1
       CONTRACTOR = Shell Australia Exploration and
                    Production. Oil and Gas.
     CLIENT_OP_CO = Shell Australia Exploration and
                    Production. Oil and Gas.
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(Inserted by DNRE - Vic Govt Mines Dept)

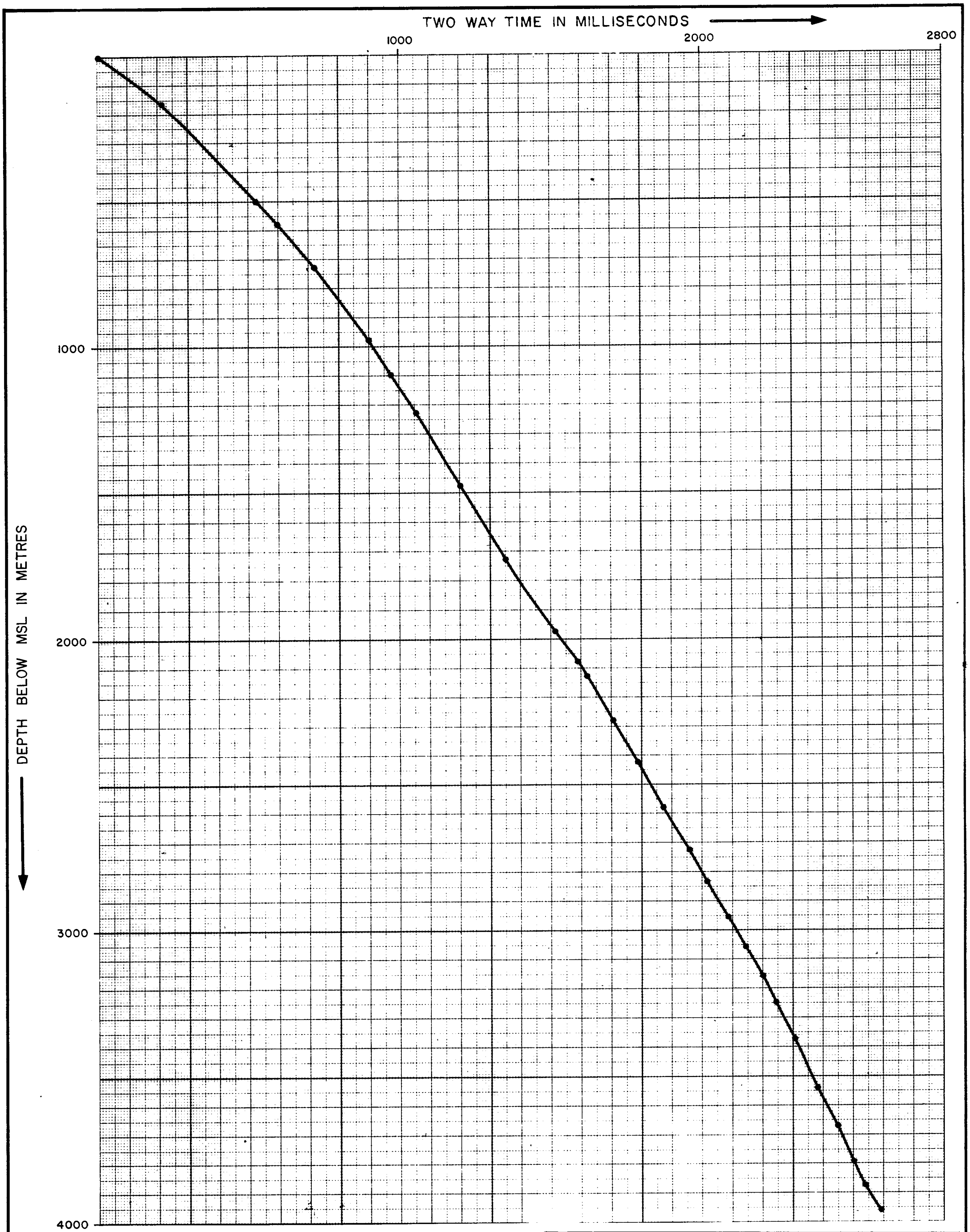
PE905411

This is an enclosure indicator page.
The enclosure PE905411 is enclosed within the container PE902560 at this location in this document.

The enclosure PE905411 has the following characteristics:

ITEM_BARCODE =	PE905411
CONTAINER_BARCODE =	PE902560
NAME =	Basker 1 Drilling Time Graph
BASIN =	GIPPSLAND
PERMIT =	VIC/P19
TYPE =	WELL
SUBTYPE =	DIAGRAM
DESCRIPTION =	Basker 1 Drilling Time Graph
REMARKS =	
DATE_CREATED =	31/08/83
DATE_RECEIVED =	28/03/84
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell Australia Exploration and Production. Oil and Gas.
CLIENT_OP_CO =	Shell Australia Exploration and Production. Oil and Gas.

(Inserted by DNRE - Vic Govt Mines Dept)



SHELL-AUSTRALIA E.& P. OIL AND GAS.

GIPPSLAND BASIN

BASKER-1
TIME-DEPTH CURVE

Author: EXH/4	Date: March 1984	Fig 15
Report No.: SDA 525	Drawing No.: 18755	

I.D. 0410B/0049B

APPENDIX 6.1

THE FORAMINIFERAL SEQUENCE IN BASKER-1

THE FORAMINIFERAL SEQUENCE
in
BASKER # 1,
GIPPSLAND BASIN.

for: SHELL DEVELOPMENT (AUSTRALIA) PTY. LTD.

August 11, 1983.

David Taylor,
23 Ballast Point Road, Birchgrove, 2041
AUSTRALIA. *(02) 810 5643*

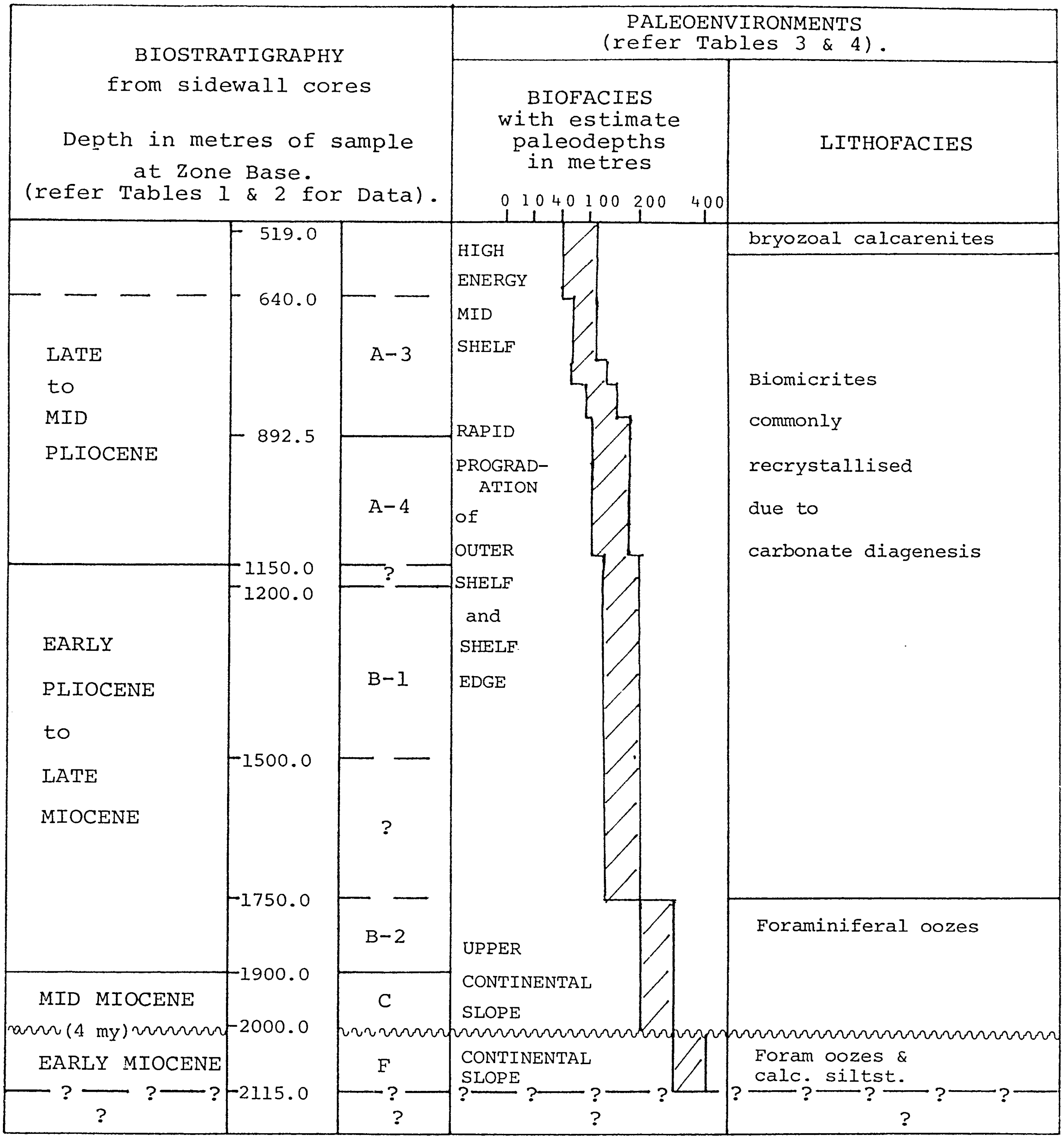


FIGURE 1: INTERPRETED FORAMINIFERAL SEQUENCE for BASKER # 1.

~~(4 my)~~ = hiatus with time span in parentheses.

To scale of 1cm = 100m.

—?—?—?— = no data below deepest sample examined at 2115m.

David Taylor August 10, 1983.

INTRODUCTION.

Fifty three sidewall cores were submitted from BASKER # 1 between 519 and 2115 metres. All contained foraminifera, but no pre-Miocene faunas were found as the deepest sample (at 2115m) contained a Zone F assemblage which represents the uppermost part of the Early Miocene.

The following Figures and Tables constitute this report:-

FIGURE 1 : *INTERPRETED FORAMINIFERAL SEQUENCE* based on Tables 2 to 4.

FIGURE 2 : *LATE NEOGENE PROGRADED and CANYON FILL SEQUENCES* using Hapuku #1, Basker #1, Flounder #5, Volador #1 and Hammerhead #1 as examples.

TABLE 1 : *BIOSTRATIGRAPHIC DATA SUMMARY* with reliability of zonal picks.

TABLE 2 : *PLANKTONIC FORAMINIFERAL DISTRIBUTION.*

TABLE 3 : *SELECTED BENTHONIC FORAMINIFERAL DISTRIBUTION.*

TABLE 4 : *PALEOENVIRONMENTAL ANALYSIS* based on Tables 2 & 3.

EARLY MIOCENE - ZONE F - 2115 to 2025m and EARLY/MID MIOCENE HIATUS at 2020m (E-Logs).

A deep water continental slope deposit which contains well developed Zone F assemblages.

A hiatus was apparent as 2025m contained *Globigerinoides bisphericus, Globorotalia miozea miozea, G. praescitula* and *G. zealandica,* whilst the sample at 2000m had a distinctly different planktonic assemblage with *G. miotumida, G. scitula* and *Globigerina nepenthes,* indicating a Zone C designation. Therefore the Early to Mid Miocene transition Zones E-2, E-1, D-2 and D-1 were absent. The time span of this hiatus was of the order of 4 million years. A similar Mid Miocene hiatus was recorded in other wells drilled along the eastern part of the Gippsland Basin Deep (refer Figure 2 - this report). In Hapuku #1 and Flounder #5, Zone C was directly above Zone D-2, with Zone D-1 absent, so that the extent of the hiatus was not as great as in Basker # 1.

MID MIOCENE to PLIOCENE - ZONES C, B-2, B-1, A-4 & A-3 - 2000 to 657m.

This sequence appears to have been a continuous one with all zones present, despite lack of biostratigraphic precision at some levels (e.g. Zone B-2/B-1 boundary) due to poor preservation, resulting from carbonate diagenesis.

The sequence of biostratigraphic events are very close to those recorded by Kennett (1973) in the Tasman Sea. *Globorotalia margaritae* was more numerically frequent and more morphologically typical, than in other Gippsland sequences; this species was much rarer and less typical in Hapuku #1 and Flounder #5. This occurrence pattern suggests that Kennett's (l.c.) warm sub-tropical Pliocene faunas did reach Eastern Gippsland but these warm waters cooled rapidly in the western direction.

Biostratigraphically diagnostic species were absent at the top of the sequence from 640 to 519m, reflecting a combination of water temperature decline and a more sheltered, shallow shelfal location. Probably the Plio/Pleistocene boundary was within this interval, but Zone A-2 could not be identified.

LATE NEOGENE PROGRADATION - refer also to FIGURE 2.

Zones C & B-2 sediments (2000 to 1750m) were rich in planktonic foraminifera and the benthonic assemblages indicated the uppermost part of the continental slope as the depositional environment.

Above 1750m, rapid progradation was evident with decrease in paleo-water depth. A feature of the benthonic foraminiferal assemblages was the sporadic presence of detrital specimens, misplaced from their inner shelf habitat, out onto a prograding shelf edge. Another phenomena recognised in some assemblages was the dominance of the lens shaped *Cassidulina leavigata* and spherical *Lagena* spp. Also there tended to be a dominance of one size range; for example, very small globigerinids recorded on Table 2 as *G'ina* & *G'alia* indet (<.2mm). This size and shape sorting is evidence of winnowing by high energy bottom currents. The pyritic infilling of many foraminiferal tests is indicative of rapid burial, associated with the high energy transport and progradation.

The *Virgulina* and *Euuvigerina bassensis* Biofacies within the Pliocene Zone A-3 interval in both Basker #1 and Hapuku #1, contains a high percentage of Buliminacea, reflecting low oxygenation. Most of these buliminids, as listed on Table 3, occur within the Pliocene Jemmys Point Formation near Lakes Entrance (Nicholls, 1968). However, they are not as frequent at Lakes Entrance or other Gippsland Pliocene localities (e.g. Flounder #5) as they are are in Basker and Hapuku (refer Figure 2).

The misplaced shallow water species in Basker #1 (refer Table 3) and in Flounder #5 (refer Figure 2) are infrequent, compared with their occurrences in shallow water deposits in the Lakes Entrance area (Nicholls, 1968). Above 640m in Basker #1, a few of these shallow water species occur without evidence of misplacement. They are associated with rich accumulations of bryozoal debris of fresher appearance than the worn skeletal material lower in the section. A decline in planktonic specific diversity, and thus biostratigraphic control, at 640m has been discussed. These observations may be evidence of the termination of progradation and establishment of a mid shelfal platform situation, in the Late Pliocene, with the water depth slightly shallower than at present, due to the Late Pliocene regression. A similar situation occurred at Flounder #5 (refer Figure 2).

Neither the misplaced shallow water species or the bryozoal-rich mid shelf facies of Basker #1 and Flounder #5 were present in the Pliocene of Hapuku #1. However, Hapuku #1 has a well developed *Virgulina* and *Euuvigerina bassensis* Biofacies in common with Basker #1, although it commences slightly later in Hapuku. This distribution pattern of biofacies in the three sequences (refer Figure 2) shows that Hapuku #1 was in a deeper water location and Flounder #5 in a slightly shallower one relative to Basker #1 during the late Neogene shelfal progradation phase.

The relative thicknesses of the late Neogene Zones in the three sections reflect a seaward progression of the shelf edge:-

i) the oldest Zone in the prograding sequence (Zone C) is thickest in Flounder #5;

ii) Zones B-1 and B-2 are thickest in Basker #1;

iii) substantial accumulation took place in the mid Pliocene Zone A-4 in Hapuku as the shelf edge prograded out to this deeper water situation.

The Volador #1 and Hammerhead #1 sequences are also plotted on Figure 2, but these sections contain a totally different set of depositional environmental characteristics, compared with Basker #1, Hapuku #1 and Flounder #5. Canyon fill carbonates accumulated in both Volador and Hammerhead, rather than the prograded sequences of the other three wells. Also Zone D-1 was represented in Volador and Hammerhead, but was absent in the other three wells, suggesting that D-1 sediment may have been removed from some localities to provide canyon fill in others.

The shelf edge regime during the Late Neogene of the Gippsland Basin appears to have been as complex then as it is now with sediment removal in one place, canyon filling in a second and progradation in a third. This confused attempts at arranging Figure 2 as a geographic section.

REFERENCES.

KENNETT, J.P., 1973 - Middle and Late Cenozoic Planktonic Foraminiferal Biostratigraphy of the Southwest Pacific - DSDP Leg 21. *Burns, R.E., Andrews, J.E., et al, Initial Reports Deep Sea Drilling Project, 21;* 575-639.

NICHOLLS, D.R., 1968 - Studies in Victorian Foraminifera from Above the *Orbulina universa* datum, *unpublished Thesis, University of Melbourne*.

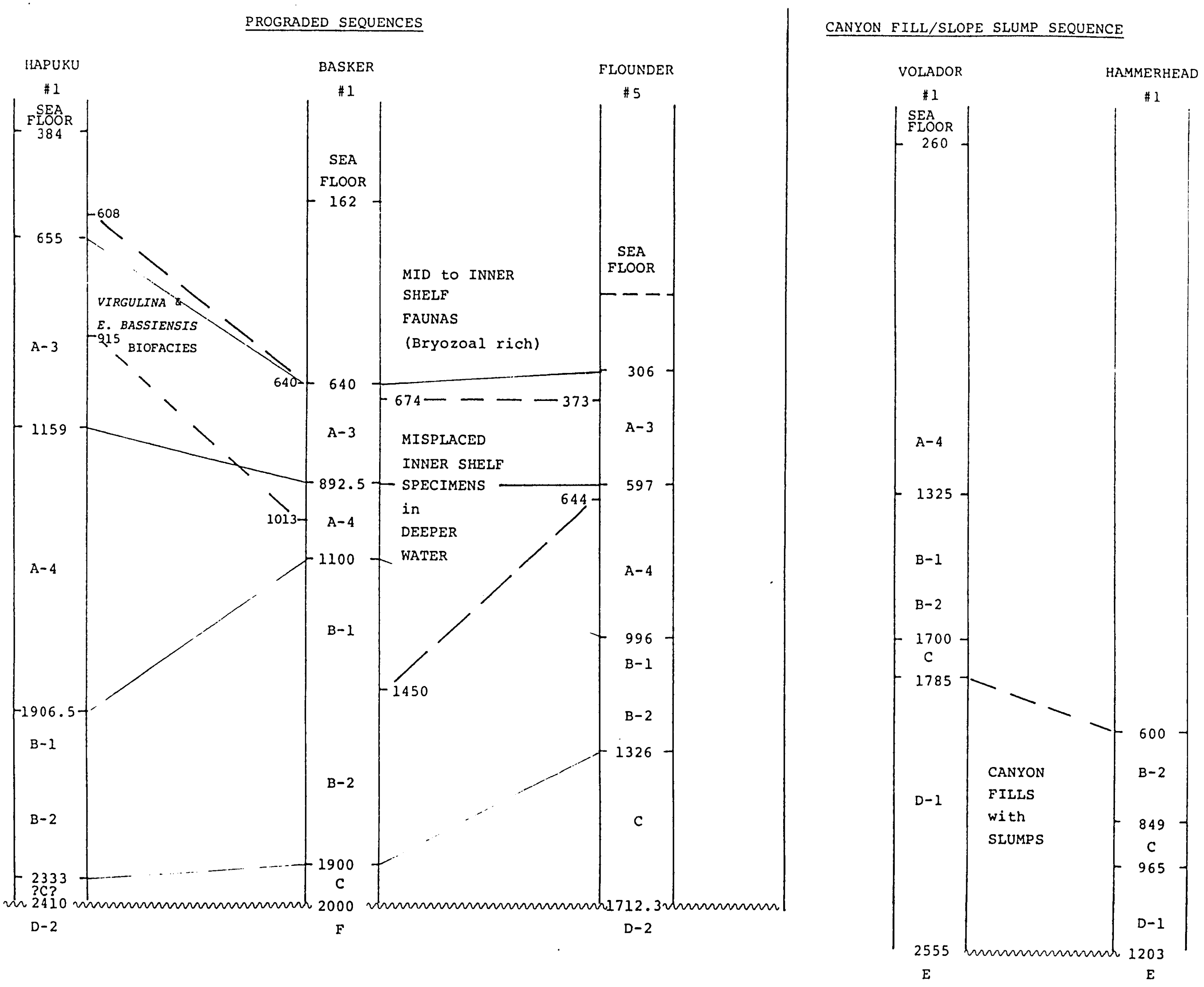


FIGURE 2: LATE NEOGENE PROGRADED and CANYON FILL SEQUENCES - EASTERN SHELF EDGE of GIPPSLAND BASIN.

Basker Report
David Taylor, August 10, 1983.

MICROPALEONTOLOGICAL DATA SHEET

BASIN: GIPPSLAND ELEVATION: KB: 25.3m GL: -162m

WELL NAME: BASKER # 1 TOTAL DEPTH:

AGE		FORAM. ZONULES	HIGHEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time	LOWEST DATA Preferred Depth	Rtg	Alternate Depth	Rtg	Two Way Time
PLEISTOCENE		A_1										
		A_2										
PLIOCENE		A_3	657	1				892.5	0			
		A_4	912	1	929	0		1150	1	1013	0	
		B_1	1250	2	1450	0		1500	1			
MIOCENE	LATE	B_2	1800	0				1900	0			
		C	1950	0				2000	0			
	MIDDLE	D_1										
		D_2										
		E_1										
		E_2										
	EARLY	F	2025	1	2050	0		2115	0			
		G										
		H_1										
OLIGOCENE	LATE	H_2										
		I_1										
		I_2										
	EARLY	J_1										
		J_2										
EOCENE		K										
		Pre-K										

COMMENTS: Deepest sidewall core submitted was at 2115.

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: David Taylor DATE: 10/8/1983.

DATA REVISED BY: DATE:

SIDEWALL CORES Depth in metres	G'oides bisphericus	G'oides trilobus	G'ina woodi connecta	G'ina woodi woodi	G'ina bulloides	G'alia zealandica (S.S.)	G'alia bella	G'alia continuosa	G'alia siakensis/mayeri	G'quad advena	G'quad dehiscens (S.S.)	Cat. dissimilis	Ss. disjuncta	G'alia miozea miozea	G'alia praescitula	G'alia continuosa	G'alia peripheronda	Orb. bilobata	Orb. universa	G'ina nepenthes	G'ina falconensis	G'alia miotumida	G'alia miozea conoidea	G'alia scitula	G'alia panda	Ss. seminulina	G'alia acostaensis	G'ina & G'alia indet (<.2mm)	G'alia humerosa	G'alia menardii	G'alia conomiozea	G'quad altispira	G'ina decoraperta	G'alia puncticulata	G'alia crassaformis	G'alia margaritae	G'alia inflata	G'oides sacculifera	G'oides conglobatus	G'ella aequilateralis
519.0					x														x		x												x				x			
538.0					o																o							D					o				x			
555.0					x																x								x				x				x			o
570.0					x														o																		x			
590.0					x														o																		x			
605.0					x														x		x								o				x				x			
627.5					x														o									D					x				x			o
640.0					x														o									D					x				x			o
657.0					x														x		x								x				x		o		x			
674.0					x														x		x								x				x		o		x			
691.0					x						x								x		x							D	o				x		x		o			
708.0					x														o		x												x		x		o			
727.0					x						o										x							D	o				x		x		x			o
748.0		o			x																			o					o				o				o		o	
758.0					o														o										o								o		o	
776.0		o			x														x		x						x		x				x		x		x		o	
790.0					x														o														x		o		o		o	
810.0					o																											o	o					o		
827.0					x																			o				D	o				x				o			
844.0					x														x		x												x	o	o		o			
861.0					x																x								o		?		x	o	o		o			
878.0					x														o		x			o					o		o		x	x	o		x			
892.5					x														o		x			o					o		o		x	x	o		x			
912.0					x																x							D	o		o		x	o	o					
929.0					x														x	o	x			o							o	o	x	o	o	o				
945.0		o			x														x	o	x			o					o		o		x	o	o	*				
963.0					x														x	o	x		o					D	o				x		o					
980.0					x														x	o	x		o				o		o		o		D	o		o				
993.0					x														x				o						o		o		x		o					
1013.0		x			x						o								x		x		o	o			o		o		o		x	x	o					
1150.0																			o					o				D						o						
1200.0																												D												
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1500.0		x																	x			x	x	x			x		o	o	?	o								
1550.0				o	x														x		o		o				o	D												
1600.0					x														x	x	x							D												
1650.0																												D												
1700.0		o			o														x		o							D												
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1850.0		o		x	x															x	x	o	x				x													
1900.0				x	x					x						x			x	x	x	x	x	x			o													
1950.0		x		x	x			x					o			o		o	x	x	x	x	x	o																
2000.0				x	x					x								o	x	x		x	x	x	x	o														
2025.0		x	x	x	x	x	x	x	x	x	x	o																												
2050.0	o	o	x	x	x	x		x	x	o		x		x	x		o																							
2070.0	x	x	x	x	x	x	x	x	x	o		x		x	x																									
2090.0	x	x	x	x	x				x			o		x	x	x																								
2115.0	x	x	x	x	x	x	x	x	x	x	x	o	o																											

PLANKTONIC FORAMINIFERAL BIOSTRATIGRAPHY

ZONE	Depth at Base	AGE
?	640.0	?
A-3	892.5	LATE to MID PLIOCENE
A-4	1150.0	
?	1200.0	
B-1	1500.0	EARLY PLIOCENE to LATE MIOCENE
?	1750.0	
B-2	1900.0	
C	2000.0	MID MIOCENE
F	2115.0	EARLY MIOCENE

KEY: ° = <20 specimens
x = >20 specimens
D = Dominant >60% specimens
? = determination queried
* = 10 typical specimens
∿∿∿∿∿ = definite hiatus

TABLE 2: MIOCENE/PLIOCENE PLANKTONIC FORAMINIFERAL DISTRIBUTION - BASKER # 1.

David Taylor 9/8/1983.

SIDEWALL CORE Depth in metres	CONTINENTAL SLOPE																		
	Oridorsalis tenera	*Reophax* spp.	*Rhabdammina abyssorum*	*Discammina compressa*	*Martinotiella communis*	*Ammobaculites calcareus*	*Bathysiphon* spp.	*Stilostomella antillea*	*Bulimina marginata*	*Ammodiscus incertus*	*Brachisiphon corbiformis*	*Karreriella bradyi*	*Siphouvigerina proboscidae*	*Gyroidinoides zealandica*	*Nonionella* spp.	*Pleurostomella tenera*	"*Cyclammina*" spp.	*Ammoglobigerina* sp.	*Pyrgo depressa*
519.0																			
538.0																			
555.0																			
570.0																			
590.0																			
605.0																			
627.5																			
640.0																			
657.0																			
674.0																			
691.0																			
708.0																			
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861.0																			
878.0																			
892.5																			
912.0																			
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980.0																			
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1850.0															x				
1900.0											°								
1950.0			°	°															°
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∿∿∿∿																			
2025.0	°	°										°		°	°				
2050.0	°			°			°				°	°	°						
2070.0	°			°			°		°	°									
2090.0						°	°	°											
2115.0	°	°	°	°	°														

SIDEWALL CORE Depth in metres	SHELF EDGE → MID SHELF																									
	Oridorsalis umbonatus	*Cassidulina leavigata*	*Discorbina berthelotti*	*Cibicides mediocris & temperatus*	*Trifarina bradyi*	*Cibicides psuedoungerianus*	*Rectoglandulina comatula*	*Cibicides subhaidingeri*	*Siphouvigerina canariensis*	*Lagena* spp. (spherical)	*Bolivina pseudobeyrichi*	*Gyroidina soldani*	*Marginulina obesa*	*Euuvigerina bassensis & pygmea*	*Anomalina procolligera*	*Loxostonum* sp. nov. Barker	*Baggina philipinensis*	*Bulimina submarginata*	*Virgulina* spp. (plexus)	*Rosalina australis*	*Bulimina* cf. *pupoides*	*Buliminella elegantissima*	*Bolivina alata*	*Bolivinita quadrilatera*	*Anomalina bassensis*	*Cassidulinoides* sp.
519.0		x		x			x	x		°							°	°	°		°		°	°		
538.0				x				°		x							°									
555.0		x		x						x	x		°					x			°		x	°	°	
570.0		°		°			°												°				°			
590.0		x																°	°		°	°			°	
605.0		D					x	°		x				x				x	x				x	°	°	
627.5		x					x	°										°	x		°		x		x	
640.0		D		°						x	x	x						x	x				x	°	x	°
657.0		x					x			x	x								x				x		x	x
674.0		x	°				°				x			x					x				x		°	°
691.0		x					x			x		°		°					x		x		°		°	
708.0		°								°				°				°	°		°				°	
727.0		x	°				x			x	x	°		x				x	x			°	x	°		
748.0		D			°		°			x	x	°						x								
758.0		°								°																
776.0		°	°								°			°					°		D			°		
790.0		D	°							°											°		°			
810.0																										
827.0		D	°			x	°			x	°										°	°				
844.0	°	°				x	°												°		°	°				
861.0		x								x	°	°								°						
878.0			x	x				x	°	x	°			x		°			x							
892.5			x						°	x	°			x		°			x							
912.0				°		x				x	°			D				°								
929.0				°						°				x			°	°								
945.0		°								°			°	x		°										
963.0						x	x			x				D		°										
980.0		x	°				°			x				D												
993.0	°					x	x			x		°		D	°											
1013.0		x							x	x	x	°	x	°	x											
1150.0																										
1200.0		D				°				x																
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2025.0																										
2050.0																										
2070.0																										
2090.0																										
2115.0																										

SIDEWALL CORE Depth in metres	MID-INNER SHELF									ZONE
	Notorotalia clathrata	*Elphidium crispum*	*Karreria cygnorum*	*Cibicides victoriensis*	*Discoanomalina mitchelli*	*Cibicides refulgens & lobatulus*	*Discorotalia & Cribrotalia*	*Heronalina lingulata*	*Quinqueloculina agglutiana*	
519.0			x	°						
538.0										
555.0		°	x							
570.0		°								
590.0										
605.0	°	°	°							?
627.5										
640.0	°									
657.0										
674.0			ξ							
691.0										
708.0										
727.0							ξ			
748.0										
758.0										
776.0										
790.0										A-3
810.0										
827.0										
844.0										
861.0		ξ	ξ							
878.0						ξ				
892.5						ξ				
912.0						ξ				
929.0						ξ				
945.0										
963.0			ξ							
980.0			ξ			ξ				A-4
993.0			ξ						ξ	
1013.0				ξ	ξ			ξ	ξ	
1150.0										
1200.0										?
1250.0							ξ			
1300.0										
1350.0			ξ	ξ		ξ				
1400.0										B-1
1450.0					ξ					
1500.0										
1550.0										
1600.0										
1650.0										?
1700.0										
1750.0										
1800.0										
1850.0										B-2
1900.0										
1950.0										
2000.0										C
∿∿∿∿										
2025.0										
2050.0										
2070.0										F
2090.0										
2115.0										

KEY: ° = <20 specimens
x = >20 specimens
D = Dominant >60% specimens
ξ = environmentally misplaced specimens
∿∿∿∿ = definite hiatus
indet = specifically indeterminate due to diagenesis.

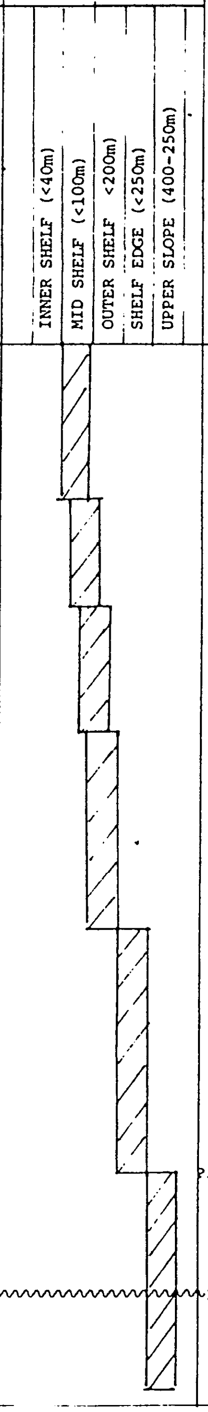
TABLE 3: DISTRIBUTION OF SELECTED BENTHONIC FORAMINIFERA IN BASKER # 1.

David Taylor, 9/8/1983.

SIDEWALL CORES Depth in metres	Total foram count	% planktonic forams	ASSEMBLAGE FEATURE	ENERGY REGIME	OXYGENATION	pyrite	limonitic clay	c-m ang qtz	ovoid clay pellets	glauconite	sponge spicules	echinoid spines	ostracods	worn bryozoal fragments	fresh bryozoal fragments	MAJOR COMPONENTS	E-LOG CHARACTER CHANGE
	GROSS FORAMINIFERAL ASSEMBLAGE CHARACTERS					RESIDUE GRAIN LITHOLOGY (>.075mm) — MINOR COMPONENTS (excl. forams)										MAJOR COMPONENTS	
519.0	1000	50					A					A	r			∩∩ ff ΨΨΨΨΨΨ	
538.0	500	60										A				∩∩ ΨΨΨΨΨΨΨΨΨ	
555.0	250	30					A					A		A	A	ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
570.0	200	70										A				ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
590.0	100	60					A					A				ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
605.0	1500	60	S	HIGH								r	r	A	A	ffffffffff ΨΨΨ	
627.5	200	50					A					r		A		ffffffffffffff	
640.0	500	60	S	HIGH			A	r				r	r	A		ffffffff ΨΨΨΨΨ	
657.0	1000	60					A						r	C		ffffffffff ΨΨΨ	
674.0	500	60					A							A		ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
691.0	1000	60			POOR		A									ffffffffff ΨΨΨ	
708.0	50	50														ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
727.0	3000	70	ξ	PROG			A					r	r			ffffffffff ΨΨΨ	
748.0	250	40	S	HIGH			r									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
758.0	20	90														ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
776.0	1000	70			POOR		A									ffffffffff ΨΨΨ	
790.0	250	40	S	HIGH												ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
810.0	20	90														ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
827.0	500	50					C					r				ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
844.0	250	70	S	HIGH			A						r			ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
861.0	?	?														ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
878.0	1000	70	ξ							A						fffffffffff ΨΨ	
892.5	1000	70	ξ				A					A				ffffffffffffff	
912.0	500	80	ξ		POOR							r				ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
929.0	500	75	ξ				A					r				ffffffffffffff	
945.0	500	80										r				ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
963.0	?	?	ξ	PROG	POOR	r				ξ						ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
980.0	500	60	ξ	PROG	POOR						A	A				ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
993.0	500	40	ξ	PROG	POOR											ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1013.0	1000	70	ξ	PROG			A	A			A	r		r		ffffffff ΨΨΨΨΨ	
1150.0	?	?				A	A									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1200.0	?	?	S	HIGH		A	A									ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1250.0	?	?	ξ	PROG												ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1300.0	?	?						C								ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1350.0	?	?	ξ	PROG							A					ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1400.0	?	?					A	A								ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1450.0	500	90	ξ	PROG			A	r								ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1500.0	500	90					A									ff mmmmmmmmmmmm	
1550.0	?	?														ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1600.0	?	?										r	r			ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1650.0	?	?														ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1700.0	?	?														ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	
1750.0	?	?														ΨΨΨΨΨΨΨΨΨΨΨΨΨΨ	?1730
1800.0	1000	95				A						r				fff mmmmmmmmmm	
1850.0	500	90			POOR								r			PPP ΨΨΨΨΨΨΨΨΨΨ	
1900.0	1000	95					A									ffffffffff mmm	
1950.0	2000	98					C									ffffffffff mmm	
2000.0	2000	95					A		A	A		r				ffffffffffffff	
∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	∿∿∿∿	2020
2025.0	2000	95				A			A	A		r	r			ffffffffff mmm	
2050.0	1000	98														ffffffffff mmm	
2070.0	1000	98														ffffffffffffff	
2090.0	500	95				A	A	A								ffffffffff mmm	
2115.0	750	90				A					A					ooo mmmmmmmmmm	

MAJOR COMPONENTS key:
∩: bryozoa
f: foramin.
Ψ: recrystall micrite
m: micrite, marls calcareous siltst.
P: pyrite
oo: c-m ang subrd qtz

¶PALEO-ENVIRONMENTAL ASSESSMENT (refer also Table 3)



PLANKTONIC FORAMINIFERAL BIOSTRATIGRAPHY

ZONE	Depth at Base	AGE
?	640.0	?
A-3	892.5	LATE to MID PLIOCENE
A-4	1150.0	LATE to MID PLIOCENE
?	1200.0	EARLY PLIOCENE to LATE MIOCENE
B-1	1500.0	EARLY PLIOCENE to LATE MIOCENE
?	1750.0	EARLY PLIOCENE to LATE MIOCENE
B-2	1900.0	EARLY PLIOCENE to LATE MIOCENE
C	2000.0	MID MIOCENE
F	2115.0	EARLY MIOCENE

KEY: ξ = environmentally misplaced specimens from shallower situation indicating
PROG = PROGRADATION
S = size and/or shape sorting of foraminifera indicating
HIGH = HIGH ENERGY CURRENTS
A = 1-5% grains
C = >20 grains
r = <20 grains
¶ Paleowater depth estimates in parentheses.

TABLE 4: PALEOENVIRONMENTAL ANALYSIS - BASKER # 1.
(refer also to Benthonic Foraminiferal Distribution on Table 3).

David Taylor, August 10, 1983.

I.D. 0410B/0049B

APPENDIX 6.2

PALYNOLOGICAL ANALYSIS OF BASKER-1
(GIPPSLAND BASIN, PERMIT VIC/P19)

By
Jan van Niel

SDA 525

1. SUMMARY

	Dinoflagellate Zones	Spore-Pollen Zones	Age
2125m	not younger than K.EDWARDSII	not younger than P.ASPEROPOLUS	not younger than Mid EOCENE
2155-2185m	A.HYPERACANTHUM	Lower M.DIVERSUS	Late PALEOCENE/ Early EOCENE
2198m	?A.HOMOMORPHUM	Upper L.BALMEI	Late PALEOCENE
2225-2452m	Upper T.EVITTII/ Lower E.CRASSITABULATA	-	Early/Mid PALEOCENE
2495m	T.EVITTII	-	Early PALEOCENE
2551-2570m	-	T.LONGUS	MAASTRICHTIAN
2667-2673m	I.DRUGGII	T.LONGUS	"
2679-3110m	-	T.LONGUS	"
3114-3216m	-	T.LONGUS/T.LILLIEI possibly T.LONGUS	MAASTRICHTIAN/ CAMPANIAN possibly MAASTRICHTIAN
3237-3936m	-	T.LILLIEI	CAMPANIAN

SPORE COLOUR/DEGREE OF ORGANIC MATURITY (D.O.M.)/SOURCE ROCK QUALITY

Transmitted (white) light: from pale yellow (2125m) to yellow or light brown (3936m)
Incident U.V. light: from light yellow to yellow/orange.
D.O.M. from immature at 2941m to early mature at T.D.

ENVIRONMENT OF DEPOSITION (Palynofacies)

2125-2185m	marine
2198m	shoreface, slight marine influences
2210m	lagoonal? (brackish/fresh water?)
2225-2673m	marine, near source/near shore
2876-3936m	non marine (swamp, lake or fluvial deposits)

2. INTRODUCTION AND METHODS

The interval examined palynologically ranged from 2125m down to 3936m (TD is at 3992m, bdf). A total of 8 core samples, 54 sidewall cores and 8 cuttings were selected on the basis of lithology. Grey to black, fine-grained sediments (mudstones, shales) are generally richer in palynomorphs than sediments such as silts and sands deposited in higher-energy environments. Where mudstones or shale samples were not available, siltstone samples were prepared. The quality of the sidewall cores was poor to fair.

Samples were prepared in Perth by Exploration Consultants Ltd (ECL) using the "standard" technique for siliclastic sediments, i.e. hydrochloric and hydrofluoric acid treatment followed by heavy-liquid separation to remove mineral matter; controlled oxidation with nitric acid to reduce unwanted organic constituents and thus concentrate the palynomorphs; and finally washing with sodium hydroxide to remove humic acids. The resulting acid - insoluble residue was mounted in Elvacite to produce permanent microscope preparations. A slide of the non-oxidised residue was used for palynomaceral studies.

All samples yielded an organic fraction and almost all were productive, although some were too poor to be of much value. Preservation deteriorated down section and influenced specific determination of some types. Diversity of assemblages varied but was generally average to poor only, particularly in the deeper part.

The palynomorphs were recorded semi-quantitatively. To provide continuity with the work of Harris, 1983, the stratigraphic interpretation of assemblages follows the zonal characteristics given in his "Biostratigraphic Summary" (Harris, undated). The range charts in this "Summary" are largely based on published and unpublished work of Stover and Evans (1974), Stover and Partridge (1973), Partridge (1975) and Partridge (1976).

Reworked palynomorphs were found in several samples but mostly as single occurrences only. Most were Permo-Triassic and Jurassic in age. It is not clear how to classify the regular occurrences of early and mid Cretaceous spores. Although found in younger sediments than their published ranges would indicate, they may in fact not be reworked.

Contamination from the mud was present in many samples. Although all samples were carefully cleaned before preparation, a fractured or broken-up sidewall sample cannot always be fully trusted as some contamination with palynomorphs from the mud is unavoidable.

3. ANALYSIS OF ZONES

A. DINOFLAGELLATE ZONES

2125m (1 SWS): not younger than K.EDWARDSII Zone (not younger than Middle Eocene)

Chorate dinoflagellate cysts, Deflandrea spp. and several other cysts are present in this sample but could not be determined specifically. Several specimens of A.homomorphum, which has its top in the K.EDWARDSII Zone indicate however that at 2125m the section is not younger than Middle Eocene. Pollen data support this (see later, under 3B).

2155-2185m (4 SWS): A.HYPERACANTHUM Zone (Late Paleocene to Early Eocene)

Based largely on the presence of Ceratiopsis dartmooria. Other cysts present include A.homomorphum, A.hyperacanthum and Deflandrea spp. (indet.).

2198m (1 SWS):

Single specimens of Senegalinium dilwynensis and A.homomorphum would suggest the presence of the A.HOMOMORHUM Zone at this level. Although pollen data do not contradict this, the evidence is considered too flimsy for a firm opinion.

2210m:

This sample contained a number of small, thin walled dinoflagellate cysts of uncertain affinity, together with common, featureless spherical bodies, thin walled, and perhaps referable to the genus Nummus. No age could be given to this curious assemblage (see Section 5).

2225-2452m (8 SWS): Upper T.EVITTII/Lower E.CRASSITABULATA Zones (Early to Middle PALEOCENE)

The assemblages are fairly diverse and contained, a.o., Eisenackia crassitabulata, E.circumtabulata, Senegalinium dilwynensis, Palaeocystodinium sp., Palaeoperidinium pyrophorum, Ceratiopsis speciosa, Deflandrea "paleocenica", Isabelidinium bakeri, Paralecaniella indentata, Glaphyrocysta retiintexta and a number of indet. cysts.

P.pyrophorum was present in the highest sample but sporadic. It only becomes common at 2430m. This "top common occurrence" may separate an E.CRASSITABULATA Zone (2225-2352m) from a T.EVITTII Zone (2430-2495m).

2495m (1 SWS): T.EVITTII Zone (Early Paleocene)

T.evittii is common in this sample but at the same time it is the only dinoflagellate present.

2515-2665m:

This interval contained rare, mostly fragmented dinoflagellate cysts only, possibly from mud contamination.

2667-2693m (1 SWS and 3 cuttings): I.DRUGGII Zone (Late Maastrichtian)

Both Isabelidinium druggii and Eurydinium conoratum were present at 2673m. Single specimens of I.druggii were found in the other samples. The only other dinoflagellate found was Palaeocystodinium sp., several specimens at 2673m.

2676-3936m:

No dinoflagellates found.

B. SPORE POLLEN ZONES

2125m (1 SWS): not younger than P.ASPEROPOLUS Zone (not younger than Middle Eocene)

The presence of Intratriporopollenites notabilis and Proteacidites grandis indicate an age not younger than Middle Eocene.

2155-2185m (4 SWS): Lower M.DIVERSUS Zone (Late Paleocene/Early Eocene)

Verrucosisporites kopukuensis delimits the base of this interval. The top of the Lower M.DIVERSUS Zone is determined by negative evidence and, although none of the overlying zonal markers were found, the top of the interval has been defined using dinoflagellates (see 3A.).

2198m (1 SWS): Upper L.BALMEI Zone (Late Paleocene)

On the common presence of Austrolopollis obscurus. Sparse dinoflagellate evidence seems to support the Late Paleocene age.

2225-2495m (10 SWS):

Pollen evidence for the Lower L.BALMEI Zone is very poor and the Early to Mid Paleocene age given to this interval is based on dinoflagellates.

2551-3110m (1 core, 15 SWS and 8 cuttings): T.LONGUS Zone (Maastrichtian)

Top of the interval has been defined by the highest occurrence of Q.brossus and P.palisadus at 2551m, and the presence of T.lilliei and T.sectilis at 2570m.

Down to 2697m pollen assemblages are relatively poor and not diverse. No suitable samples were available between 2697 and 2876m but from then on down the number of specimens was high in most samples although diversity remained low. G.rudata was common in most samples and Nothofagidites spp. correspondingly rare although occasionally this relation was reversed. G.edwardsi, T.longus, T.lilliei, T.sectilis, G.wahooensis, Stereisporites (Tripunctisporis) sp. and S.regium, T.verrucosus, L.amplus, and Proteacidites spp. (a.o. "wahooensis", "gemmatus", "reticuloconcavus", angulatus, palisadus and amolosexinus) were among the more noteworthy types present. Several specimens of "Grapnelispora evansii" occurred at 3089 and 3110m. Stover and Partridge (in press) consider this megaspore Maastrichtian in age, based on finds around Australia and New Zealand.

3114-3216m (7 core and 4 SWS): T.LONGUS/T.LILLIEI Zone, possibly T.LONGUS Zone (Maastrichtian/Campanian, possibly Maastrichtian)

The top of the T.LILLIEI Zone is based on negative evidence, i.e. by the base occurrence of markers for the overlying T.LONGUS Zone. Unhappily, the interval under discussion is rather poor in pollen so that the absence of specific markers may be more apparent than real. One positive feature of the T.LONGUS/T.LILLIEI zonal boundary is the marked reduction up section of Nothofagiditis spp. and the corresponding increase of Gambierina. In Basker-1 this occurs at 3237m and this has therefore been taken as the top of the T.LILLIEI Zone. Additional evidence that the interval 3114-3216m could still belong to the T.LONGUS Zone comes from a single specimen of P.angulatus at 3170m. Other species found: T.lilliei, T.longus, P."reticuloconcavus", N.endurus, L.balmei, L.amplus and several Proteacidites spp.

3237-3936m (13 SWS): T.LILLIEI Zone (Campanian)

Top based on the highest occurrence of common Nothofagidites spp. relative to Gambierina. The deepest samples still contain T.sectilis and T.confessus which would seem to indicate that the base of the T.LILLIEI Zone was not reached. The following species were present: G.rudata (uncommon), N.endurus, N.senectus, Nothofagidites spp., T.lilliei, T.sectilis, T.longus (?), T.confessus, L.balmei, G.wahooensis, P.amolosexinus, P.scaboratus and Proteacidites spp. (probably unnamed). T.sabulosus was present from 3630m down.

4. SPOROMORPH COLOUR, DEGREE OF ORGANIC METAMORPHISM (D.O.M.) AND SOURCE ROCK POTENTIAL

The colour of palynomorphs changes when subjected to the increasing or prolonged temperatures such as occur during burial. These changes in colour are irreversible and therefore indicate the maximum level of maturity reached. The different stages, yellow to golden-yellow through orange and brown to black can be correlated with changes in chemical composition as hydrocarbons are generated from the organic matter (see Fuchs, 1969; Standard Legend, 23.51.10). The sporomorph colour scale is more subjective than the more commonly used vitrinite reflectance scale. Ideally, a long-ranging sporomorph type should be selected as different types of sporomorphs within the same sedimentary section show variations in colour. As observed in transmitted white light the change in colour from light yellow to golden-yellow or orange corresponds with the onset of oil generation, whereas the onset of gas generation is associated with a change in colour from orange to brown. Post-mature source rocks contain black sporomorphs and organic fragments only.

In incident ultraviolet light palynomorphs (and some palynomacerals) exhibit fluorescence colours that not only help in their identification but also increase and decrease according to rank. Fluorescence is maximal at the threshold of the "oil window", decreases with increasing rank and disappears at the end of the "oil window" (1-1.3% Ro, see Robert, 1981).

In Basker-1 sporomorph-colour in transmitted light ranged from pale-yellow at 2125m to yellow and yellow-orange to lightest brown at 3936m. Over the same interval fluorescence colours of sporomorphs ranged from golden yellow to yellowish-orange. Both estimates see to indicate immature conditions at 2125m, changing into early mature towards 3936m.

Palynomaceral determination was carried out on a sieved, non-oxidised preparation. The sieving (with a 10 micrometer mesh sieve) was necessary to concentrate the large palynomacerals that otherwise would be diluted by fine, amorphous organic matter. This fine fraction is undoubtedly important for source rock characterisation but its nature and origin cannot be determined by ordinary means.

In Basker-1 the total organic content after sieving in the interval 2125-2430m contained 20-30% Inertinite (hydrogen-poor, no precursor of either oil or gas), 40-50% Vitrinite (relatively hydrogen-poor) and 20-30% Liptinite (spores, pollen, dinoflagellates, cutinite, alginite, all hydrogen-rich precursors of oil and gas); the interval 2452-2673m contained 60-80% Inertinite, 20-30% Vitrinite and 5-10% Liptinite; the interval 2876-3151m contained 10-20% Inertinite, 70-90% Vitrinite and 5-10% Liptinite; and finally the interval 3170-3936m contained 20-80% Inertinite, 20-70% Vitrinite and 1-5% Liptinite.

Although no accurate figures are available, a rough estimate during preparation showed that between 2125 and 2697m total organic matter varied from 0.1 to 0.4 millilitre per 10 grams of sample, and from 2876-3936m from 0.4-6.0 millimetre per 10 grams with the higher figures on either side of about 3100m.

Both in composition and in total amount of organic matter there seems to be clear differences between Volador-1 and Basker-1, the latter being apparently richer in Inertinite and less rich in organic matter per gram of sediment. Most likely, this reflects slight differences in environment of deposition between the two wells.

Source Rock Qualities

The amount and composition of the organic matter would suggest that the best source rocks occur below about 3000m with a rather uneven distribution below about 3200m.

5. ENVIRONMENT OF DEPOSITION/PALYNOFACIES

The relationship between organic matter and grainsize of the sediments has been well-documented and is used to deduce depositional environment (palynofacies) from the type of palynomorphs and palynomacerals present.

The palynomorphs can be divided into marine organisms such as dinoflagellates and Tasmanites (both algae) and foraminiferal test linings; fresh and brackish water organisms such as Botryococcus and Acritarchs; and land derived pollen and spores (Sporomorphs).

Breakdown products of plants (woody fragments, epidermal tissues, cork cells, resin), algal and bacterial remains, animal tissue and many indeterminate organic fragments are collectively known as palynomacerals.

Although wind transport is an important aspect of the initial dispersal of sporomorphs, water transport then carries the sporomorphs and palynomacerals until they settle out of the water column. A continuous process of mechanical abrasion, biological degradation and wave and current action sorts and grades the particles during this transportation phase. Less buoyant, heavy or larger organic particles tend to characterise environments close to source while lighter, more buoyant and smaller particles are carried further afield. Very low sporomorph diversity indicates authochthonous environments (marsh, swamps); allochthonous environments are characterised by more diverse assemblages. Marine microplankton diversity increases in an offshore direction (Whitaker, 1979).

In Basker-1 the interval 2125-2185m is clearly marine: dinoflagellates are present throughout although not abundant or diverse; the presence of sporomorphs and land derived organic matter suggests a near source, near shore environment. The sample at 2198m contained only a few dinoflagellates, common sporomorphs and rich Inertinite, and may represent a shore face environment. Thin bodied leiospheres and small, thin walled dinoflagellates together with land derived organic matter would suggest that the sample at 2210m is lagoonal (brackish water). Between 2225-2673m the environment is marine, with rich and rather diverse dinoflagellate assemblages down to 2495m although, again, the presence of sporomorphs and plant tissues suggest near shore; between 2557 and 2673m fewer dinoflagellates are present and only a few species per sample; Inertinite is common and a shore face environment most likely.

The interval 2876-3936m lacks marine indicators; most samples contain medium to sometimes very large plant tissues suggesting limited water transport. "Under the tree" conditions are evident in several samples, where one pollen species outnumbers all others, eg. at 2911m (dominance of T.sectilis), 2942m (G.wahooensis) and 3123m (Dacrydium sp.). This interval is also richer in total organic matter per gram of sediment and could represent a swamp environment. Many of the other sampled intervals, especially below about 3170m, show high percentages of Inertinite alternating with samples in which the Vitrinite component dominates. A corresponding alternation between a low energy swamp environment and low to medium energy fluvial or lacustine deposits is suggested.

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BASKER - I BIOSTRATIGRAPHIC SCHEME

AGE			SPORES AND POLLEN REGEO CODES			SPORES AND POLLEN ZONES *	
T	OL	L	S9				
T	OL	L	S9	S980		P. TUBERCULATUS	
T	EO	U	S9	S970	S 9707	N. ASPERUS	U
T	EO	U / M	S9	S970	S 9705	N. ASPERUS	M
T	EO	M	S9	S970	S 9702	N. ASPERUS	L
T	EO	M	S9	S 950		P. ASPEROPOLUS	
T	EO	L	S9	S 930	S 9307	M. DIVERSUS	U
T	EO	L	S9	S 930	S 9303	M. DIVERSUS	L
T	PC	U	S9	S 920	S 9207	L. BALMEI	U
T	PC	M / L	S9	S 920	S 9203	L. BALMEI	L
K	MA		S8	S890		T. LONGUS	
K	CA		S8	S880		T. LILLIEI	
K	SA		S8	S 870		N. SENECTUS	
K	CO		S8	S865		T. PACHYEXINUS	
K	TR		S8	S860		C. TRIPLEX	
K	CE		S8	S850		A. DISTOCARINATUS	
K	AB		S8	S845		T. PANNOSUS	
K			S8				

DINOFLAGELLATES REGEO CODE		DINOFLAGELLATES ZONES *
M 9		
M8	M890	OPERCULODINIUM spp
M8	M880	P. "CORIOIDES"
M8	M870	V. EXTENSA
M8	M860	D. HETEROPHLYCTA
M8	M850	W. ECHINOSUTURATUM
M8	M840	K. EDWARDSII
M8	M830	W. "THOMPSONAE"
M8	M820	W. ORNATUM
M8		
M7	M790	D. WAIPAWAENSIS
M7	M780	A. HYPERACANTHUM
M7		
M7	M760	A. HOMOMORPHUM
M7		
M7	M740	E. CRASSITABULATA
M7		
M7	M720	T. EVITTII
M7		
M6	M690	I. DRUGGII

* AFTER HARRIS (UNDATED)

SHELL - AUSTRALIA E.& P. OIL AND GAS.

GIPPSLAND BASIN

BASKER - I

BIOSTRATIGRAPHIC SCHEME

Author: EXH / 8	Date: March 1984
Report No.: SDA 525	Drawing No.: 18773

I.D. 0410B/0049B

APPENDIX 6.3

DEPOSITIONAL ENVIRONMENT, REGIONAL SETTING, MINERALOGY AND DIAGENESIS OF BASKER-1 FROM CORE, SIDEWALL CORE AND LOG INFORMATION

Sedimental
sedimentary geology consultancy
16 muir street
innaloo
W.A. 6018
445 2125

DEPOSITIONAL ENVIRONMENT, REGIONAL SETTING, MINERALOGY AND DIAGENESIS OF BASKER-1 FROM CORE, SIDEWALL CORE, AND LOG INFORMATION

by

Alan M. Tait

Sedimental
sedimentary geology consultancy
16 muir street
innaloo
W.A. 6018
445 2125

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16 muir street
innaloo
W.A. 6018
445 2125

INTRODUCTION

On 4th August 1983 I inspected the slabbed core 1 from Basker-1 at Corelab, Welshpool. Subsequently, I examined photographs of the core, 8 thin sections of core plugs, 57 thin sections of sidewall cores, the well logs, the wellsite core description and sidewall core description, and the Geodip log from 3085 to 3140 metres. I also examined the logs of Stonefish-1 snd the logs and 30 thin sections of 15 sidewall cores from Hammerhead-1. Data from my previous report on Volador-1 are included.

I have discussed my preliminary findings with Shell Development (Australia) Pty Ltd staff (Phil Hanson, John Stainforth, Lee Taylor and Geoff Townson) and incorporated the results of these discussions as I understand them. Figures 5 and 6 were supplied by Shell.

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LITHOLOGICAL DESCRIPTION OF CORE 1 (3108 - 3126.5 metres)

The core consists of a range of interbedded lithologies from black carbonaceous claystone to pale grey coarse grained sandstone. Claystone predominates. Please refer to the Corelab core photographs and the core description sheets (Figures 1 and 2).

The claystones vary from black carbonaceous claystone to pale brown silty claystone. The darker-coloured claystones are often cm flat bedded; the paler claystones usually show irregular bedding, sometimes with small-scale burrowing and/or root structures. Most of the dark claystones rest sharply on the paler ones but grade upwards into paler claystones. This 'paling-up' claystone unit varies in thickness from 10 cm to more than 1 metre. There appears to be an upwards decrease in plant fragments in the paling-up units. Much of the pale brown colour in the claystones is due to disseminated microcrystalline siderite. Some pyrite nodules are also present.

The sediments interbedded with the claystones have been given numbers from the top of the core down for ease of reference (Figures 1 and 2). They range from siltstones to coarse sandstones. The unit thickness varies with grainsize, from argillaceous siltstone 10 cm thick (no.6) to medium to coarse grained sandstone about 3.5 metres thick (no.2). The finer grained units usually have irregular bedding due to burrowing, roots or slumping. The thick sandstones are cm-dm cross bedded but fine upwards to mm-cm cross bedded fine sandstones with claystone and plant fragment layers. Pyrite occurs locally as irregularly shaped nodules destroying porosity.

DEPOSITIONAL ENVIRONMENT FROM CORE AND LOGS

The background sediment is the claystone. The black carbonaceous flat bedded claystone accumulated in lakes on a vegetated alluvial plain. The common upwards gradation into paler, often silty, claystones represents lake infill and/or the effects of soil-forming processes. Fluctuations in water level and floating mats of vegetation with roots penetrating the lake floor might have contributed to the development of the paler claystones. There are no indications of subaerial exposure with desiccation; even the soils were always waterlogged.

Into this environment, coarser sediments were introduced intermittently. The uniform nature of the claystones and their preponderance suggests that the lakes were normally isolated from coarser sediments, probably by levees but possibly by distance from active channels. The various siltstone to sandstone units in the core can be regarded as sections through different parts of crevasse splays and used to model a typical splay (Figure 3).

The thickest sand, no.2, has a very coarse grained basal unit with a sharp, partly loaded base and claystone clasts and plant fragments.

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Above this it fines up through a stack of cm-dm crossbeds to cm cross bedded fine to medium grained sandstone with clay and plant fragment layers. A second fining-up unit (fine to medium sand passing up into fine sandstone with increasing numbers of clay layers upwards) overlies this at 3112.45 metres core depth. The no.2 sand is either the most proximal part of a crevasse splay, the channel through the levee feeding the rest of the splay, or a distributary channel from which splays originate. The two fining-up units may be lateral accretion units developed during lateral migration of meanders in the channel.

Further down-splay, the crevasse sand has a thin coarsening-up basal unit overlain by the main fining-up sequence. Two sands in the core show this feature. No.1 has a basal unit which consists of a homogeneous layer of sand with entrained clay, overlain by rippled sand. No.9 has a basal unit with a less homogeneous entrainment of plastic clay, which coarsens up into medium then into coarse sand. The more gradational nature of the bases of these two sands, compared with the base of sand no.2, and their coarsening-up basal units may be due to a slower current speed as the splay fanned out and/or as it entered the shallow water of a lake. Sand no.1 has low-angle bedding and scour surfaces which suggest a sheet-flood origin.

Yet further down-splay, only fine sandstones and siltstones with clay layers are present, e.g. nos.7, 8 and 10. These are analogous to the fining-up tops of the thicker coarser sands, nos.2, 9 and 11. Uneven rapid deposition of the sediment may have caused local loading, slumping and soft-sediment faulting, e.g. sand no.8, especially on the soft clay substrate.

The distal edges of the crevasse splays are represented by thin silty units, e.g. nos.5 and 6, which are burrowed, rooted and fine upwards. These sediments may have been deposited by density currents in the lake.

The general fining-up nature of these splay sediments is probably due to their single-event character. They are not composites of several flood units over several years steadily building out into a lake as a small delta, but are more like single overbank sheetfloods. Perhaps the lakes were too shallow to allow the development of thick crevasse sequences. The soil developments on top of most of the crevasse sands and the thickness of sand no.2 suggest that the lakes had a maximum depth of 3 to 4 metres. Various fining and coarsening-up patterns of various thicknesses are visible on the logs and may represent build out and retreat of crevasses.

After deposition, the splay sediments were burrowed and/or rooted before drowning by the encroaching lake. The lack of thick coals could have many causes including fluctuating water levels, insufficient time between crevasse events for coal development (i.e. too fast an overall rate of sedimentation), and too high a water level (the root traces being produced by floating vegetation).

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As mentioned above, sand no.2 may have been deposited by a distributary channel from which splays originated (Figures 3 and 4). If the channel was non-meandering, the sandbody width for a thickness of 4 metres is likely to be around 30 metres: if the channel meandered, it may have formed a sandbody around 300 metres wide. In both cases the length of the sandbody is much greater than the width. Crevasse splays and levees along the sides of the channels increased the width and volume of reservoir rock considerably. A levee/crevasse width/length of around 500 metres either side of the channel gives a sandbody around 1300 metres wide for a meandering channel or around 1030 metres wide for a non-meandering channel. Most of the crevasse width should be reservoir quality sand, i.e. greater than 50 cm thick.

In Basker-1 the sand percentage is 29% (calculated from sand thickness data on Figure 6). This percentage should apply laterally as well as vertically suggesting that, on average, channel/levee/crevasse sandbodies cover 25% to 33% of the alluvial plain surface and thus are from 3 to 6 km apart at any one time in the Basker-1 area.

REGIONAL DEPOSITIONAL ENVIRONMENT

This discussion is based on data from Hammerhead-1, Basker-1, Volador-1 and Stonefish-1 wells (Figure 5).

The prospective section in Basker-1 was deposited in an area of extensive shallow lakes on an alluvial plain. Between the lakes flowed a network of distributary channels which discharged into the lakes during floods. Vegetation grew around the lakes, on the channel banks and levees, and 'prograded' into the lakes as floating mats of swamp plants. This environment extended over a large area, at least including Basker-1, Volador-1 and Stonefish-1 (Figure 5).

Reservoir sands (channels and crevasse splays) average 3 metres in thickness in Basker-1 and 2 metres in Volador-1 (Figure 6). The sand percentage (Figure 6) decreases from Basker-1 (29%) to Volador-1 (16%). Stonefish-1 (27%) is similar to Basker-1. The equivalent section in Hammerhead-1 is much sandier. Few thick claystones occur, and most apparent claystones have a low Gamma Ray reading which is taken to indicate a high sand content. These data suggest a depositional strike from Stonefish-1 to Basker-1 and a dip direction from Hammerhead-1 to Volador-1. The depositional strike is taken to be sub-parallel to the east-west Rosedale Fault, and the depositional dip from north to south. The sand percentage and the average sandbody thickness both decrease from north to south into the basin.

Two large-scale coarsening-up units in Hammerhead-1, one from 2100 to 1750 metres, the other from 1750 to 1550 metres, may be alluvial fan sequences. The units show an upward change from claystones with thin sands (up to 5 metres thick) and thin coals, through stacked sands (5 to 25 metres thick) with thin claystones, to clean sand units up

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to 50 metres thick. The claystones with thin sands are an alluvial plain/lake system with distributary channel and crevasse sands similar to Basker-1 and Stonefish-1. Upwards, the channel (and perhaps crevasse) sands become thicker and stacked. The thickest sands at the top may be either large single channels or stacked thinner sands.

Thus the sequence from the Rosedale Fault southwards into the basin is alluvial fans passing into alluvial flood plains and lakes. Alluvial fans need not exist all along the Rosedale Fault; the fans could be localised by point sources of sediment. The basinwards decrease in sand percentage and average sandbody thickness would be expected in an alluvial fan to lake (humid playa) transition. It is possible that there are no major river channels running southwards into the basin through the lake-plain. The channels may instead form an anastomosed network branching basinwards into smaller channels. The decline in sand percentage and in average sand thickness into the basin results either from progressively smaller channels or from progressively less bedload in the channels such that eventually, south of Volador-1, a channel fill or crevasse splay might consist entirely of silt of poor to non-reservoir quality. The present sand percentage and thickness data show no evidence of a southerly sediment source.

From the Rosedale Fault southwards, channel/levee/crevasse splay sandbodies thin and narrow into the basin and may silt-out south of Volador-1. There is thus a pronounced north-south 'grain' to the reservoir system which has probably influenced hydrocarbon migration.

The upper part of the sequence in Hammerhead-1 is of shallow marine origin with thick (up to 110 metres) coarsening-up sandbodies. The lower parts of the coarsening-up units are fine grained sandstones: the tops of the units are coarse grained sandstones up to 20 metres thick. The sandbodies were formed by lateral migration of large offshore sand 'bars', below normal wavebase except for the coarse clean top sands. Glauconitic layers occur at the bases of the coarsening-up units and thin heavy mineral layers within the units.

In Volador-1 a more complete transgressive sequence can be seen (unless the supposed alluvial fans in Hammerhead-1 are a coastal barrier complex). Above 3670 metres in Volador-1, the thin coals of the lake-plain become rarer and stop at 3550 metres. Claystones from 3515 to 3460 and from 3420 to 3355 metres are the lagoonal sediments just behind the barrier. The sand between them is either a washover delta or a barrier bar isolated by local coastal outbuilding. From 3355 to 3140 metres is the coastal barrier complex comprising blocky sands with fining-up tops, and coarsening-up sands. High Gamma Ray spikes are probably heavy mineral layers. Above this, from 3120 to 3030 metres, is a coarsening-up unit interpreted as an offshore shallow marine 'bar' sand.

The sequence in Volador-1 indicates that the lake-plain was fringed to the south and/or east by a sandy coastline. The steady relative sea-level rise which caused the transgression could have produced the lake-plain by steadily raising base-level and hence ponding-back the river system.

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MINERALOGY AND DIAGENESIS

I have examined thin sections of sandstones from sidewall cores and conventional core plugs over the interval from 2190 to 3241 metres in Basker-1.

The sandstones range in average grain size from fine to coarse, and in sorting from good to poor. Their constituents in percentage of grain volume are usually quartz (50 to 85%), soft lithics (5 to 20%), feldspar (10 to 20%), mica (0 to 5%), quartz cement (0 to 20%) and carbonate cement (0 to 10%). Plant fragments, pyrite and heavy minerals (mainly zircon and tourmaline) are present in trace amounts.

Detrital quartz is mainly monocrystalline though some polycrystalline quartz and rare quartz-feldspar lithics are included in this group.

Soft lithics vary from clay clasts to clasts of micaceous silty clay. Most of these are squashed due to the effects of compaction. A small amount of pressure solution is visible at some clay/quartz boundaries.

Feldspars range from orthoclase and microcline to plagioclase. Some are zoned. Many have been broken and bent during compaction. Some have secondary porosity and a few have been partly replaced by siderite.

Muscovite and pleochroic brown biotite occur in varying amounts in the sandstones. Some mica has been altered to kaolinite, some replaced by siderite (usually microcrystalline). Most mica has been bent during compaction.

Authigenic quartz is a relatively minor but ubiquitous late diagenetic cement.

The carbonate cement includes early diagenetic microcrystalline siderite, larger late diagenetic rhombs of siderite, and poikilitic patches of late diagenetic ?siderite and ?calcite. The carbonates are almost entirely confined to the sidewall cores from 2986 to 3097 metres and the core plugs (3108.19 to 3126.5 metres core depths). The early diagenetic microcrystalline siderite occurs as scattered crystals, as replacements of clay clasts and layers, and as partial replacements of micas and rarely of feldspars. The late diagenetic carbonate cements, mainly siderite, fill some pore space but also replace mica, clay clasts and feldspar.

Overall, the mineralogy and diagenetic sequence in Basker-1 are similar to Volador-1. The significant differences are discussed below.

The grain sizes of sandstones are generally higher in Basker-1 than in the equivalent section in Volador-1 which fits with the paleogeographical model. The feldspar content of Basker-1 sandstones appears to be higher than in Volador-1 though the reverse might be

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expected from the grain-size data. It has been suggested that carbon dioxide expelled during source rock maturation could have caused the differences in feldspar content between Basker-1 and Volador-1 in that the Volador-1 sequence is mature and thus the feldspars have been under attack by carbon dioxide longer than in Basker-1. This seems quite likely.

From limited data, the mineralogy and diagenesis of Hammerhead-1 are similar to those of Basker-1 and Volador-1. The heavy mineral and glauconite layers in Hammerhead-1 have been mentioned in the section on regional environment. The only other feature is the presence in four of the thin sections (1293, 1342, 1354 and 1384 metres) of clasts of limestone containg microfossils which may have some age, provenance or environmental significance.

CORE/GEODIP CORRELATION AND EXTRAPOLATION

The aim of this study was to identify the lithology of the hydrocarbon-bearing sandstones above and below the cored interval by first correlating the core lithology with the logs over the cored interval and then extrapolating from these known correlations to produce a detailed lithology for the uncored intervals.

I have examined the1:20 Geodip log, 1:200 LDL-CNL-GR and DLL-MSFL-GR logs, wellsite core descriptions, sidewall core descriptions, thin sections of sidewall cores and core plugs, photographs of core 1 and the core itself. Figure 7 combines the 1:20 Geodip log with my core description at 1:20 scale and is annotated with more details than appear in the following text. It shows the correlations between the Geodip log and the core, hand-drawn correlations where no or spurious correlations have been made by the Geodip program, and a partial colour-coded lithology.

Geodip is a Schlumberger computer program for correlating the four microresistivity logs of the HDT. Geodip produces 'stratigraphic' dips using a mathematical pattern recognition process for comparison of curves. Many of the correlations that Geodip generates look incorrect and many other 'obvious' correlations are not made. Correlations producing cross-bedding dips greater than about 35 to 40° are discarded by the program and other lower dip correlations are substituted. Correlations are ranked and the best are picked first. Second-choice correlations cannot crosscut previously made correlations. It is possible to calculate the dips of handmade correlations with a calculator version of the Geodip program.

The main use of Geodip is in identification of rock fabric within certain scalar limits. The correlation of the four HDT curves within the borehole indicates the continuity of lithological features. The main interpretation guidelines are:-

a) Spiky curves that can be correlated indicate interbedded lithologies. Bed thicknesses can be measured down to cm-scale.

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b) Spiky curves that can't be correlated result from several lithologies including: sandstone with pebbles of quartz, claystone or other rock types; claystone with sandstone lenses which don't extend across the borehole; sandstone with claystone lenses which don't extend across the borehole; sandstone or claystone with concretions of various types.

c) The scale of bedding identification is related to the borehole diameter and the thickness of the bedding units, e.g. cross-bedding will not be identified if it occurs in units too thin to allow one foreset bed to cross the borehole: only the flatter, more extensive surfaces between the cross-bed units will be seen.

d) Smooth curves in a sandstone suggest a uniform fine grain size. As the grain size of the sandstone increases up to conglomerate, the curves become more spiky.

e) In hydrocarbon-bearing sediments, the normal sandstone/claystone resistivity contrast is not as pronounced as in water-bearing sediments and may be reversed. Care must be taken in identifying lithology in hydrocarbon/water transition zones.

Other problems may arise when correlating cores with Geodip logs. Although the HDT has a fifth electrode used for determining the amount of acceleration and deceleration of the tool during logging, a correction is applied only within certain limits. Comparison of Geodip logs from two separate HDT runs over the same section of the borehole often shows discrepancies due to speed variations. Erratic movement of the HDT tool may also show up when correlating cores with a Geodip log, with sections of core being 'thicker' or 'thinner' than their correlative Geodip unit. Poor or incomplete core recovery may add to this problem. On the other hand, small-scale features may not correlate from core to Geodip because of the amount of rock removed between the core and the borehole wall during coring.

Sticking of the HDT, which gives too thin an interval, and bouncing which gives too thick an interval, are apparent on the Basker-1 Geodip log between 3130 and 3135 metres. The correct thickness of the sequence is shown by the correlation log in the left-hand track. Dips are plotted at the correct depth relative to this log. The four HDT logs have not been corrected to show true thickness.

The thickest sand in the core, no.2 (Figure 1), consists of two stacked fining-up units. These can be seen in the core and on the Geodip log. None of the cross-bedding seen in the core has been identified by the Geodip program but much of it is in units too thin to be recognised in this size of borehole. The clay layers towards the tops of the fining-up units have been correlated and have low dips to the south.

The lower hydrocarbon sand, 3128 to 3130.75 metres on the Geodip log, has a stretched base due to the HDT sticking in the claystone unit

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beneath. The sand has an erratic base on the Geodip log, similar to the base of sand no.2 in the core and therefore interpreted as coarse grained sandstone with clay clasts and layers. The sand has a slightly more argillaceous centre which may be an expanded top of a fining-up unit such as that in sand no.2. This centre part of the sand, 3129 to 3129.5 metres on the Geodip log, is composed of stacked fining-up units from 10 to 15 cm thick. By analogy with the unit at 3112.8 to 3113 metres core depth (3114.75 metres on the Geodip log), these are probably single cm-dm cross-bed units capped by mm-cm ripples with clay drapes or at least with some argillaceous sandstone layers. The tops are certainly less argillaceous than at 3112.8 metres in the core. The rest of this lower hydrocarbon sand is probably fine to medium grained sandstone with cm-dm cross-bedding as in sand no.2 from 3113.2 to 3114.5 metres core depth. The high resistivity of this sandstone on the Geodip log is due to the hydrocarbons.

The upper hydrocarbon sand, 3089.4 to 3097.5 metres on the Geodip log, also has a high resistivity. It consists of five fining-up units separated by two claystones, one a metre thick and the other probably only 20 cm thick. The upper two fining-up units and the lower two form sands similar in type to sand no.2 in the core and the lower hydrocarbon sand described above. The middle fining-up unit could belong to either of the other sands to form a triple fining-up sand or could be on its own and unrelated to the others. However, it is very likely that the whole stack of five fining-up units is in communication close to the borehole as the thickest claystone is only one metre thick and all the sands seem to have sharp erosive bases. Each of the five fining-up units appears similar to the previously described ones, consisting of fine to medium sandstone, possibly coarse at its base, mainly cm-dm cross-bedded with increasing numbers of thin clay and argillaceous sandstone layers towards its top.

From this Geodip correlation, it seems that the two hydrocarbon-bearing sandstones are similar to sand no.2 in the core and therefore the conclusions on reservoir shape and volume of sand no.2 in a previous section apply here.

The carbonaceous claystones in the core correlate with the higher resistivity zones on the Geodip and the DLL-MSFL-GR log, and with the low density 'coals' on the LDL-CNL-GR log. The paler coloured claystones have lower resistivities. Pyrite nodules produce low resistivity spikes in the claystones and some sandstones, e.g. no.9 in the core which has pyrite nodules down one side of the borehole.

Alan M. Tait

5th October 1983

Figure 1

COMPANY SHELL	WELL BASKER-1	CORE No. 1
CORED FROM 3108m TO 3126·5m	RECOVERED %	
CORE SIZE 3"	DATE 4 AUG '83 / DESCRIBED BY A.M. TAIT	SHEET 1 OF 2

DEPTH | TRAY | LITHOLOGY | CORE DESCRIPTION | SCALE 1:40 | DEPTH

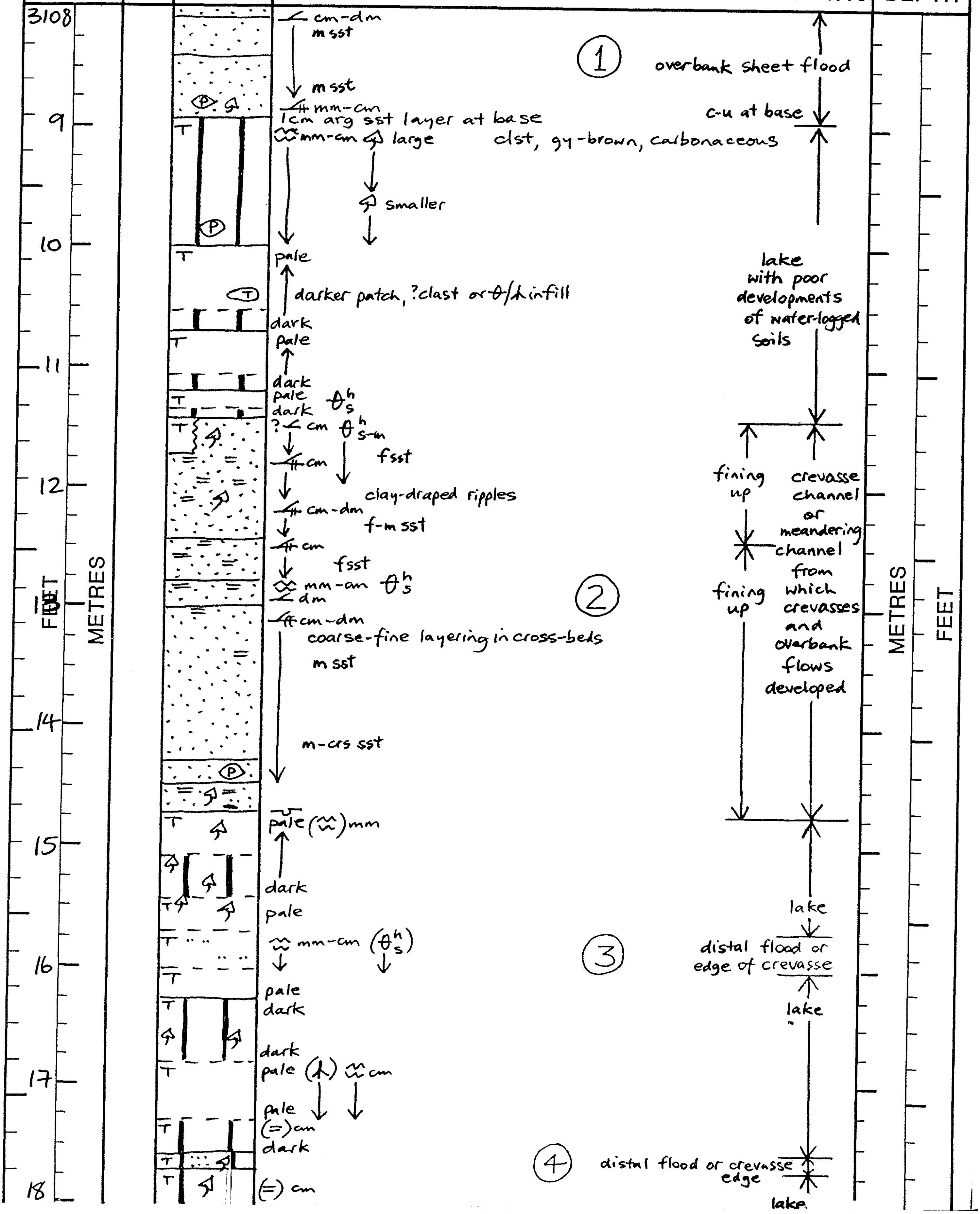
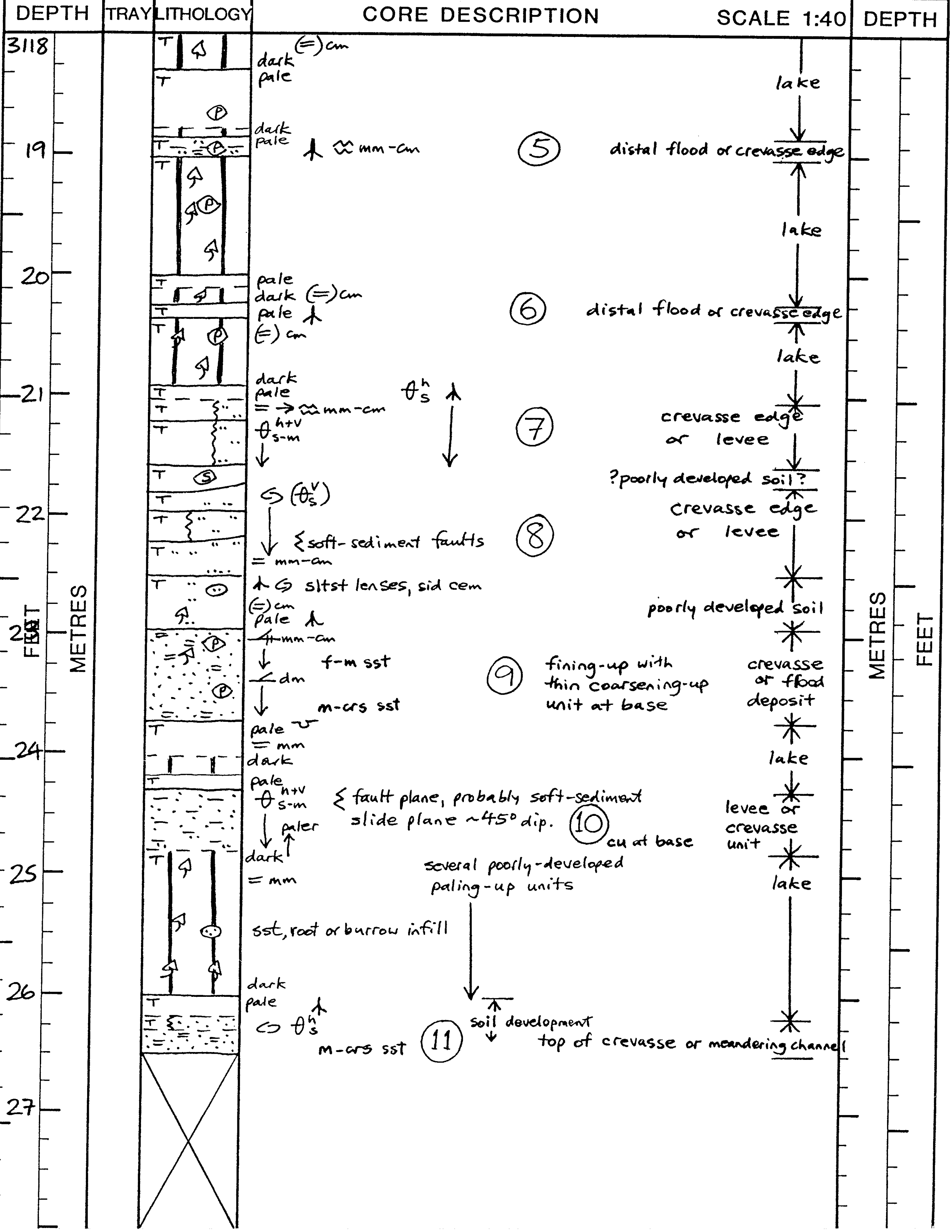


Figure 2

COMPANY SHELL	WELL BASKER-1	CORE No. 1
CORED FROM 3108 m TO 3126·5 m	RECOVERED %	
CORE SIZE 3"	DATE 4 AUG '83	DESCRIBED BY A.M. TAIT	SHEET 2 OF 2



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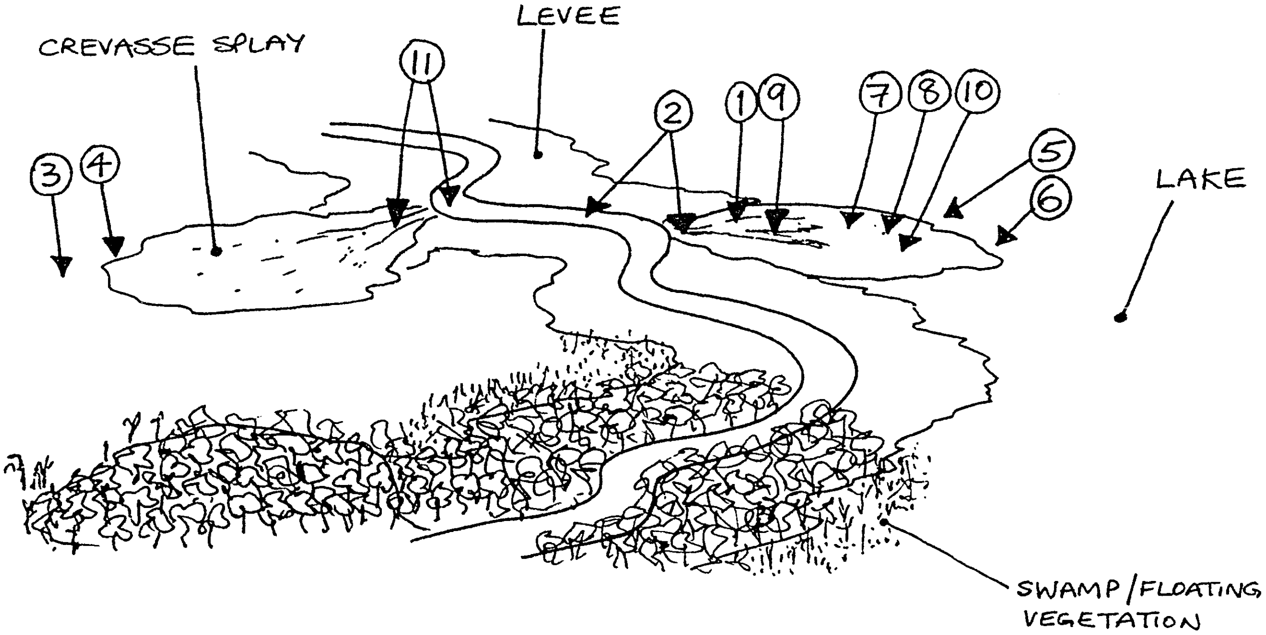


Figure 3. Diagram of alluvial plain environments with relative locations of cored sand/silt units numbered as in Figures 1 and 2. In foreground, the vegetation has been drawn in to show the differences between levee, swamp and lake environments. In the rest of the diagram, the vegetation has been omitted for clarity.

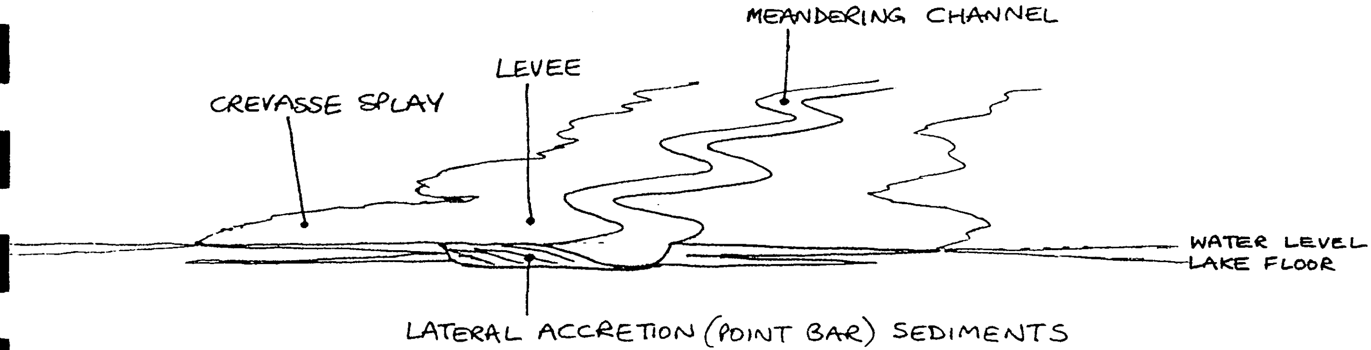


Figure 4. Diagram of meandering channel with levees and crevasse splays to show possible shape of reservoir sandbodies which may be composites of channel and crevasse splay sands. On abandonment, the channel may be filled with silts and clays to form a possible permeability barrier within the sandbody. The width of the composite sandbody may be around 1300 metres if the channel sand is 3 to 4 metres thick.

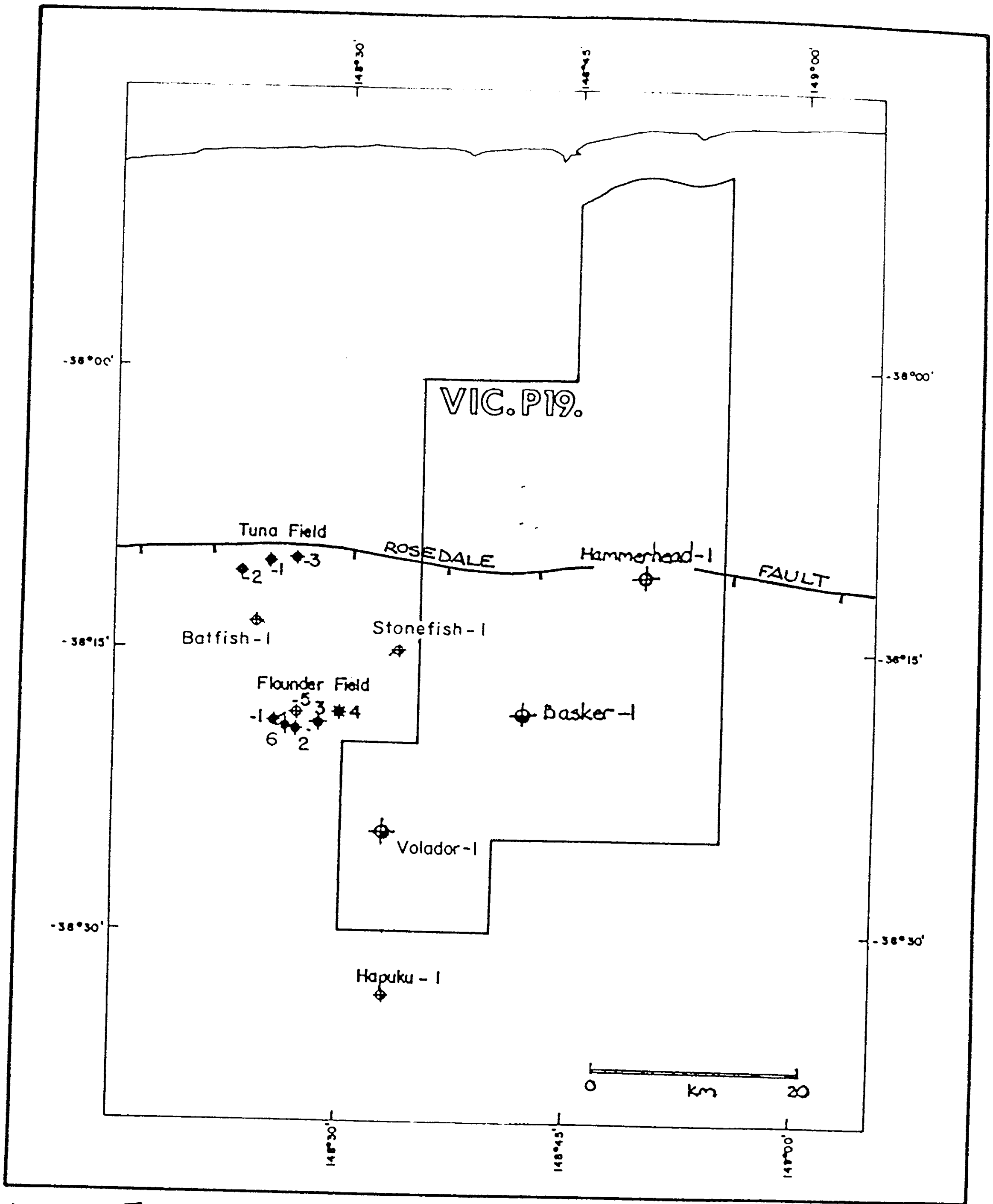
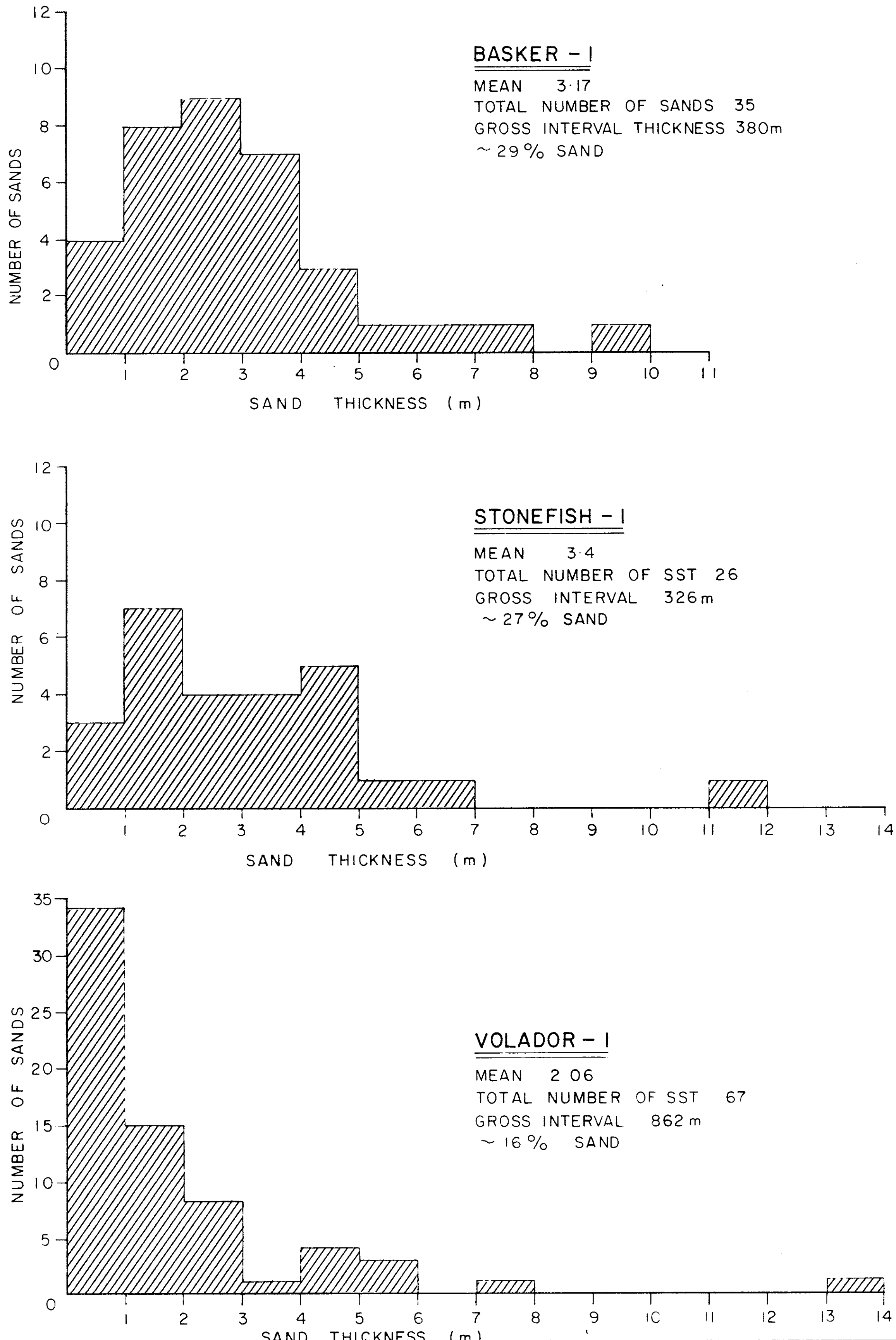


Figure 5. LOCATION DIAGRAM



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GIPPSLAND BASIN SAND DISTRIBUTION BETWEEN THE INTRA CAMPANIAN & LOWER CAMPANIAN SEISMIC MARKERS		
Author EXH / 4	Date Febuary 1984	Fig 6
Report No	Drawing No 18405	

PE601276

This is an enclosure indicator page.
The enclosure PE601276 is enclosed within the container PE902560 at this location in this document.

The enclosure PE601276 has the following characteristics:

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CONTAINER_BARCODE =	PE902560
NAME =	Petrophysical Evaluation
BASIN =	GIPPSLAND
PERMIT =	
TYPE =	WELL
SUBTYPE =	WELL_LOG
DESCRIPTION =	Petrophysical Evaluation (from WCR) for Basker-1
REMARKS =	
DATE_CREATED =	30/09/1983
DATE_RECEIVED =	28/03/1984
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell
CLIENT_OP_CO =	Shell

(Inserted by DNRE - Vic Govt Mines Dept)

PE902561

This is an enclosure indicator page.
The enclosure PE902561 is enclosed within the container PE902560 at this location in this document.

The enclosure PE902561 has the following characteristics:

ITEM_BARCODE =	PE902561
CONTAINER_BARCODE =	PE902560
NAME =	Well Summary Sheet
BASIN =	GIPPSLAND
PERMIT =	
TYPE =	WELL
SUBTYPE =	MONTAGE
DESCRIPTION =	Well Summary Sheet (from WCR) for Basker-1
REMARKS =	
DATE_CREATED =	28/02/1984
DATE_RECEIVED =	28/03/1984
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell
CLIENT_OP_CO =	Shell

(Inserted by DNRE - Vic Govt Mines Dept)

PE601275

This is an enclosure indicator page.
The enclosure PE601275 is enclosed within the container PE902560 at this location in this document.

The enclosure PE601275 has the following characteristics:

ITEM_BARCODE =	PE601275
CONTAINER_BARCODE =	PE902560
NAME =	Composite Well Log
BASIN =	GIPPSLAND
PERMIT =	
TYPE =	WELL
SUBTYPE =	COMPOSITE_LOG
DESCRIPTION =	Composite Well Log (from WCR) for Basker-1
REMARKS =	
DATE_CREATED =	31/12/1983
DATE_RECEIVED =	28/03/1984
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell
CLIENT_OP_CO =	Shell

(Inserted by DNRE - Vic Govt Mines Dept)

PE905832

This is an enclosure indicator page.
The enclosure PE905832 is enclosed within the container PE902560 at this location in this document.

The enclosure PE905832 has the following characteristics:

ITEM_BARCODE = PE905832
CONTAINER_BARCODE = PE902560
NAME = Composite Log (sheet 2 of 2) for Basker-1
BASIN = GIPPSLAND
PERMIT = VIC/P19
TYPE = WELL
SUBTYPE = COMPOSITE_LOG
DESCRIPTION = Well Composite Log, sheet 2 of 2, (from WCR) for Basker-1
REMARKS =
DATE_CREATED = 31/12/83
DATE_RECEIVED =
W_NO = W812
WELL_NAME = BASKER-1
CONTRACTOR = SHELL
CLIENT_OP_CO = SHELL

(Inserted by DNRE - Vic Govt Mines Dept)

PE601278

This is an enclosure indicator page.
The enclosure PE601278 is enclosed within the container PE902560 at this location in this document.

The enclosure PE601278 has the following characteristics:

ITEM_BARCODE =	PE601278
CONTAINER_BARCODE =	PE902560
NAME =	Geodip Processed Dipmeter
BASIN =	GIPPSLAND
PERMIT =	
TYPE =	WELL
SUBTYPE =	WELL_LOG
DESCRIPTION =	Geodip Processed Dipmeter (from CR) for Basker-1
REMARKS =	
DATE_CREATED =	28/03/1984
DATE_RECEIVED =	28/03/1984
W_NO =	W812
WELL_NAME =	Basker-1
CONTRACTOR =	Shell
CLIENT_OP_CO =	Shell

(Inserted by DNRE - Vic Govt Mines Dept)

PE601277

This is an enclosure indicator page.
The enclosure PE601277 is enclosed within the container PE902560 at this location in this document.

The enclosure PE601277 has the following characteristics:

ITEM_BARCODE = PE601277
CONTAINER_BARCODE = PE902560
NAME = Well Correlation
BASIN = GIPPSLAND
PERMIT =
TYPE = WELL
SUBTYPE = CROSS_SECTION
DESCRIPTION = Well Correlation (From WCR) for Basker-1
REMARKS =
DATE_CREATED = 31/08/1983
DATE_RECEIVED = 28/03/1984
W_NO = W812
WELL_NAME = Basker-1
CONTRACTOR = Shell
CLIENT_OP_CO = Shell

(Inserted by DNRE - Vic Govt Mines Dept)